MINISTRY OF HEALTH PROTECTION OF UKRAINE
ODESSA NATIONAL MEDICAL UNIVERSITY

Faculty Pharmaceutical .
(faculty name)

Department Pharmaceutical chemistry and drug technology
(name of department)

I APPROVE
Vice-rector for scientific and pedagogical work
__________ Eduard BURYACHKIVSKY
" 01 " September 20 23 _

METHODOLOGICAL DEVELOPMENT TO PRACTICAL CLASSES FROM THE ACADEMIC DISCIPLINE

Faculty, course Pharmaceutical, course III

Academic discipline Drugs technology
(name of academic discipline)

Approved:
Meeting of the Department of Pharmaceutical Chemistry and Drug Technology
Odessa National Medical University

Protocol No. 1 dated August 28 , 2023 .

Head of Department ___________ Volodymyr HELMBOLDT
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Developers:
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Topic " State regulation of the manufacture of drugs in pharmacies. General issues of drug technology" – 2 hours.

1. Relevance of the topic: In its day-to-day practice, the pharmacist constantly has to work with recipes, normative and technical documentation (State Pharmacopoeia, orders from the Ministry of Health, information letters) and reference literature. The pharmacist is responsible for the release from pharmacies of only well-prepared drug forms, and for this he must control the correctness of prescription and registration of the recipe, be able to correct it and in a timely manner to prevent possible errors. The pharmacist will be able to cope with his duties only if he clearly represents the structure of the recipe, he should know the rules for its prescription and registration in accordance with the requirements of the Order of the Ministry of Health of Ukraine of 19.07.05 No. 360, to be able to use the State Pharmacopoeia, other normative and technical documentation, as well as reference literature. Practical need to study this topic is shown here.

The main operation used in the preparation of drugs is dosage. In pharmacy practice, the most commonly used dosage methods are weighing, volume measurements and drops. The quality of the preparation of drugs, the compliance with the dosage, and hence the therapeutic effect on the body depends on the accuracy of the performed operations. Without the ability to accurately and quickly discharge the impossible work of a pharmacist-technologist. This explains the need to study this topic.

2. Objectives classes:

Learn basic concepts and terms of technologies dosage forms.

To study the specifics of dosing in the pharmaceutical industry.

Learning process dosage. Learn how to use the methods of dosage should be, measuring by volume and drops.

2.1.Educational objectives:

• Formulate the basic concepts and terms of the technology of medical forms.

• To understand in the main directions of state regulation of the production of medicinal products.

• Read recipes in Latin, analyze their constituent parts and evaluate the correctness of the prescription.

• To understand the structure and content of the State Pharmacopoeia of Ukraine.

• To use the State and International Pharmacopoeia, other regulatory documents, as well as reference literature to find information on the composition, preparation, storage and release of drugs, the verification of doses of poisonous and potent medicinal substances in them.

• To check the main metrological characteristics of the 2nd grade accuracy of the technical weights used in the pharmacy (prescription and manual).

• Work with prescription (tariff) and manual scales when weighing different aggregate state of medicinal substances.

• Carry out preparatory and basic technological operations for the packing of medicinal substances (to leverage, weigh, measure).
• To select the packing material when dispensing bulk, dense and viscous substances and liquids.
• To pack and prepare for packing the packed medicinal substances.
• Determine the relative error when weighing different weights on prescription and manual scales.
• Calibrate a non-standard (empirical) droplet and drip the droplets.

2.2. Educational objectives associated with: Formation of professionally important properties and qualities of the person of the future pharmacist. Education of students with professional responsibility in the manufacture of medicinal products.

2.3. Specific goals:

- know:

•Types of scales used in pharmacy practice. Structure prescription (tariff) and hand weights, limit their accuracy.
•The metrological characteristics of scales: stability, precision (accuracy), sensitivity, consistency and evidence of their determination. State test weights.
•Rules on manual and weighing scales prescription granular, liquid and viscous (thick) substances. Care scales and wings.
•Determining the relative weighting errors. Factors that affect its value.
•Measuring utensils. Terms of liquids by volume.
•Standard Definition droplometer. Rules dosing liquid drops. Factors affecting the accuracy of dosing.
Calibration nonstandard droplometerby weight and volume.

2.4. Based on theoretical knowledge on the topic:

- master the methods / be able to:

•Check the main technical characteristics metrological weights Class 2 accuracy used in pharmacy (prescription and manual).
•Working with prescription (tariff) and manual scales for weighing different state of aggregation drugs.
•To carry out preparatory and basic technological operations in prepackaging drugs (weigh, measure).
•Pick Tara packing material at a dosage of loose, thick and viscous substances and liquids.
•Packing and arrange delivery to the packaged drugs.
•Determine the relative error when weighing different hinge on prescription and hand weights.
•Calibrate custom (empirical) droplometer and dispense liquid drops.

3. Materials for audience independent preparation (interdisciplinary integration)

number	Discipline	**Know**	**Be able**

1.	2.	**3.**	**4.**
I.	1. Biology	Features of the structure, function and interaction of bodies of humans.	To define different processes that take place in human.
	2. Chemistry (inorganic, organic)	Characteristic elements.	To define, write formulas and chemical reactions, perform calculations concentration solutions.
	3. Physical and Colloid Chemistry.	The solubility of solids and liquids in liquids. Raoult's Law. Extraction. Buffer solutions.	Conduct fractional distillation.
	4. Latin	Basics of grammar.	To be able to write in Latin names of drugs and medicines.
	5. Pharmacy Drug Technology	Technology preparation of various dosage forms. Disciplines medicinal substances and excipients in the dosage form.	Choose the best option according to the technology and prepare it with stepwise drug quality assessment;
II.	**The following subjects** 1. Organization and Economy of Pharmacy.	Contemporary forms of prescription forms. The order of pharmacies.	Distinguished form №1, №2, №3 prescription forms. Take recipes of various shapes and then organize work with them.

4. Content of classes.

Modern pharmaceutical science must improve the practice, to open new ways to improve the medical provision of the population of Ukraine. The significance of pharmacy for public health is determined by the role of drugs playing in the modern system of treatment and preventive measures. I.P. Pavlov, in 1895, noted that the medicine was a "universal weapon of a physician," and attached great importance to their study. It becomes obvious that the widespread use of therapeutic and prophylactic measures (physiotherapy, radiotherapy, hydrotherapy, etc.) in no way reduces the value of drugs, because prevention of many diseases and their treatment without the use of drugs is impossible. In fact, it is difficult to imagine modern surgery without the use of anesthesia, painkillers or disinfectants. It is impossible and a serious struggle against infections without the use of sulfanilamides, antibiotics and disinfectants.

With the advent of new effective medicines, the need for modern scientific substantiation of the methods of manufacturing and improving the technology of medical forms has been increased in order to obtain stable medicinal products with the optimal therapeutic effect.

The technology of medicine is a science of the theoretical foundations and production processes of the processing of medicinal products into medicines (medicines) by providing them with a certain dosage form on the basis of established physical, chemical, mechanical and other regularities.

The task of technology as a science is to do discover physical, chemical, mechanical and other laws in order to identify and use in practice the most effective and economical production processes.

The main objective of technology of medicine as a scientific discipline is the research of scientifically grounded, technically perfect methods of transformation of medicinal products into medicinal forms and preparations.

The word "technology" comes from the Greek techne - skill, skill and logos-science, learning. Literally, "drug technology" means "learning how to cook drugs."

By the definition of the encyclopedic dictionary (1982), technology is a set of methods of processing, manufacturing, changing the state, properties, forms of raw materials or materials that are carried out in the production process. The task of technology as a science – is to discover of physical, chemical, mechanical and other laws in order to identify and use in practice the most effective and economical production processes. The main purpose of the technology of medicine as a scientific discipline is the search for scientifically grounded, technically advanced methods of transformation of medicinal products into medicinal forms and preparations.

The technology of medicine widely uses the data of general education disciplines (chemistry, physics, mathematics), medical-biological (physiology, pharmacology, microbiology) and pharmaceutical disciplines (pharmacognosy, pharmaceutical chemistry), organizations and economics of pharmacy, management and marketing.

The most closely related technology of pharmaceuticals is related to pharmaceutical disciplines. By definition, Professor AA Iovsky, she is the leading specialist the pharmacy. The technology of medicine as a separate scientific pharmaceutical discipline during its formation has undergone several different stages. At the initial stage of development, she was participated in more issues in the technology of manufacturing medical forms and that was called the "course of practical work", "recipe practice", "pharmacy practice", "pharmaceutical formulation", "pharmaceutical propaedeutics". An outdated, meaningless name "pharmaceutical propaedeutica" in 1920 was proposed to be replaced by the exact term "technology of medical forms", and in 1924 by the decision of the First Congress on pharmaceutical education, this name was finally fixed. Since 1955 it began to be called "technology of medicines". During this period, she has grown into an independent leading pharmaceutical discipline, which determines the content of the practical activity of the pharmacist.

The conditions formed at the time: a fundamentally new system of pharmaceutical education, significant advances in pharmaceutical science (developed new methods of producing drugs, new types of medicinal forms), the development of industrial pharmacy accelerated the process of differentiation of technology medicine for the technology of pharmacy and factory production.

Factory (industrial) production is large serial and is carried out by mechanized pharmaceutical companies (factories, factories).

Pharmaceutical production is engaged in the manufacture of medicines for individual props, the preparation of internally pharmacy preparations, packing and is carried out in the conditions of the pharmacy. It is characterized by a large assortment of small-scale products. In pharmacies, drugs are prepared, unstable in storage, and complex, having individual dosage.

Pharmacy and factory production complement each other, develop and succeed in parallel. Now our discipline is called "pharmacy technology of medicine", which most accurately reflects not only the essence of this science, but also its complete independence. Consistently, the course of technology medicine, first pharmacy, and then factory, shows their close relationship, the sequence and defines the tasks of industrial pharmacy.

In the US, our science is called "theoretical and practical pharmacy1", in England, France, and Holland - "galena pharmacy" and "prescription art."

Modern science has put a number of completely new research and practical problems in the field of medical dosage forms, the decisions of which will allow a qualitative change of approach both to questions of the creation of medical forms and to the very medicinal product.

The main ones are:

- conducting of fundamental complex researches in the field of technology, biopharmacy and pharmacokinetics of medicinal products;
- development of new types of medical forms and improvement of existing ones;
- creation of prolonged drugs, as well as dosage forms, which are deposited in pediatric and geriatric practice;
- search of new auxiliary substances, expansion of assortment of preservatives and stabilizers for Injectable dosage forms;
- use of modern packaging material;
- expansion of research on mechanization and automation of technological processes of production in pharmacies. The task of technology of medical forms as a discipline is: - training of students of the activity of a pharmacist-technologist; - study of theoretical foundations, acquisition of professional skills and skills in the manufacture of medical forms, as well as determining the effect of storage conditions and the type of packaging on the stability of medicinal products.

The tasks set before the technology of pharmaceutical forms as a branch of pharmacy, can be solved only at the level of scientific research, high qualification of personnel and the integration of science with production.

Significance of medicine technology for the specialty "pharmacist". Communication technology with other sciences.

The technology of medicines is an essential component of a complex of knowledge, which is required for the specialty pharmacist (together with pharmaceutical chemistry, pharmacognosy, management and economics of pharmacy).

The technology of medicine widely uses the data of general education (chemistry, physics, mathematics), medical-biological (physiology, pharmacology, microbiology) and pharmaceutical (pharmacognosy, pharmaceutical chemistry, organization and economics of pharmacy, management and marketing) disciplines.

Basic terms and concepts.

A pharmacological agent is a substance or a mixture of substances with established pharmacological activity.

Medicinal product - a pharmacological agent authorized by the body for use in order to treat, prevent and diagnose a human or animal disease.

Medicinal substance is a medicinal product that is an individual chemical compound or biological substance.

Medicinal raw materials - are natural substances in the unprocessed form or are used for to simple, initial processing and requiring the application of one or another processing or purification. *Excipients are additional substances* that do not have the expressed pharmacological activity required for the preparation of the medicinal product. In the technology of medicine it is allowed to use only auxiliary substances authorized for medical use by the relevant normative documentation

Until recently (biopharmaceutical period of linguistics), auxiliary substances were considered only as indifferent fillers, form-makers, and the choice of auxiliary substances was dictated purely by technology, and often simply by economic considerations. For their application it was only necessary to prove that they are pharmacologically indifferent, informing the pharmaceutical form of the corresponding technological properties and economically accessible.

Modern pharmacy has abandoned the former understanding of auxiliary substances as indifferent form-makers. Excipients have certain physical and chemical properties. Depending on the nature of the medicinal substance, the conditions for obtaining and storing the medicinal form, they are able to enter into more or less complex interactions, both with medicinal substances, and with factors of the external environment (for example, between tissue fluid, contents of the gastrointestinal tract, etc.). It has been proved that auxiliary substances can greatly affect the pharmacological activity of medicinal substances: to increase or decrease it, or to change the nature of therapeutic action altogether.

Medicinal form - a unique condition for the medicinal product or medicinal plant material, in which the desired therapeutic effect is achieved.

Medicinal product (medicine) - a medicinal product in the form of a certain dosage form. It is a finished product, prepackaged, packaged, marked with a certain medical purpose and with a prescribed shelf-life.

General view of the pharmacy.

The pharmacy is a healthcare institution that functions with the permission and under the control of state bodies whose mission is to provide the population, medical and preventive, physical culture and sanitation, sanitary and resorts, scientific medical and other health care institutions, enterprises and organizations. Medical products and medical products. Pharmaceutical regime in pharmacies. The main document is the Order of the Ministry of Health of Ukraine No. 275 dated May 15, 2006 "On Approval of the Instructions on Sanitary and Anti-Epidemiological Treatment of Pharmacy Establishments".

State regulation of the production of medicinal products.

Inappropriate composition of the preparation, incorrect preparation or dosage can lead to a reduction or loss of the therapeutic effect or even before the toxic effect of the medicinal product. Therefore, the entire process, from manufacturing to implementation, is controlled by the state.

Rationing is carried out in 4 directions:

1. Restrictions on the range of persons authorized to prepare medicines (the right to pharmaceutical work).
2. Rationing of prescriptions of medicinal products.
3. Rationing of the quality of drugs and auxiliary substances used for the preparation of medicinal products.
4. Rationing conditions and technological process of preparation of medicinal preparations.

1. *Responsibilities of persons* - pharmacies can work only as a pharmacist.

2. The basic document that *rules the composition of the prescriptions* – is a recipe.

The recipe is called a written application (instruct) of the doctor to the pharmacist (in the pharmacy) about the preparation of the medicinal product and its release to the patient with an indication of the method of application.

Guidance document - Order of the Ministry of Health of Ukraine No. 360 dated 19.07.05 "On Approval of the Rules for Prescribing Recipes and the Procedure for Dispensing Medicinal Products from Pharmacies".

3. *The standardization of the quality* of medicinal products is carried out through the establishment and application of standards. Standards are state (DSTU), sectoral (OST) and enterprise standards (STP). The set of all industry standards is called normative and technical documentation (NTD). NTD, which raises the quality of drugs is divided into: 1) the State Pharmacopoeia of Ukraine; 2) analytical normative documentation (AND).

The AND is a normative and technical document that establishes the requirements for a medicinal product, its packaging, conditions and the term of storage and methods of quality control of this medicinal product.

State Pharmacopoeia is a collection of compulsory medical and pharmaceutical national standards and regulations that regulate the quality of medicines.

Pharmacopoeia has a legislative character, obligatory for all medical, including veterinary establishments and enterprises of the country, which prepare, preserve, control and apply medicines.

In Ukraine there is one pharmacopoeia and 2 additions to it.

4. Rationing of the conditions and technological process of preparation of medicinal products is carried out through the publication of various instructions, orders, etc.

Basic Orders to Know:

• Order of the Ministry of Health of Ukraine No. 360 of 07.07.05 "On Approval of the Rules for Prescribing Recipes and the Procedure for Dispensing Drugs from Pharmacies".

• Order of the Ministry of Health of Ukraine No. 626 dated December 15, 2004 "On Approval of the Rules of Manufacture (Manufacture) of Medicines in Pharmacy Conditions"

• Order of the Ministry of Health of Ukraine No. 275 dated May 15, 2006 "On approval of the Instructions on the sanitary-and-epidemiological regime of the pharmacy establishments".

• Order of the Ministry of Health of Ukraine No. 197 of March 7, 1993 "On Approval of Instructions for the Preparation of Drug Forms in Pharmacies with a Liquid Dispersion Environment".

• Order of the Ministry of Health of Ukraine No. 44 "On the organization of storage in pharmacies of different groups of medical products and medical devices."

DOSAGE IN PHARMACY PRACTICE

The main operations that are used in the preparation of drugs are the dosage associated with measuring the mass of the substance, and measuring it in certain portions (doses). In pharmacy practice, the most used methods of dosing, such as weighing and measuring in volume and drops.

The accuracy of these operations depends on the pharmacological action of the drugs, and hence their therapeutic effect on the body. Dosage is carried out with the help of special adaptations to which the relevant requirements are put forward, while using the metrological system of measures, which is common and obligatory in our country.

Scales is a device designed to determine the weight of drugs in a way comparing it with the standards of mass (with conventionally accepted units - weights).

For the preparation of medicinal products in the conditions of pharmacy practice apply equivalents of scales of the 2-nd class: technical pharmacies and hand-made pharmacies.

Scales are used to weigh solids, dense and liquid substances. They are made with the limits of permissible loads from 50 g to 1 kg. They are called container scales because the dosage by weight always preceded by the container operation.

Scales hand-made pharmacy brands BP are intended for dosage by weight of dry medicinal substances in amounts from 0.02 to 100.0 g, as well as for conducting technical analyzes. Depending on the permissible marginal load of VR there are several standard sizes: BP-1; BP-5, BP-20 and BP-100. Scales - one of the oldest measuring instruments. More than 3000 years before our era, the Egyptians used them in the form of a rectangular rocker arm with raised cups. For the first time, the principle of not the equatorial arm was used by ancient Arabs. The scales created by them were a kind of displacement, which was widely used in ancient Russia.

In 1670 tabletop scales were made upright cups, in 1818 - ten thousand and a little later-hundreds of scales. In the second half of the XIX century. There appeared a scale platform scales, automatic and spring, in the 20-ies of XX century. - dial faces. Of great importance in the development of structures of weights belongs to the works of D. I. Mendeleev, A. N. Dobrokhotov and others.

By structural features distinguish hydrostatic, spring and weighing scales.

From the standpoint of metrological characteristics (stability, consistency of indications, accuracy and sensitivity) distinguish scales:

· Metrological - designed to check the mass of working standards with the state standard. These are the balances of higher precision, special construction, are observed from their adjacent room by means of special optical devices for their fluctuations;

· Exemplary - for checking and checking the weight;

· Analytical - for weighing under precise chemical analysis;

· Technical - 1st, 2nd and 3rd grades.

For the preparation of medicinal products in the conditions of pharmacy practice, the equivalents of scales of the 2-nd class are used: technical pharmacies (containers) and hand-made pharmacies. In material use ordinary table cup scales, and for large masses - decimal and hundreds of scales.

Technical grade scales of the 2-nd class are the brands of VKT - scales technical packaging on the column (scales Mora), grades T-2 - scales technical, grades VA-4 - scales technical pharmacies.

Container scales serve to weigh solid, dense and liquid substances. They are made with the limits of permissible loads from 50 g to L kg. Container they are called because the dosage by weight is always preceded by a tare operation - balancing the mass of the container with the help of a fraction or other tare material.

METROLOGICAL PROPERTIES OF SCALES

Scales, regardless of their design, should have such metrological properties.

Stability - the ability of weights eliminated from the state of equilibrium, quickly return to the original position.

Constancy of indications - the ability of the scales to show the same results with multiple determinations of body weight, carried out on these scales under the same conditions.

Sensitivity - the ability of the weights to indicate a minimum change in load at the moment of equilibrium.

The verification of the sensitivity of the weights is carried out by determining the minimum load (mg), which causes the standard deviation of the arrow from the equilibrium position. For a standard deviation, a deviation of 5 mm (or three scale divisions) for tare weight and an exit of the arrow with a hump to half its length, with an angle of approximately 5 °, for manual scales are taken.

The sensitivity expressed by the absolute value of the load, which causes the standard deviation of the arrow, is called absolute sensitivity (SABS), or absolute error of weighing.

The sensitivity of manual and container weights is determined in three positions: loaded by 1/10 of the marginal load, extremely loaded and unloaded. If a load corresponding to the value of the permissible error (established by DSTU) for this type of weighing, placed on one of the cups of such weights, causes a standard deviation of the arrow, then the balance is considered sensitive.

The relative sensitivity of the weights can be expressed by the ratio of the minimum load P, causing a marked deviation of the arrow from the zero position of the scale, to the n-recession n, which lies on one cup of weights, because the sensitivity of the weights may vary slightly depending on the load size:

If, for example, scales load weights of 100.0 g on each cup and place an additional load equal to 0.05 g, which gives the standard deviation of the arrow, then the relative sensitivity of the weights is:

That is, on these scales it is possible to weigh a load equal to 100.0 g, with an accuracy of 0.0005 of its true mass, that is, the relative error does not exceed 0.05% (0.0005 · 100). Such scales can be considered rather sensitive.

Determination of weighing errors. On the same scales the load can be weighed with different accuracy. The greatest accuracy can be obtained when the weight is close to the maximum allowable weight load. The weighing error increases if the boundary of the marginal or minimum load is exceeded, which is indicated by the buckling of these weights.

In order to conclude that the masses of matter are correctly selected, we need to establish the accuracy of the weighing or relative error (in%).

For example, calculate the relative error when weighing 0,1 g of sodium chloride on BP-1. According to the table. Find an error that is acceptable at a load of 0.1 g. Since the closure is closest to the value of 1/10 of the marginal load, than to the marginal load or to unloaded weights, the permissible error of the SABS is 0.003 (3 milligrams). Having made a proportion, we find a weighing error (x) of ± 3%:

0.1 to 0.003

Accuracy or correctness - the ability of the weights to show the correct ratio between the weight of the substance weighed and the corresponding weights.

Rules for weighing on technical and manual equilibrium weights. Before weighing, we must check the conformity of the weights with the above metrological properties. It is necessary to adhere to the marginal and minimum loads set for these weights.
Before work, scales should be examined, rubbed with a gauze cloth dampened with alcohol-ether mix, to ensure their equilibrium in unloaded condition. If the scales are not balanced, then they are balanced with the help of regulators, placed at the ends of the rocker arms.

When weighing medical and auxiliary substances, the assistant reads their names three times: removing from the turntables, when weighing and returning the barbell to the place. Weight calculation is made twice - at the beginning of weighing and after the end.

Powder-like substances are weighed directly onto a scales cup when weighing on hand-made scales, and dense - on a circle of parchment or filter paper. Weighing of any substances directly on a cup of tare weight is inadmissible, it is necessary to use the appropriate container (vials, jars, capsules, etc.).

Crescent substances are weighed directly from the paddle by lightly tapping on it the index finger of the right hand.

Add the substance in small portions so that the threads of the weights are not contaminated. As the equilibrium moment approaches, a portion of the added substance is reduced to avoid possible overdose of the powder. If necessary, the substance is taken with a plastic or celluloid plate.

5. Plan and organizational structure of employment.

Number	**The main stages of employment, their function and meaning.**	**Learning Objectives levels of assimilation.**	**Means of instruction and control.**	**Materials on methodological Secured Lock class visibility, control of knowledge of students.**	**Duration (in minutes or in%) of the total time employment.**
1	**2**	**3**	**4**	**5**	**6**
1	**Preparatory** - organizing classes - setting educational goals - control the output level of knowledge	I			15-20

2	- monitoring skills of students, their willingness to accept this material class **Basic** tasks	II, III		Slideshow table	50-60
3	**Final** -control of professional skills - supply results of studies - granting homework from sending literature	IV			15-20

6. Materials on methodological support classes.

6.1. Control materials for the preparatory stage of the class:

1. Basic pharmaceutical concepts: physics, pharmacy, biopharmaceuticals, pharmacist etc.
2. Definition of technology of medical forms as a scientific discipline, its task at the present stage.
3. History of pharmaceutical technology. The main stages of development. The role of domestic and foreign scientists in the development and development of technology of medical forms.
4. Technological terms: medicinal substance, medicinal product, pharmaceutical form, medicinal product.
5. Classification of dosage forms.
6. Directions of state regulation of the production of medicinal products. The structure and general rules that should guide the use of the State Pharmacopoeia to find the necessary information. History of domestic pharmacopoeia. International Pharmacopoeia.
7. Recipe, its value. The recipe structure.
8. Types of normative and technical documentation and reference literature on pharmacy.
9. Concepts about doses and their classification.
10. Types of scales used in pharmacy practice.
11. equipment and check tariff and hand weights.
12. The metrological characteristics of scales: stability, accuracy (fidelity), sensitivity, sustainability indications, and their definitions.
13. Rules weighing on tariff, hand weights and use difficult.
14. Determination of weighing errors.

15. Factors affecting the accuracy of dosing by weight.

6.2. Materials of methodical provision of the main stage of the class:

1. *The pharmacy received a prescription for a medicinal form with a poisonous substance, which is certified by a personal seal and a physician's signature. What should a pharmacist-technologist do in this case?*

Answer. According to the Order of the Ministry of Health of Ukraine No. 360 dated July 19, 2005, prescriptions for medicinal preparations containing poisonous substances should additionally be certified by the seal of the medical institution. In this case the recipe is discharged with violations, it is subject to repayment with the stamp "The recipe is invalid" and return to the patient.

2. *A pharmacy receives a prescription in which the dose of a poisonous substance is overstated. What should a pharmacist-technologist do in this case?*

Answer. According to the Order of the Ministry of Health of Ukraine No. 360 dated July 19, 2005, such a recipe is repaid by stamp "The recipe is invalid" and returned to the patient.

3. *In the recipe that arrived at the pharmacy, the liquid ingredients of the medicinal form (syrup, tincture) and solvent (water) are dispensed by weight (in grams). Is the recipe correct? What are document prescribing rules?*

Answer. The recipe is written out incorrectly. Liquid medicinal products, such as syrup, tinctures, water are prescribed in volume (in ml or drops). The survey rules are standardized by the order of the Ministry of Health of Ukraine No. 360 of July 19,

4. *A pharmacy receives a prescription in which all the medicinal substances included in the prescription are written in Ukrainian and in the abbreviated form. Among the abbreviations is "sodium sulfate." What mistakes did the doctor admit?*

Answer. First, prescription drugs are prescribed only in Latin, and secondly, it is forbidden to reduce the names of the relatives by the name of the ingredients, which can lead to confusion (sodium sulfate - sodium sulfite, etc.).

5. *The patient came to the pharmacy to order eye drops with atropine sulfate on prescription, which was prescribed by a physician 2 weeks ago. Your actions on the spot of a pharmacist-technologist?*

Answer. Such a drug can be released. According to the Order of the Ministry of Health of Ukraine No. 360 dated July 19, 2006 eye droplets with atropine sulfate are prescribed on the prescription form F-1. The recipe on this form is valid for a month.

6. The pharmacy receives a prescription for powders containing ascorbic acid with glucose, which is certified only by the physician's signature. What should a pharmacist-technologist do in this situation?

Answer. The recipe is decorated incorrectly. It is repaid by stamp "The recipe is inaccurate" and returned to the patient. According to the Order of the Ministry of Health of Ukraine No. 360 of July 19, 2005, the recipe must be certified by a personal seal of the doctor.

7. The pharmacy receives a recipe in which all its constituent parts, including the signature (method of use), are written in Latin. What is a doctor's mistake?
Answer. According to the Order of the Ministry of Health of Ukraine No. 360 dated July 19, 2006, the signature (method of use) should be indicated in Ukrainian.

6.3 Control Materials for the Final Stage of the Lesson:
Tests with answers
1. The pilot-technologist received a prescription for the preparation of a dosage form for a child aged 5 years with the content of a potent substance. Which of the principles should be guided by when checking the dose of the drug?
A. * Differentiate the dose depending on the age or weight of the child
B. Take 1/2 doses of an adult
C. Take 1/4 of the adult dose
D. Take 1/12 adult dose
E. Take 3/4 doses of an adult
2. A substance or a mixture of substances authorized by an authorized body for use in the treatment, prevention and diagnosis of a disease of a person or an animal.
A. * Medicinal product
B. Medicinal form
C. Medicinal product
D. Medicinal raw materials
E. Pharmacologic means
3. Define the term "medicinal substance":
A. * a medicinal product that is an individual chemical compound or biological substance
B. Substance or mixture of substances with established pharmacological activity
C. A unique medical condition suitable for use
D. medicinal product in the form of a certain dosage form
E. natural substances in the unprocessed form, which require application of one or another processing or purification
4. Define the term "medicinal product":
A. * Medicinal product in the form of a certain dosage form
B. Substance or mixture of substances with established pharmacological activity
C. A pharmacological agent authorized by the authorized body for use in the treatment, prevention and diagnosis of a human or animal disease
D. Medicinal product, which is an individual chemical compound or biological substance
E. A state-of-the-art condition for the medicinal product or medicinal plant material in which the desired therapeutic effect is achieved
5. Biofarmation is a science that studies

A. * dependence of therapeutic action of medicinal preparations on an organism from various factors
B. processes for the processing of medicinal products into medicinal products, by providing them with a certain dosage form
C. Changes in the quality of drugs during the shelf life
D. bioavailability of medicinal substances depending on the routes of administration
E. technology of manufacturing of medicinal preparations from natural raw materials

6. Polymorphism is

A. * the ability of one and the same substance to form different crystals in shape
B. one of the physical states of the drug substance
C. the ability of a substance to form various chemical compounds
D. the ability to administer a drug in different dosage forms
E. the process of formation of new compounds during the term of storage

7. Medicines prepared according to standard prescriptions by the pharmaceutical industry in large quantities are

A. * officinal preparations
B. Triggers
C. Extemporal drugs
D. Manuscripts
E. Normative drugs

8. The mainstay of prescription drugs is

A. * prescriptions prescribed by a doctor to a particular patient
B. standard prescriptions, repeatedly checked and included in the prescription reference books
C. prescriptions contained in the State Pharmacopoeia
D. prescriptions, the manufacture of drugs that are carried out as quickly as possible
E. prescriptions for medicinal preparations of industrial production

9. Part of the prescription, which contains information about a health care institution, is called

A. * Inscriptio
B. Invocatio
C. praescriptio
D. Subscription
E. Signature

10. How many types of prescription forms exist in Ukraine?

A. * 2
B. 1
C. 3
D. 4
E. 5

11.When making liquid dosage forms for Extent of dosing liquid ingredients following:
A * Tincture of valerian
B Dimexidum
C methyl salicylate
D-400 Polyethylene
E Perhiidrol
12. In the technology of dosage forms, the following ingredients are always dosed by weight
A * Perhidrol
B ammonia-anise Drops
C Solution citral 1 \% alcohol
D Belladonna Tincture
E elixir Chest
13. A pharmacist prepares 200.0 oil emulsion. Add a weight that can be used for weighing 20.0 peach oil:
A * Balance pharmaceutical scales
B torsion balance
C VR-1
Dr. weighing
E. BP-5

14. A pharmacist must weigh drug candidates - glucose. What amount of glucose can weigh scales on hand?

A * 0,02
B 0.01
C 0.03
D 0.04
E 0,05

15. When dosing a small amount of liquid used droplometer. Specify the number of drops per 1 ml of purified water under standard droplometer.
A * 20
B 50
C 30
D 40
E 10
16. Patient dosing medicine tablespoon. Specify the number of milliliters of liquid in it:

A * 15
B 25
C 10
D 20

E 5

17. A pharmacist prepares powders with papaverine hydrochloride. Enter manual weight weighing 0.05 g ingredients:

A * BP 1.0
B. BP 5.0
C. BP 20.0
D BP 10.0
E. BP 2.0

6.4. Materials methodological support self-students:

number	Main tasks	Directions	Responses
1.	State regulation of the manufacture of drugs in pharmacies.	General issues of drug technology.	1,2,3,4,5
2.	fundamental complex researches in the field of technology, biopharmacy and pharmacokinetics of medicinal products; types of medical forms ; -prolonged drugs, as well as dosage forms, which are deposited; - search of new auxiliary substances, expansion of assortment of preservatives and stabilizers; - modern packaging material;	General issues of drug technology	1,2,3,4,5

7. References for the teacher.

1. O.I. Tikhonov, T.G. Jarnykh "Technology of Drugs", textbook for universities, see. Vinnytsya, 2016
2. A.I. Tikhonov et al. "Practice on pharmacy technology", sch. Allowance for Higher Educational Institutions, Kharkiv, "Original", 2016
3. Technology of medicines. Educational and methodical manual: A manual for higher education institutions / O. I. Tikhonov, P. A. Logvin, S. O. Tikhonova, A. V. Mazulin, T. G. Yarnykh, O. S. Shpichak, O. M. Kotenko; Edited by O. I. Tikhonov - Kharkiv: NFaU; Original, 2009. - 432 pp.
4. Technology of medicines: Textbook / O. S. Marchuk, N. B. Androschuk - Kyiv: Medicine, 2008. - 488 p.

8. Literature for students:

1. AI Tikhonov, T.G. Yarnykh "Technology of medicines", a textbook for higher educational establishments, Kharkov, "Original", 2006
2. Workshop on pharmacy technology of medicines; For the stud Farmac Higher Teach Institutions / O. I. Tikhonov, TG Yarnyh, V. O. Sobolev, and others; Ed. OI Tikhonova. - X .: View of the NFPA: Golden Pages, 2002. - 256 p.

9. Individual work well with students making it the subject

9.1. Methods of work performance stages.

(List of tasks for this type of activity)

Each student performs one task from the proposed set of individual tasks.

Method of execution.

1. Recipe materials. Type the recipe in the Latin language and format it in accordance with the requirements of the Order of the Ministry of Health of Ukraine No. 360 dated July 19, 2005. Specify the ingredients of the recipe and its design.
2. Theoretical questions. Tasks from UDRS and SRS on this topic. Analysis of requirements of the State Pharmacopoeia of Ukraine and other normative documents regulating the production of various groups of medical forms. Give answers (in writing) to questions from one of the following individual tasks.

9.2. Tests for self-control with standard answers

1. The ability scales show the correct weight ratio between the substances weighed and corresponding weights is called:

A. * The accuracy or correctness
B. Sensitivity
C. Sustainability indications
D. Stability
E. Relative Sensitivity

2. The recipe is prescribed drug in decigramms. What is the weight equivalent to one decigramme?

A. * 0,1 g
B. 1.0 g
C. 0.01 g
D. 0,001 g
E. 0,0001 g

3. The recipe is prescribed drug in centigrams. What is the weight equivalent to one centigram?

A. * 0,01
B. 0,1
C. 1,0
D. 0,001

E. 0,0001

4. spelled prescription drug in milligrams. What is the weight equivalent to one milligram?

A. * 0,001

B. 0,1

0.01 C.

D. 0.0001

E. 1,0

5. pharmacist provides packaging powders. Specify the minimum mass weights, which is included set of weights?

A. * 0,01 g

B. 0,05 g

C. 0,2 g

D. 0.02 g

E. 0,015 g

6. pharmacy prescribed 0.5 ml of tincture of valerian. What is required to use pharmacist for dispensing a liquid in an amount of 1 ml?

A. * calibrated eye dropper

B. Hand scales

C. Measuring cylinder

D. Measuring finger

E. volumetric flask

7. What is the minimum weight can weigh on VR- 1?

A. * 0,02 g

B. 0,1 g

C. 0,05 g

D. 0,5 g

E. 0,2 g

8. A pharmacist should weigh 1.5 grams of powder. What he enjoyed scales?

A. * BP-5

B. BP-1

BP-20 C.

D. BP 100

E. CGT-1000

9. What is the maximum weight you can weigh with hand weights?

A. * 100g

B. 1 g

C. 5 g

D. 20 g

E. 1000 g

10. The ratio of the minimum load that causes significant deflection from the zero position of the scale to the sample, which lies on one cup weights is called

A. * Relative Sensitivity
B. absolute sensitivity
C. sustainability
D. minimum sensitivity

9.3. Tasks for self-control

Situational tasks

1. From recipe written powders including 6 0.1 0.3 ascorbic acid and glucose each. Pharmacist is making preparation 6 doses of ascorbic acid weighed 0.1 and 0.3 glucose. Give a critical assessment of his actions.

Answer. Pharmacist incorrectly calculated the amount of ingredients. Must take 0.1 · 6 = 0.6 0.3 ascorbic acid and glucose 6 = 1.8

2. Pharmacist compounded complex powders and divided them at a dose of 0.3. After checking the weight of three powders results were 0.31; 0.29; 0.3. Is it acceptable deviation in doses?

Answer. Analysis algoritm

According to the order number 626, the allowed deviation for 0.3 g of sample should be ± 5%.

3. The drugs with different crystalline structure are prescribed in equal amounts. In a mortar initially the crystalline substance were crushed , and then coarsely crystalline. Evaluate the accuracy of this method of preparing.

Answer. First you need to grind coarsely crystalline substance because they have smaller losses in a mortar

10. Materials for self-preparation of the students:

List of educational practical tasks to be performed during the practical (laboratory) classes:

1. Take:	routine 0.01 Calcium gluconate 0.15 Glucose 0.3 Mix to form a powder Give such doses number 6 Mark. 1 powder 3 times a day.	2. Take:	Ascorbic acid 0.1 Calcium glycerophosphate 0.3 Glucose 0.2 Mix to form a powder Give such doses number 6 Mark. 1 powder 3 times a day
3.	Sodium chloride 10.0	4.	Vimutu nitrate core

Take:	Sodium tetraborate Sodium bicarbonate in 15.0 Mix to form a powder. Give such doses number 10 Mark. At 1 h. L. to ½ c. water. Rinsing.	Take:	Magnesium oxide Sodium bicarbonate 0.3 Mix to form a powder. Give such doses number 6. Mark. 1 powder 3 times a day
5. Take:	0.2 hexamethylenetetramine Boric acid 0.15 Sodium bicarbonate 1.0 Mix to form a powder. Give such doses number 12. Mark. 1 powder 3 times a day	6. Take:	0.2 hexamethylenetetramine Boric acid 0.15 Sodium bicarbonate 1.0 Mix to form a powder. Give such doses number 12. Mark. 1 powder 3 times a day

11. The theme of next session

Solid dosage forms. Manufacturing in the conditions of pharmacies of simple and complex powders with medicinal substances, differing in prescribed quantity, bulk density and structure of particles.

Topic of the lesson 2: "Solid dosage forms. Manufacturing in the conditions of pharmacies of simple and complex powders with medicinal substances, differing in prescribed quantity, bulk density and structure of particles" – 4 hours.

1. Relevance of the topic : In the extemporal formulation of pharmacy powders make up more than 15% due to their positive qualities: ease of preparation, ease of administration, accuracy of dosage, versatility of the composition. In addition, new drugs for which the starting and experimental industrial regulations have not yet been developed, are prescribed for individual preparing in pharmacies, which explains the need to study the technology of this dosage form.

2. Subject of the lesson: Learn how to prepare simple and complex powders with drugs, different prescribed quantity, bulk weight and structure of the particles.

2.1. General objectives:
Learn how to prepare simple and complex powders with drugs, different physical and chemical properties, quantity, assess their quality.

2.2. Educational objectives:
• Too evaluate the correctness of recipe prescribing in different ways: Distributive and Separate.
• To use the State Pharmacopoeia, other normative documentation and reference literature to find the necessary information on the preparation of simple and complex powders.
• To calculate the amount of drugs for the preparation of simple and complex powders.
• To choose and substantiate the optimum technology of complex powders on an individual basis.
• To carry out basic technological operations for the preparation of simple and complex powders with medicinal substances, registered in equal and different quantities, differing in structure of particles, size and shape of crystals, aggregate state, bulk density (weigh, crush, mix, and dosage).
• To use small means of mechanization for mixing and dosing of powders (Lopatina, Islamgulova, mills, TK-3, DPR-2, etc.).
• To pick up the packaging material according to the properties of the ingredients and make the preparation ready for issue.
• To evaluate the quality of the prepared powders and write a passport of written control.

2.3. Specific goals:
- to know:
Characterization of a powder dosage form, their classification. State Pharmacopoeia requirements for powders.

•Methods of powders prescription.
•Stages of preparing simple and complex powders.
•Factors that affect the order of mixing the components in the preparation of complex powders.
•Regulations preparation of complex powders with drugs, prescribed in equal and different amounts.
•The technology of powdered ingredients, different density, bulk weight, particle structure (amorphous, crystalline etc.).
•The main equipment used for chopping, mixing and dispensing of powders.
•The rules of selection of packaging material in accordance with the physical and chemical properties of the components of the powder. Dosage powders.
•Evaluation of the quality powders in accordance with the requirements of the State Pharmacopoeia and other regulatory documents.

2.4. Based on theoretical knowledge on the topic:
- master the methods / to be able to /:
• To evaluate the accuracy of writing prescriptions in various ways: distribution and separation.
•Using the State Pharmacopoeia and other standard documentation and reference books to find the necessary information on how to prepare simple and complex powders.
• To count the number of drugs to prepare simple and complex powders.
•To choose and justify optimal technology of complex powders for individual words.
•To provide basic technological operations in preparing simple and complex powders with drugs, prescribed in equal amounts and different, different structure of particle size and shape of crystals, aggregate state, bulk weight (weigh, grind, mix, dispense).
• To use Rigging for mixing and dispensing powders (machines Lopatin, Islamhulova, grinders, dosing TK-3, DPR-2, etc.).
•To pick the packing material in accordance with the properties of the ingredients and preparation is made to execute delivery.
•To evaluate the quality of prepared powders and to make written passport control.

3. Materials of before class for independent preparation (interdisciplinary integration).

numbe r	Discipline	Know	Be able
1.	2.	3.	4.

I.	1. Biology 2. Chemistry (inorganic, organic) 3. Physical and Colloid Chemistry. 4. Latin 5. Pharmacy Drug Technology	Features of the structure, function and interaction of bodies of humans. Characteristic elements. The solubility of solids and liquids in liquids. Raoult's Law. Extraction. Buffer solutions. Basics of grammar. Technology preparation of various dosage forms. Disciplines medicinal substances and excipients in the dosage form.	To define different processes that take place in human. To define, write formulas and chemical reactions, perform calculations concentration solutions. Conduct fractional distillation. To be able to write in Latin names of drugs and medicines. Choose the best option according to the technology and prepare it with stepwise drug quality assessment;
II.	**The following subjects** 1. Organization and Economy of Pharmacy. Tech industrial production of drugs	Contemporary forms of prescription forms. The order of pharmacies. General technology complex powders The general principles of selection of excipients mixing	Distinguished form №1, №2, №3 prescription forms. Take recipes of various shapes and then organize work with them. Pick Excipients in powders and evaluate their quality Prepare complex solid dosage forms
III	Intersubject integration Plant collections		

4. Content themes (text or abstracts), logical structure of employment.

Powders - one of the most ancient medicinal forms used in medical practice for 2500 - 3000 years BC and have not lost their significance until now. Investigations of the extemporal formulation have shown that in the form of powders a very large number of different medicinal substances is prepared, depending on the specifics of the recipe of a region (city, district, region, region) and time of year.

The technology of powders is quite simple to execute. However, the knowledge acquired under the basic rules for the preparation of powders will serve as a basis for the study of more complex dosage forms, such as suspensions, ointments, suppositories, pills, both pharmacy and factory production.

The widespread distribution of powders in medical practice is due to the definite advantages of them as a pharmaceutical form.

Powders - a solid dosage form for internal and external application, consisting of one or several shredded substances and has the property of fluidity.

The advantages of powders as dosage forms include the following:

- ease of preparation, accuracy of dosing;
- versatility of the composition (in the form of powders it is possible to combine different composition and properties of medicinal substances);
- convenient storage and transportation.

Disadvantages of powders:

- slower therapeutic action compared with liquid dosage forms;
- poor preservation due to a large specific surface (easily lose or absorb water, oxidize, etc.);
- an inconvenience of taking odorous, colored and having an unpleasant taste of substances;
- irritating effect on the mucous membrane of the gastrointestinal tract.

Classification of powders.

Depending on the composition, the powders are divided into simple (Pulveres simplices), consisting of one ingredient, and complex (Pulveres compositi), consisting of several ingredients (sometimes up to 10).

Depending on the nature of the dosage, the powders are classified into dosed, that is, divided into separate doses (Pulveres divisi) and not dosed, that is, unpaired (Pulveres indivisi).

Depending on the method of application, there are powders for internal (Pulveres ad usum internum) or oral (Pulveres peroralia) and external (Pulveres ad usum externum) applications.

Basic requirements for powders: fluffiness; uniform distribution of substances in the whole mass of the complex powder; homogeneity of mixing; precision of dosing; stability.

Ways of prescribing powders. Dosage powders are prescribed in two ways:

Distributive - when the amount of substance per dose is prescribed in the prescription and how many powder need to be prepared (most often used).

Separate - when in the prescription the amount of the drug is prescribed immediately to all powders and it is indicated how many doses it is necessary to divide the total mass (used rarely).

Technological stages of preparation of powders.

The preparation of powders consists of the following stages:

- *shredding,*
- *mixing,*
- *dosing,*
- *packaging*

- *design.*

Shredding is a process of reducing the size of solids particles using different gadgets.

The grinding of medicinal substances is very important in the preparation of powders. Finely crushed substances have a great therapeutic effect. The more crushed the drug substance, the faster and more fully it can be absorbed, and insoluble substances are better adsorbed by the mucous membranes and show better therapeutic effect.

When grinding in a mortar several ingredients are crushed independently of one another, as in a mortar rational crushed mixture of substances than each of them individually, except for hard-to-grind drugs (iodine, menthol, camphor, streptotsid, salicylic acid), which requires addition of auxiliary liquids.

Smooth solvents are also used when rubbing especially poisonous drugs (for example, mercuric dichloride, arsenic anhydride).

Powders of viscous substances are in presence in lactose, which take in a ratio of 1: 1 to the taken basic substance.

Such drugs as Phytin, zinc oxide, magnesium oxide, mercury amidohloryd, quinine salts, acetylsalicylic acid, magnesium carbonate and others by grinding adhere tightly to the walls of mortar and pressing, so it is recommended to rub gently, effortlessly. If necessary, before crushing sugar can be dried at a temperature of 40-60 ° C and heated to rub in a mortar, because even at low humidity and it sticks to the walls of the mortar.

Insoluble in water: sulfur, butadiene, terpinhydrate - are highly electrified when spraying, especially when trying to collect them with a celluloid plate. Therefore, these substances should be rubbed together with the prescribed water-soluble substances or liquids in order to avoid losses.

When crushed, a small amount of medicinal substances is lost in the pores of the mortar. Fill the pores of the mortar with the rubbing substance first. The number of losses is determined by the structure of the substance, and in order to establish the sequence of their addition, it is necessary to know the amount of losses of medicinal substances in the mortar.

If there is no excipient (sugar), the grinding should begin with the substance that is discharged in greater quantities and the least amount is lost in the pores of the mortar.

Mixing is a process that results in homogeneity, that is, the same parity of the component particles in any part of the resulting mixture.

The method and procedure of mixing powders depends on the weight ratio of the prescribed ingredients and their physical and chemical properties (aggregate state, wet-absorption, etc.). Depending on the factors mentioned above, very important practical provisions have been developed which should be observed when mixing powders. The main ones are as follows.

Pharmaceutical substances of complex powder are dispensed in equal or approximately equal quantities (**the ratio in mass does not exceed 1: 5**). In this case, there are two possible mixing options.

1. If the physicochemical properties of medicinal substances are approximately the same, then they are mixed, taking into account the amount of losses when crushed in a mortar.

2. If the physicochemical properties of the medicinal substances are different, then the mixing and grinding begin with a coarse-grained substance, and then it is added to the fine-crystalline substance.

Amorphous substances (talc, magnesium oxide, starch, etc.) are mixed with the powder mass without further grinding.

The substances that are easily sprayed, add in the last place and mix carefully.

Pharmaceuticals of complex powder are discharged in different quantities (**the ratio in weight is more than 1: 5).**

In this case, the order of preparation of the powder is as follows: the first crushed medicinal product, which is included in a larger number and has less losses in the pores of the mortar. Then the crushed powder is poured onto the capsule, leaving a small amount in the mortar (about as much as the next ingredient). Mixing starts with the ingredient prescribed in the smallest amount, gradually adding other substances in the order of growth of the prescribed quantities, taking into account the crystalline structure and spray of the drugs.

Pharmaceutical ingredients of complex powder (in multi-component prescriptions) can be dispensed simultaneously and in equal quantities, and in different quantities. In this case, it is necessary to follow all of the above provisions without violating the basic rule of mixing: from smaller to larger.

Packing of powders. For packing of powders, depending on their physical and chemical properties, different packaging materials are used: written, paraffined and waxed paper, parchment and subpergament, cellophane, polyethylene film, cardboard etc.

Gluten-free capsules (simple capsules) are used for packaging non-hygroscopic and non-volatile substances; wax and paraffin paper - for the packaging of hygroscopic substances, as well as substances that change under the influence of oxygen, easily weathered carbon dioxide. Waxes and paraffin capsules are not suitable for the packaging of powders soluble in wax or paraffin (essential oils, camphor, menthol, phenylsalicylate, etc.). Camphor and menthol form an eutectic alloy with wax.

Parsley capsules are used for packing volatile and soluble waxes and paraffin substances (menthol, thymol, camphor, etc.). Cellophane capsules are used in the same cases as parchment. Parchment and cellophane slightly pass the vapor and gases, at the same time they are fat-impermeable.

Non-dosed powders are released in paper bags, cardboard and plastic boxes.

It is desirable to dispose of the powder in a special package with an additional inner lid, which has small holes for sawing.

Appearance of powders. Powders, prepared in pharmacies, are issued with the main label "Powders". If necessary, stick a warning label: "Store in a dry, cool place protected from light".

Rp .: Phenobarbital 0.3

Dibazole 0.1
Papaverini hydrochloride 0,2
Sacchari 2.0
Misce fiat pulvis
Divide in partes aequales No. 10
Signa 1 powder 2 times a day

Into the mortar, place 2,0 g sugar, grind, pour some of it into a capsule, leaving in a mortar a quantity approximately equal to the mass of dibazole (0,1 g), add dibasole, mix with sugar, rubbing the mixture, then add 0,2 g of papaverine hydrochloride and blended when rubbed. At the end, add phenobarbital (0.3 g), sugar parts from the capsule and mix to homogeneity.

QUALITY CONTROL.

The assessment of the quality of the powders includes substance calculation checking, physical, organoleptic, chemical (selective) control and release control.

In assessing the quality of powders, first of all, the analysis of documentation (recipe, control panel), testing of compatibility of drugs, checking of doses of potent and poisonous drugs and the norm of drug release is carried out. Check the color, taste and smell of the properties of the added drugs. Determine the deviation in the mass of individual doses of allowed standards. Homogeneity is checked after pressing the head of the blender to a mass of powder (at a distance of 25 cm from the eye, there should be no visible individual particles, sequins). Browsiness is checked by pouring powder from one capsule to another, while it should not be lacerated. Check the design of powders - the correspondence of labels and the packaging.

5. Plan and organizational structure of employment.

Number	**The main stages of employment, their function and meaning.**	**Learning Objectives levels of assimilation.**	**Means of instruction and control.**	**Materials on methodological Secured Lock class visibility, control of knowledge of students.**	**Duration (in minutes or in%) of the total time employment.**
1	**2**	**3**	**4**	**5**	**6**
1	**Preparatory** - organizing classes - setting educational goals - control the output level of knowledge - monitoring skills	I			15-20

	of students, their willingness to accept this material class			Slideshow table	
2	**Basic** tasks	II, III			50-60
3	**Final** -control of professional skills - supply results of studies - granting homework from sending literature	IV			15-20

6. Materials methodological support classes.

6.1. The task source for self-control

1. A pharmacist prepares powders with hard-to-grind material. Specify substance is ground with a volatile liquid?

A. * Camphor
B. Magnesium oxide
C. Zinc sulfate
D. Copper sulfate
E. Glucose

2. Pharmacist compounded powders which include camphor. What capsule should be taken for their packaging?

A. * Butter
B. Paper
C. Paper
D. Paraffin
E. cellophane

3. Pharmacist compounded by prescription medication. Choose the best option Technology:

Rp .: Magnesii oxydi
Natrii hydrocarbonatis ana 0,2
M. f. 70ulv.

D. td №12
S. 1 powder 3 times a day.

A. * grind sodium bicarbonate added magnesium oxide, mixed.
B. grind magnesium oxide, sodium bicarbonate is added, mixed.
C. grind sodium bicarbonate with alcohol added magnesium oxide, mixed.
D. grind of magnesium oxide, sodium bicarbonate added, then the balance of magnesium oxide, mixed.
E. grind magnesium oxide with alcohol added sodium bicarbonate, confused.

4. Pharmacist compounded by prescription medication,
Rp .: Papaverini hydrochloridi 0,01
Sachari 0,25
Mf pulv.
Dtd №10
S. 1 powder 3 times a day. Expect a lot of other powder

A. * 0,26
B. 0,23
C. 0,22
D. 0,28
E. 0,25

5. When preparing powders in conditions of pharmacies into account physical and chemical properties of individual ingredients. Please indicate which drug is mixed with a powder without further crushing weight:

A. * Starch
B. Camphor
C. Menthol
D. salicylic acid
E. streptocide

6. Pharmacy received the prescription:
Rp .: Dibazoli 0.05
Papaverini hydrochloridi 0.15
Sacchari 2.5
M. fiat pulv.
Divide in partes aequales № 10. Add one powder weight
A. * 0,27
B. 2,7
C. 0,25
D. 0,26
E. 0,30

7. Among the drugs ex temporal preparation occupy a prominent position powders. Indicate which of the following components injected into the powder without grinding:

A. * basic bismuth nitrate
B. ascorbic acid
C. camphor
D. Xeroform
E. Calcium gluconate

8. A pharmacist prepares powders, rubbing one component of prescription from ethanol. Indicate which substances characteristic of this technology:

A. * streptocide
B. Starch
C. Talc
D. Zinc oxide
E. Clay White

9. Which drugs should grind of an auxiliary liquid in the manufacture of powder?

A. * salicylic acid, sodium tetraborate, streptotsid
B. glucose, sodium bicarbonate, dibazol
C. menthol, camphor, dermatol
D. iodine, magnesium oxide, salicylic acid
E. sodium tetraborate, thymol, zinc oxide

10. The pharmacy made effervescent powders. Specify a matter which, in addition to the citric acid is included in their composition.

A. * Sodium bicarbonate
B. Magnesium oxide
C. Sodium chloride
D. Sodium Sulfate
E. Sugar

6.2 Information necessary for the formation of knowledge, skills can be found in textbooks:

Basic

1. Aseptic drug forms, extemporaneous compounding: Guidelines /O.I.Tyhonov, L.V.Bondareva, T.H.Yarnyh, N.F.Orlovetska etc .; Ed. O.I.Tyhonova and T.H.Yarnyh. - H .: Izd pharmacy; Original, 2005. - 184 p.

2. Solid dosage forms: extemporaneous compounding: Guidelines /O.I.Tyhonov, L.V.Bondareva, T.H.Yarnyh, N.F.Orlovetska etc .; Ed. O.I.Tyhonova and T.H.Yarnyh. - H .: Izd pharmacy; Original, 2003. - 176 p.
3. Soft medicinal forms: extemporaneous compounding: Guidelines /O.I.Tyhonov, L.V.Bondareva, T.H.Yarnyh, N.F.Orlovetska etc .; Ed. O.I.Tyhonova and T.H.Yarnyh. - H .: Izd pharmacy; Original, 2003. - 128 p.
4. Liquid formulations: extemporaneous compounding: Guidelines /O.I.Tyhonov, L.V.Bondareva, T.H.Yarnyh, N.F.Orlovetska etc .; Ed. O.I.Tyhonova and T.H.Yarnyh. - H .: Izd pharmacy; Original, 2005. - 160 p.
5. Workshop on pharmaceutical drug technology; for students. Pha. HI. teach. schools / AI Tikhonov, T. Yarnyh, V. Sobolev et al .; Ed. AI Tikhonov. - H .: Izd pharmacy: Golden Pages, 2002. - 256 p.

Aditional Reading:

1. Dictionary-guide for pharmacy specialists in management and economics / Ed. prof. Black VP // Kharkov: Publishing pharmacy "Golden storynky" - 2001 - 281 p.

6.3.Table for independent work with literature on the lecture topic .

№№ pp	Main tasks	Directions	Responses (literature)
1	2	3	4
1.	Powders as dosage form	Define powders as a dosage form. Regulations prescribing powders	1, 2,5
2.	Technology of preparing powders	What are the main technological stages of manufacture of complex powders	1, 2,5
3.	Terms packaging powders	What Closing materials and their selection rules	1, 2,5
4.	Evaluation of the quality powders	What are the main indicators of the quality powders	1, 2,5

7. Materials for self-training.

A. Questions

1. Definition of a powder dosage form, their classification and requirements.
2. Method of prescription recipes with powders.
3. The degree of grinding drugs in powders, depending on the medical application.
4. Technological stage of preparation of simple and complex powders.
5. Factors affecting the order of mixing drugs in the fresh snow.
6. Preparation of complex powders, which include drugs that differ in density, bulk weight, particle structure.
7. Preparation of powders with drugs, prescribed in equal and different amounts.
8. The main equipment used for chopping, mixing and dispensing of powders.

9. The rules of selection of the packaging material according to the physicochemical properties of incoming ingredients and their dosage.
10. Evaluation of the quality powders according to the requirements of technical standards (flowability, uniform mixing degree of dispersion, precision dispensing, packaging, design to delivery, storage).
11. Characteristics, classification, methods of prescribing, preparation, storage and delivery fees.

B. Tests for self-control with standard answers.

1. The pharmacy made easy dosage powder. What technological stage you do not need in their manufacture.

A. * Mixing
B. Shredding
C. Dosage
D. Packaging
E. clearance to leave

2. Pharmacy got the prescription for preparation of powder for external use which includes hard-to-grind material. Which of these liquids can be used by pharmacist in the dispersion of the substance?

A. * Ether medical
B. Purified Water
C. Water for Injection
D. Dimexidum
E. isopropyl alcohol

3. Determine what type of powder is included, which quickly react on the presence of water with the release of carbon dioxide:

A. * Powder "effervescent"
B. soluble powders
C. oral administration Powders
D. Nasal Powders
E. powders for outdoor use

4. Pharmacy got a recipe:

Rp .: Rutini 0,01
Calcii gluconatis 0,10
Sacchari 0,15R'a M. f. pulv.
D. td N 10R'a S. 1 now. 3 times a day.
Select spellings technology

A. * to mellow sugar pour off of the capsule, then add crushing, rutin, calcium gluconate, sugar capsules
B. to mellow sugar, then add the crushing, rutin, calcium gluconate
C. grind calcium gluconate, pour off of the capsule, add rutin, sugar, and calcium gluconate capsules
D. grind calcium gluconate, routines and add sugar, mix
E. to mellow routines with alcohol, add calcium gluconate, then sugar, mix

5. A pharmacist prepares medicine by the prescription:

Rp .: Thiamini chloride
Acidi ascorbinici ana 0,05
Glucosi 0,15R'a M. f. pulv.
D. td N 10S. 1 now. 2 times a day. As a pharmacist preparing the drug?
A. * grind glucose, thiamine chloride added acid and ascorbic carefully stamped
B. grind glucose pour off of the capsule, said chloride thiamine, ascorbic acid, mixed, added with glucose capsules
C. grind glucose pour off it into a capsule in a mortar, grind liberated thiamine chloride with alcohol added ascorbic acid, glucose from the capsule, carefully mixed
D. grind thiamine chloride with alcohol added ascorbic acid, glucose, and then carefully mixed
E. grind ascorbic acid, thiamine chloride is added, then glucose and carefully stamped

6. What drug did not crush alone?

A. * Sulfur
B. bismuth nitrate basic
C. glucose
D. rutin
E. Calcium glycerophosphate

7. What is the recommended maximum loading mortar with crushed dry matter:

A. * 1 / 20th volume of mortar
B. 1/10 volume of mortar
C. 1/5 volume of mortar
D. 1/2 volume of mortar
E. 1/100 volume of mortar

8. A pharmacist prepares powder and starch. How should he pack this?

A. * in a glass jar

B. in plastic wrap
C. in waxed capsules
D. in parchment capsules
E. in simple capsule

9. Pharmacist preparing complex powder grinds two substances simultaneously in a mortar. How should the different masses of these substances?

A. * No more than 5 times
B. Not less than 5 times
C. No more than 10 times
D. Not less than 10 times
E. No more than 20 times

10. How should be packed complex sugar-dosed powder?

A. * In waxed capsules
B. In parchment capsules
C. In gelatin capsules
D. In paper capsules
E. In glass jars

C. Situational tasks

1. From written powders recipe including 6 0.1 0.3 ascorbic acid and glucose each. Pharmacist is making preparation 6 doses of ascorbic acid weighed 0.1 and 0.3 glucose. Give a critical assessment of his actions.

Answer. Pharmacist incorrectly calculated the amount of ingredients. He should t take 0.1 · 6 = 0.6 0.3 ascorbic acid and glucose 6 = 1.8

2. Pharmacist compounded complex powders and divided them at a dose of 0.3. After checking the weight of three powders results were 0.31; 0.29; 0.3. Is it acceptable deviation in doses?

Answer. Analysis algoritm

According to the order number 626, the allowed deviation for 0.3 g of sample should be ± 5%.

3. The drugs with different crystalline structure are prescribed in equal amounts. In a mortar initially the crystalline substance were crushed , and then coarsely crystalline. Evaluate the accuracy of this method of preparing.

Answer. First you need to grind coarsely crystalline substance because they have smaller losses in a mortar.

4. When checking individual doses of powder weighing 0.25 deviation in mass was ± 0,03. Can you believe these powders prepared satisfactorily?

Answer. Calculate the deviation in%. The deviation is 12%

According to the order number 626, for a sample of 0.25 g, deviation should be ± 5% as powders prepared unsatisfactory.

5. The recipe written bismuth nitrate basic and sodium bicarbonate in equal amounts. During the preparation of a pharmacist weighed powders in a mortar and grind substance in the order of their prescription in the recipe. Is the correct order of mixing the ingredients he chose?

Answer. Wrong. The first had podribnity sodium bicarbonate because of a smaller loss when crushed in a mortar.

8. Materials for self-preparation of the students:

8.1. List of educational practical tasks to be performed during the practical (laboratory) classes:

1. Take:	routine 0.01 Calcium gluconate 0.15 Glucose 0.3 Mix to form a powder Give such doses number 6 Mark. 1 powder 3 times a day.	2. Take:	Ascorbic acid 0.1 Calcium glycerophosphate 0.3 Glucose 0.2 Mix to form a powder Give such doses number 6 Mark. 1 powder 3 times a day
3. Take:	Sodium chloride 10.0 Sodium tetraborate Sodium bicarbonate in 15.0 Mix to form a powder. Give such doses number 10 Mark. At 1 h. L. to ½ c. water. Rinsing.	4. Take:	Vimutu nitrate core Magnesium oxide Sodium bicarbonate 0.3 Mix to form a powder. Give such doses number 6. Mark. 1 powder 3 times a day
5. Take:	0.2 hexamethylenetetramine Boric acid 0.15 Sodium bicarbonate 1.0 Mix to form a powder. Give such doses number 12. Mark. 1 powder 3 times a day	6. Take:	0.2 hexamethylenetetramine Boric acid 0.15 Sodium bicarbonate 1.0 Mix to form a powder. Give such doses number 12. Mark. 1 powder 3 times a day
7.	Ascorbic acid 0.1	8.	Bismuth nitrate core

Take:	Calcium glycerophosphate 0.25 routine 0.01 Sugar 0.2 Mix to form a powder Give such doses number 6 Mark. 1 powder 3 times a day	Take:	Magnesium oxide 0.25 Mix to form a powder. Give such doses number 6. Mark. 1 powder 3 times a day
9. Take:	Calcium glycerophosphate 0.2 Routine Calcium lactate 0.3 Mix to form a powder Give such doses number 6 Mark. 1 powder 3 times a day	10. Take:	thymol Zinc oxide Talc in 6.0 Mix to form a powder Are. Mark. Foot Powder
11. Take:	salicylic acid Boric acid 1,0 Starch 10.0 Mix to form a powder Are. Mark. Dusting.	12. Take:	ascorbic acid Riboflavin 0.05 Calcium gluconate 0.3 Mix to form a powder. Give such doses number 30 Mark. 1 powder 3 times a day.
13. Take:	Bismuth nitrate, basic 0.5 Magnesium oxide 0.25 Mix to form a powder. Give such doses number 10. Mark. 1 powder 3 times a day	14. Take:	Sodium chloride 15.0 Sodium tetraborate 5.0 Sodium bicarbonate 10.0 Mix to form a powder. Give such doses number 6 Mark. At 1 h. L. to ½ c. water. Rinsing.
15. Take:	Calcium glycerophosphate 0.1 0.2 routine Calcium lactate 0.5 Mix to form a powder Give such doses number 10 Mark. 1 powder 3 times a day	16. Take:	0.5 hexamethylenetetramine Boric acid 0.2 Sodium bicarbonate 0.5 Mix to form a powder. Give such doses number 6. Mark. 1 powder 3 times a day
17. Take:	Clay white Starch 1,0 talc 5.0 Mix to form a powder Mark. Dusting	18. Take:	Calcium glycerophosphate 0.5 routine 0.02 Ascorbic acid 0.3 Sugar 0.5 Mix to form a powder Give such doses number 10 Mark. 1 powder 3 times a day
19. Take:	glutamic acids Ascorbic acid 0.3 Calcium lactate 0.2 Mix to form a powder Give such doses number 6	20. Take:	boric acid Zinc oxide Talc in 5.0 Mix to form a powder Mark. Foot Powder.

	Mark. 1 powder 3 times a day		

9. Instructional materials for acquiring professional skills:

9.1. Methods of work performance stages.

Each student performs the same task with the proposed set of individual tasks. Write down the recipe and place an accordance with MOH Ukraine number 360 of 19/07/05 p. Describe drugs. Describe the best option technology with theoretical substantiation give an assessment of its quality. Specify its release design. Place written passport control .

10. Materials for self-control of knowledge and skills provided by this work.

10.1. Tests of different levels

1. Salicylic acid is ground in the presence of alcohol in connection with the fact that salicylic acid has strong large crystals.

A. The first statement is correct, the second wrong
B. The first statement is wrong, second right
C. First and second assertions are correct and there is a connection between them
D. First and second assertions are correct, but there is no connection between them
E. Both statements are incorrect

Answer: A

2. Sulfur always crushed in a mortar first, because sulfur is electrified by grinding.

A. The first statement is correct, the second is wrong
B. The first statement is wrong, secondis right
C. First and second assertions are correct and there is a connection between them
D. First and second assertions are correct, but there is no connection between them
E. Both statements are incorrect

Answer: B

3. Pick a pair:

Drug substance packaging

1. Fenilsalitsylat	A. simple capsule
2. Bismuth Nitrate main waxed	B. Capsules
3. Methylene blue	C. parchment capsules
4. Dibazol	D. gelatin capsules

A 1 - B; 2 - A; 3 - D; 4 - B.

11. The theme of the next lesson.

Production of complex powders with poisonous and potent substances. Triturations.

Topic of the lesson 3: "Production of complex powders with poisonous and potent substances. Triturations" – 2 hours.

1. Relevance of the topic : In the extemporal formulation of pharmacy powders make up more than 15% due to their positive qualities: ease of preparation, ease of administration, accuracy of dosage, versatility of the composition. In addition, new drugs for which the starting and experimental industrial regulations have not yet been developed, are prescribed for individual preparing in pharmacies, which explains the need to study the technology of this dosage form.

2. Subject of the lesson: Learn how to prepare complex powders with toxic and potent substances and triturations.

2.1. General objectives:
Learn how to prepare simple and complex powders with toxic, narcotic and potent substances, assess their quality and release.

2.2. Educational objectives:
Formation of professionally important characteristics and personality traits of future pharmacists. Educating students in professional liability in the manufacture of drugs.

2.3. Specific goals:
- to know:

- Regulations prescribing toxic, narcotic and potent drugs, the order of storage, delivery and use in compliance with the orders of the Ministry of Health of Ukraine.
- Testing of single and daily doses of toxic and potent drugs in powders. The list of drugs and their disposable delivery standards.
- Preparing features of difficult powders with toxic, narcotic drugs, prescribed in small (less than 0.05) quantities.
- Characteristics of triturations, their preparation, storage, use for preparing powders.
- Quality control, design rules for release and storage of dosage forms in accordance with the requirements of the State Pharmacopoeia and other regulatory documents.

2.4. Based on theoretical knowledge on the topic:
- master the methods / to be able to /:

- Evaluate the accuracy of writing prescriptions.
- To use the State Pharmacopoeia other standard documentation and reference books to find the necessary information for the preparation of complex powders with toxic and potent drugs.

- Conduct inspections doses of toxic and potent substances and standards disposable dispensing drugs and similar substances in the powder.
- Count the number of drugs and triturations that are difficult to prepare powders.
- Choose and justify optimal technology complex powders with toxic and potent substances according to individual specifications.
- Provide basic technological operations triturations preparation and complex powders with toxic and potent drugs, prescribed in small quantities.
- Take safety precautions when working with toxic substances.
- Evaluate the quality of manufactured powders; pack and arrange to drug delivery.
- Fill written passport control.

3. Materials of before class for independent preparation (interdisciplinary integration).

number	**Discipline**	Know	Be able
1.	**2.**	3.	4.

I.	1. Biology 2. Chemistry (inorganic, organic) 3. Physical and Colloid Chemistry. 4. Latin 5. Pharmacy Drug Technology	Features of the structure, function and interaction of bodies of humans. Characteristic elements. The solubility of solids and liquids in liquids. Raoult's Law. Extraction. Buffer solutions. Basics of grammar. Technology preparation of various dosage forms. Disciplines medicinal substances and excipients in the dosage form.	To define different processes that take place in human. To define, write formulas and chemical reactions, perform calculations concentration solutions. Conduct fractional distillation. To be able to write in Latin names of drugs and medicines. Choose the best option according to the technology and prepare it with stepwise drug quality assessment;
II.	The following subjects 1. Organization and Economy of Pharmacy. Tech industrial production of drugs	Contemporary forms of prescription forms. The order of pharmacies. General technology complex powders The general principles of selection of excipients Mixing technology	Distinguished form №1, №2, №3 prescription forms. Take recipes of various shapes and then organize work with them. Pick Excipients in powders and evaluate their quality Prepare complex solid dosage forms
III	Intersubject integration Plant collections		

4. Content themes (text or abstracts), logical structure of employment.

Powders - one of the most ancient medicinal forms used in medical practice for 2500 - 3000 years BC and have not lost their significance until now. Investigations of the extemporal formulation have shown that in the form of powders a very large number of different medicinal substances is prepared, depending on the specifics of the recipe of a region (city, district, region, region) and time of year.

The technology of powders is quite simple to execute. However, the knowledge acquired under the basic rules for the preparation of powders will serve as a basis for the study of more complex dosage forms, such as suspensions, ointments, suppositories, pills, both pharmacy and factory production.

Appearance of powders. Powders prepared in pharmacies are issued with the main label "Powders". If necessary, stick a warning label: "Store in a dry, cool place protected from light".

Trituration

When preparing powders with poisonous and potent substances (including narcotic and stomach), you must adhere to the working rules. Poisonous drugs are available upon request. On the front of the written control passport (PPC), the pharmacist signs in the issuing, and the assistant in obtaining the required amount of poisonous substance with an indication of its name and quantity. Getting a poisonous substance, the pharmacist is obliged to make sure the name of the nail file in the recipe, as well as the correctness of the set of weights and weights.

Poisonous and potent substances should not be rubbed in an empty mortar (they are usually prescribed in small quantities). The surface of the mortar should be pre-coated with a layer of a more indieferent substance or a substance that is included in a larger number.

Preparation of complex powders with potent substances.

Rp .: Dimmerli 0,05
Sacchari 0.3
Misce fiat pulvis
Da tales doses No. 6
Signa For 1 powder 3 times a day

Complex dosage powder for internal use, which includes a potent substance (dimedrol) and a crystalline substance - sugar. The powder is dispensed by a distributive method.

It is necessary to check whether one-time and daily doses of dimedrol are not inflated by comparing prescribed doses in a prescription with pharmacopoeial doses:

Higher single dose (WR) - 0.1 g
The highest daily dose (npd) is 0.25 g
medical single dose (literally) - 0.05 g (by prescription)
therapeutic daily dose (ns.dd) - 0.05-3 = 0.15 g
Doses are not inflated

Before preparing, first determine the mass of each ingredient for all doses of powders. For this weight of one dose of medicinal substance (by prescription) multiplied by the number of doses specified in the recipe:

Dimedrol 0,05 · 6 = 0,3 g
Sugar 0,3 · 6 = 1,8 g

Then determine the amount of fun - a dose of complex powder for one meal. There are two methods of calculation for this: either one-time doses of medicinal substances (0,05 + 0,3 = 0,35 g) are summed up, or the total mass of the powder mixture is divided by the number of prescribed doses ((0,3 + 1,8) : 6 = 0.35 g).

All calculations are made before the preparation of the drug and recorded on the reverse side of the control panel.

In a mortar rub 1.8 g of sugar, then leave in the mortar about 0,3-0,4 g, and the residue is poured onto the capsule. Then put in a mortar 0,3 g of dimedrol, carefully mix with sugar, add the remaining sugar, add to the homogeneity.

Before adding each subsequent portion of sugar, remove from the walls of the mortar and the filler a powder mixture adhering to them with a celluloid plate. The resulting mixture is suspended in 6 doses of 0.35 g in paraffin capsules.

Recording in the control panel on the front side is made in Latin in memory immediately after preparation of the drug in accordance with the technology.

Control panel

Date Recipient No

Sacchari 1.8

Dimerri 0.3

0.35 No. 6

Prepared by: (signature)

Checked out: (signature)

Rp .: Phenobarbital 0.3
Dibazole 0.1
Papaverini hydrochloride 0,2
Sacchari 2.0
Misce fiat pulvis
Divide in partes aequales No. 10
Signa 1 powder 2 times a day

Into the mortar, place 2,0 g sugar, grind, pour some of it into a capsule, leaving in a mortar a quantity approximately equal to the mass of dibazole (0,1 g), add dibasole, mix with sugar, rub the mixture, then add 0,2 g of papaverine hydrochloride and blend when rubbed. At the end, add phenobarbital (0.3 g), sugar parts from the capsule and mix to homogeneity.

Trituratio. If the total amount of poisonous or potent substance in the prescription is less than 0.05 g for all powders, then they use triturations. The word "titureing" came from the Latin. trituratio - rubbing.

Triturates are pre-mixtures of poisonous and potent medicinal substances with fillers.

The use of triturations is necessary to ensure a fairly accurate dosage of poisonous and potent drugs, since the inoculation of the drug substance below 0.05 g can not be weighed with the necessary accuracy. Sometimes poisonous substances are prescribed in such minimal quantities that they can not be weighed on hand weights. In addition, triturations make a more even distribution of small quantities of poisonous or potent substances in the total mass of the powder.

Preparation of trituration

Most often, in trituration, as a filler, milk sugar (Saccharum lactis) is used because it has a number of advantages over other fillers: non-hygroscopic, most indifferent in comparison with other substances in the chemical and pharmacological relations, odorless, has a weak sweet taste, is not toxic, the density of milk sugar (1,52) is close to the density of poisonous substances, which to some extent prevents the stratification of the mixture.

Trigurates from poisonous drugs, single-dose in milligrams are usually prepared in a ratio of 1: 100 (1% of the poisonous component, that is, taking 1 part of the poisonous drug and 99 parts of the filler), and from drugs whose doses are expressed in Santigrams - in the ratio of 1:10 (10% of the poisonous component, that is taking 1 part of the poisonous agent and 9 parts of the filler). In the first case, 1.0 g of trituration is 0.01 g of poisonous substance, while in the other - 1.0 g of trituration equals 0.1 g of poisonous substance. For example, for the preparation of 10.0 g of 1% trituration of atropine sulfate, it is necessary to take 0.1 g of atropine sulfate and 9.9 g of milk sugar. In a dirty mortar, rub 9.9 g of milk sugar, select the capsule, leaving 0.1 g (equal amount of poisonous substance) and mix with 0.1 g of atropine sulfate. Then, gradually, in a few steps, add the remainder of the milk sugar (with thorough mixing). The homogeneity of the trituration that is being prepared depends on the diligence of rubbing the poisonous substances with the filler. It is important to know that storing triturations with poisonous drugs that have a much higher density than milk sugar (lactose), such as mercury dichloride, arsenic anhydride can lead to its stratification. Therefore, such triturations should be additionally thoroughly mixed in each mortar before use.

Triturates are prepared in quantities sufficient to provide about a monthly requirement for them. Keep triturations in small ground glass stopper and corresponding inscriptions on labels:

Trituratio Atropini sulfatis (1: 100) cum Saccharo lactis
(0,001 Atropini sulfatis = 0,1 triturationis 1 : 100)
Date; Serial number; Analysis number;
the signature of the person who prepared the truancy;
signature of the person who verified the truancy

PREPARATION OF COMPLEX POWDERS USING TRITURATION.

Rp .: *Atropine sulfate 0.0005*
Proserini 0.01
Sacchari 0.3
Misce fiat pulvis.
Da tales doses No. 10
Signa For 1 powder 3 times a day.

Complex dosage powder for internal use, dispensed by a distributive method, with poisonous medicinal substances.

Atropine sulfate is discharged in an amount less than 0.05 g, so it is necessary to use trituration (1: 100). In order not to increase the mass of powder, you can reduce the amount of sugar in the recipe.

Calculation:

Atropine sulfate $0.0005 \cdot 10 = 0.005$ g

Trituration of atropine sulfate (1: 100) $0.005 \cdot 100 = 0.5$ g

Sugar $(0,3 \cdot 10) - 0,5 = 2,5$ g

Prozeryn $0,01 \cdot 10 = 0,1$ g

Weighing: $(0,1 + 0,5 + 2,5): 10 = 0,31$ g

The sugar is triturated in a mortar, a portion is poured into a capsule, leaving about 0.1 g, add 0.1 g of proserin (which is obtained upon request), mix, then add 0.5 g of trituration of atropine sulfate (also available on request), mix thoroughly. The remaining sugars are added to the parts, mixed to homogeneity. Stand 0,31 g for 10 doses. Packed in wax capsules, placed in a paper bag. Make a signature, additional labels "Be careful", "Keep in a dry place", "Keep away from children" and put a Seal.

In cases where the sugar is not prescribed in the recipe, the amount of powder taken by the trituration is increased. These changes in the registration must be marked on the signature, indicating the amount of triturated and the mass of the powder.

The assessment of the quality of the powders includes questioning, physical, organoleptic, chemical (selective) control. In assessing the quality of powders, first of all, the analysis of documentation (recipe, control panel), testing of compatibility of drugs, checking of doses of potent and poisonous drugs and the rules of drug release. Check the color, taste and smell of the properties of the incoming drugs. Determine the deviation in the mass of individual doses of permissible standards. Homogeneity is checked after pressing the head of the blender to a mass of powder (at a distance of 25 cm from the eye, there should be no visible individual particles, sequins). Browsiness is checked by pouring powder from one capsule to another, while it should not be lacerated. Check the design of powders - the correspondence of labels, packaging.

5. Plan and organizational structure of employment.

Number	**The main stages of employment, their function and meaning.**	**Learning Objectives levels of assimilation.**	**Means of instruction and control.**	**Materials on methodological Secured Lock class visibility, control of knowledge of students.**	**Duration (in minutes or in%) of the total time employment.**

1	2	3	4	5	6
1	**Preparatory** - organizing classes - setting educational goals - control the output level of knowledge - monitoring skills of students, their willingness to accept this material class	I		Slideshow table	15-20
2	**Basic** tasks	II, III			50-60
3	**Final** -control of professional skills - supply results of studies - granting homework from sending literature	IV			15-20

6. Materials methodological support classes.

6.1. The task source for self-control

1. Does the pharmacist use triturations in the manufacture of powders for words containing platifilline hydrotartrate 0.05 for all doses?
A. * Not used
B. used in a ratio of 1:10
C. used in a ratio of 1: 100
D. powders produced twice
E. recipe containing 0.05 grams of toxic substances not being prepared

2. Assistant prepared powder by prescription. What triturations he used in the process:
Rp: atropine sulfate 0,0005
phenobarbital 0,02
papaverine hydrochloride 0,02
mix. Give such doses number
Mark 10: 1 powder 2 times a day.

A. * 1: 100
B. 1:10
C. 1: 100 and 1:10
D. 1 1000
E. Not used

3. A pharmacist prepared substance by prescription:
Rp: Dibazole 0,1
papaverine hydrochloride 0,2
phenobarbital 1,0
Sugar 2,0
Mix to form a powder
Sections at the number of 10 .
Mark. 1 powder 3 times a day.
What is the equal mass of powder on prescription and what is allowed deviation in %?
A. * 0,33 ± 5%
B. 3,3 ± 3%
C. 0,033 ± 15%
D. 0,55 ± 15%
E. 0,33 ± 15%

4. Pharmacist has to prepare 5.0 atropine sulfate triturations (1: 100). How many toxic substances and lactose he should take:
A. * 0,05: 4, 95
B. 1,0: 4, 0
C. 0,1: 4, 9
D. 0,5: 4, 5
E. 0,01: 4, 99

5. Pharmacist-technologist prepared triturations 10.0 etylmorfine hydrochloride (1: 100). How many toxic substances and excipient he took?
A. * 0,1 g etylmorphine g / s and 9.90 grams of sugar
B. 0.01 g etylmorphine g / s and 9.99 grams of sugar
C. 0,1 g etylmorphine g / h and 10.0 grams of sugar
D. 0,05 g etylmorphine g / s and 9.95 grams of sugar
E. g etylmorphine 1.0 g / h and 9.0 grams of sugar

6. Prescription issued 0.0001 atropine sulfate. Specify the number of triturations atropine sulfate (1: 100), which is required for preparing 10 powders:
A. * 0,10
B. 0,20
C. 0,50

D. 0.01
E. 0.02

7. The pharmacist must prepare triturations platifilline hydrotartrate (1:10). Choose the best filler for making triturations:
A. * Lactose
B. Refined sugar
C. Modified starch
D. Rice Starch
E. mannitol

8. A pharmacist is preparing powders with platifilline gidrotartrate. Specify the minimum weight of toxic substances on the hand scales:
A. * 0,05
B. 0,02
C. 0.03
D. 0,1
E. 0,15

9. Pharmacist compounded 20.0 triturations atropine sulfate (1: 100). Specify the number of toxic substances and fillers:
A. * 0,20 and 19,8
B. 0.02 and 19.98
C. 0,1 and 19,0
D. 2,0 and 18,0
E. 0,20 20,0

10. Pharmacist compounded by prescription medication,
Rp .: Papaverini hydrochloridi 0,01
Saschari 0,25
Misce fiat pulvis
Da tales doses №10
Signa. 1 powder 3 times the mass of one den.
Calculate mass of the powder
A. * 0,26
B. 0,23
C. 0,22
D. 0,28
E. 0,25

6.2 Information necessary for the formation of knowledge, skills can be found in textbooks:

Basic

1. Technology drugs. Textbook: Textbook for Universities / AI Tikhonov, PA Logvyn, S. Tikhonov, A. Mazulin, TG Yarnyh, OS spiers, O. Mikhail Kotenko; Edited by AI Tikhonov - Kharkov: Pharmacy; Original, 2009. - 432 p.
2. Technology Medicine: Textbook / A. Marchuk, NB Androshchuk - Kyiv: Health, 2008. - 488 p.

Additional

6. Soft medicinal forms: extemporaneous compounding: Guidelines / AI Tikhonov, T. Yarnyh, AV Lukienko etc .; Ed. OI Tikhonov. - H .: Izd pharmacy; Golden Pages, 2003.-128 with.
7. Aseptic drug forms, extemporaneous compounding: Guidelines / AI Tikhonov LV Bondarev, TG Yarnyh NF Orlovetska etc .; Ed. AI Tikhonov and T. Yarnyh. - H .: Izd pharmacy; Original, 2005. - 184 p.
8. Solid dosage forms: extemporaneous compounding: Guidelines / AI Tikhonov, T. Yarnyh, S. Gritsenko, etc .; Ed. AI Tikhonov - H .: Izd pharmacy; Golden Pages, 2003. - 176 p.
9. Liquid formulations: extemporaneous compounding: Guidelines / AI Tikhonov, T. Yarnyh NF Orlovetska etc .; Ed. AI Tikhonov and T. Yarnyh. - H .: Izd pharmacy; Original, 2005. - 160 p.

6.3. Table for independent work with literature on the lecture topic .

№№ pp	**Main tasks**	**Directions**	**Responses (literature)**
1	**2**	**3**	**4**
1.	Regulations prescribing toxic, narcotic and potent drugs	Regulatory and technical documents regulating the rules of toxic and potent drugs	1, 2
2.	The technology complex powders with toxic, narcotic and highly-active medicinal substances	The main technological stages of preparation of powders with toxic and potent drugs	1, 2
3.	Triturations.	What types of technology and tryturatsiy	1, 2
4.	Evaluation of the quality powders with toxic and potent drugs	What are the main indicators of the quality powders	1, 2

7. Materials for self-training.

B. Questions

1. The rules of prescribing toxic, narcotic and potent drugs, the procedure for storing, dispensing and applying accordance with orders of the MOH Ukraine: № 360 of 19/07/05 p. 356 and the number of 18/12/97 p.
2. Verification of single and daily doses of toxic, narcotic and potent drugs in powders.
3. Technology complex powders with toxic, narcotic and potent drugs, prescribed in small amounts (less than 0.05).
4. Triturations, their preparation and storage. Using technology of trituration powders.

5. Quality control, design rules for release and storage of drugs as required in the documentation.

B. Tests for self-control with standard answers.

1. The pharmacist is preparing triturations scopolamine hydrobromide. What component should be used to prepare triturations in addition to toxic substances?
A. * Lactose
B. sucrose
C. Glucose
D. Starch
E. Talc

2. Pharmacist is preparing triturations toxic and potent substances. In what proportions they can be prepared?
A. * 1: 10 and 1: 100
B. Only 1:10
C. 1 1000
D. 1: 500
E. Only 1 100

3. Pharmacist got prescription, which is registered scopolamine hydrobromide 0.0002 to 1 g powder. How many of triturations 1: 100 should be taken to prepare 10g of powder?
A. * 0,2
B. 0,04
C. 4,0
D. 0,4
E. 2,0

4. Pharmacist compounded 10.0 triturations atropine sulfate (1: 100). Specify how much atropine sulfate filler and pharmacist he had taken:
A. * 0,1 and 9,9
B. 1.0 and 9.0

0.01 and 9.99 C.
0.01 and 0.9 D.
E. 0,1 and 99,9

5. Triturations drugs used in cases where the weight of toxic or potent substances in prescription is:
A. Less than 0.05 *
B. Over 0.05
C. or less equals 0.1
D. Less than 0.5
E. Less than 0.1

6. Pharmacist-technologist prepared 20.0 triturations (1:10). How many toxic substances and excipient he took:
A. * 2,0 and 18,0
B. 0,20 and 19,8
C. 0.02 and 19.98
D. 0,2 and 20,0
E. 1,0 and 19,0

7. Pharmacist prepared the substance by prescription. How many triturations platifillin hydrotartrate (1:10) he took:
Rp .: Platyphyllini hydrotartratis 0,003
Sacchari 0,25
Misce fiat pulvis
Da tales doses №10
S. 1 powder 3 times day
A. * 0,3
B. 0,03
C. 3,0
D. 2,53
E. 0,28

8. Calculate the weight of one powder:
Rp .: Atropini sulfatis 0,0005
Phenobarbitali 0,02
Sacchari 0,3
Misce fiat pulvis
Da tales doses №10
Signa. 1 powder 3 times a day
A. * 0,32
B. 0,28
C. 0,30
D. 0,25

E. 0,27

9. A pharmacist compounded 10 powders containing atropine sulfate in an amount of 0.00005 per dose. What triturations he had used?
A. * 1: 100
B. 1:10
C. 1 1000
D. 1:50
E. 1:20

10. The pharmacist should prepare triturations atropine sulfate. Which adjuvant he have to use for the preparation of triturations?
A. * lactose
B. sucrose
C. Glucose
D. Starch
E. Talc

C. Tasks for self-control with answers.

1. The recipe, which prescribed narcotic morphine hydrochloride and sugar, was discharged on the usual prescription blank form №1, decorated only personal seal and signature of the doctor. Can I take a recipe for making the drug?
*Answer.*No. According to MOH Ukraine number 360 of 19/07/05 p. Narcotics mixed with indifferent materials (sugar) issued on prescription blank form F-3.
2. When calculating the total mass of poisonous substances was found that it is less than 0.05. What the pharmacist should do?
Answer. A pharmacist needs to take advantage of toxic substances triturations 1:10 or 1: 100.
3. A pharmacist must prepare triturations atropine sulfate 5.0 1: 100. How many toxic substances and lactose should be taken for that?
Answer. Triturations 1: 100 is composed of 1 part of healing. product and 99 parts of sugar. 5.0 g should be taken:

1	-	100	
X	-	5.0,	x = 0.05 (atropine sulfate)
			Sugar = 5.0 - 0.05 = 4.95

4. When used for the preparation of triturations powder, which had been prescribed sugar, weight of each powder was increased by triturations. Give a critical evaluation process for preparing powders.
Answer. Since in the recipe was registered sugar, it should reduce the number of the mass triturations.
5. As a pharmacy assistant in the room are available triturations platifillin hydrotartrate 1:10 and 1: 100. What are appropriate to take to prepare 12 powder, which is prescribed to 0,002 toxic substances and 0.25 sugar?

Answer. Total weight platifillin = 0.002 · 12 = 0,024. Use the lowest triturations need. In this case, using 1:10 triturations should take her 0,024 x 10 = 0.24 and triturations 1: 100:
· 0.024 · 100 = 2.4. As may weigh 0.24, you should use triturations 1:10.

8.Materials for audience independent preparation:
List of educational individual practical tasks to be performed during the practical classes:

A set of individual tasks

1. Take:	Atropine Sulphate 0.0005 phenobarbital 0.02 Sugar 0.3 Mix to form a powder Give such doses number 30 Mark. 1 powder 3 times a day.	2. Take:	Codeine phosphate 0.015 diphenhydramine 0.05 analginum 0.25 Mix to form a powder. Give such doses number 10. Mark. 1 powder pain
3. Take:	Codeine phosphate 0.18 camphor 0.3 Sugar 3.0 Mix to form a powder. Sections of the number at 10. Give. Mark. 1 powder 2 times a day	4. Take:	Atropine Sulphate 0.0002 Papaverine hydrochloride 0.02 benzocaine 0.25 Mix to form a powder Give such doses number 6 Mark. 1 powder 3 times a day
5. Take:	Atropine Sulphate 0.0003 Ephedrine Hydrochloride 0.05 Glucose 0.2 Mix to form a powder Give such doses number 6 Mark. 1 powder 3 times a day	6. Take:	Platifillin hydrotartrate 0,003 Papaverine hydrochloride 0.02 Ascorbic acid 0.05 Glucose 0.2 Mix to form a powder Give such doses number 10 Mark. 1 powder 3 times a day
7. Take:	Platifillin hydrotartrate 0,003 Papaverine hydrochloride 0.02 Sugar 0.2 Mix to form a powder Give such doses number 30 Mark. 1 powder 3 times a day	8. Take:	benzocaine 6.0 Papaverine hydrochloride 0.6 novocaine 0.3 Mix to form a powder. Sections of the number at 20. Mark. 1 powder 3 times a day

9. Take:	Atropine Sulphate 0.0002 Papaverine hydrochloride 0.02 benzocaine 0.25 Mix to form a powder Give such doses number 10 Mark. 1 powder 3 times a day	10. Take:	Atropine Sulphate 0.0003 phenobarbital 0.02 theophylline 0.1 Sugar 0.2 Mix to form a powder Give such doses number 6 Mark. 1 powder 3 times a day
11. Take:	Platifillin hydrotartrate 0,001 phenobarbital 0,005 Sugar 0.3 Mix to form a powder. Give such doses number 5. Mark. 1 powder 3 times a day. The child is 8 years	12. Take:	phenobarbital 0.03 Ephedrine Hydrochloride 0.02 Caffeine sodium benzoate Glucose 0.1 Mix to form a powder Give such doses number 6 Mark. 1 powder 3 times a day
13. Take:	Platifillin hydrotartrate 0,002 Dibazolu 0.02 Sugar 0.3 Mix to form a powder Give such doses number 10 Mark. 1 powder 3 times a day	14. Take:	1.5 Osarsolu Glucose 6.0 Boric acid 0.6 Mix to form a powder Sections of the level of number 6 Give. Mark. Dusting
15. Take:	Platifillin hydrotartrate 0,005 theophylline 0.1 Sugar 0.3 Mix to form a powder Give such doses number 10 Mark. 1 powder 3 times a day	16. Take:	phenobarbital 0.02 Caffeine sodium benzoate 0.1 Acetylsalicylic acid 0.3 Mix to form a powder. Give such doses number 30 Mark. 1 powder 3 times a day
17. Take:	diphenhydramine 0.03 Ephedrine Hydrochloride 0.02 Calcium gluconate 0.25 Mix to form a powder Give such doses number 6 Mark. 1 powder 3 times a day	18. Take:	phenobarbital 0.05 Papaverine hydrochloride 0.06 analginum 0.25 Mix to form a powder Give such doses number 10 Mark. 1 powder 3 times a day.

19. Take:	Platifillin hydrotartrate 0,002 Dibazolu 0.02 0.3 analginum Mix to form a powder Give such doses number 12 Mark. 1 powder 3 times a day	20. Take:	diphenhydramine 0.05 routine 0.03 Calcium lactate 0.03 Ascorbic acid 0.1 Mix to form a powder Give such doses number 30 Mark. 1 powder 3 times a day

9. Instructional materials for acquiring professional skills:

9.1. Methods of work performance stages.

Each student performs the same task with the proposed set of individual tasks. Write down the recipe and place an accordance with MOH Ukraine number 360 of 19/07/05 p. Describe drugs. Check the single and daily doses of toxic and potent substances. Describe the best option technology with theoretical substantiation give an assessment of its quality. Specify design it to leave. Bring norm tolerances when weighing these powders. Please written passport control.

10. Materials for self-control of skills provided by this work.

10.1. Tests of different levels (or tests that are part of the bank for the Rector control).

Tests of different levels

1. Finish the sentence:

Pre-prepared mixture of toxic and potent drugs with fillers is...

Answer. **triturations**

2. Pick-up a match

Name and mass triturations

Mass drug / excipient substance

1. Atropine sulphate (1: 100) 5.0
2. Atropine sulfate (1: 100) 50.0
3. Atropine Sulphate (1:10) 5.0
4. Atropine Sulphate (1:10) 50.0

A. 5.0 / 45.0
B 0.5 / 49.5
C. 0.05 / 4.95
D. 0.5 / 4.95

3. When producing powders, which registered atropine sulfate in quantities of 0,003 for the entire recipe should be used triturations, because

A. atropine sulfate - a toxic substance.
B. The first statement is correct, the second wrong

C. The first statement is wrong, second right
D. First and second assertions are correct and there is a connection between them
E. First and second assertions are correct, but there is no connection between them
H. Both statements are incorrect

11. The theme of next lesson.

Production of complex powders with colorful, fragrant and hardly crushed substances

Topic of the lesson 4: «Production of complex powders with colorful, fragrant and hardly crushed substances» – 2 hours.

1. Relevance of the topic : Complex powders with coloring, aromatic and hard-to-grind medicinal substances require special technology, which is caused by physical and chemical properties of the ingredients. Getting the skills of preparing difficult powders on the basis of physical and chemical properties of drugs, use of gelatin capsules mask the unpleasant taste and odor to their packaging makes it possible not only to improve the quality of powders but also to increase productivity in the pharmacy and this explain need to study the subject.

2. Subject of the lesson:

2.1. General objectives:

To learn how to prepare a complex of fragrant powders, coloring drugs and hard-to-grind materials. Assess the quality and arrange to leave.

2.2. Educational objectives:

Formation of professionally important characteristics and personality traits of future pharmacists. Educating students in professional liability in the manufacture of drugs.

2.3. Specific goals:

- to know:

- Classes of coloring drugs. List of coloring and odorous substances and their storage requirements by MOH ordered Ukraine from 16.03.93 №44.
- Technology features of powders with coloring substances and sanitary conditions of their preparation.
- Disciplines of odorous substances to the dosage forms. Features packing powders with volatile substances.
- List of hard-to-grind drugs. The reasons for the use of auxiliary fluids to improve their dispersion.
- Characteristics of hard gelatin capsules; use cases for packaging powders.

2.4. Based on theoretical knowledge on the topic:

- master the methods / be able to:

- Evaluate the accuracy of writing prescriptions and to inspect doses of toxic and potent substances.
- To use the State Pharmacopoeia, other regulatory documents and reference books to find the necessary information about the complex technology of coloring powders, fragrant and hard-to-grind drugs, extracts and semi.
- Count the number of drugs for the preparation of complex powders.
- Choose and justify optimal technology complex powders for individual words from the abovementioned substances.
- Perform basic process steps of preparation of complex powders with coloring, aromatic and medicinal substances hard-to-grind (weigh, grind, mix, dispense).

- Perform basic process steps of preparing powdered extracts (dry, dense, solutions of extracts Goose) and semi (weigh, grinding-mates, mix, dispense).
- Evaluate the quality of prepared powder, pack and arrange them for release.
- Fill written passport control.

3. Materials of before class of independent preparation (interdisciplinary integration).

number	**Discipline**	Know	Be able
1.	**2.**	3.	4.
I.	1. Biology	Features of the structure, function and interaction of bodies of humans.	To define different processes that take place in human.
	2. Chemistry (inorganic, organic)	Characteristic elements.	To define, write formulas and chemical reactions, perform calculations concentration solutions.
	3. Physical and Colloid Chemistry.	The solubility of solids and liquids in liquids. Raoult's Law. Extraction. Buffer solutions.	Conduct fractional distillation.
	4. Latin	Basics of grammar.	To be able to write in Latin names of drugs and medicines.
	5. Pharmacy Drug Technology	Technology preparation of various dosage forms. Disciplines medicinal substances and excipients in the dosage form.	Choose the best option according to the technology and prepare it with stepwise drug quality assessment;
II.	The following subjects 1. Organization and Economy of Pharmacy.	Contemporary forms of prescription forms. The order of pharmacies.	Distinguished form №1, №2, №3 prescription forms. Take recipes of various shapes and then organize work with them.
	Tech industrial production of drugs	General technology complex powders The general principles of selection of excipients	Pick Excipients in powders and evaluate their quality Prepare complex solid

		Mixing technology	dosage forms
III	Intersubject integration Plant collections		

4. Content themes (text or abstracts), logical structure of employment.

Powders are one of the most ancient medicinal forms that were used in medical practice for 2500 - 3000 years BC and have not lost significance until now. Investigations of the extemporal formulation have shown that in the form of powders a very large number of different medicinal substances is prepared, depending on the specifics of the recipe of a region (city, district, region, region) and time of year.

The technology of powders is quite simple to execute. However, the knowledge acquired under the basic rules for the preparation of powders will serve as a basis for the study of more complex dosage forms such as suspensions, ointments, suppositories, pills, both pharmacy and factory production.

The widespread distribution of powders in medical practice is due to the definite advantages of them as a pharmaceutical form.

POWDERS OF COLORFUL DRUGS.

According to the Order of the Ministry of Health of Ukraine No. 44 dated March 16, 1993 (Annex 8), the group of colored drugs includes substances, as well as their solutions, mixtures, etc., leaving the colored tray on containers, closing devices, equipment and others. Items that are not washed off by ordinary sanitary-hygienic treatment. These medicinal substances include: ethacridine lactate (rivanol), diamond green, indigo carmine for injection, potassium permanganate, methylene blue, riboflavin (vitamin B2), furatsillin, acrylic, and others. Color medications should be stored in a special closet in tightly closed containers, individually by name.

The group of colored medicinal substances include substances that do not leave a colored trace on the container, sealing materials. They are preserved of course and powders with such substances are prepared according to the general rules for the preparation of complex powders. These medicinal substances include: quinolol, dermatol, protargol, collargol, and others.

The preparation of powders with coloring agents should be carried out in a separate mattress, in a separate workplace or on a table covered with a white sheet of paper. When weighing we use separate scales. Powders are prepared using the "three-layer" method (a colorant is placed between two layers of the uncoloured substance before mixing).

The packaging should be used so that the colorants do not contaminate the oral mucosa, for example, gelatin capsules.

Rp .: Riboflavin 0.05
Sodium salicylah 0,2
Misce fiat pulvis
Da tales doses No. 12
Signa For 1 powder 3 times a day

A complex dosage powder for internal use with a riboflavin-colored drug.

Calculation:
Riboflavin $0.05 \cdot 12 = 0.6$ g
Sodium salicylate $0,2 \cdot 12 = 2,4$ g
Cravings: $0.05 + 0.2 = 0.25$ g

In a mortar, put 2.4 g sodium salicylate, rub and pour into a capsule, leaving about half the amount (1.2 g) in the mortar. On special scales we weigh 0.6 g of riboflavin, add to the remaining salicylic sodium in a mortar, pour over a layer of sodium-sodic acid salicylate and only then carefully mix to homogeneity. In this order of work, the loss of colorant is reduced due to adsorption on the surface of the mortar and the filler, and also it is possible to get a homogeneous mixture faster. The resulting homogeneous powder is suspended in 12 doses of 0.25 g in parchment capsules, or, if there is an indication of the doctor in the recipe, released in gelatin capsules. Powders are made according to the general rules.

POWDERS WITH HEAVY-CRUSHED, FRAGRANT AND LETHAL DRUGS.

In the composition of complex powders, heavy-crushed medicinal substances (camphor, menthol, iodine, thymol, phenylsalicylate, sodium tetraborate, salicylic acid, streptocide) are often prescribed, which are appropriate to be crushed in the presence of alcohol or ether.

Rp .: Camphorae 0.1
Sacchari 0.25
Misce fiat pulvis
Da tales doses No. 10
Signa For 1 powder 3 times a day

Complex dosage powder for internal use, which includes a fragrant, volatile, heavy-crushed substance camphor.

Calculation:
Camphor $0.1 \cdot 10 = 1.0$ g
Ethyl alcohol 95% 10 drops.
Sugar $0,25 \cdot 10 = 2,5$ g
Weighing: $0,1 + 0,25 = 0,35$ g

It is advisable to prepare powders with such substances on a separate workplace, using separate scales and mortar. First, in a mortar, rub off 2.5 g of sugar and pour into a capsule. 1.0 g of camphor are triturated with 10 drops of 95% alcohol, after which in some methods, with a thorough mixing, add tart sugar. Stand up to 0,35 g and let go in parchment capsules.

The composition of the powders may include odorous drugs (both volatile and practically non-lethal), which are also stored separately in a special closet in a hermetically sealed container that is impermeable to odor. To fragrant medicinal substances include; iodoform, camphor, menthol, xeroform, thymol, phenol, and others. (see annex 7 to the order number 44 of the Ministry of Health of Ukraine dated March 16, 1993). When working, they should be weighed on individual scales, which are immediately wiped with cotton wool, moistened with alcohol or a mixture of alcohol with ether. Fragrant medicinal substances are added in the last resort.

QUALITY CONTROL

The assessment of the quality of the powders includes questioning, physical, organoleptic, chemical (selective) control and control during the holiday.

In assessing the quality of powders, first of all, the analysis of documentation (recipe, control panel), testing of compatibility of drugs, checking of doses of potent and poisonous drugs and the rules of drug release. Check the color, taste and smell of the properties of the incoming drugs. Determine the deviation in the mass of individual doses of permissible standards. Homogeneity is checked after pressing the head of the blender to a mass of powder (at a distance of 25 cm from the eye, there should be no visible individual particles, sequins). Looseness is checked by pouring powder from one capsule to another, while it should not be lacerated. Check the design of powders - the correspondence of labels, packaging.

5. Plan and organizational structure of employment.

Number	**The main stages of employment, their function and meaning.**	**Learning Objectives levels of assimilation.**	**Means of instruction and control.**	**Materials on methodological Secured Lock class visibility, control of knowledge of students.**	**Duration (in minutes or in%) of the total time employment.**
1	**2**	**3**	**4**	**5**	**6**
1	**Preparatory** - organizing classes - setting educational goals	I			15-20

2	- control the output level of knowledge - monitoring skills of students, their willingness to accept this material class **Basic** tasks	II, III		Slideshow table	50-60
3	**Final** -control of professional skills - supply results of studies - granting homework from sending literature	IV			15-20

6. Materials for methodological support classes.
6.1. The task source for self-knowledge skills
1. A pharmacist prepared solution of 20.0 g of thick extract of belladonna (1: 2). Specify how much alcohol he had taken:
A. 1.0 *
6.0 B.
10.0 C.
D. 12,0
E. 2,0

2. Pharmacist compounded powders. Which auxiliary liquid he has used as a grinding ingredient:
A. * Fenilsalitsylat
B. Sodium bicarbonate
C. furatsillin
D. Novocaine
E. Dibazol

3. Pharmacy got prescription for compounding powders, which include odorous substances. Indicate which of the following matters relating to odorous substances:
A. * Camphor
B. Fenilsalitsylat
C. Ethacridine lactate

D. streptocide
E. Bismuth nitrate core

4. The pharmacist received a prescription for powders with an extract of belladonna. Specify the amount of dry extract of belladonna should be used in powder technology:
Rp: Extr.Belladonnae 0,01
Papaverini hydrochloridi 0,02
sacchari 0,2
M.f. pulv.
Dtd№10
S. 1 powder 3 times a day
A. 0.20 *
B. 0,50
C. 0,46
D. 0,10
E. 0,15

5. The task is to prepare powders for prescription:
Rp: Camphorae 0,1
Glucosi 0,25
M.f. pulv.
Dtd N 10
S. 1 powder 3 times a day.
Choose the best technology option:
A. Glucose * wipe mortar, pour on the capsule crushed, in the presence of alcohol camphor, mix
B. In a mortar weigh camphor, add the glucose, mix
C. overwrite glucose mortar, pour in a capsule, crushed camphor, mix
D. Camphor placed between layers of glucose mix
E. Grind in a mortar glucose with alcohol, add camphor, mix

6. The pharmacist needs to prepare powders that contain menthol. How should he achieve the required degree of crushing menthol?
* A. grind with alcohol or ether
B. pound with glycerin or chloroform
C. pound with purified water
D. pound with other components of the recipe
E. Carefully grind with sugar

7. A pharmacist prepared powders comprising streptocide. Specify the correct way of adding the streptotside:
A. * rubs primarily with alcohol
B. Add as triturations

C. Use Method "three layers"
Add at the end D. and mixed to homogeneity
E. Add primarily by grinding with glycerin

8. A pharmacist prepared the powders by the prescription that contains an extract of belladonna 0,015 per dose, and took dry extract in ten doses:
A. 0.3 *
B. 0,15
C. 1,5
D. 0,2
E. 0,015

9. A pharmacist prepared from powder substance in a separate mortar on a separate workplace, using the "three layers" method .Specify a matter which is characterized by the technology?
* A. Methylene blue
B. Sulfur
C. Glucose
D. protargolum
E. Copper sulfate

10. To hard-to-grind substances include:
A. * Iodine, menthol, streptotsid, sodium tetraborate
B. camphor, menthol, boric acid, fenilsalitsylat
C. Menthol, streptocide, boric acid, magnesium oxide
D. streptocide, iodine, sodium tetraborate, riboflavin
E. Fenilsalitsylat, camphor, methylene blue, thymol

6.2. Necessary information for the formation of knowledge, skills can be found in textbooks:

Basic

- Technology drugs. Textbook: Textbook for Universities / AI Tikhonov, PA Logvyn, S. Tikhonov, A. Mazulin, TG Yarnyh, OS spiers, O. Mikhail Kotenko; Edited by AI Tikhonov - Kharkov: Pharmacy; Original, 2009. - 432 p.
- Technology Medicine: Textbook / A. Marchuk, NB Androshchuk - Kyiv: Health, 2008. - 488 p.

Additional

3. Soft medicinal forms: extemporaneous compounding: Guidelines / AI Tikhonov, T. Yarnyh, AV Lukienko etc .; Ed. OI Tikhonov. - H .: Izd pharmacy; Golden Pages, 2003.-128 with.

4. Aseptic drug forms, extemporaneous compounding: Guidelines / AI Tikhonov LV Bondarev, TG Yarnyh NF Orlovetska etc .; Ed. AI Tikhonov and T. Yarnyh. - H .: Izd pharmacy; Original, 2005. - 184 p.
5. Solid dosage forms: extemporaneous compounding: Guidelines / AI Tikhonov, T. Yarnyh, S. Gritsenko, etc .; Ed. AI Tikhonov - H .: Izd pharmacy; Golden Pages, 2003. - 176 p.
6. Liquid formulations: extemporaneous compounding: Guidelines / AI Tikhonov, T. Yarnyh NF Orlovetska etc .; Ed. AI Tikhonov and T. Yarnyh. - H .: Izd pharmacy; Original, 2005. - 160 p.

6.3. Table for independent work with literature on the lecture topic.

№№ pp	Main tasks	Directions	Responses (literature)
1	2	3	4
1.	Features of preparing powders with coloring substances	Provide a list of useful substances. Specify rules for dealing with them and ways to prepare powders.	1, 2
2.	Features of preparing powders of aromatic substances	Provide a list of odorous substances. Specify rules for dealing with them and prepare powders.	1, 2
3.	Terms of preparing powdered extracts	What types of extracts. Add features to work with extracts.	1, 2
4.	Containers and packaging material for fragrant powders, coloring substances and extracts	What packaging, packaging material and rules for the use of fragrant powders, coloring agents, extracts	1, 2
5.	Preparation of powders with semi	What are the main range of semi-finished products for making powders	1, 2
6.	Evaluation of the quality powders	Add documentation that normalize quality powders and key quality indicators	1, 2

7. Materials for self-training.

A. Questions

1. Determination of colouring and stained drugs. List of colouring, colored, fragrant drugs and their storage accordance with MOH Ukraine number 44 of 16/03/93 p.
2. Technology features of powders with coloring agents. Requirements for their production in accordance with orders of the MOH Ukraine 15.05.06 number 275 on p. 626 and the number of 15.12.2004.
3. List of odorous and volatile drugs, the rules of preparation and packaging of powders of these substances.
4. List of drugs. Use of auxiliary liquids in the preparation of these powders.
5. Selection of tare packing material depending on the physicochemical properties of drugs.
6. Characteristics of hard gelatin capsules, DF requirements for them. Use of cases for packing powders.
7. Characteristics of extracts and their classification.
8. Preparation of solutions extracts and dense storage.
9. Rules preparing difficult powders with dry, thick dense solution extracts and extracts.
10. Evaluation of the quality and design of the coloring powders, fragrant, volatile, hard-to-grind drugs and extracts as required documentation.
11. Biopharmaceutical aspects of the technology of solid dosage forms.

B. Tests for self-control with standard answers.

1. The pharmacy should prepare powder containing 0.02 g of extract of belladonna. What amount of dry belladonna extract powders (1: 2) pharmacist weighed for the preparation of 10?

A. 0.4 g *
B. 0,6 g
C. 0,5 g
D. 0,8 g
E. 0,2 g

2. A pharmacist is preparing powders with riboflavin. What type of adding riboflavin powder he should choose to the mix?

A. * use method "three layers"
B. Use pre-screened riboflavin
C. Use Mixing principle from smallest to largest
D. Use mixing principle from largest to smallest
E. Riboflavin make over prepared mixture of powders

3. Pharmacy got the prescription for preparation of powders with instructions to release the powder in gelatin capsules. Specify a substance listed part of these powders:

A. ethacridine lactate *
B. Magnesium oxide
C. streptocide
D. Diphenhydramine

E. Glucose

4. A pharmacist prepares powder using "three layers" method. Indicate which is substances characteristic of this technology:

A. * Riboflavin

B. Glucose

C. Analgin

D. Ascorbic acid

E. Sodium bicarbonate

5. Pharmacy got prescription for preparation of complex powders comprising coloring substance. Indicate which of the following compounds are part relates to powder coloring matters:

A. * ethacridine lactate (rivanolum)

B. Camphor

C. streptocide

D. Bismuth nitrate core

E. protargolum

6. Calculate the dry extract of belladonna (1: 2) to prepare dosage forms:

Extrasti Belladonnae

Rp .: 0,015

Magnesii oxydi 0,5

Natrii hydrocarbonatis 0,2

Misce ut fiat pulvis

Da tales doses №10

Signa. 1 powder 3 times a day.

A. 0.3 *

B. 0,15

C. 0,4

D. 0,6

E. 0,015

7. This substance has a blue color, but leaves a coloring trace; powders it is prepared by the general rules. Add this matter:

A. * Copper sulfate

B. Ethacridine lactate

C. Riboflavin

D. Mepacrine

E. furatsilline

8. Add the required amount of ethyl alcohol to grind thymol 1.0:

A. * 10 drops

B. 5 drops

C. 8 drops

D. 15 drops

E. 20 drops

9. Select the list of substances of hard-to-grind matter:

A. * Menthol

B. Analgin
C. protargolum
D. Potassium iodide
E. Calcium chloride
10. Add a drug that is ground with the addition of volatile solvents:
A. * streptocide
B. Dibazol
C. Magnesium oxide
D. Bismuth nitrate core
E. Riboflavin
11. Handheld scales to weigh the filter paper circles:
* A. belladonna extract thick
B. dry extract of belladonna
C. protargolum
D. Iodine
E. Menthol
12. Calculate and specify the amount of extract of belladonna thick for making powders for prescription:
Rp .: Extracti Belladonnae 0,015
Papaverini hydrochloridi 0,02
sacchari 0,3
Misce, fiat pulvis
Da tales doses № 10
Signa. 1 powder 3 times a day
A. 0.15 *
B. 1,5
C. 0,3
D. 0,25
E. 0,015
13. Colored substances include:
A. Dermatol *
B. Zinc oxide
C. Potassium iodide
D. Riboflavin
E. Calcium chloride

C. Tasks for self-control with answers.
Situational tasks

1. The menthol sugar is prescribed in the recipe. Pharmacist grind it in order of prescription. What the optimal technology should be used?
Answer. It was necessary to grind the sugar first then put it into a capsule in a mortar chop menthol with alcohol, then add the sugar capsule.
2. Powders with a drying agent and dye eufillina ethacridine lactatepharmacist dozed device TK-3. Can I use dosing spoon in this case?

Answer. No, you can not because the coloring substance ethacridine lactate polluting equipment.
3.When preparing the first compound powders in a mortar was crushed riboflavin and glucose. Powders were released in simple capsules. Give a critical appraisal of the pharmacist.
Answer. First you need to grind glucose and riboflavin should grind between layers of glucose. Let these powders need to parchment capsules or the consent of a doctor in gelatin.
4.Preparing powders of iodine pharmacist immediately weighed it on the cup weights. What was his mistake?
Answer. Iodine - a strong oxidant that can spoil when exposed equipment. Iodine is necessary to weigh the filter paper circle.
5.Preparing powder of salicylic acid, a pharmacist mixed ingredients of prescription by general rules. Why after that he began to tear his eyes?
Answer. Salicylic acid sprayed much when grinding dand irritated the mucous membranes. It is necessary to grind with alcohol or ether.

8.Materials for audience independent preparation:
8.1. List of educational practical tasks to be performed during the practical (laboratory) classes:

1. Take:	Iodi 0.05 Sodium bicarbonate Sodium tetraborate to 5.0 Mix to form a powder Mark. To rinse.	2. Take:	Herb extract 0,015 hexamethylenetetramine Fenilsalitsylatu 0.25 Mix to form a powder. Give such doses number 6. Mark. 1 powder 2-3 times a day
3. Take:	riboflavin 0,015 Thiamine bromide 0.03 0.1 nicotinic acids Glucose 0.25 Mix to form a powder Give such doses number 6 Mark. 1 powder 2 times a day after meals.	4. Take:	Herb extract 0,015 phenobarbital 0.05 Papaverine hydrochloride in 0.03 Sugar 0.2 Mix to form a powder. Give such doses number 6. Mark. 1 powder 2-3 times a day

5. Take:	Menthol 0.2 streptocide Norsulfazola to 3.0 Mix to form a powder Mark. Respirable when cold.	6. Take:	Herb extract 0,015 Ephedrine Hydrochloride 0.02 Calcium gluconate 0.25 Sugar 0.2 Mix to form a powder. Give such doses number 6. Mark. 1 powder 2-3 times a day
7. Take:	Methylene blue 0.05 Sulfatsil sodium 0.2 Mix to form a powder Give such doses number 10 in gelatin capsules Mark. 1 capsule 2 times a day	8. Take:	Herb extract 0,015 diphenhydramine 0.03 0.2 analginum Mix to form a powder. Give such doses number 6. Mark. 1 powder 2-3 times a day
9. Take:	camphor 0.2 Boric acid 1.0 Starch 5.0 Mix to form a powder Mark. Give. Dusting	10. Take:	Herb extract 0.02 benzocaine 0.2 Magnesium oxide 0.3 Mix to form a powder. Sections of at number 6. Mark. 1 powder 2 times a day
11. Take:	Codeine phosphate 0.02 camphor 0.03 Sugar 0.25 Mix to form a powder Give such doses number 6 Mark. 1 powder 3 times a day	12. Take:	herb extract Papaverine hydrochloride 0,015 Camphor 0.2 Mix to form a powder. Give such doses number 6. Mark. 1 powder 2-3 times a day
13. Take:	camphor 0.05 Sugar 0.25 0.1 analginum Mix to form a powder Give such doses number 6 Mark. 1 powder 3 times a day	14. Take:	Methylene blue 0.05 Sodium salicylate Hexamethylenetetramine 0.2 Mix to form a powder Give such doses number 10 in gelatin capsules Mark. 1 capsule 2 times a den

9. Instructional materials for acquiring professional skills:
9.1. Methods of work performance stages.

Write down the recipe and place an accordance with MOH Ukraine number 360 of 19/07/05 p. Describe drugs. If a prescription toxic and potent substances and check single daily dose. Describe the best option technology with theoretical substantiation give an assessment of its quality. When using it extract provide consistency. Specify its design to release. Bring norm tolerances when weighing these powders. Please see the written passport control.

10. Materials for self-mastery of knowledge provided by this work.

10.1. Tests of different levels

Tests of different levels

1. Salicylic acid is ground in the presence of alcohol in connection with the fact that salicylic acid has strong large crystals.
A. The first statement is correct, the second wrong
B. The first statement is wrong, second right
B. First and second assertions are correct and there is a connection between them
D. First and second assertions are correct, but there is no connection between them
D. Both statements are incorrect
2. Pick a pair:

Medicinal substance	**Features of the technology**
1. Camphor 2. Sulfur 3. Magnesium oxide 4. Sodium tetraborate 5. Riboflavin	A. Does not require additional crushing B. Shredded with auxiliary liquids, because it has a scaly structure B. Released in parchments capsules G. Grinds between layers of others powders D. Shreds simultaneously with other substances, because it is strong Electrified.

11. The theme of the next session.

Production of complex powders with extracts and semi-finished products

Topic of the lesson 5: «Production of complex powders with extracts and semi-finished products» – 2 hours.

1. Relevance of the topic: In the extemporal formulation of pharmacy powders make up more than 15% due to its positive qualities: ease of preparation, ease of use, accuracy of dosage, versatility of the composition. In addition, new drugs for which the starting and experimental industrial regulations have not yet been developed are prescribed for individual prepareing in pharmacies which explains the need to study the technology of this dosage form.

2. Subject of the lesson: Learn how to prepare simple and complex powders with extracts and semi-finished products, calculate quantity, evaluate their quality and make up for release.

2.1. General objectives:

• To orient in the main directions of state regulation of the production of medicinal products.

• To orientate in the structure and content of the State Pharmacopoeia of Ukraine.

2.2. Educational objectives:

• Evaluate the correctness of recipe prescribing in different ways: Distributive and Separate.

• Use the State Pharmacopoeia, other normative documentation and reference literature to find the necessary information on the preparation of simple and complex powders with extracts and semi-finished products.

2.3. Specific goals:

to know:

- Characteristics of extracts used in powders, their classification according to the State Pharmacopoeia.
- Preparation of solutions of thick extracts, conditions and duration of storage.
- Technology features of complex powders with dry, thick and dense solutions of extracts.

2.4. Based on theoretical knowledge on the topic:

• Calculate the amount of drugs for the preparation of simple and complex powders.

• To choose and substantiate the optimum technology of complex powders on an individual basis.

• Carry out basic technological operations for the preparation of simple and complex powders with extracts and semi-finished products.

• Pick up the packaging material according to the properties of the ingredients and make the preparation ready for use.

• Evaluate the quality of the prepared powders and write a written passport of control.

3. Materials of before class of independent preparation (interdisciplinary integration).

Disciplines	To know	To be able
1. Preliminary		
Latin	Basics of grammar. Spelling Latin names of medicines and chemicals, herbs, families, and raw materials of vegetable and animal origin. Recipe.	Evaluate the accuracy of prescriptions
Anatomy and Physiology	The structure and functional properties of the body at different levels: molecular, cellular, organ system.	Evaluate the functional state of the organism as a whole and individual organs and systems
General and Inorganic Chemistry	The main provisions of the atomic-molecular theory.	Calculate the molar mass and equivalent compounds.
Physics	Physical methods of analysis of drugs.	Identify key quality hard drugs.
Organic chemistry	Physical, chemical properties of organic compounds and basic methods of analysis.	Conduct elemental analysis and identification of organic compounds.
Analytical chemistry	Methods of qualitative and quantitative analysis of inorganic and organic substances	Perform qualitative and quantitative analysis of individual substances and mixtures, make the necessary calculations for data analysis.
2. The following		
Organization and economics of pharmacy	General technology complex powders	Make payments dosage, excipients
Tech industrial production of drugs	The general principles of selection of excipients	Pick Excipients in powders and evaluate their quality

3. Intersubjective integration Plant collections	mixing Technology	Prepare complex solid dosage forms

4. Content themes (text or abstracts).

Powders - one of the most ancient medicinal forms that was used in medical practice for 2500 - 3000 years BC and have not lost significance until now. Investigations of the extemporal formulation have shown that in the form of powders a very large number of different medicinal substances is prepared, depending on the specifics of the recipe of a region (city, district, region, region) and time of year.

The technology of powders is quite simple to execute. However, the knowledge acquired under the basic rules for the preparation of powders will serve as a basis for the study of more complex dosage forms such as suspensions, ointments, suppositories, pills, both pharmacy and factory production.

The widespread distribution of powders in medical practice is due to the definite advantages of them as a pharmaceutical form.

POWDERS WITH DRY AND DENSE EXTRACTS.

The preparation of complex powders with extracts, which are concentrated extracts from the medicinal plant material, depends on the properties of the extract used and its consistency. In the technology of powders, the extract of belladonna is very common. SF contains two preparations of the extract of belladonna: a thick, containing 1.5% of alkaloids, and a dry, containing 0.75% of alkaloids, ie 2 parts of dry extract is equal to 1 part of the thick extract (1: 2).

Dry extract

In the absence of a dry extract for the convenience of work in pharmacies, a solution of the extract extract - Extractum Belladonnae solutum (1: 2), which is prepared by the name is allowed to be used: 100.0 g of the thick extract is dissolved in a mixture of 60.0 g of water, 10.0 g of 90 % ethanol and 30.0 g of glycerol. Water is the main solvent, glycerin plays the role of peptize. It protects colloidal solutions and solutions of macromolecular compounds formed during the dissolution of the extract, from coagulation, aging. Ethyl alcohol improves the dissolution of the extract and also acts as a preservative. When stored the solution of the extract is less stable than the original thick extract. Therefore, the solution is allowed to prepare for no more than 15 days.

The solution of the extract of belladonna thick as well as dry is used in duplicate in relation to the prescription.

Rp .: Extracti Belladonnae 0.01
Papaverini hydrochloride 0.02
Sacchari 0.2
Misce fiat pulvis

Da tales doses No. 10
Signa For 1 powder 3 times a day

In the absence of instructions in the recipe on the consistency of the extract, the belladonna always means dense. The most convenient and least complicated is the preparation of powdered dry extracts, which are prepared according to the general rules.

Calculation using a dry extract of a belladonna:
Extract of dry belladonna (1: 2) 0.01 · 2 · 10 = 0.2 g
Papaverine hydrochloride 0,02
· 10 = 0,2 g
Sugar 0,2 · 10 = 2,0 g
Weighing: 0,02 + 0,02 + 0,2 = 0,24 g

In a mortar thoroughly rub 2,0 g of sugar, pour into a capsule, leaving about 0,2 g (equal to the amount of dry extract of belladonna), then add 0,2 g extract of dry belladonna (1: 2), thoroughly rub and to the resulting mixture at 0.2 g of papaverine hydrochloride is added to the stirring, mixed several times, removing the powder from the walls of the mortar and the filler, then add the remaining amount of the crushed sugar and mix well again. Control the quality of grinding and mixing visually. The resulting mixture is suspended at 10 doses of 0.24 g.

Powders are packaged in paraffin capsules (sugar and extract of belladonna - hygroscopic substances). Draw the same as above.

Dense extracts

Dense extracts are not very convenient for practical use. At their dosage there are significant losses.

Rp .: Extracti Belladonnae 0.015
Magnesium oxide 0.5
Sodium hydrocarbonate 0.2
Misce fiat pulvis
Da tales doses No. 12
Signa For 1 powder 3 times a day

Calculation using a thick extract of belladonna:
Extract of belladonna thick 0,015 · 12 = 0,18 g
Magnesium oxide 0,5 · 12 = 6,0 g
Sodium bicarbonate 0,2 · 12 = 2,4 g
Weighing: 0,015 + 0,2 + 0,5 = 0,71 g

On a hand-made scales on a circle of filtered paper with a spat we weigh 0.18 g of a thick extract of belladonna. After weighing, stick the extract to the head of the blender along with the paper. Separate the paper wetting it with a few drops of the appropriate solvent (with aqueous extract - water, and with alcohol-water - 40-70% alcohol). Having leaked with a solvent the circle is easily separated from the extract leaving it on the filler. In an empty mortar, pre-rubbed with sodium bicarbonate, add 5-6 drops of 95% alcohol and rub it with an extract to form a homogeneous thick liquid. Then gradually add sodium bicarbonate and in the last turn magnesium oxide, allow the solvent to evaporate and mix until a homogeneous powder mass is obtained. If you need quickly to remove the solvent, then lightly heat the mortar.

Calculation using a solution of a dense extract:
The solution of a dense extract of belladonna (1: 2)
$0.18 \cdot 2 = 0.36$ g = 18 cups.
(0.1 g of dense extract - 5 drops).
Sodium hydrogen carbonate 2.4 g
Magnesium oxide 6.0 g
Weighing: $(0{,}015 \cdot 2) + 0{,}5 + 0{,}2 = 0{,}73$ g

In a mortar rub 2.4 g sodium bicarbonate, then add 18 drops of a solution of a thick extract of baldonium evenly distributing it along the whole surface of the powder, leave for several minutes to dry. Add 6.0 g of magnesium oxide and mix thoroughly to homogeneity.

Control panel
Date Recipient No
Sodium hydrocarbonatis 3.0
Extracts of Belladonnae (1: 2) gtts XVIII
Magnesium oxide 6.0
0.73 No. 12
Prepared by: (signature)
Checked out: (signature)
Released (signature)

It is convenient to use a solution of belladonna extract if the powder mixture contains substances with high adsorption capacity and poorly soluble in water (magnesium oxide, magnesium carbonate, starch, phenylsalicylate, etc.). Otherwise wet bundles are formed which are laced and difficult to disperse. Powders containing extracts due to their hygroscopicity are released in waxy or paraffinic capsules.

SEMI-FINISHED POWDERS.

Semi-finished products are special intra-pharmacy blanks of powder mixtures of two or more medicinal substances made in the same ratios as the most frequently occurring prescriptions. When prepareing medicines to the appropriate half-finished products add one or another ingredient according to the prescription form.

The use of semi-finished products, which are technically processed by semi-finished products, significantly reduces the time spent on the preparation of complex powders and contributes to improving their quality and expediting the release of drugs from the pharmacy.

In the form of semi-finished preparations only those medicinal preparations that are most often repeated in prescriptions of pharmacies and are rational (in terms of their compatibility) combinations of medicinal substances which do not change at storage for a certain time are prepared. Periodically prefabs are reviewed. For each half-finished product, the conditions and the admissible maximum storage period must be established.

In order to protect the semi-finished products from flaking, they should be filled in the stems to the top fully possible. When stored in a pharmacy they must be periodically mixed in a mortar.

An example of the use of a half-finished product in the pharmacy's work is the preparation of a medicinal product with the following words:

Rp .: Dimedroli 0.02
Papaverine hydrochloride 0.02
Glucose 0,3
Misce fiat pulvis
Da tales doses No. 20
Signa For 1 powder 3 times a day

The pharmacy has a semi-finished product - papaverine hydrochloride and dimedrol equally.

Calculation:
Dimedrol = 0.02 · 20 = 0.4 g
Papaverine hydrochloride = 0,02 · 20 = 0,4 g
of the mixture = 0,4 + 0,4 = 0,8 g
Glucose 0.3 · 20 = 6.0 g
Weighing: 0,02 + 0,02 + 0,3 = 0,34 g

Prepare the rule for mixing complex powders. In a mortar, rub off 6.0 g of glucose, and partly pour into a capsule, leaving about 0.8 g in the mortar. Add 0.8 g of the semi finished product and mix thoroughly to homogeneity, then add the rest of the amount of crushed glucose. Stand up to 0,34 g for 20 doses in paraffin capsules. Make up for leave.

The assessment of the quality of the powders includes questioning, physical, organoleptic, chemical (selective) control and control during the holiday.

In assessing the quality of powders, first of all, the analysis of documentation (recipe, control panel), testing of compatibility of drugs, checking of doses of potent and poisonous drugs and the norm of drug-drug release is carried out. Check the color, taste and smell of the properties of the incoming drugs. Determine the deviation in the mass of individual doses of permissible standards. Homogeneity is checked after pressing the head of the blender to a mass of powder (at a distance of 25 cm from the eye, there should be no visible individual particles, sequins). Browsiness is checked by pouring powder from one capsule to another, while it should not be lacerated. Check the design of powders and the correspondence of labels, packaging.

5. Plan and organizational structure of employment.

Number	**The main stages of employment, their function and meaning.**	**Learning Objectives levels of assimilation.**	**Means of instruction and control.**	**Materials on methodological Secured Lock class visibility, control of knowledge of students.**	**Duration (in minutes or in%) of the total time employment.**
1	**2**	**3**	**4**	**5**	**6**
1	**Preparatory** - organizing classes - setting educational goals - control the output level of knowledge - monitoring skills of students, their willingness to accept this material class	I		Slideshow table	15-20
2	**Basic** tasks	II, III			50-60
3	**Final** -control of professional skills - supply results of studies - granting homework from sending literature	IV			15-20

6. Materials methodological support classes.

6.1. The task source for self-knowledge skills

1. The pharmacist received a prescription for powders with an extract of belladonna. Specify the amount of dry extract of belladonna should be used in powder technology:

Rp: Extr.Belladonnae 0,01
Papaverini hydrochloridi 0,02
sacchari 0,2
M.f. pulv.
Dtd№10
S. 1 powder 3 times a day
A. 0.20 *
B. 0,50
C. 0,46
D. 0,10
E. 0,15

2. A pharmacist prepares powders with hard-to-grind material. Specify with what substance should be ground a volatile liquid?

A. * Camphor
B. Magnesium oxide
C. Zinc sulfate
D. Copper sulfate
E. Glucose

3. Pharmacist compounded powders which include camphor. What capsule should be taken for their packaging?

A. * Butter
B. Paper
C. Paper
D. Paraffin
E. cellophane

4. Pharmacist compounded by prescription medication. Choose the best option Technology:

Rp .: Magnesii oxydi
Natrii hydrocarbonatis ana 0,2
M. f. 70ulv.
D. td №12
S. 1 powder 3 times a day.
A. * grind sodium bicarbonate added magnesium oxide, mixed.
B. grind magnesium oxide, sodium bicarbonate is added, mixed.
C. grind sodium bicarbonate with alcohol added magnesium oxide, mixed.
D. grind of magnesium oxide, sodium bicarbonate added, then the balance of magnesium oxide, mixed.
E. grind magnesium oxide with alcohol added sodium bicarbonate, confused.

5. Pharmacist compounded by prescription medication,
Rp .: Papaverini hydrochloridi 0,01
Sachari 0,25
Mf pulv.
Dtd №10
S. 1 powder 3 times a day. Expect a lot of other powder
A. * 0,26
B. 0,23
C. 0,22
D. 0,28
E. 0,25

6. When prepareing powders in conditions of pharmacies into account physical and chemical properties of individual ingredients. Please indicate which drug is mixed with a powder without further crushing weight:

A. * Starch
B. Camphor
C. Menthol
D. salicylic acid
E. streptocide

7. Pharmacy got prescription for compounding powders, which include odorous substances. Indicate which of the following matters relating to odorous substances:

A. * Camphor
B. Fenilsalitsylat
C. Ethacridine lactate
D. streptocide
E. Bismuth nitrate core

8. The drug received a prescription for powders with an extract of belladonna. Specify the amount of dry extract of belladonna should be used in powder technology:

Rp: Extr.Belladonnae 0,01
Papaverini hydrochloridi 0,02
sacchari 0,2
M.f. pulv.
Dtd№10
S. 1 powder 3 times a day
A. 0.20 *
B. 0,50

C. 0,46
D. 0,10
E. 0,15

9. Necessary to prepare powders for prescription:

Rp: Camphorae 0,1
Glucosi 0,25
M.f. pulv.
Dtd N 10
S. 1 powder 3 times a day.
Choose the best option technology:
A. Glucose * wipe mortar, pour on the capsule crushed, in the presence of alcohol camphor, mix
B. In a mortar weigh camphor, add the glucose, mix
C. overwrite glucose mortar, pour in a capsule, crushed camphor, mix
D. Camphor placed between layers of glucose mix
E. Grind in a mortar glucose with alcohol, add camphor, mix

10. The pharmacist needs to prepare powders that contain menthol. In what way a pharmacist must achieve the required degree of crushing menthol?

* A. grind with alcohol or ether
B. pound with glycerin or chloroform
C. pound with purified water
D. pound with other components of the recipe
E. Carefully grind with sugar

6.2. Information necessary for the formation of knowledge, skills can be found in textbooks:

Basic

- Technology drugs. Textbook: Textbook for Universities / AI Tikhonov, PA Logvyn, S. Tikhonov, A. Mazulin, TG Yarnyh, OS spiers, O. Mikhail Kotenko; Edited by AI Tikhonov - Kharkov: Pharmacy; Original, 2009. - 432 p.
- Technology Medicine: Textbook / A. Marchuk, NB Androshchuk - Kyiv: Health, 2008. - 488 p.

Additional

7. Soft medicinal forms: extemporaneous compounding: Guidelines / AI Tikhonov, T. Yarnyh, AV Lukienko etc .; Ed. OI Tikhonov. - H .: Izd pharmacy; Golden Pages, 2003.-128 with.
8. Aseptic drug forms, extemporaneous compounding: Guidelines / AI Tikhonov LV Bondarev, TG Yarnyh NF Orlovetska etc .; Ed. AI Tikhonov and T. Yarnyh. - H .: Izd pharmacy; Original, 2005. - 184 p.

9. Solid dosage forms: extemporaneous compounding: Guidelines / AI Tikhonov, T. Yarnyh, S. Gritsenko, etc .; Ed. AI Tikhonov - H .: Izd pharmacy; Golden Pages, 2003. - 176 p.
10. Liquid formulations: extemporaneous compounding: Guidelines / AI Tikhonov, T. Yarnyh NF Orlovetska etc .; Ed. AI Tikhonov and T. Yarnyh. - H .: Izd pharmacy; Original, 2005. - 160 p.

6.3. Table for independent work with literature on the lecture topic.

№	The main tasks	Instructions	Answers (literature)
1	**2**	**3**	**4**
1.	Powders as a dosage form	Give the definition of powders as a dosage form. Pouring rules	1, 2.
2.	Powder technology	What are the main technological stages of making complex powders?	1, 2.
3.	Rules for packing of powders	Name blocking materials and their selection rules	1, 2.
4.	Assessment of powders quality	What are the main quality indicators of powders?	1, 2.

7. Materials for self-training quality.

A. Questions

1. Determination of powders as dosage forms, their classification and requirements
2. Ways of prescribing powders in recipes.
3. Degree of shredding of medicinal substances in powders, depending on medical application.
4. Technological stages of preparation of simple and complex powders with extracts and semi-finished products.

B. Tests for self-control with standard answers.

Tests with answers

1. A pharmacist prepares powders with a hard-crushing substance. Indicate which substance is chopped with volatile liquid?

A. * Camphor
B. Magnesium oxide
C. Zinc sulfate
D. Copper sulphate
E. Glucose

2. The pharmacist has prepared powders, which include camphor. What capsules should I take to pack them?
A. * Parchment
B. Paper
C. Paper
D. Paraffin
E. Cellophane
3. A pharmacist has prepared a prescription drug. Specify the best technology option:
Rp .: Magnesium oxide 0.1
Sodium hydrocarbonatis ana 0,2
M. f. p.
D.T. d No 12
S. One powder 3 times a day.
A. * Grinded sodium bicarbonate, added magnesium oxide, mixed.
B. Shred magnesium oxide, added sodium bicarbonate, mixed.
C. Crumbled sodium bicarbonate with alcohol, added magnesium oxide, mixed.
D. Crush a portion of magnesium oxide, add sodium bicarbonate, then a residue of magnesium oxide, mixed.
E. Crumbled magnesium oxide with alcohol, added sodium bicarbonate, mixed.
4. A pharmacist has prepared a prescription drug:
Rp .: Papaverini hydrochloride 0.01
Sachar 0.25
M.f. powder
D.D. No. 10
S. One powder 3 times a day. Calculate the mass of one powder
A. * 0.26
B. 0.23
C. 0.22
D. 0.28
E. 0.25
5. When preparing powders in pharmacies, take into account the physical and chemical properties of individual ingredients. Indicate which drug substance is mixed with the powder mass without further grinding:
A. * Starch
B. Camphor
C. menthol
D. Acid salicylic acid
E. Streptocide

6. The pharmacy received the recipe:
Rp .: Dibazol 0.05
Papaverini hydrochloride 0.15
Sacchari 2.5

M. fiat pulv.
Divide in partes aequales No. 10. Specify the weight of one powder
A. * 0.27
B. 2,7
C. 0.25
D. 0.26
E. 0,30

7. Among preparations of extemporaneous preparation, considerable space is occupied by powders. Specify which of the following components is added to the powder without pre-shredding:
A. * Bismuth nitrate is basic
B. acid ascorbic acid
C. camphor
D. Xerox
E. calcium gluconate

8. A pharmacist prepares powders, rubbing one of the components of the prescription with alcohol. Specify what issubstance characteristic of this technology :
A. * Streptocide
B. Starch
C. Talc
D. Zinc oxide
E. Clay white

9. What medicinal substances should be chipped with auxiliary fluid in the production of powders?
A. * salicylic acid, sodium tetraborate, streptocide
B. glucose, sodium bicarbonate, dibasole
C. menthol, camphor, dermatol
D. iodine, magnesium oxide, salicylic acid
E. sodium tetraborate, thymol, zinc oxide

10. In the pharmacy are made of effervescent powders. Specify a substance that in addition to lemon acid is included in their composition.
A. * Sodium bicarbonate
B. Magnesium oxide
C. Sodium chloride
D. Sodium sulfate
E. Sugar

C. Tasks for self-control with answers.

1. Recipes contain powders of 6 to 0.1 ascorbic acid and 0.3 glucose per each. Pharmacist for prepareing 6 doses weighed 0,1 acid ascorbic acid and 0,3 glucose. Give a critical assessment of his actions.

Answer. The pharmacist incorrectly calculated the amount of ingredients. It is necessary to take $0{,}1 \cdot 6 = 0{,}6$ ascorbic acid and $0{,}3\ 6 = 1{,}8$ glucose

2. The pharmacist prepared complex powders and weighted it at a dose of 0.3. After checking the mass of three powders, the results were 0.31; 0.29; 0.3 Are deviations within the permissible limits?

Answer. Deviation is: 0.33%

According to the order number 626, for weight gain 0,3 g, the deviation should be ± 5%.

3. The prescription contains medicines in equal quantities that have a different crystalline structure. The mortar was initially crushed fine crystalline substances and then roughly crystalline. Evaluate the correctness of this preparing method.

Answer. The first one is to grind rough-crystalline substances because they have less losses in the mortar.

4. When checking individual doses of powders weighing 0.25 the mass deviation was ± 0.03. Can these pills be considered as prepared satisfactorily?

Answer. We expect a deviation of%:

Deviation is equal to: 5%

According to the order number 626, for a weight gain of 0,25 g, the deviation must be ± 5%, so the powders are prepared poorly.

5. The preset contains bismuth nitrate and sodium bicarbonate in equal amounts. In the process of preparation of powders, the pharmacist weighed and chopped in a mortar substance in the order of their prescription in the recipe. Did he choose the correct mixing of components?

Answer. Wrong. The first one was to grind sodium bicarbonate, because it has less losses when crushed in a mortar.

8.Materials for audience independent preparation:

8.1. List of educational practical tasks to be performed during the practical (laboratory) classes:

1. Take:	Boric acid 0.1 Ethacridine lactate 0.05 Sugar 0.15 Mix to form a powder Give such doses number 12 in gelatin capsules Mark. 1 capsule 3 times a day	2. Take:	Herb extract 0.06 Bismuth nitrate, basic 0.9 Sugar 1.2 Mix to form a powder. Sections of at number 6. Mark. 1 powder 3 times a day

3. Take:	Herb extract 0.12 Sodium bicarbonate 1.5 0.9 Fenilsalitsylatu Mix to form a powder. Sections of at number 6. Mark. 1 powder 2 times a day	4. Take:	Codeine 0.01 riboflavin 0.01 Ascorbic acid 0.2 Mix to form a powder Give such doses number 10 Mark. 1 powder 3 times a day
5. Take:	Herb extract 0,015 diphenhydramine 0.02 Camphor 0.2 Mix to form a powder. Give such doses number 6. Mark. 1 powder 2-3 times a day	6. Take:	Herb extract 0.01 Dibazolu Papaverine hydrochloride 0.02 Glucose 0.3 Mix to form a powder. Give such doses number 6. Mark. 1 powder 2-3 times a day

9. Instructional materials for acquiring professional skills.

9.1. Methods of work performance stages.

Write down the recipe and place an accordance with MOH Ukraine number 360 of 19/07/05 . Describe drugs. If a prescription toxic and potent substances and check single daily dose. Describe the best option technology with theoretical substantiation give an assessment of its quality. When using it extract provide consistency. Specify design it to release. Bring norm tolerances when weighing these powders. Please see written passport control.

10. Materials for self-mastery of knowledge provided by this work.

Pick a pair:

Medicinal substance	**Features of the technology**
1. Camphor 2. Sulfur 3. Magnesium oxide 4. Sodium tetraborate 5. Riboflavin	A. Does not require additional crushing B. Shredded with auxiliary liquids, because it has a scaly structure B. Released in parchments capsules G. Grinds between layers of others powders D. Shreds simultaneously with other substances, because it is strong Electrified.

11. The theme of the next session.

Making a meeting in a pharmacy.

Topic of the lesson 6: «Making herbal mixtures in a pharmacy» – 2 hours.

1. Relevance of the topic: Herbal mixtures are the oldest dosage form. Mentions of medicinal plants are found in Egyptian papyri, ancient Arabic and Greek literature. The Herbal mixtures have retained their significance to this day due to their inherent advantages: the presence of active substances in the raw material in its native form, ease of manufacture, cheapness. Herbal mixtures have long been a dosage form of pharmacy.

2. Objectives classes: Learn to prepare Herbal mixtures from medicinal plant raw materials, evaluate their quality and design for storage and use.

2.1. General objectives:

To learn how to prepare concentrated solutions of medicinal substances for the burette system, evaluate their quality and make them for storage and use.

2.2. Educational objectives:

Formation of professionally important properties and personality qualities of the future pharmacist. Education of students in professional responsibility in the manufacture of drugs.

2.3. Specific goals:

- to know:

- Characteristics of vegetable raw materials, its classification.
- Rules for the preparation of Herbal mixtures for herbal medicinal raw materials
- Quality control of Herbal mixtures, their storage.

2.4. Based on theoretical knowledge on the topic:

- master the methods /to be able to:

- Use the State Pharmacopoeia, regulatory documentation and reference literature to search for the necessary information on the preparation of Herbal mixtures for medicinal raw materials
- To perform basic process steps for the production of Herbal mixtures for medicinal raw materials.
- To issue Herbal mixtures for medicinal raw materials for use and to ensure appropriate conditions of storage.

3. Materials of before class of independent preparation (interdisciplinary integration).

Disciplines	To know	To be able

1. Preliminary		
Latin	Basics of grammar. Spelling Latin names of medicines and chemicals, herbs, families, and raw materials of vegetable and animal origin. Recipe.	Evaluate the accuracy of prescriptions
Anatomy and Physiology	The structure and functional properties of the body at different levels: molecular, cellular, organ system.	Evaluate the functional state of the organism as a whole and individual organs and systems
General and Inorganic Chemistry	The main provisions of the atomic-molecular theory.	Calculate the molar mass and equivalent compounds.
Physics	Physical methods of analysis of drugs.	Identify key quality hard drugs.
Organic chemistry	Physical, chemical properties of organic compounds and basic methods of analysis.	Conduct elemental analysis and identification of organic compounds.
Analytical chemistry	Methods of qualitative and quantitative analysis of inorganic and organic substances	Perform qualitative and quantitative analysis of individual substances and mixtures, make the necessary calculations for data analysis.
2. The following Organization and economics of pharmacy	Total liquid dosage form technology for internal use	Make payments dosage, excipients and purified water
Tech industrial production of drugs	Technology solutions for internal use	Technological stage production solutions for internal use
Biopharmacy	Technological process of	Prepare solutions for internal use, taking into

   3. Intersubjective integration Pharmacognosy Herbal mixtures	preparation of solutions for internal use. Mixing technology	account physical and chemical properties of the ingredients. Prepare complex solid dosage forms

4. Content themes (text or abstracts)

Characteristics of Herbal mixtures. The Herbal mixtures are a mixture of several types of crushed, less often whole, medicinal plant materials, sometimes with the addition of salts of essential oils, and used as medicines.

In the form of Herbal mixtures, drugs are used for both internal and external use and are intended to treat a wide variety of diseases. Moreover, the composition of the Herbal mixtures, like other drugs, is not constant, therefore they are used either in a simplified form or in the form of complex mixtures.

The **advantages** of Herbal mixtures as a dosage form include the following:

— the presence of active ingredients in raw materials in their natural original form;
— simplicity of their preparation;
— availability of raw materials.

However, Herbal mixtures also have significant **disadvantages**. The main one is that these are not fully prepared preparations, and the patient is forced to process them before use. In addition, Herbal mixtures belong to difficult-to-dose drugs, and most often they are dosed by the patient himself with a spoon. In this regard, poisonous and potent agents are not introduced into the collection.

Classification of Herbal mixtures. Herbal mixtures are classified by:

- dosage,
- composition,
- medical purpose
- method of application.

According to dosing, Herbal mixtures can be not-dosed (*species indivisi*) and dosed (*species divisi*).

In terms of composition, Herbal mixtures can be simple, consisting of one type of medicinal plant material, and complex, consisting of several plants and other medicines.

Based on medical purposes, they divide into emollient remedies (*species ad cataplasmata*), remedies for the preparation of infusions (teas) and decoctions (*species ad in fusa el decocta*), smoking Herbal mixtures (*species fumales, cigarettae*).

Depending on the method of application, Herbal mixtures are distinguished for internal (*species ad usum internum*) and for external use (*species ad usum externum*). Tea or decoctions is prepared from the first. This type of Herbal mixtures is the most common and is usually used in cases where it is necessary to systematically use drugs, for example, in the form of a laxative, appetizing, etc.

This group includes the following Herbal mixtures:

choleretic (*species chologonae*),
breasty - No. 1, 2, 3, 4 (*species pectoralis*),
laxatives - No. 1, 2, 3 (*species foxons*),
diaphoretic - No. 1, 2, 3 (*species diaphoreticae*),
diuretics - No. 1, 2, 3 (*species diureticae*),
vitaminic - No. 1, 2 (*species ritominicoe),*
calming (*species nervinae*),
carminative (*species carminativa*).

Charges for external use are less common and are used mainly for gargling (*species ad garga rismata*).

METHODS OF PRESCRIBING Herbal mixtures

Not-dosed Herbal mixtures are prescribed, taking into account the weight quantities of each ingredient in the recipe based on the entire amount of the Herbal mixtures. Plant raw materials are usually listed in the recipe in the order of their pharmacological activity (main, auxiliary, corrective, etc.). Salts and essential oils are indicated at the end of the recipe. The recipe details the method of preparation and use of the drug.

Exemple:

Rp.: Corticis Frangulae 4,0
Radicis Glycyrrhizae 1,0
Magnesii sulfatis 5,0
Misce, fiat species
Da. Signa. For one time Brew with a glass of boiling water.

The dosage Herbal mixtures are prescribed by indicating the weighted amounts of each ingredient per single dose of Herbal mixtures and indicated the number of doses. Dosed Herbal mixtures are rarely prescribed.

PREPARATION OF Herbal mixtures

Herbal mixtures technology consists of the following stages:

- grinding and sieving plant material;
- mixing of crushed plant materials;
- adding salts, essential oils and other medicines prescribed in the Herbal mixtures;
- packing, packaging and registration for dispensing.

Shredding. The raw materials used for the preparation of the Herbal mixtures must comply with the requirements of the regulatory and technical documentation.

When grinding plant materials, a certain amount of very fine particles (so-called dust) are formed. Therefore, all parts and types of plants after grinding must be cleaned of dust. Dust separation is easily accomplished by sieving the crushed particles through a 0.2 mm sieve.

Mixing. In pharmacy Herbal mixtures, the mixing of plant materials, crushed and sifted out of dust, is carried out on a sheet of paper, in a wide mortar or porcelain cup using a spatula, celluloid plate. First mix the plant materials prescribed in smaller amounts, and then gradually add the plant materials prescribed larger amounts and mix until a uniform mixture is obtained.

Introduction of salts. Salts cannot be added to the Herbal mixtures by direct mixing with plant raw materials, since due to the significant difference in the density of the components, the mixture delaminates.

It is necessary to fix the salt on the plant material, only in this case a homogeneous collection can be obtained. Salt can be added in two ways: as a solution or dry.

In cases where the recipe includes soluble salts (in small quantities), an aqueous or alcoholic saturated solution is prepared from them, by which is sprayed with the Herbal mixtures using a spray bottle, followed by drying until the solvent is completely removed.

Drying is an absolutely obligatory operation. Because moist plant material is very easily subject to enzymatic and microbiological deterioration. The drying temperature, as a rule, should not exceed 60 °C in order to avoid denaturation of the components of plant materials. The end of drying is determined by weighing the Herbal mixtures (the weight after drying should be equal to the total weight of plant materials and salt).

Exemple:

Rp.: Corticis Frangulae
Folii Urticae ana 5,0
Florum Helichrisi arenarii 3,0
Radicis Glycyrrhizae
Magnesii sulfatis ana 10,0
Misce, fiat species
Signa. Brew with 2 cups of boiling water.
2 tablespoons 3 times a day

Magnesium sulfate is readily soluble in water (1: 1), but the amount of salt in the recipe is large (more than 30%). Therefore, it is advisable to add dry salt. Licorice root is moistened with 5 ml (1/2 of the root weight) of 70% alcohol and sprinkled with crushed magnesium sulfate, after which it is dried. After drying, add the rest of the Herbal mixtures ingredients.

The completeness of drying is controlled by periodic weighing of the Herbal mixtures. The ready-made Herbal mixtures is packed and issued for dispensing.

Hygroscopic materials or those that are easily damaged by moisture are added after the prepared mixture is treated with a salt solution and dried.

Introduction of essential oils and alcohol-soluble substances (menthol, camphor).

Camphor, menthol and similar substances, as well as essential oils are included in the Herbal mixtures, as a rule, in small quantities. Therefore, a uniform distribution in the Herbal mixtures mass of these substances can be achieved only by introducing them in the form of a solution in 90% ethyl alcohol in a ratio of 1: 10.

In this case, the Herbal mixtures are laid out in a thin layer on a glass plate, the plant material is sprayed with the resulting solution from a spray bottle, after which the Herbal mixtures is dried in the open air until the alcohol is removed with frequent stirring of the Herbal mixtures.

Exemple:

Rp.: Radicis Althaeae 8,0
Radicis Glycyrrhizae 6,0
Folii Salviae 5,0
Olei Menthae piperitae gtts X
Misce, fiat species
Da. Sigпa. Brew with a glass of boiling
water, leave for 15 minutes. Take 1 tablespoon 3 times a day

Technology:

5.0 g of sage leaves are weighed, crushed to particles no more than 5 mm in size, dust is sifted out.

8.0 g of marshmallow root and 6.0 g of licorice root, crushed to particles no more than 3 mm in size, are added to the crushed raw materials.

mixed thoroughly and the mixed raw material is sprayed with a solution (10 drops of mint oil in 2 ml of 90% alcohol) and packed in a parchment capsule.

Dosed Herbal mixtures. Medicinal plants of the general list and potent medicinal plants are prescribed in the form of dosed Herbal mixtures.

The preparation of dosed Herbal mixtures is distinguished by the following feature: each separate dose of the Herbal mixtures (quantity per 1 dose) is prepared and dispensed in a separate package (capsule).

Exemple:

Rp.: Herbae Adonidis vernalis 2,0
Rhizomatis сиш radicibus Valerianae 1,5
Misce, fiat species
Da tales doses № 10
Signa. Brew each dose with a glass of
boiling water, leave for 30 minutes.
Take 1 tablespoon 3 times a day

Technology:

Since the grass of the adonis belongs to potent substances, it is imperative to check its dose at one time. In this case, a simplified calculation method can be used. 200 ml corresponds to 2.0 g of adonis herb, and 15 ml (tablespoon) - 0.15 g. The dose is not overestimated.

20.0 g of adonis herb and 15.0 g of valerian root are crushed and sifted from dust. Weigh and mix 10 times separately 2.0 g of adonis herb and 1.5 g of valerian root. Each dose is packaged in a separate bag.

QUALITY CONTROL, STORAGE AND DISPENSING OF Herbal mixtures

Assessment of the quality of Herbal mixtures. In Herbal mixtures, smell and taste are determined (in aqueous extract). To determine the authenticity of the Herbal mixtures, an analytical sample weighing 10.0 g is taken from the average sample. The sample is placed on a clean smooth surface and the components are determined by their appearance, examining them with the naked eye and using a magnifying glass (10x). All investigated partes must have diagnostic signs corresponding to the types of raw materials included in the Herbal mixtures.

For the Herbal mixtures determine: the content of active substances (determination methods are specified in the relevant documentation); humidity; the content of total ash and ash insoluble in a 10% solution of hydrochloric acid; fineness and content of impurities.

Storage. For the storage of medicinal plant materials, a dry, light and well-ventilated room is required. Because moisture and dust are factors that stimulate the development of mites. Most of them are found on berries, seeds, and some herbs (adonis). Treatment of the infected plant material with ether steam and drying at a temperature of 50 C for 2 hours destroys ticks, larvae and eggs. Herbal mixtures are stored in closed boxes, and those that contain odorous raw materials - in tin boxes.

To scare away insects, it is recommended to put a jar with cotton soaked in chloroform in the boxes.

Dispensing of Herbal mixtures. The Herbal mixtures are released in cardboard boxes lined with parchment paper, or in a double paper bag of 50, 100, 150 and 200 g.

If the Herbal mixtures contain volatile substances, it is dispensing in cellophane or parchment paper.

The label indicates the composition of the Herbal mixtures and the method of use.

A promising release method is compressed dues (briquettes) for a single dose or likes slabs with notches for separate doses. Briquetting provides:

- more correct dosing;
- improving the storage conditions of the Herbal mixtures (the smaller surface of the plant raw material determines, respectively, the lower hygroscopicity of the collection, the oxidizability of the active substances, etc.);
- briquettes are convenient for transportation.

5. Plan and organizational structure of employment.

Num ber	**The main stages of employment,**	**Learning Objectives**	**Means of instruction**	**Materials on**	**Duration (in**

	their function and meaning.	**levels of assimilation.**	**and control.**	**methodological Secured Lock class visibility, control of knowledge of students.**	**minutes or in%) of the total time employment.**
1	**2**	**3**	**4**	**5**	**6**
1	**Preparatory** - organizing classes - setting educational goals - control the output level of knowledge - monitoring skills of students, their willingness to accept this material class	I		Slideshow table	15-20
2	**Basic** tasks	II, III			50-60
3	**Final** -control of professional skills - supply results of studies - granting homework from sending literature	IV			15-20

6. Methodological materials.
6.1. The task source for self-knowledge skills
Tests with answers
1. For the prevention of influenza should recommend medicinal plant raw materials rich in ascorbic acid. Indicate which plant material the pharmacist may recommend in this case:
a. *Fructus Aroniae
b. Fructus Rhamni catharticae
c. Fructus Crarategi
d. Fructus Ribes nigri
e. Fructus Myrtilli

2. Columns with corn receivers, which contain vitamins, fatty acids, essential oils, saponins and other substances, are used as:

a. *Diuretic and cholagogue
b. Expectorant and antitussive
c. Bactericidal and astringent
d. Sedative and anticonvulsant
e. Cardiotonic and antiarrhythmic agent

3. Rhizomes and roots of Rhodiola rosea are used to obtain a liquid extract. The quality of raw materials is regulated by the content:

a. *Salidroside
b. Panaxoside
c. Salicin
d. Eleutherochid
e. Echinacoside

4. Cranberry leaves, which contain arbutin, are used as a diuretic and antiseptic in urolithiasis. In their absence, we can recommend:

a. *Folia Padi
b. Folia Uvae Ursi
c. Folia Myrtilli
d. Folia Urticae
e. Folia Menthae

5. In the treatment of urolithiasis drug rhizomes and roots of madder dye may stain urine and sweat in red, due to the following class of active substances of this raw material:

a. *Flavonoids
b. Alkaloids
c. Tannins
d. Terpenoids
e. Anthracene derivatives

6. It is known that the herd is used as a diuretic and diaphoretic. It is a pharmacopoeial type

a. *Bidens tripartita
b. Bidens cernua
c. Bidens radiata
d. Bidens frondosa
e. Bidens orientalis

7. The main active ingredient of barberry leaves is berberine. What class of biologically active substances does it belong to?

a. *Alkaloids
b. Flavonoids
c. Coumarins
d. Tannins
e. Essential oils

8. Which of the following plants contains tropane alkaloids that are part of the drug "Asthmatin"?
   a. *Blackness black
   b. Uterine horns
   c. Plantain is large
   d. Peppermint
   e. Celandine is large

9. Replace the patient's missing in the pharmacy glaucine hydrochloride with another generic herbal preparation of similar action:
   a. *Broncholitin
   b. Mukaltin
   c. Codeine phosphate
   d. Cough tablets
   e. Galantamine hydrobromide

10. For the manufacture of the plant galenic drug "Pertusin", which has expectorant properties, use the herb extract:
   a. *Thymus serpyllum
   b. Bursa pastoris
   c. Hypericum perforatum
   d. Erysimum diffusi
   e. Polygonum avicularis

6.2. Information necessary for the formation of knowledge, skills can be found in textbooks: / basic literature provided with the designation of pages:

A) Basic

10. Aseptic drug forms, extemporaneous compounding: Guidelines /O.I.Tyhonov, L.V.Bondareva, T.H.Yarnyh, N.F.Orlovetska etc .; Ed. O.I.Tyhonova and T.H.Yarnyh. - H .: Izd pharmacy; Original, 2005. - 184 p.
11. Solid dosage forms: extemporaneous compounding: Guidelines /O.I.Tyhonov, L.V.Bondareva, T.H.Yarnyh, N.F.Orlovetska etc .; Ed. O.I.Tyhonova and T.H.Yarnyh. - H .: Izd pharmacy; Original, 2003. - 176 p.
12. Soft medicinal forms: extemporaneous compounding: Guidelines /O.I.Tyhonov, L.V.Bondareva, T.H.Yarnyh, N.F.Orlovetska etc .; Ed. O.I.Tyhonova and T.H.Yarnyh. - H .: Izd pharmacy; Original, 2003. - 128 p.
13. Liquid formulations: extemporaneous compounding: Guidelines /O.I.Tyhonov, L.V.Bondareva, T.H.Yarnyh, N.F.Orlovetska etc .; Ed. O.I.Tyhonova and T.H.Yarnyh. - H .: Izd pharmacy; Original, 2005. - 160 p.
14. Workshop on pharmaceutical drug technology; for students. Pha. HI. teach. schools / AI Tikhonov, T. Yarnyh, V. Sobolev et al .; Ed. AI Tikhonov. - H .: Izd pharmacy: Golden Pages, 2002. - 256 p.

B) Further Reading:

2. Dictionary-guide for pharmacy specialists in management and economics / Ed. prof. Black VP // Kharkov: Publishing pharmacy "Golden storynky" - 2001 - 281 p.

6.3. Table for independent work with literature on the lecture topic

№	Main tasks	Directions	Responses (literature)
1	2	3	4
1.	Characterization solid dosage forms.	Define the concept of Herbal mixtures.	1,3
2.	Preparation of Herbal mixtures	What are the main technological stages of preparation of Herbal mixtures	1, 3
3.	Quality rating Herbal mixtures	What documentation that normalize quality Herbal mixtures	1, 3

7. Materials for self-training quality.

A. *Questions*

1. Characteristics of Herbal mixtures as a dosage form
2. Classification of Herbal mixtures
3. Regulatory and technical documentation governing the requirements for the manufacture of Herbal mixtures
4. Technological features of preparation of dosed and not-dosed Herbal mixtures
5. The main technological stages of Herbal mixtures
6. Rules for the introduction of salts in the Herbal mixtures
7. Rules for the introduction of essential oils in the Herbal mixtures
8. Storage conditions of medicinal plant raw materials
9. Quality control of Herbal mixtures
10. Packing and labeling of Herbal mixtures

8. Materials for audience independent preparation:

8.1. List of educational practical tasks to be performed during the practical (laboratory) classes. Write down in the form of medical prescriptions:

1. Herbal mixtures from the fruits of fennel (Foeniculum), marshmallow root (Althaea), chamomile flowers (Chamomilla) and rhizomes with licorice roots (Glycyrrhiza), taken in 10 grams. 5 grams of Herbal mixtures for 1 glass of water, boil for 10 minutes, leave for 20 minutes, strain, take 1 glass at night for gastritis with low acidity
2. Take Chamomile flowers (Chamomilla), St. John's wort herb (Hypericum), peppermint leaves (Mentha piperita), linden flowers (Tilia) and plantain leaves (Plantago major) 10 grams each. Herbal mixtures for stomach inflammation. Preparation: 1 tablespoon of the Herbal mixtures for 1 cup of boiling water, leave

30 minutes, drain. Take 1/3 cup 3-4 times a day.
3. Carminative and fixing Herbal mixtures. Take 10 grams of wormwood herb (Absinthium), horsetail (Equisetum arvense) and yarrow (Millefolium). A tablespoon of Herbal mixtures in a glass of hot water, boil for 10 minutes, cool, drain. Take 3/4 from 1 glass in the morning and evening.
4. Take Bark of oak (Quercus) 15 grams, horsetail herb (Equisetum arvense) and rhizomes with valerian roots (Valeriana) 20 grams each. Take 1 tablespoon of the Herbal mixtures for 1 glass of hot water, boil for 30 minutes, cool for 15 minutes, strain, bring the volume to the original. Accept by 1/2 cup with enterocolitis.
5. Take 40 grams of pine buds (Pinus), 30 grams of plantain leaves (Plantago major), and 30 grams of coltsfoot leaves (Farfara). Take 1/4 cup of warm infusion 3 times a day for bronchial asthma, whooping cough, infectious diseases of the bronchi.
6. Gastric Herbal mixtures No. 3. Take rhizomes of calamus 6 %, marshmallow roots 7 %, flowers of sand cumin 7%, black elder flowers 6 %, St. John's wort 6 %, marigold flowers 7 %, nettle leaves 7 %, peppermint leaves 7 %, wormwood herbs 5 %, chamomile flowers 7%, Japanese sophora fruit 8 %, licorice root 8 %, yarrow herb 6 %, sage leaves 6 %, rose hips 7 %. Prepare 75 g of this Herbal mixtures. Take 4.5 g (1 tablespoon) of the Herbal mixtures is placed in an enamel bowl, pour 200 ml (1 glass) of cold boiled water, cover with a lid, heated in a boiling water bath for 30 minutes, cooled for 10 minutes at room temperature, filtered, the remaining raw material is wrung out. Volume the resulting broth is brought to 200 ml with boiled water. Accepted by 1/2 cup morning and evening. Prepared broth before use shake up.
7. Choleretic Herbal mixtures No. 3. Take 40 % of sandy immortelle, 30 % of three-leaf watch, 20 % of peppermint and 10 % of coriander fruit. Prepare 50 g of this Herbal mixtures. The Herbal mixtures bag is placed in a glass or enamel dish, poured 200 ml (1 glass) boiling water, cover and infuse for 15 minutes. Take 1 glass 3 times a day for 4 weeks.
8. Choleretic Herbal mixtures. 40 g of sandy immortelle, 30 g of three-leaf watch, 20 g of peppermint and 20 g of coriander fruit. 1 tablespoon Herbal mixtures, pour 200 ml of boiling water, close the lid or insist in a thermos. Left at room temperature for 45 minutes, drain. 0.5-0.30 cups 3 times a day, 20-30 minutes before meals. with chronic diseases of the liver and gallbladder.
9. Antiseptic Herbal mixtures. Take the root of the genus with roots (Sanguisorba officinalis L.) - 17 g, larkspur root - 17 g, black elderberry - 17 g, shavli leaf - 17 g, thyme herb - 17 g, eucalyptus leaf - 15 g. 1 tablespoon Herbal mixtures, pour 200 ml of boiling water, close the lid or insist

in a thermos. Left at room temperature for 45 minutes, drain. 0.5-0.30 cups 3 times a day, 20-30 minutes before meals. Purpose: to use in case of inflammation of the oral cavity and pharynx (gingivitis, periodontitis, aphthous loss of the mouth, laryngitis, tonsillitis).
10. Sedative Herbal mixtures. Take the herbs of dog nettle – 40 %, hop cones – 20%, peppermint leaves – 15%, rhizomes with valerian roots – 15%, licorice root – 10%. Prepare 50 g of this Herbal mixtures. 1 g Herbal mixtures pour 200 ml of boiling water, close the lid or insist in a thermos. Left at room temperature for 45 minutes, drain. 0.5-0.30 cups 3 times a day, 20-30 minutes before meals with nervous excitement, insomnia, neurosis.
11. Antidiabetic Herbal mixtures. 1 g of the Herbal mixtures contains: blueberries ordinary shoots - 0.2 g, beans common fruit leaves - 0.2 g, Eleutherococcus prickly rhizomes with roots - 0.15 g, rose hips - 0.15 g, horsetail - 0.1 g, St. John's wort - 0.1 g, chamomile flowers - 0.1 g. 1 g Herbal mixtures pour 200 ml of boiling water, close the lid or insist in a thermos. Left at room temperature for 45 minutes, drain. 0.5-0.30 cups 3 times a day, 20-30 minutes before meals.
12. BRONCHOFIT Herbal mixtures. Take rhizomes of calamus 9 g, marshmallow roots 9 g, linden flowers 9 g, black elder flowers 8 g, rhizomes and roots of ergot 7 g, marigold flowers 9 g, nettle leaves 8 g, peppermint leaves 8 g, chamomile flowers 7 g, licorice roots 9 g, creeping thyme 8 g, sage leaves 9 g. 1 g Herbal mixtures pour 200 ml of boiling water, close the lid or insist in a thermos. Left at room temperature for 45 minutes, drain. 0.5-0.30 cups 3 times a day, 20-30 minutes before meals for coughs and colds
13. GASTROFIT Herbal mixtures. Take rhizomes of calamus 6 g, marshmallow roots 7 g, flowers of sand cumin 7 g, black elder flowers 6 g, St. John's wort 6 g, marigold flowers 7 g, nettle leaves 7 g, peppermint leaves 7 g, wormwood herbs 5 g, chamomile flowers 7 g, Japanese sophora fruit 8 g, licorice root 8 g, yarrow herb 6 g, sage leaves 6 g, rose hips 7 g. 1 tablespoon of Herbal mixtures pour 200 ml of boiling water, close the lid or insist in a thermos. Left at room temperature for 45 minutes, drain with chronic gastritis
14. CHEST Herbal mixtures № 1 ". PECTORALES SPECIES № 1 Take marshmallow roots - 40%, mother-and-stepmother leaves - 40%, oregano grass - 20%. Prepare 50 g of this Herbal mixtures. Place 5 g (1 tablespoon) of the Herbal mixtures in an enamel dish, pour 200 ml (1 cup) of boiled water at room temperature, cover with a lid and infuse in a boiling water bath for 15 minutes. Cool at room temperature for 45 minutes, filter, the residue is squeezed to the filtered infusion. The infusion is adjusted to 200 ml with boiled water. Take 1/2 cup 2-3 times a day, after meals for bronchitis, bronchopneumonia. It is recommended to shake the infusion before use.

15. Antiseptic Herbal mixtures. Take trailers of grass 0.1 g, chamomile flowers 0.1 g, licorice roots 0.2 g, sage leaves 0.2 g, eucalyptus twigs 0.2 g, calendula flowers 0.2 g. Give such doses number 10. Mark. 1 Herbal mixtures pour 200 ml of boiling water, leave for 15 minutes. Cool. Take 0.5 cup 2 times daily before meals in the complex therapy of acute and chronic diseases of the ear, throat and nose; inflammatory diseases of the oral cavity and digestive tract.
16. Sedative Herbal mixtures 2. Take the herbs of dog nettle - 40.0 g, hop cones - 20.0 g, peppermint leaves - 15.0 g, rhizomes with valerian roots - 15.0 g, licorice root - 10.0 g. 1 g Herbal mixtures pour 200 ml of boiling water, close the lid or insist in a thermos. Left at room temperature for 45 minutes, drain. 0.5-0.30 cups 3 times a day, 20-30 minutes before meals with nervous excitement, insomnia, neurosis.
17. Antiseptic Herbal mixtures. Take trailers of grass 10%, chamomile flowers 10%, licorice roots 20%, sage leaves 20%, eucalyptus twigs 20%, calendula flowers 20%. Prepare 50 g of this Herbal mixtures. Mark. 1 tablespoon of Herbal mixtures pour 100 ml of boiling water, leave for 15 minutes. Cool. Use for lotions for inflammation, wounds and bruises.

9. Instructional materials for acquiring professional skills:

9.1. Methods of work performance, stages.

1. Prescription prescriptions

Write down and arrange the recipe according to the requirements of the Order of the Ministry of Health of Ukraine No. 360 dated July 19, 2006. Describe the medicinal product. Describe the optimal version of the technology of Herbal mixtures with theoretical justification and necessary calculations. Give a rating of quality. Specify the preparation of the drug for leave. Write the passport of written control.

10. Materials for self-mastery of knowledge, skills provided by this work.

1. Tests of different levels

1. When analyzing the essential oil, it was found that it contains anethole. From which medicinal plant was this oil obtained:
    a. *Anisum vulgare
    b. Coriandrum sativum
    c. Valeriana officinalis
    d. Allium sativum
    e. Allium cepa

2. Indicate which of the following types of medicinal plant raw materials can be part of the drug collection of hemostatic action?
    a. *grass buckthorn

b. grass herds
c. dried flowers grass
d. celandine herb
e. violet grass

3. Yellow grass (Herba Glaucii flavi) is used to obtain drugs with antitussive effect. What alkaloid is isolated from it.
a. *Glaucine
b. Gindarin
c. Codeine
d. Thermopsin
e. Atropine

4. For the treatment of the upper respiratory tract use plant materials that contain mucus. The source of this class of compounds is:
a. *Radix Althaeae
b. Radix Inulae
c. Radix Ipecacuanhae
d. Radix Rhodiolae
e. Radix Belladonnae

5. Rauwolfia roots contain reserpine, which has an antihypertensive and sedative effect. Reserpine is a representative of the group:
a. *alkaloids
b. saponins
c. flavonoids
d. anthracene derivatives
e. cardioglycosides

11. The theme of the next session.

Liquid dosage forms. Manufacturing of concentrated solutions

Topic of the lesson 7: «Liquid dosage forms. Manufacturing of concentrated solutions» – 2 hours.

1. Relevance of the topic: Concentrated solutions are used in pharmacies in the manufacture of liquid dosage forms by mass-volume method. The use of such solutions greatly increases the productivity, efficiency and quality of the assistant's work, therefore knowledge of the correct technology of concentrated solutions and the ability to count the amount of ingredients correctly is essential for their quality preparation.

2. Objectives classes: to learn how to prepare concentrated solutions of medicinal substances for the burette system, evaluate their quality and make them for storage and use.

2.1. General objectives:

To learn .

2.2. Educational objectives:

Formation of professionally important characteristics and personality traits of future pharmacists. Educating students in professional liability in the manufacture of drugs.

2.3. Specific goals:

- to know:

- Characterization solutions as disperse systems, their classification.
- The preparation of purified water in pharmacies. Requirements that apply to treated water in accordance with standards established by the State Pharmacopoeial and the order of the MOH Ukraine 15.12.04 number 626.
- To calculate the amount of drugs and water to prepare concentrated solutions of different ways:
  - using dimensional dishes;
  - given magnification volume;
  - taking into account the density of the solution.
- The rules for the preparation of concentrated solutions burette system according to the instructions in order MOH Ukraine of 07.09.93 number 197.
- Control of concentrated solutions, their storage and accounting solutions prepared by MOH ordered Ukraine from 7.09.93 number 197.
- Dosage by volume. Factors affecting the accuracy of dosing.
- Structure burette system, rules of care and use it.

2.4. Based on theoretical knowledge on the topic:

- master the methods /to be able to:

- To use the State Pharmacopoeia, regulatory documentation and reference books to find the necessary information on how to prepare concentrated solutions.

- To calculate the amount of water and drugs for the manufacture of concentrated solutions.
- To ensure aseptically prepare concentrated solutions.
- To perform basic process steps for the production of concentrated solutions (weigh, measuring, dissolve, filter).
- To conduct quality control concentrated solutions and correct their concentration if necessary.
- To maintain the pharmacy records prepared concentrated solutions.
- To issue a concentrated solution for use and to ensure appropriate conditions of storage.
- Mount burette system to fill its concentrated solutions and provide care for its sanitary condition.

3. Materials of before class of independent preparation (interdisciplinary integration).

Disciplines	To know	To be able
1. Preliminary		
Latin	Basics of grammar. Spelling Latin names of medicines and chemicals, herbs, families, and raw materials of vegetable and animal origin. Recipe.	Evaluate the accuracy of prescriptions
Anatomy and Physiology	The structure and functional properties of the body at different levels: molecular, cellular, organ system.	Evaluate the functional state of the organism as a whole and individual organs and systems
General and Inorganic Chemistry	The main provisions of the atomic-molecular theory.	Calculate the molar mass and equivalent compounds.
Physics	Physical methods of analysis of drugs.	Identify key quality hard drugs.
Organic chemistry	Physical, chemical properties of organic compounds and basic methods of analysis.	Conduct elemental analysis and identification of organic compounds.
Analytical chemistry	Methods of qualitative	Perform qualitative and

	and quantitative analysis of inorganic and organic substances	quantitative analysis of individual substances and mixtures, make the necessary calculations for data analysis.
2. The following		
Organization and economics of pharmacy	Total liquid dosage form technology for internal use	Make payments dosage, excipients and purified water
Tech industrial production of drugs	Technology solutions for internal use	Technological stage production solutions for internal use
Biopharmacy	Technological process of preparation of solutions for internal use.	Prepare solutions for internal use, taking into account physical and chemical properties of the ingredients.
3. Intersubjective integration		
Injection solutions and eye drops	Preparation of solutions mass-volume method	Conduct calculations of the amount of dry matter and water

4. Content themes (text or abstracts)

Liquid dosage forms occupy a significant place in the formulation of pharmacies and make up 60% or more of the total number of all medications prepared in pharmacies.

By its nature, all liquid dosage forms are free comprehensive, dispersed systems in which the drugs (the phase) are evenly distributed in a liquid dispersion medium. Medicinal substances in liquid dosage forms may be in various aggregate states: solid, liquid and gaseous.

Depending on the degree of shredding of the dispersed phase (the medicinal substance) and the nature of its connections with the dispersion medium (solvent), the following physico-chemical systems are distinguished: real solutions of low- and high-molecular compounds, colloidal solutions (ash), suspensions and emulsions. Individual dosage forms may also be combined disperse systems - the combination of the main types of disperse systems (infusions and decoctions, extracts, etc.).

In the study of various liquid dosage forms, we will characterize them as the corresponding disperse systems that differ in their physical and chemical properties. By using certain technological techniques (dissolution, peptization, suspension or emulsification), the constituent medicinal substance (solid, liquid and gaseous) can be reduced to a greater or lesser degree of dispersion from ions and molecules to coarse particles that are noticeable under a microscope or naked eye. This is important for the detection of the therapeutic effects of the drug substance on the body, which has been repeatedly confirmed by biopharmaceutical research.

Solutions are a group of liquid dosage forms that are characterized by a large variety of composition and methods of application.

Solutions are a homogeneous dispersion system consisting of at least two or more components, in which the molecules of the dissolved substance are evenly distributed between the solvent molecules.

Real solutions cover two categories of disperse systems: ion-disperse systems and molecular-disperse systems.

Ion-disperse systems include solutions in which the particle size of the disperse phase is about 0.1 nm. The dissolved substance is in the form of individual hydrated ions. This group includes solutions of electrolytes, for example: sodium chloride, sodium sulfate, and others.

Molecular-disperse systems include solutions in which the size of particles of the disperse phase is less than 1 nm. In the process of dissolution, the substance decomposes into separate independent molecules. If aggregates of particles are formed, then the composition of such complexes is limited to a small number of molecules (2-3). This group mainly includes non-electrolytes (sugar, glucose, hexamethylenetetramine and the like).

Real solutions are characterized by a high strength bond between the dissolved substance and the solvent.

These are fairly stable, single-phase, homogeneous, dispersed systems that do not divide even with long-term preservation. They are transparent, well diffused and dialized and can be filtered.

Stability of solutions is of great importance in practical terms as it makes it possible to prepare various solutions into the stock that is to prepare concentrated solutions of medicinal substances when using the burette system.

In pharmacy practice the percentage of true solutions accounts for up to 30% of the overall pharmacy recipe.

Liquid dosage forms are a form of delivery of drugs that are obtained by mixing or dissolving active substances in water, alcohol, oils and other solvents as well as by extracting active substances from plant material.

Depending on the degree of shredding of the dispersed phase and the nature of its connection with the dispersion medium (solvent), the following physical and chemical systems are distinguished: true solutions of low and high molecular compounds, colloidal solutions (ash), suspensions and emulsions.

Water purified (Aqua purificata). As the solvent for liquid dosage forms for internal use, the most commonly used water is purified.

Water is pharmacologically indifferent, available and dissolves a lot of medicinal substances but at the same time some medicinal substances and microorganisms reproduce rather quickly.

Purified water can be obtained by distillation, ion exchange, electrolysis, reverse osmosis. The quality of cleaned water is regulated by the DFU: it should be colorless, transparent, odorless and not flavored; pH may vary within the range of 5.0-7.0; should not contain renewables, nitrates, nitrites, chlorides, sulfates, traces of ammonia and other impurities.

From the methods of obtaining purified water the most common method of distillation (distillation).

Once a quarter, purified water is sent to the control and analytical laboratory for analysis.

In recipes, the concentration of solutions is indicated by the following methods:

1. Indicate the concentration of the drug in percentages (which shows the weight of the solute in grams in 100 ml of solution).

RP .: *Solution Calcium iodine* 2% 200 ml
Da Signa

2. Indicate the amount of medicinal substance and solvent.

Rp .: Kalii Iodine 4.0
Aquae purificatae 200 ml
Misce Da Signa

3. Indicate the amount of the drug substance and the total volume of the solution, which is achieved by the addition of the prescribed solvent (denoted by means of lats ad-to).

Rp .: Kalii Iodine 4.0
Aquae purificatae 200 ml
Misce Da Signa

4. Indicate the ratio of the amount of prescribed medicinal product to the total amount of solution obtained by using lats. ex – with

Rp .: *Solution Calci iodine ex* 4.0 - 200 ml
Da Signa

Despite the different ways of prescribing potassium iodide solutions, its volume is 200 ml, the amount of medicinal substance is 4.0 g.

5. Indicate the degree of dilution of the medicinal substance, for example, 1: 1000, 1: 5000, 1: 10000 and the volume of this solution.

RP*: Solution Furacilini* (1: 5000) 200 ml
Da Signa

Of all the methods mentioned, the method of indicating the concentration of the solution in percentages is most often used.

PREPARATION OF AQUEOUS SOLUTIONS.

When calculating the amount of water purified take into account the percentage of medicinal substance (or the sum of substances). If solutions are prepared in a concentration of up to 3%, then the water is taken up by volume as long as the solution is prescribed in the recipe because when dissolved a small amount of the drug does not significantly change the volume of the solution.

Example:

Rp .: *Solutionis Analgini* 2% 150 ml
Da Signa 1 tablespoon 3 times a day

Mixture-solution with a highly soluble, potent drug, discharged in an amount up to 3%.

Calculation:

Analgin:
2.0 - 100 ml
x - 150 ml; x = 3.0
Purified water - 150 ml

In the stand, 150 ml of purified water is measured. Weigh 3.0 g of analgin, pour into the stand and dissolve.

Solutions in concentrations higher than 3% are prepared in measuring dishes or counting the amount of water with the help of coefficients of increase in volume (see Annex 2 to the Order of the Ministry of Health of Ukraine No. 197 dated September 7, 1993).

The volume increase factor (ml / g) shows the increase in the volume of solution (ml) when dissolving 1,0 g substance at 20 ° C.

Rp .: Solution Magnesium sulfate 20% 150 ml
Da Signa 1 tablespoon 3 times a day

Mixture-solution with a well-soluble drug magnesium sulfate, discharged in an amount of more than 3%.

The technology of the solution using the measuring dishes. In a measuring cylinder place about 80 ml of purified water. Weigh out 30.0 g of magnesium sulfate on BP-100, pour into a barrel and mix until completely dissolved with a glass rod. Then bring the solution to a volume of 150 ml.

The technology of the solution using the volume increase factor (VIF).

For magnesium sulfate, VIF is equal to 0.50.

Calculation:

Magnesium sulfate 30.0 g
Water purified 150 ml - (30,0 · 0,50) = 135 ml

135 ml of purified water is measured in the stand, which dissolves 30,0 g of magnesium sulfate.

Concentrated solutions are not a dosage form of pharmaceutical blank, which is used to prepare dosage forms with a liquid dispersion medium, by dilution or in a mixture with other medicinal substances.

Concentrated solutions are working solutions of medicinal substances at a much higher concentration than these substances are prescribed in recipes, calculated on the appropriate dilution water to the concentration indicated in the prescription. They are usually called "concentrates." The use of concentrated solutions has several advantages over the preparation of mixtures of dry substances: the work of the pharmacist is facilitated, the quality improves and the release of medicines to patients is accelerated.

The nomenclature of concentrated solutions is determined by requests of the extemporal formulation entering the pharmacy and depending on the need, the list of concentrated solutions may vary. In the Instruction on the preparation of pharmaceutical forms with liquid dispersion in pharmacies in Appendix 1 (Order No. 197) an exemplary list of concentrated solutions which are most often used in the preparation of liquid medicinal products is given.

Due to the fact that concentrated solutions can become a medium for the development of microorganisms, they should be prepared in aseptic conditions on freshly distilled water purified. All used auxiliary materials as well as dishes for their preparation and storage should be pre-sterilized and the obtained solutions must be filtered (and not strained).

Concentrated solutions after preparing are subjected to complete chemical control (authenticity, quantitative content of active substances). All prepared concentrated solutions are recorded in a laboratory journal and on the label of the vessel in which they are stored, indicate: the name and concentration of the solution, the number of the series and analysis, the date of preparing.

Stocks of concentrated solutions are stored in tightly sealed bottles in a cool and protected place from a light temperature of 20-22 ° C or in a refrigerator (3-5 ° C).

In pharmacies, concentrated solutions are prepared in such quantities that they can be used within the prescribed shelf life. Limit storage times for individual solutions are set depending on their shelf life of 2 to 30 days.

PREPARATION OF CONCENTRATED SOLUTIONS.

Concentrated solutions are prepared by mass-volume method using the measuring dishes. You can also calculate the amount of water you need by using the volume increase factors or the density of the solution.

For example, you need to cook 1 liter of 20% (1: 5) solution of potassium bromide.

1. Preparation of the solution in a measuring dish.

In a sterile measuring flask of 1 liter capacity, a 200-grams of potassium bromide weighed down through a funnel and dissolved in a small amount of freshly boiled (chilled) purified water. Then water is added to the label. The solution is filtered into a material glass of dark glass with a stopper, checked for identity, purity and quantitative content, labeled with a denomination of the name and concentration of the solution, its preparation, serial numbers and analysis.

2. Preparation of the solution using CIV.

If we take into account the increase in volume equal to 0,27 ml / g for potassium bromide, then the volume occupied by 200,0 g of potassium bromide is

54 ml (200,0 · 0,27), then the water for the preparation of the solution need 946 ml (1000 ml - 54 ml). In this case the use of measuring dishes is not required. 946 ml of freshly boiled (cooled) purified water are measured in the stand and dissolved in it 200.0 g of potassium bromide.

3. Preparation of the solution taking into account its density.

The density of the 20% solution of potassium bromide is 1,144 which means that 1 liter of this solution should have a mass of 1144.0 g (according to the formula P = V · d, where P is the mass of the solution, V is the volume and d is the density) . Since in this solution of potassium bromide is taken by weight, the water should be 1144,0 - 200,0 = 944,0 p. The volume of the solution at that will be 1 liter and its mass - 1144.0 p.

944 ml of freshly boiled water purified and 200.0 g of potassium bromide are dissolved in the stand. If it is not possible to measure the required amount of water it is weighed into a pre-planted stand. After dissolution, filter as above.

Medicinal substances (crystalline hydrates) are weighed against the actual moisture content.

1. If the solution was stronger than necessary, it must be diluted with water to the desired concentration, the amount of which is calculated by the formula:

$$X = A * \frac{C-B}{B}$$

where X is the amount of water needed to dilute the prepared solution, ml
A - volume of the prepared solution, ml
B - concentration of solution required,%
C - actual concentration of solution,%

2. If the solution appeared to be less than necessary, it should be strengthened by the addition of a medicinal substance, the amount of which is calculated by the formula:

$$X = \frac{A*(B-C)}{100*d-B}$$

X is the amount of water needed to dilute the prepared solution, ml
A is volume of the prepared solution, ml
B is concentration of solution required,%
C is actual concentration of solution,%
d is the density of the solution required concentration, g/cm^3.

Technological stages of preparation of liquid drugs forms

All liquid dosage forms are prepared by mass-volume method (Order of the Ministry of Health of Ukraine No. 197 dated September 7, 09, p.) which provides the required mass of medicinal substance in a given volume of solution. By mass, usually prepare solutions in which as a solvent used liquids with high density, viscous, volatile as well as emulsions and some medicinal forms by author's proprietary. By volume prepare solutions of ethyl alcohol of different strengths, solutions of standard pharmacopoeias liquids. In the mass-bulk method, the soluble substance is taken by weight and the solvent is added to obtain the required volume of solution.

If the solvent in the recipe is not specified then aqueous solutions are prepared. The word "water" refers to purified water if there are no special instructions.

The process of preparation of liquid dosage forms consists of the following stages: preparatory work (selection of appropriate dishes and plugs to it); weighing and measuring medicines and solvents; mixing or dissolving, extracting, dispersing or emulsifying complex components of a medicinal product; strain or filter; evaluation of the quality and registration of the medicinal product before departure.

Depending on the dosage form, the solubility of the medicinal substances and the type of solvent one or another technological step is used.

Selection of dishes (bottles) and stoppers. The vial and cork are picked up in advance taking into account the volume of the liquid dosage forms being prepared and the properties of their components.

The bottle should be clean and dried. The lid should be screwed to the neck freely to the stop and not rotated. If liquid medicinal products contain photosensitive substances they are placed in a vial of orange glass.

Weighing and measuring. When weighing and measuring medicinal substances are guided by the basic rules of dosage.

Mixing, dissolving, extracting, dispersing, emulsifying. All these technological processes for liquid dosage forms serve as the basis for the formation of a disperse system. The presence or absence of a dispersed phase in these processes depends on the solubility of drugs in water or other solvents.

When preparing liquid dosage forms, dissolving dry medicinal substances should be guided by the following rules:

- the first is always measured in the stand (a pot with a wide throat) calculated amount of purified water, which dissolves dry medicinal substances: first poisonous; and potent, then - a general list, taking into account their solubility and other physical and chemical properties. This sequence of solution preparation is needed to prevent or eliminate the processes of interaction of drugs that occur most rapidly in solutions with high concentration;

- large-crystalline medicinal substances (copper sulfate, alum, potassium permanganate, etc.) to accelerate the dissolution process, first, in a mortar with a small amount of solvent;

- heat-resistant substances that slowly dissolve (sodium tetraborate, boric acid, mercuric dichloride, riboflavin, ethacridine lactate, etc.) in a hot solvent or when heated;

- to accelerate the dissolution process, shake or mix the solution with a glass rod.

When preparing liquid dosage forms by mixing or increasing the liquid components, the following rules should be followed:

- mixing of liquids is carried out in order of increasing their quantity;
- fragrant waters, tinctures, liquid extracts, alcoholic solutions, flavor and sugar syrups and other liquids are added to the aqueous solution in the last place in the bottle for delivery in the following order: water non-fat and non-liquid liquids; alcohol solutions in the order of increasing the concentration of alcohol; odorous and volatile liquids;
- liquid medicinal products containing essential oils (ammonia-anise drops, thoracic elixir, citral solution, etc.) are added to the mixture by mixing with sugar syrup (if it is available in the formulation) or with an equal amount of the mixture;
- tinctures, emulsion-aniseed drops and other volatile liquids should not be added to warm solutions;
- medicines with increased viscosity (ihtiol, dense extracts, etc.) are pre-mixed in a mortar with a part of the solvent and after increasing another are transferred to the vial for delivery.

Cooling (colatio) and filtration (filtratio). These processes are used in pharmacy practice for the separation of the liquid phase from all suspended particles (mechanical impurities) which fall into liquid dosage forms when contaminated with solvents and dissolved substances from devices and utensils in the form of fibers, dust and the like. Filtration and filtration are carried out with the help of funnels made of different materials of different capacities and types.

The process is used for the separation of large particle for which the liquid is passed through a lump of cotton wool or several layers of gauze, less often canvas, silk, capron and other fabrics.

The process is run through a cotton swab, pre-washed with water purified to remove small fibers. The purity of the drug in this case will depend on the density of the lump of cotton wool, enclosed in the mouth of the funnel. Excess hardness of a cotton swab is undesirable as the rate of stratification slows down.

Mucus, emulsions, infusions and broths are filtered through a double layer of gauze or cloth.

A very important issue when preparing liquid dosage forms by mass-volume method is to determine the total volume which is calculated by summing up all volumes of liquid ingredients (according to the order of the Ministry of Health of Ukraine No. 197 dated September 7, 1993). The total volume includes: solvent, water and alcohol solutions of medicinal substances, tinctures, liquid extracts and all other prescribed liquids, which are prescribed in recipes in ml.

If it is necessary to establish the volume of liquid dosage forms which include viscous, volatile, and also liquids with a higher density take into account their density. The number of dry substances in the determination of the total volume is not taken into account. When determining the total volume it is necessary to consider the method of prescribing the solvent.

Rp .: Sodium hydrocarbonatis 2.0
Tincturae Valerianae 6 ml

Sirupi's simplicity 10 ml
Aquae purificatae 200 ml
Misce Da Signa 1 tablespoon 3 times a day

In the given formulation, the amount of solvent is indicated. In this case, the calculation of the total volume of the mixture is made by summing the volumes of liquid ingredients: 200 ml of purified water + 6 ml of tincture of valerianum + 10 ml of syrup of sugar, which will make 216 ml

Mixture can be prepared using a concentrated solution of 5% sodium bicarbonate (1:20).

Calculation:
A solution of sodium bicarbonate 5% (1:20) = 20 · 2.0 = 40 ml
Water purified 200 - 40 = 160 ml

Control panel
Date Recipient No
Aquae purificatae 160 ml
Solution Sodium hydrocarbonatis 5% (1:20) 40 ml
Sirupi's simplicity 10 ml
Tincturae Valerianae 6 ml
--- ------------
V= 216 ml
Prepared by: (signature)
Checked out: (signature)
Released (signature)

If the amount of the solvent is indicated "to a certain volume", then the liquid ingredients are included in the volume of the aqueous solution.
Example:

Rp .: Nartii hydrocarbonatis 2.0
Tincturae Valerianae 6 ml
Sirupi's simplicity 10 ml
Aquae purificatae 200 ml
M. D. Signa. 1 tablespoon 3 times a day

The total volume of the mixture in this case is 200 ml. Number of treated water: 200 - (40 + 6 + 10) = 144 ml

Control panel
Date Recipient No
Aquae purificatae 144 ml
Solution Sodium hydrocarbonatis 5% (1:20) 40 ml
Sirupi simplicis 10 ml (or 13.0)
Tincturae Valerianae 6 ml
--- ------------
V = 200 ml
Prepared by: (signature)

Checked out: (signature)
Released (signature)

When preparing mixtures of concentrated solutions, the following rules are followed:

- first of all, in the bottle for purification, measure the water purified, then concentrated solutions of poisonous and potent substances and then concentrated solutions of medicinal substances of the general list in the order they are prescribed in the recipe;
- the medicines are not filtered and prepared immediately in the bottle for release.

Taking into account all these requirements, the mixture is prepared according to the above prescription form: 160 ml of purified water is measured in 160 ml of purified water, then 40 ml of a 5% solution of sodium bicarbonate, 10 ml of sugar syrup and lastly 6 ml of tincture of valerian are measured here.

The vial is sealed and drawn up for leave.

In the absence of concentrated solutions, the mixture is prepared taking into account the percentage of dry medicinal substances in the total volume of the solution.

1. If the liquid dosage form consists of dry medicinal substances in a total amount of up to 3%, the concentrated solutions are absent then they are dissolved in a measured quantity of prescribed water or other liquid without taking into account the CCD.

Example:

Rp .: Analgini 3.0
Calcium bromide 4.0
Tincturae Belladonnae 8 ml
Tincturae Valerianae 10 ml
Aquae purificatae 200 ml
Misce Da Signa 1 tablespoon 3 times a day

A flaking mixture containing highly active substances (analgin and tincture of belladonna, prepared on 40% alcohol), photosensitive substance potassium bromide and tincture of valerian, prepared on 70% alcohol.

The examination of single and daily doses of analgin and tincture of belladonna is carried out by comparing them with higher single and daily doses for internal use.

Total volume of the drug: 200 ml + 10 ml + 8 ml = 218 ml

3.0 g of analgin (a concentrate which is absent) in a volume of 218 ml will consist of:

218 ml - 3.0 g
100 ml - x g; x = 1,7%, that is less than 3%.

When dissolved, 3.0 g of analgin (KOO = 0.68 ml / g) will increase by 2.04 ml ($0.68 \cdot 3.0 = 2.04$).

For a volume of more than 200 ml a deviation from the norm is allowed ± 1%. For a volume of 218 ml this deviation will be 2.18 ml. Apparently, the variation in the volume that takes 3.0 g of analgin does not exceed the permissible norm, since 2.18 ml is more than 2.04 ml. Therefore, in such cases, the CCD does not take into account.

Calculation:

Potassium bromide solution 20% (1: 5) = 5 · 4 = 20 ml

Water purified = 200 - 20 = 180 ml

In the stand, weigh 180 ml of purified water, which dissolves 3,0 g of analginum. The solution is filtered into a leave-up bottle and first add 20 ml of a 20% solution of potassium bromide, then 8 ml of tincture of belladonna, and lastly - 10 ml of tincture of valerian. Clog up and draw up to leave.

2. Liquid dosage forms containing dry substances in a total amount of 3% or more are prepared using concentrated solutions or in measuring vessels or the volume of water required for the dissolution of dry substances, determined by calculation, taking into account the CCD.

Rp: Solution Calcium chloride 5% in 200 ml
Glucose 60.0
Sodium Bromide 3.0
Misce Da Signa 1 tablespoon 3 times a day

Mixture-solution, which includes a photosensitive substance - sodium bromide, a strongly hygroscopic substance - calcium chloride and glucose, registered in a concentration of more than 3%.

The mixture is prepared using concentrated solutions.

Calcium chloride is a strongly hygroscopic substance that spills in air to the consistency of a syrupy solution. Using crystalline calcium with chloride is uncomfortable (crystals are wet and dirty, while weighing there is no certainty in the exact dosage, since the unknown content in this salt of hygroscopic water). In order to avoid damage to the drug and inaccurate dosing of calcium chloride from it, prepare a concentrated solution of 50 or 20%, which is used for the preparation of liquid medicinal products. The solution is stable and well preserved for a long time.

Calculation:

A solution of calcium chloride 50% (1: 2) = 10.0 · 2 = 20 ml

Glucose solution 50% (1: 2) = 60.0 · 2 = 120 ml

A solution of sodium bromide 20% (1: 5) = 3.0 · 5 = 15 ml

Water purified 200 - (20 + 120 + 15) = 45 ml

In a bottle for leave, 45 ml of purified water, 20 ml of 50% concentrated calcium chloride solution, 120 ml of 50% concentrated glucose solution, 15 ml of 20% concentrated solution of sodium bromide are measured.

In the absence of a concentrated glucose solution, the amount of solvent is calculated using an increase in volume for glucose. When dissolved 60.0 g of glucose, the volume of the solution will increase by 41.4 ml (0.69 · 60 = 41.4). Therefore, the amount of water purified to obtain 200 ml of solution will be equal to 123.6 ml (200 - 20 - 15 - 41.4 = 123.6).

In 123.6 ml of warm water, dissolve 60.0 g of glucose, cool the solution, filter in the bottle for delivery, and add the calculated amount of concentrated solutions of calcium chloride and sodium bromide.

3. If in the prescription the medicinal substances are discharged in dry form separately in quantities less than 3% and in the amount in excess of 3%, then in calculating water it is necessary to take into account the volume occupied by each of the medicinal substances.

4. Liquid dosage forms, in which the solvent does not use purified water and fragrant waters or other liquids (pertussin, water extracts from vegetable raw materials, polyethylene oxide-400, ethyl alcohol, etc.) are prepared without the use of concentrated solutions of medicinal substances and accounting CCD when dissolving substances.

Rp .: Sodium hydrocarbonatis 2.0
Sodium benzoate 1.5
Anchovy anionic liquor 4 ml
Syrupi sacchari 10 ml
Aquae Menthae 100 ml
Misce Da Signa 1 tablespoon 3 times a day

Flashing mixture with amniotic-anisive drops, which add to the aqueous solutions by a special method.

In a stand, measure 100 ml of mint water which dissolves 2,0 g of sodium bicarbonate and 1,5 g of sodium benzoate. The solution is filtered into the vial for delivery. In a separate jar add 4 ml of ammonia drops, mix and transfer to a vial for delivery to 10 ml of sugar syrup.

If sugar syrup is not specified in the formulation then the ammonia-aniseed drops are pre-mixed with approximately equal amount of aqueous solution.

With the direct addition of ammonia drops to aqueous electrolyte solutions the anetol contained in the aniseed oil which precipitates in the form of flakes on the walls of the bottle is released.

5. Plan and organizational structure of employment.

Number	**The main stages of employment, their function and meaning.**	**Learning Objectives levels of assimilation.**	**Means of instruction and control.**	**Materials on methodological Secured Lock class visibility, control of**	**Duration (in minutes or in%) of the total time employment.**

				knowledge of students.	
1	**2**	**3**	**4**	**5**	**6**
1	**Preparatory** - organizing classes - setting educational goals - control the output level of knowledge - monitoring skills of students, their willingness to accept this material class	I		Slideshow table	15-20
2	**Basic** tasks	II, III			50-60
3	**Final** -control of professional skills - supply results of studies - granting homework from sending literature	IV			15-20

6. Methodological materials.

6.1. The task source for self-knowledge skills

Tests with answers

1. For a complete chemical analysis of purified water is sent to the analytical lab once:

A. * Quarter
B. Moon
C. Week
D. Year
E. Six months

2. The volume of purified water, taken for the manufacture of 200 ml of 20% magnesium sulfate concentration (LCE = 0.5 ml / g), is:

A. 180 ml *
B. 200 ml
C. 185.5 ml
D. 190 ml

E. 195 ml

3. Calculate how much potassium bromide (LCE 0.27 ml / g) and purified water should be taken to prepare 500 ml of 20% solution of potassium bromide:
* 100.0 A. potassium bromide and 472 ml of purified water
B. 100,0 potassium bromide and 500 ml of purified water
C. 200,0 potassium bromide and 300 ml of purified water
D. 200,0 potassium bromide and 944 ml of purified water
E. 110.0 potassium bromide and 500 ml of purified water

4. Pharmacist-technologist prepared concentrated solution of sodium bromide. Specify that his actions after the preparation of the solution:
A. * Gave pharmacist-analyst for the full chemical analysis
B. posted written passport control
C. designed to leave
D. placed in stagnal
E. filtered solution

5. A pharmacist prepared 1000 ml of a 10% solution of calcium gluconate. Specify how much material and water it took to prepare (LCE calcium gluconate = 0.5)
A. * 100.0 and 950 ml
B. 50,0 and 950 ml
C. 100,0 and 900 ml
D. 200,0 and 850 ml
E. 200,0 and 800 ml

6. Pharmacist-technologist prepared concentrated solution and delivered for analysis. Determine what would be his actions after receiving a positive test result:
A. filtered solution *
B. Filter solution
C. moved into the material stagnal
D. designed for use
E. dismissed

7. Concentrated solutions are prepared in a pharmacy in mass and volume concentration. Specify what is meant by the designation of concentration of the solution 1:10?
* A. 1.0 g of substance and solvent to obtain 10 ml
B. 10.0 g substance and 1 ml of solvent
C. 1.0 g and 10 g of substance solution
D. 1,0 g substance and 10 mL of solvent
E. 1,0 g of substance and 9 ml of solvent

8. Pharmacy received the prescription for solution in the ratio-tion of the active substance and solvent 1: 5000. Where in the concentration corresponding to this ratio:
A. * 0.02%
B. 5,0%
C. 0,5%
D. 0,1%
E. 0,05%

9. The number of purified water is calculated using the coefficient of volume increase, if the concentration of the solution is:
A. * 3%
B. 2%
C. 0,5%
D. 0,3%
E. 2,5%

10. To prepare 250 ml of 50.0 pharmacist used potassium iodide. What is the concentration of the resulting solution?
A. * 20%
B. 50%
C. 25%
D. 10%
E. 15%

6.2. Information necessary for the formation of knowledge, skills can be found in textbooks: / basic literature provided with the designation of pages:

A) Basic

15. Aseptic drug forms, extemporaneous compounding: Guidelines /O.I.Tyhonov, L.V.Bondareva, T.H.Yarnyh, N.F.Orlovetska etc .; Ed. O.I.Tyhonova and T.H.Yarnyh. - H .: Izd pharmacy; Original, 2005. - 184 p.
16. Solid dosage forms: extemporaneous compounding: Guidelines /O.I.Tyhonov, L.V.Bondareva, T.H.Yarnyh, N.F.Orlovetska etc .; Ed. O.I.Tyhonova and T.H.Yarnyh. - H .: Izd pharmacy; Original, 2003. - 176 p.
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19. Workshop on pharmaceutical drug technology; for students. Pha. HI. teach. schools / AI Tikhonov, T. Yarnyh, V. Sobolev et al .; Ed. AI Tikhonov. - H .: Izd pharmacy: Golden Pages, 2002. - 256 p.

B) Further Reading:

3. Dictionary-guide for pharmacy specialists in management and economics / Ed. prof. Black VP // Kharkov: Publishing pharmacy "Golden storynky" - 2001 - 281 p.

6.3. Table for independent work with literature on the lecture topic

№	Main tasks	Directions	Responses (literature)
1	2	3	4
1.	Characterization solutions as dispersed systems.	Define the concept of solution. Describe the main ways of expressing concentration of solutions	4, 5
2.	Purified water	Describe the main methods of obtaining purified water. What documentation that normalize quality purified water	4, 5
3.	Preparation of concentrated solutions	What are the main technological stages of preparation of concentrated solutions	4, 5
4.	Quality rating concentrated solutions	What documentation that normalize quality concentrated solutions	4, 5

7. Materials for self-training quality.

A. *Questions*

1. Characteristics solutions as disperse systems, their classification.
2. Methods for obtaining purified water; equipment that is used for this purpose, how it works.
3. Quality of water purified by SPU, and MOH Ukraine number 626 of 15.12.2004.
4. Concentrated solutions of their appointment, terms of preparation in pharmacies according to the instructions in order MOH Ukraine number 197 of 09/07/93 p.
5. Calculation of number of drugs and water to prepare concentrated solutions of different ways:
- using dimensional dishes;
- using the lift volume;
- taking into account the density of the solution.
6. Control of concentrated solutions, correct concentration, storage conditions. Accounting prepared concentrated solutions.
7. The device burette installation, maintenance and rules for its use.

B. *Tests for self-control with standard answers.*

1. A pharmacist prepares a concentrated solution of glucose 40% 1000 ml. What amount of glucose with 10% humidity he should take?

A.* 444.4

B. 440.0

C. 400,0
D. 404,0
E. 404.4

2. A pharmacist prepared 2000 ml of concentrated sodium benzoate 10%. However, the analysis showed that the solution has a concentration of 11.5%. What you need to add in water to bring the concentrated solution to normal?
A. * 300 ml
B. 15 ml
C. 20 ml
D. 115 ml
E. 30 ml

3. In the analysis of 800 ml concentrated solution of magnesium sulfate 25% revealed that the solution has a concentration of 26%. Pharmacist calculated amount of water for dilution. What is it?
A. * 32 ml
B. 80 ml
C. 16 ml
D. 8 ml
E. 20 ml

4. Calculate the amount of sodium salicylate and purified water to prepare 5000 ml of concentrated sodium salicylate 10%. (Density of 10% sodium salicylate = 1.0301 g / ml).
A. 500.0 * sodium salicylate, and 4650.5 ml of purified water
B. 500,0 sodium salicylate and 4500 ml of purified water
C. 500,0 sodium salicylate and 5000 ml of purified water
D. 50,0 sodium salicylate and 4950 ml of water
E. 50,0 sodium salicylate and 4700 ml of water

5. A pharmacist prepared 1000 ml concentrated solution of chloral hydrate 20% and gave the analyst. The analysis showed that the concentration of the solution is 19.5%. What amount of solids to add to stronger solution to normal? Density 20% solution of chloral hydrate = 1.0860 g / ml
A. 5.64 g *
B. 5.0 g
C. 3.5 g
D. 50.5 g
E. 5,4 g

6. What is the shelf life of treated water in closed containers?
A. * 3 days
B. 1 day
C. 5 days

D. 7 days
E. 14 days

7. What does the following entry:

Solutionis Calcii chloridi ex 40,0 - 500 ml?
* A. Calcium chloride - 40.0, purified water to 500 ml
B. Calcium chloride - 40.0 purified water - 500 ml
C. Calcium chloride - 40.0, purified water - 460 ml
D. Calcium chloride - 40.0, purified water - 540 ml
E. Calcium chloride - 40.0, purified water - 440 ml

8. In the analysis of 1500 ml of 20% solution of sodium benzoate, caffeine was found that its concentration is 18%. Calculate the amount of caffeine sodium benzoate to be added to correct the concentration of the solution. Density 20% solution of sodium benzoate, caffeine equal to 1.0730 g / ml.
A. 34.4 *
30,0 B.
C. 68,8
D. 15.5
E. 3,2

9. What is the tolerance concentration of 10% concentrated sodium benzoate?
A. * ± 2%
B. ± 1%
C. ± 0,5%
D. ± 3%
E. ± 5%

10. What is tolerance concentration of 40% concentrated solution of glucose?
A. * ± 1%
B. ± 2%
C. ± 0,5%
D. ± 3%
E. ± 5%

C. Tasks for self-control with answers.

1. Pharmacist-technologist calculated that for the preparation of 2 liters of 20% sodium bromide 400.0 should take the drug and 1,600 ml of purified water. Is it correct calculation?

Answer. No, wrong. To produce 2 liters of 20% sodium bromide must take sodium bromide and 400.0 2000 - 400.0 · 0.26 = 1896 ml.

2. Analitic pharmacist-technologist said that the analysis of 3 liters of 5% sodium bicarbonate concentrations appeared to be 4.8%. How can be achieved the correct concentration of the solution?

Answer. Correct concentration can be achieved by adding dry matter. Its amount is calculated as follows:

3. Pharmacist-technologist in volumetric flask of 1 liter through the funnel added 100.0 caffeine, sodium benzoate and purified water immediately added to the 1 liter mark. At what stage he made a mistake?

Answer. It is necessary to first dissolve the dry matter in a little water then add the remaining water to the mark.

4. Pharmacist-technologist prepared concentrated solution of chloral hydrate, filtered it and gave chemist analytics for analysis. Are the sequence of process stages right?

Answer. No. Initially concentrated solution given analytics for analysis, and then filtered.

5. To prepare 4 liters of 10% sodium salicylate pharmacist-technologist weighed 40.0 g of sodium salicylate and measured 4080 ml of water. Dissolved in the stand, he filtered solution through te wool glass cylinder with ground glass stopper. Evaluate the correctness of his actions.

Answer. To produce 4 liters of 10% sodium salicylate should take sodium salicylate 400.0 and 4000 (400 · 0.59) = 3764 ml of purified water. After making the solution passed analytics for analysis and then filtered through a filter paper or glass.

8. Materials for audience independent preparation:

8.1. List of educational practical tasks to be performed during the practical (laboratory) classes:

1. A solution of magnesium sulfate 25% 5 L (Concentration resulting solution 23.2%; 28%)	2. A solution of potassium bromide 2 l 20% (Concentration resulting solution 18.5%; 23.5%)
3.Solution 20% hexamethylenetetramine 1 liter (Concentration of the resulting solution 18%; 23.1%)	4. A solution of sodium salicylate 10% 4 L (Concentration resulting solution 8.9%; 10.7%)
5. A solution of caffeine-sodium benzoate 10% 3 l (Concentration resulting solution 9.5%; 10.8%)	6. The solution of calcium gluconate 10% 7 l (Concentration resulting solution 9.1%; 11.3%)
7. The solution of calcium chloride 50% 2 l (Concentration of the resulting solution 47% ;, 53.5%)	8. A solution of potassium iodide 5 liters of 20% (Concentration resulting solution 18.5%; 21.3%)
9. The solution of sodium bicarbonate 5% 3 l (Concentration resulting solution 4.2%; 5.5%)	10. The solution of sodium bromide 2 l 20% (Concentration resulting solution 18.3%; 22%)

11. 40% glucose solution 4 l (Concentration of the resulting solution 42%; 38.6%)	12. The solution of ammonium chloride 20% 4 L (Concentration resulting solution 19.3%; 22.3%)
13. 10% glucose solution 2 l (Concentration resulting solution 9.2%; 11%)	14. The solution of potassium bromide 20% 3l (Concentration resulting solution 18.8%; 22.1%)
15. The solution of sodium salicylate 20% 1 liter (Concentration resulting solution 19.1%; 21.7%)	16. The solution of boric acid l 2 4% (Concentration resulting solution 3.2%; 4.5%)
17. The solution of ascorbic acid 5% 5 L (Concentration resulting solution 4.4%; 5.6%)	18. The solution of calcium chloride 20% 2 l (Concentration resulting solution 18.9%; 21%)
19. The solution of sodium benzoate 3 liters of 10% (Concentration resulting solution 9.1%; 10.8%)	20. The solution of chloral hydrate 20% 1 liter (Concentration of the resulting solution 19%; 21.3%)

9. Instructional materials for acquiring professional skills:

9.1. Methods of work performance stages.

1. Calculate the amount of dry matter and water purified preparation of concentrated solution burette installation in two ways:

a) on the basis of the density of the solution;

b) using the coefficient of volume increase.

Spend the necessary calculations to correct concentration solutions prepared using formulas strengthen and dilution (instruction in order MOH Ukraine number 197 of 07/03/93 p.).

2. Write the name of the concentrated solution in Latin, calculate the amount of water treated and the drug required for solution. Describe the best option technology concentrated solution of theoretical justification, allow assessment of its quality, specify its registration.

10. Materials for self-mastery of knowledge, skills provided by this work.
10.1. Tests of different levels

Calculate the amount of drugs and solvent for preparation of the concentrated solution with consideration of increasing the volume and density of the solution. If necessary correct the concentration of the solution using formulas strengthen and breeding. Expect standards tolerances in the concentration of the solution according to the MOH ordered Ukraine from 7.09.93 №197.

Tasks:
1. Prepare 1,5 l 20% solution of chloral hydrate.
Answer.
Chloral hydrate · 20 = 1500/100 = 300.0
Purified water = 1500 - 300 = 1272 · 0.76 ml

2. Prepare 4 liters of 10% sodium salicylate.

Answer.

Sodium salicylate × 10 = 4000/100 = 400.0

Purified water = 4000 - 400 = 3764 · 0.59 ml

3. Prepare 2 liters of 40% solution of hexamethylenetetramine;

Answer.

Hexamethylenetetramine · 40 = 2000/100 = 800.0

Purified water = 2000 - 800 = 1376 · 0.78 ml

11. The theme of the next session.

Production of liquid dosage forms by mass-volume method by dissolving dry medicinal substances and use of concentrated solutions.

Topic of the lesson 8: «Production of liquid dosage forms by mass-volume method by dissolving dry medicinal substances and use of concentrated solutions» – 4 hours.

1. Relevance of the topic: Concentrated solutions are used in pharmacies in the manufacture of liquid dosage forms by mass-volume method. The use of such solutions greatly increases the productivity, efficiency and quality of the assistant's work. The knowledge of the correct technology of concentrated solutions and the ability to count the number of ingredients correctly is essential for their quality preparation.

2. Objectives classes: to learn how to prepare concentrated solutions of medicinal substances for the burette system, evaluate their quality and make them for storage and use.

2.1. General objectives:

• Use the State Pharmacopoeia, regulatory documentation and reference literature to find the necessary information on the preparation of concentrated solutions.

• Calculate the amount of water and medicinal substances for the production of concentrated solutions.

2.2. Educational objectives:

• Formulate the basic concepts and terms of the technology of medical forms.

• Read recipes in Latin, analyze their constituent parts and evaluate the correctness of the prescription.

• Use the State and International Pharmacopoeia, other regulatory documents as well as reference literature to find information on the composition, preparation, storage and release of drugs, the verification of doses of poisonous and potent medicinal substances in them.

2.3. Specific goals:

- to know:

•Characterization solutions as disperse systems, their classification.

•The preparation of purified water in pharmacies. Requirements that apply to treated water in accordance with standards established by the State Pharmacopoeia, and the order of the MOH Ukraine 15.12.04 number 626.

•Calculate the amount of drugs and water to prepare concentrated solutions of different ways:

- using dimensional dishes;
- given magnification volume;
- taking into account the density of the solution.

•The rules for the preparation of concentrated solutions burette system according to the instructions in order MOH Ukraine of 07.09.93 number 197.

•Control of concentrated solutions, their storage and accounting solutions prepared by MOH ordered Ukraine from 7.09.93 number 197.

•Dosage by volume. Factors affecting the accuracy of dosing.

•Structure burette system, rules of care and use it.

2.4. Based on theoretical knowledge on the topic:

- master the methods / to be able to /:

• Provide aseptic conditions for the preparation of concentrated solutions.

• Carry out basic processing operations for the production of concentrated solutions (weigh, measure, dissolve, filter).

• Conduct control of the quality of concentrated solutions and, if necessary, correct their concentration.

• To keep records of prepared concentrated solutions in the pharmacy.

• Make concentrated solutions to use and provide appropriate storage conditions.

• Install a burette system, fill it with concentrated solutions and provide care for its sanitary condition.

3. Materials of before class of independent preparation (interdisciplinary integration).

Disciplines	To know	To be able
1. Preliminary		
Latin	Basics of grammar. Spelling Latin names of medicines and chemicals, herbs, families, and raw materials of vegetable and animal origin. Recipe.	Evaluate the accuracy of prescriptions
Anatomy and Physiology	The structure and functional properties of the body at different levels: molecular, cellular, organ system.	Evaluate the functional state of the organism as a whole and individual organs and systems
General and Inorganic Chemistry	The main provisions of the atomic-molecular theory.	Calculate the molar mass and equivalent compounds.
Physics	Physical methods of analysis of drugs.	Identify key quality hard drugs.

Organic chemistry	Physical, chemical properties of organic compounds and basic methods of analysis.	Conduct elemental analysis and identification of organic compounds.
Analytical chemistry	Methods of qualitative and quantitative analysis of inorganic and organic substances	Perform qualitative and quantitative analysis of individual substances and mixtures, make the necessary calculations for data analysis.
2. The following Organization and economics of pharmacy	Total liquid dosage form technology for internal use	Make payments dosage, excipients and purified water
Tech industrial production of drugs	Technology solutions for internal use	Technological stage production solutions for internal use
Biopharmacy	Technological process of preparation of solutions for internal use.	Prepare solutions for internal use, taking into account physical and chemical properties of the ingredients.
3. Intersubjective integration Injection solutions and eye drops	Preparation of solutions mass-volume method	Conduct calculations of the amount of dry matter and water

4. Content themes (text or abstracts)

Liquid dosage forms occupy a significant place in the formulation of pharmacies and make up 60% or more of the total number of all medications prepared in pharmacies.

By its nature all liquid dosage forms are free comprehensive dispersed systems in which the drugs are evenly distributed in a liquid dispersion medium. Medicinal substances in liquid dosage forms may be in various aggregate states: solid, liquid and gaseous.

Depending on the degree of shredding of the dispersed phase (ie, the medicinal substance) and the nature of its connections with the dispersion medium (solvent), the following physico-chemical systems are distinguished: real solutions of low- and high-molecular compounds, colloidal solutions (ash), suspensions and emulsions. Individual dosage forms may also be combined disperse systems - the combination of the main types of disperse systems (infusions and decoctions, extracts, etc.).

In the study of various liquid dosage forms, we will characterize them as the corresponding disperse systems that differ in their physical and chemical properties. By using certain technological techniques (dissolution, peptization, suspension or emulsification), the constituent medicinal substance (solid, liquid and gaseous) can be reduced to a greater or lesser degree of dispersion from ions and molecules to coarse particles that are noticeable under a microscope or naked eye. This is important for the detection of the therapeutic effects of the drug substance on the body which has been repeatedly confirmed by biopharmaceutical research.

Solutions are a group of liquid dosage forms that are characterized by a large variety of composition and methods of application.

Solutions are a homogeneous dispersion system consisting of at least two or more components in which the molecules of the dissolved substance are evenly distributed between the solvent molecules.

Real solutions cover two categories of disperse systems: ion-disperse systems and molecular-disperse systems.

Ion-disperse systems include solutions in which the particle size of the disperse phase is about 0.1 nm. The dissolved substance is in the form of individual hydrated ions. This group includes solutions of electrolytes for example: sodium chloride, sodium sulfate and others.

Molecular-disperse systems include solutions in which the size of particles of the disperse phase is less than 1 nm. In the process of dissolution- the substance decomposes into separate independent molecules. If aggregates of particles are formed then the composition of such complexes is limited to a small number of molecules (2-3). This group mainly includes non-electrolytes (sugar, glucose, hexamethylenetetramine and the like).

Real solutions are characterized by a high strength bond between the dissolved substance and the solvent.

These are fairly stable, single-phase, homogeneous, dispersed systems that do not divide even with long-term preservation. They are transparent, well diffused and dialized and can be filtered.

Stability of solutions poses the great importance for its use as it makes possible to prepare various solutions into the stock to prepare concentrated solutions of medicinal substances when using the burette system.

In pharmacy practice, the percentage of true solutions accounts for up to 30% of the overall pharmacy recipe.

Liquid dosage forms are a form of delivery of drugs that are obtained by mixing or dissolving active substances in water, alcohol, oils and other solvents as well as by extracting active substances from plant material.

Depending on the degree of shredding of the dispersed phase and the nature of its connection with the dispersion medium (solvent), the following physical and chemical systems are distinguished: true solutions of low and high molecular compounds, colloidal solutions (ash), suspensions and emulsions.

Water purified (*Aqua purificata*). As the solvent for liquid dosage forms for internal use the most frequently used water is purified.

Water is pharmacologically indifferent, available and dissolves a lot of medicinal substances but at the same time some medicinal substances and microorganisms reproduce rather quickly.

Purified water can be obtained by distillation, ion exchange, electrolysis, reverse osmosis. The quality of cleaned water is regulated by the DFU: it should be colorless, transparent, odorless and not flavored; pH may vary within the range of 5.0-7.0; should not contain reducing impurities, nitrates, chlorides, sulfates, traces of ammonia and other impurities.

From the methods of obtaining purified water the most common method of distillation (distillation).

Once a quarter, purified water is sent to the control and analytical laboratory for analysis.

TECHNOLOGICAL STAGES OF PREPARATION OF LIQUID DOSAGE FORMS.

All liquid dosage forms are prepared by mass-volume method (Order of the Ministry of Health of Ukraine No. 197 dated September 7, 09, p.). This provides the required mass of medicinal substance in a given volume of solution. By mass, usually prepare solutions in which as a solvent used liquids with high density, viscous, volatile as well as emulsions and some medicinal forms by author's proprietary. By volume prepare solutions of ethyl alcohol of different strengths, solutions of standard pharmacopoeias liquids. In the mass-bulk method, the soluble substance is taken by weight and the solvent is added to obtain the required volume of solution.

If the solvent in the recipe is not specified then aqueous solutions are prepared. By the word "water" if there are no special instructions refer to purified water.

The process of preparation of liquid dosage forms consists of the following stages: preparatory work (selection of appropriate dishes and plugs to it); weighing and measuring medicines and solvents; mixing or dissolving, extracting, dispersing or emulsifying complex components of a medicinal product; strain or filter; evaluation of the quality and registration of the medicinal product before departure.

Depending on the dosage form, the solubility of the medicinal substances and the type of solvent one or another technological step is used.

Selection of dishes (bottles) and stoppers. The vial and cork are picked up in advance taking into account the volume of the liquid dosage forms being prepared and the properties of their components.

The bottle should be clean and dried. The lid should be screwed to the neck freely to the stop and not rotated. If liquid medicinal products contain photosensitive substances, they are placed in a vial of orange glass.

Weighing and measuring. When weighing and measuring medicinal substances are guided by the basic rules of dosage.

Mixing, dissolving, extracting, dispersing, emulsifying. All these technological processes for liquid dosage forms serve as the basis for the formation of a disperse system. The presence or absence of a dispersed phase in these processes depends on the solubility of drugs in water or other solvents.

When preparing liquid dosage forms, dissolving dry medicinal substances should be guided by the following rules:

- The first is always measured in the stand (a pot with a wide throat) calculated amount of purified water, in which dissolve dry medicinal substances: first poisonous then goes a general list, taking into account their solubility and other physical and chemical properties. This sequence of solution preparation is needed to prevent or eliminate the processes of interaction of drugs that occur most rapidly in solutions with high concentration;
- large-crystalline medicinal substances (copper sulfate, gallium, potassium permanganate, etc.) to accelerate the dissolution process, first, in a mortar with a small amount of solvent;
- heat-resistant substances that slowly dissolve (sodium tetraborate, boric acid, mercuric dichloride, riboflavin, ethacridine lactate, etc.), dissolve in a hot solvent or when heated;
- to accelerate the dissolution process, shake or mix the solution with a glass rod.

When preparing liquid dosage forms by mixing or increasing the liquid components, the following rules should be followed:

- mixing of liquids is carried out in order of increasing their quantity;
- fragrant waters, tinctures, liquid extracts, alcoholic solutions, flavor and sugar syrups and other liquids are added to the aqueous solution in the last place in the bottle for delivery in the following order: water non-fat and non-liquid liquids; alcohol solutions in the order of increasing the concentration of alcohol; odorous and volatile liquids;
- liquid medicinal products containing essential oils (ammonia-anise drops, thoracic elixir, citral solution, etc.) are added to the mixture by mixing with sugar syrup (if it is available in the formulation) or with an equal amount of the mixture;
- tinctures, emulsion-aniseed drops and other volatile liquids should not be added to warm solutions;
- medicines with increased viscosity (ihtiol, dense extracts, etc.) are pre-mixed in a mortar with a part of the solvent and after increasing another are transferred to the vial for delivery.

Cooling (*colatio*) and filtration (*filtratio*). These processes are used in pharmacy practice for the separation of the liquid phase from all suspended particles (mechanical impurities) which fall into liquid dosage forms when contaminated with solvents and dissolved substances from devices and utensils in the form of fibers, dust and the other. Filtration is carried out with the help of funnels made of different materials of different capacities and types.

The process is used for the separation of large particles, for which the liquid is passed through a lump of cotton wool or several layers of gauze, less often canvas, silk, capron and other fabrics.

The process is run through a cotton swab, pre-washed with water purified to remove small fibers. The purity of the drug in this case will depend on the density of the lump of cotton wool, enclosed in the mouth of the funnel. Excess hardness of a cotton swab is undesirable, since the rate of stratification is slowed down.

Mucus, emulsions, infusions and broths are filtered through a double layer of gauze or cloth.

A very important issue when preparing liquid dosage forms by mass-volume method is to determine the total volume which is calculated by summing up all volumes of liquid ingredients (according to the order of the Ministry of Health of Ukraine No. 197 dated September 7, 1993). The total volume includes: solvent, water and alcohol solutions of medicinal substances, tinctures, liquid extracts and all other prescribed liquids, which are prescribed in recipes in ml.

If it is necessary to establish the volume of liquid dosage forms, which include viscous, volatile, and also liquids with a higher density, take into account their density. The number of dry substances in the determination of the total volume is not taken into account. When determining the total volume, it is necessary to consider the method of prescribing the solvent.

Rp .: Sodium hydrocarbonatis 2.0
Tincturae Valerianae 6 ml
Sirupi's simplicity 10 ml
Aquae purificatae 200 ml
Misce Da Signa 1 tablespoon 3 times a day

In the given formulation, the amount of solvent is indicated. In this case, the calculation of the total volume of the mixture is made by summing the volumes of liquid ingredients: 200 ml of purified water + 6 ml of tincture of valerianum + 10 ml of syrup of sugar, which will make 216 ml

Mixture can be prepared using a concentrated solution of 5% sodium bicarbonate (1:20).

Calculation:
A solution of sodium bicarbonate 5% (1:20) = 20 · 2.0 = 40 ml
Water purified 200 - 40 = 160 ml

Control panel

Date	Recipient No
Aquaepurificatae	160 ml
Solution Sodium hydrocarbonatis 5% (1:20)	40 ml
Sirupi's simplicity	10 ml

TincturaeValerianae	6 ml
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V_{total} = 216 ml

Prepared by: (signature)
Checked out: (signature)
Released (signature)

If the amount of the solvent is indicated "to a certain volume", then the liquid ingredients are included in the volume of the aqueous solution.
Example:

Rp .: Nartiihydrocarbonatis 2.0
TincturaeValerianae 6 ml
Sirupi's simplicity 10 ml
Aquaepurificatae 200 ml
M. D. Signa. 1 tablespoon 3 times a day

The total volume of the mixture in this case is 200 ml. Number of treated water: 200 - (40 + 6 + 10) = 144 ml

Control panel

Date	Recipient No
Aquaepurificatae	144 ml
Solution Sodium hydrocarbonatis 5% (1:20)	40 ml
Sirupisimplicis	10 ml (or 13.0)
TincturaeValerianae	6 ml
---	------------

V_{total} = 200 ml

Prepared by: (signature)
Checked out: (signature)
Released (signature)

When preparing mixtures of concentrated solutions, the following rules are followed:

- first of all, in the bottle for purification, measure the water purified, then concentrated solutions of poisonous and potent substances and then concentrated solutions of medicinal substances of the general list in the order they are prescribed in the recipe;
- the medicines are not filtered and prepared immediately in the bottle for release.

Taking into account all these requirements the mixture is prepared according to the above prescription form: 160 ml of purified water is measured in 160 ml of purified water, then 40 ml of a 5% solution of sodium bicarbonate, 10 ml of sugar syrup and lastly 6 ml of tincture of valerian are measured here.

The vial is sealed and drawn up for release.

In the absence of concentrated solutions, the mixture is prepared taking into account the percentage of dry medicinal substances in the total volume of the solution.

1. If the liquid dosage form consists of dry medicinal substances in a total amount of up to 3%, the concentrated solutions are absent then they are dissolved in the measured quantity of prescribed water or other liquid without taking into account the CVI.

Example:

Rp .: Analgini 3.0
Calcium bromide 4.0
TincturaeBelladonnae 8 ml
TincturaeValerianae 10 ml
Aquaepurificatae 200 ml
Misce Da Signa 1 tablespoon 3 times a day

A flaking mixture containing highly active substances (analgin and tincture of belladonna, prepared on 40% alcohol), photosensitive substance potassium bromide and tincture of valerian, prepared on 70% alcohol.

The examination of single and daily doses of analgin and tincture of belladonna is carried out by comparing them with higher single and daily doses for internal use.

Total volume of the drug: 200 ml + 10 ml + 8 ml = 218 ml

3.0 g of analgin (a concentrate which is absent) in a volume of 218 ml will consist of:

218 ml - 3.0 g

100 ml - x g; x = 1,7%, that is less than 3%.

When dissolved, 3.0 g of analgin (CVI = 0.68 ml / g) will increase by 2.04 ml ($0.68 \cdot 3.0 = 2.04$).

For a volume of more than 200 ml a deviation from the norm is allowed ± 1%. For a volume of 218 ml this deviation will be 2.18 ml. Apparently, the variation in the volume that takes 3.0 g of analgin does not exceed the permissible norm, since 2.18 ml is more than 2.04 ml. Therefore, in such cases, the CVI does not take into account.

Calculation:

Potassium bromide solution 20% (1: 5) = $5 \cdot 4 = 20$ ml

Water purified = 200 - 20 = 180 ml

In the stand, weigh 180 ml of purified water which dissolves 3,0 g of analginum. The solution is filtered into a release-up bottle and first add 20 ml of a 20% solution of potassium bromide, then 8 ml of tincture of belladonna, and lastly - 10 ml of tincture of valerian. Clog up and draw up to release.

2. Liquid dosage forms containing dry substances in a total amount of 3% or more are prepared using concentrated solutions or in measuring vessels or the volume of water required for the dissolution of dry substances, determined by calculation, taking into account the CCD.

Rp: Solution Calcium chloride 5% in 200 ml
Glucose 60.0
Sodium Bromide 3.0
Misce Da Signa 1 tablespoon 3 times a day

Mixture-solution, which includes a photosensitive substance - sodium bromide, a strongly hygroscopic substance - calcium chloride and glucose, registered in a concentration of more than 3%.

THE MIXTURE IS PREPARED USING CONCENTRATED SOLUTIONS.

Calcium chloride is a strongly hygroscopic substance that spills in air to the consistency of a syrupy solution. Using crystalline calcium with chloride is uncomfortable (crystals are wet and dirty, while weighing there is no certainty in the exact dosage, since the unknown content in this salt of hygroscopic water). In order to avoid damage to the drug and inaccurate dosing of calcium chloride from it, prepare a concentrated solution of 50 or 20%, which is used for the preparation of liquid medicinal products. The solution is stable and well preserved for a long time.

Calculation:

A solution of calcium chloride 50% (1: 2) = 10.0 · 2 = 20 ml
Glucose solution 50% (1: 2) = 60.0 · 2 = 120 ml
A solution of sodium bromide 20% (1: 5) = 3.0 · 5 = 15 ml
Water purified 200 - (20 + 120 + 15) = 45 ml

In a bottle for release, 45 ml of purified water, 20 ml of 50% concentrated calcium chloride solution, 120 ml of 50% concentrated glucose solution, 15 ml of 20% concentrated solution of sodium bromide are measured.

In the absence of a concentrated glucose solution, the amount of solvent is calculated using an increase in volume for glucose. When dissolved 60.0 g of glucose, the volume of the solution will increase by 41.4 ml (0.69 · 60 = 41.4). Therefore, the amount of water purified to obtain 200 ml of solution will be equal to 123.6 ml (200 - 20 - 15 - 41.4 = 123.6).

In 123.6 ml of warm water, dissolve 60.0 g of glucose, cool the solution, filter in the bottle for delivery, and add the calculated amount of concentrated solutions of calcium chloride and sodium bromide.

3. If in the prescription the medicinal substances are discharged in dry form separately in quantities less than 3% and in the amount in excess of 3%, then in calculating water it is necessary to take into account the volume occupied by each of the medicinal substances.

4. Liquid dosage forms in which the solvent does not use purified water and fragrant waters or other liquids (pertussin, water extracts from vegetable raw

materials, polyethylene oxide-400, ethyl alcohol, etc.) are prepared without the use of concentrated solutions of medicinal substances and accounting CCD when dissolving substances.

Rp .: Natrii hydrocarbonatis 2.0
Natrii benzoatis 1.5
Liquori Ammoniianisati4 ml
Sirupi sacchari 10 ml
Aquae Menthae 100 ml
Misce Da Signa 1 tablespoon 3 times a day

Flashing mixture with amniotic-anisive drops, which add to the aqueous solutions by a special method.

In a stand, measure 100 ml of mint water which dissolves 2,0 g of sodium bicarbonate and 1,5 g of sodium benzoate. The solution is filtered into the vial for delivery. In a separate jar add 4 ml of ammonia drops, mix and transfer to a vial for delivery to 10 ml of sugar syrup.

If sugar syrup is not specified in the formulation, then the ammonia-aniseed drops are pre-mixed with approximately equal amount of aqueous solution.

With the direct addition of ammonia drops to aqueous electrolyte solutions, the anetol contained in the aniseed oil, which precipitates in the form of flakes on the walls of the bottle, is released.

5. Plan and organizational structure of employment.

Number	**The main stages of employment, their function and meaning.**	**Learning Objectives levels of assimilation.**	**Means of instruction and control.**	**Materials on methodological Secured Lock class visibility, control of knowledge of students.**	**Duration (in minutes or in%) of the total time employment.**
1	**2**	**3**	**4**	**5**	**6**
1	**Preparatory** - organizing classes - setting educational goals - control the output level of knowledge - monitoring skills of students, their willingness to accept this material	I		Slideshow table	15-20

2	class **Basic** tasks	II, III			50-60
3	**Final** -control of professional skills - supply results of studies - granting homework from sending literature	IV			15-20

6. Methodological materials.
6.1. The task source for self-knowledge skills
Tests with answers

1. For a complete chemical analysis of purified water is sent to the analytical lab once:

A. * Quarter
B. Moon
C. Week
D. Year
E. Six months

2. The volume of purified water, taken for the manufacture of 200 ml of 20% magnesium sulfate concentration (LCE = 0.5 ml / g), is:

A. 180 ml *
B. 200 ml
C. 185.5 ml
D. 190 ml
E. 195 ml

3. Calculate how much potassium bromide (LCE 0.27 ml / g) and purified water should be taken for preparing 500 ml of 20% solution of potassium bromide:

* A. 100.0 potassium bromide and 472 ml of purified water
B. 100.0 potassium bromide and 500 ml of purified water
C. 200.0 potassium bromide and 300 ml of purified water
D. 200.0 potassium bromide and 944 ml of purified water
E. 110.0 potassium bromide and 500 ml of purified water

4. Pharmacist-technologist had prepared concentrated solution of sodium bromide. Specify his actions after the preparation of the solution:

A. * Gave pharmacist-analyst for the full chemical analysis
B. posted written passport control
C. designed to release
D. placed in stagnal
E. filtered solution

5. A pharmacist prepared 1000 ml of a 10% solution of calcium gluconate. Specify how much material and water it took to prepare (LCE calcium gluconate = 0.5)

A. * 100.0 and 950 ml
B. 50,0 and 950 ml
C. 100,0 and 900 ml
D. 200,0 and 850 ml
E. 200,0 and 800 ml

6. Pharmacist-technologist prepared concentrated solution and delivered for analysis pharmacist-analyst. Determine what are his actions after receiving a positive test result:

A. filtered solution *
B. Filter solution
C. moved into the material stagnal
D. designed for use
E. dismissed

7. Concentrated solutions are prepared in a pharmacy in mass and volume concentration. Specify what is meant by the designation of concentration of the solution 1:10?

* A. 1.0 g of substance and solvent to obtain 10 ml
B. 10.0 g substance and 1 ml of solvent
C. 1.0 g and 10 g of substance solution
D. 1,0 g substance and 10 mL of solvent
E. 1,0 g of substance and 9 ml of solvent

8. Pharmacy received the prescription for solution in the ratio-tion of the active substance and solvent 1: 5000. Where in the concentration corresponding to this ratio:

A. * 0.02%
B. 5,0%
C. 0,5%

D. 0,1%
E. 0,05%

9. Number of purified water is calculated using the coefficient of volume increase if the concentration of the solution is:

A. * 3%
B. 2%
C. 0,5%
D. 0,3%
E. 2,5%

10. To prepare 250 ml of 50.0 pharmacist used potassium iodide. What is the concentration of the resulting solution?

A. * 20%
B. 50%
C. 25%
D. 10%
E. 15%

6.2. Necessary information for the formation of knowledge and skills
Basic

1. AI Tikhonov, T.G. Yarnyh "Technology of Drugs", a textbook for Higher Educational Institutions, Kharkov, "Original", 2006.
2. Workshop on pharmacy technology of medicines; for studio Pharmacist higher tutor institutions / O. I. Tikhonov, T. G. Yarnykh, V. O. Sobolev, and others; Ed. OI Tikhonova. - X .: View of the NFPA: Golden Pages, 2002. - 256 p.

Additional

1. Soft dosage forms: Extemporal formulation: Methodical recommendations / O. I. Tikhonov, T. G. Yarnykh, O. V. Lukienko and others; Ed. OI Tikhonov - X .: View of NFaU; Golden Pages, 2003.-128 p.
2. Aseptic dosage forms: Extemporal formulation: Methodical recommendations / O. I. Tikhonov, L. V. Bondareva, T. G. Yarnykh, N. F. Orlovetsky and others; Ed. OI Tikhonova and TG Yarnyh. - X .: View of NFaU; Original, 2005. - 184 c2.
3. Solid dosage forms: Extemporal formulation: Methodical recommendations / O. I. Tikhonov, T. G. Yarnykh, S. V. Gritsenko and others; Ed. OI Tikhonova - Kh.: View of NFaU; Golden Pages, 2003. - 176 pp.
4. Liquid dosage forms: Extemporal formulation: Methodical recommendations / O. I. Tikhonov, T. G. Yarnykh, N. F. Orlovetsky, and others; Ed. OI Tikhonovaand TG Yarnyh. - X .: View of NFaU; Original, 2005. - 160 p.

6.3. Table for independent work with literature on the lecture topic.

№	The main tasks are	Instructions	Answers (literature)

1	2	3	4
1.	Characteristics of solutions as disperse systems.	Give the definition of the solution. Specify the main ways of expressing the concentration of solutions	1,2
2.	Water purified	Describe the main ways to get purified water. What is the NTD, which regulates the quality of cleaned water	1,2
3.	Preparation of concentrated solutions	What are the main technological steps in the preparation of concentrated solutions	1,2
4.	Assessment of the quality of concentrated solutions	Name the NTD, which normalizes the quality of concentrated solutions	1,2

7. Materials for self-training quality.

A. Question

1. Characteristics of solutions as disperse systems, their classification.
2. Ways of obtaining purified water; the equipment used for this purpose, the principle of its work.
3. Requirements for the quality of water purified according to the State Food and Drug Administration and the order of the Ministry of Health of Ukraine No. 626 dated December 15,
4. Concentrated solutions, their purpose, conditions of preparation in pharmacies in accordance with the instruction to the order of the Ministry of Health of Ukraine No. 197 dated September 7, 1993
5. Calculations of the amount of medicinal substances and water for the preparation of concentrated solutions in various ways:
- using the measuring dishes;
- using the ratio of increase in volume;
- taking into account the density of the solution.
6. Control of the quality of concentrated solutions, correction of their concentration, storage conditions. Accounting for prepared concentrated solutions.
7. The device of the burette installation, rules of care and use of it.

B. Tests for self-control with standard answers.

1. For complete chemical analysis purified water is sent to the control and analytical laboratory once at:
A. * Quarter
B. The Month
C. Week
D. Year
E. Six months

2. The volume of purified water taken for the preparation of 200 ml of a magnesium sulfate solution of 20% concentration (CVI = 0.5 ml / g), is:
A. * 180 ml
B. 200 ml
C. 185.5 ml
D. 190 ml
E. 195 ml

3. Calculate how much potassium bromide (CVI 0.27 ml / g) and purified water should be taken to prepare 500 ml of 20% potassium bromide solution:
A. * 100.0 potassium bromide and 472 ml of purified water
B. Potassium bromide 100.0 and 500 ml purified water
C. 200.0 potassium bromide and 300 ml of purified water
D. 200.0 potassium bromide and 944 ml of purified water
E. 110.0 potassium bromide and 500 ml of purified water

4. The analyzer-technologist prepared a concentrated solution of sodium bromide. Specify what its effects are after the solution is made:
A. * Has given a pharmacist-analyst for a complete chemical analysis
B. Written the passport of written control
C. Checked out before leaving
D. Put in a bobbler
E. The solution was filtered

5. The pharmacist has prepared 1000 ml of 10% calcium gluconate solution. Specify what amount of substance and water he took for cooking (CVI calcium gluconate = 0.5)
A. * 100.0 and 950 ml
B. 50.0 and 950 ml
C. 100.0 and 900 ml
D. 200.0 and 850 ml
E. 200.0 and 800 ml

6. The pilot-technologist prepared a concentrated solution and gave to the analyst. Specify what are his actions after receiving the positive result of the analysis:

A. * Filtered solution
B. Processed solution
C. Moved to a material barbell
D. Designed for use
E. Released

7. Concentrated solutions are prepared at the pharmacy in mass-volume concentration. Indicate what is meant by the concentration of solution 1:10?
A. * 1.0 g of substance and solvent to obtain 10 ml of solution
B. 10 g of substance and 1 ml of solvent
C. 1.0 g of substance and 10 g of solution
D. 1.0 g of substance and 10 ml of solvent
E. 1.0 g of substance and 9 ml of solvent

8. A prescription for the preparation of the solution in the ratio of the active substance and solvent 1: 5000 was received at the pharmacy. What concentration corresponds to this ratio:
A. * 0.02%
B. 5,0%
C. 0.5%
D. 0.1%
E. 0,05%

9. The amount of purified water is calculated using the volume increase factor if the solution concentration is:
A. * 3%
B. 2%
C. 0.5%
D. 0,3%
E. 2.5%

10. For the preparation of 250 ml of a solution, the pharmacist used 50.0 potassium iodide. What is the concentration of the solution obtained?
A. * 20%
B. 50%
C. 25%
D. 10%
E. 15%

C. Tasks for self-control with answers.
1. The pilot-technologist calculated that to prepare 2 liters of 20% solution of sodium bromide it is necessary to take 400.0 medical substance and 1600 ml of purified water. Are his calculations correct?

Answer. No wrong To make 2 liters of 20% solution of sodium bromide it is necessary to take 400.0 bromide sodium and 2000 - 400.0 · 0.26 = 1896 ml.

2. A chemist-analyst informed a pharmacist-technologist that, when analyzing 3 l of a 5% solution of sodium bicarbonate, its concentration was 4.8%. How can the concentration of solution be corrected?
Answer. You can correct the concentration by adding a dry substance. Its amount is calculated by the formula:

3. The pilot-technologist in a volumetric flask of 1 liter capacity through a funnel was poured 100.0 caffeine-sodium benzoate and immediately added water purified to the label of 1 liter. At what stage did he make a mistake?
Answer. You must first dissolve the dry substance in a small amount of water, and then add the rest of the water to the label.

4. The pilot-technologist prepared a concentrated solution of chloral hydrate, filtered it and gave the chemist-analyst for analysis. Is the sequence of technological steps followed?
Answer. No. First, the concentrated solution is given to the analyze for analysis, and then filtered.

5. To prepare 4 liters of 10% sodium salicylate solution, the pharmacist-technologist weighed 40.0 grams of sodium salicylate and measured 4080 ml of water. After dissolving in the stand, he filtered the solution through a squeegee wool into a glass cylinder with a corked cork. Evaluate the correctness of his actions.
Answer. To make 4 liters of 10% sodium salicylate solution, it is necessary to take 400.0 grams of sodium salicylate and 4000 - (400 × 0.59) = 3764 ml of purified water. After manufacturing, the solution is transferred to the analyst for analysis, and then filtered through a glass or paper filter.

8.Materials for audience independent preparation:
8.1. List of educational practical tasks to be performed during the practical (laboratory) classes:

1. A solution of potassium bromide 250 ml of 20%	2. A solution of magnesium sulfate 25% 100 ml
3. The solution of sodium salicylate 600 ml 10%	Hexamethylenetetramine 4.Rozchyn 750 ml 20%
5. The solution of calcium gluconate 10% 150 ml	6. The solution caffeine-sodium benzoate 10% 300 ml
7. A solution of potassium iodide 500 ml of 20%	8. The solution of calcium chloride 50% 650 ml
9. A solution of sodium bromide 350	10. The solution of sodium bicarbonate in

ml of 20%	400 ml of 5%
11. The solution of ammonium chloride in 400 ml of 20%	12. 40% glucose solution 200ml
13. The solution of potassium bromide 200 ml of 20%	14. 10% glucose solution 550 ml
15. The solution of boric acid 4% 300 ml	16. The solution of sodium salicylate 800 ml 20%
17. The solution of calcium chloride 20% 750 ml	18. The solution of ascorbic acid, 150 ml of 5%
19. The solution of chloral hydrate 20% 1000 ml	20. The solution of sodium benzoate 10% 250 ml

9. Instructional materials for acquiring professional skills:
9.1. Methods of work performance stages.

1. Calculate the amount of dry matter and water purified preparation of concentrated solution burette installation in two ways:

a) on the basis of the density of the solution;

b) using the coefficient of volume increase.

Spend the necessary calculations to correct concentration solutions prepared using formulas strengthen and dilution (instruction in order MOH Ukraine number 197 of 07/03/93 p.).

2. Write the name of the concentrated solution in Latin, calculate the amount of water treated and the drug required for solution. Describe the best option technology concentrated solution of theoretical justification, allow assessment of its quality, specify its registration.

10. Materials for self-mastery of knowledge, skills provided by this work.
10.1. Tests of different levels

Calculate the amount of drugs and solvent for preparation of the concentrated solution with consideration of increasing the volume and density of the solution. If necessary correct the concentration of the solution using formulas strengthen and breeding. Expect standards tolerances in the concentration of the solution according to the MOH ordered Ukraine from 7.09.93 №197

1. 1,5 l 20% solution of chloral hydrate;

Answer.
Chloral hydrate · 20 = 1500/100 = 300.0
Purified water = 1500 - 300 · 0.76 ml = 1272

2. 4 liters of 10% sodium salicylate;

Answer.
Sodium salicylate × 10 = 4000/100 = 400.0
Purified water = 4000 - 400· 0.59 ml = 3764 ml

3. 2 liters of 40% solution of hexamethylenetetramine;

Answer.
Hexamethylenetetramine · 40 = 2000/100 = 800.0
Purified water = 2000 - 800· 0.78 ml = 1376

11. The theme of the next session.
Special cases Production of aqueous solutions. Drops.

Topic of the lesson 9: «Special cases Production of aqueous solutions. Drops»– 2 hours.

1. Relevance of the topic: in the extemporal formulation of liquid medicinal products, there are prescriptions with medicinal substances whose solutions can not be prepared according to general rules. The dissolution of these substances requires the use of individual techniques, depending on the peculiarities of their physico-chemical properties. Some specificity in the preparation, due to the small number of solutions that are prescribed can have drops inside. Knowledge of the pharmacist-technologist of the features of technology as drops and special cases of preparation of aqueous solutions is necessary to provide patients with high-quality medicinal products. This determines the theoretical and practical need to study the topic.

2. General objectives: to learn how to prepare aqueous solutions of hard and low soluble, easily oxidized, interacting solubility and complexing drugs and drops of different composition, check the quality of the prepared medicines and make them ready for release.

2.1. General objectives:

To learn how to prepare aqueous solutions of difficult and slightly soluble, easily oxidized , mutually impairing solubility and complexing drugs and drops of different composition, prepared to check the quality of medicines and to draw them to leave.

2.2. Educational objectives:

Formation of professionally important characteristics and personality traits of future pharmacists. Educating students in professional liability in the manufacture of drugs.

2.3. Specific goals:

- to know:

•Types of cases hindered preparation of aqueous solutions, most commonly found in pharmacies, slow and difficult dissolution or insolubility of drugs prescribed in the solvent; decomposition substances easily oxidized; deterioration in the solubility of joint presence.

•Special processing methods that overcome difficulties in preparing solutions:

- pre-grinding materials and heated solvent use;
- using of freshly distilled purified water and related ancillary materials;
-addition of excipients and the use of complex formation the preparation of solutions;
-separate dissolution.

•Characteristics of drops dosage form, their classification according to the method of application.

•Checking doses of toxic and potent substances in the droplets.

•Terms of using drops of concentrated solutions and by dissolving solids.

•Preparation of drops in non-aqueous solvents. The formation of eutectic mixtures.

•Quality assessment and storage solutions and water drops, closing, processing to delivery in accordance with regulatory requirements.

2.4. Based on theoretical knowledge on the topic:

- to be able to:

• To evaluate the correctness of prescribing and check the doses of poisonous and potent drugs in sachets and drops.

• To use the State Pharmacopoeia, other regulatory documentation and reference literature to find the necessary information on the preparation of aqueous solutions and droplets.

• To calculate the amount of water, medicinal and auxiliary substances for the preparation of solutions and drops.

• To choose the best technology option that takes into account the properties of the ingredients and the available equipment.

• To select the appropriate taro coating material depending on the volume of the prescribed medicinal product and the physical and chemical properties of the ingredients.

• To conduct basic technological operations for the preparation of aqueous solutions and drops (weigh, measure, heat, grind, dissolve, strain).

• Use small means of mechanization for the preparation of aqueous solutions and drops (burette installation, liquid dispensers, etc.).

• Evaluate quality, clog and dispose of the drug before release.

• Write a written control passport.

3. Materials of before class of independent preparation (interdisciplinary integration).

Disciplines	To know	To be able
1. Preliminary		
Latin	Basics of grammar. Spelling Latin names of medicines and chemicals, herbs, families, and raw materials of vegetable and animal origin. Recipe.	Evaluate the accuracy of prescriptions
Anatomy and Physiology	The structure and functional properties of the body at different	Evaluate the functional state of the organism as a whole and individual

	levels: molecular, cellular, organ system.	organs and systems
General and Inorganic Chemistry	The main provisions of the atomic-molecular theory.	Calculate the molar mass and equivalent compounds.
Physics	Physical methods of analysis of drugs.	Identify key quality hard drugs.
Organic chemistry	Physical, chemical properties of organic compounds and basic methods of analysis.	Conduct elemental analysis and identification of organic compounds.
Analytical chemistry	Methods of qualitative and quantitative analysis of inorganic and organic substances	Perform qualitative and quantitative analysis of individual substances and mixtures, make the necessary calculations for data analysis.
2. The following Organization and economics of pharmacy	Total liquid dosage form technology for internal use	Make payments dosage, excipients and purified water
Tech industrial production of drugs	Technology solutions for internal use	Technological stage production solutions for internal use
3. Intersubjective integration Injection solutions and eye drops	Workflow solution for internal use.	Prepare solutions for internal use, taking into account physical and chemical properties of the ingredients.
	Preparation of solutions mass-volume method	To carry out calculations of solids and water

4. Content themes (text or abstracts).

1. When preparing dosage forms, a certain order of dilution and mixing of medicinal products shall be observed taking into account their physical and chemical properties.

2. The first one always measures the calculated amount of purified water. In the stand in the water purified first of all dissolve poisonous, narcotic, potent substance then a general list (at first - hardly soluble, and then - readily soluble).

3. Dry substances in the total amount up to 3%, in the absence of their concentrated solutions, dissolve in a measured amount of prescribed water or other liquid without taking into account the increase in the volume: in the case of a total amount of 3% or more - LDF is prepared from using concentrated solutions. In the absence of concentrated solutions, the volume of water required to dissolve the medicinal products is calculated using the volume increase factors (VIF).

4. The solutions of dry matter are filtered into the vial for delivery and added concentrated solutions: first strong substances are added and then common in the sequence in which they are indicated in the formulation.

5. Liquid dosage forms, in which solvent is used to use flavoring water or other liquids (for example, water extracts from vegetable raw materials), are prepared without the use of concentrated solutions of medicinal substances and taking into account CCD when dissolving dry substances.

6. Fragrant waters, tinctures, liquid extracts, alcoholic solutions, syrups and other liquids are added to the aqueous solution in the last order in the following order: water non-fat and non-volatile liquids; alcohol solutions in order of increasing alcohol strength; odorous and volatile liquids.

Liquid medicinal products containing essential oils (amniotic anise drops, thoracic elixir, citral solution, etc.) are added to the mixture by mixing with sugar syrup (if it is in the form of a prescription) or with an equal amount of potion in the support.

7. In the preparation of drops, dry medicinal substances dissolve in half the prescribed water the solution is filtered through pre-soaked water, a cotton swab in the bottle for relese, add the rest of the water. If necessary you can use concentrated solutions.

8. The manufacture of dosage forms, which include standard pharmacopoeias fluids is carried out directly in the bottle for delivery, in which the water is initially measured and then the calculated amount of liquid. The amount of liquid pharmacopoeia is calculated according to prescription method.

If the liquid is registered under the chemical name then solution amount is calculated based on the actual content of the substance in the pharmacopeias liquid.

If in the registration the conditional name of the pharmacopoeias fluid is indicated then in the calculations the concentration of standard pharmacopoeia fluid is taken as unit (100%).

In the case of using a non-standard liquid its amount is calculated based on the actual content of the substance in the pharmacopeias fluid.

If the concentration of standard pharmacopoeias liquids is not indicated in the formulation, then a 3% solution of hydrogen peroxide, 10% ammonia solution, 30% acetic acid solution and 8.3% solution of hydrochloric acid are prepared. The latter are taken per unit (100%) and used to prepare solutions of other concentrations for internal use and pharmacy preform "A solution of hydrochloric acid dilute 1:10". Acid with a concentration of hydrogen chloride 24,8-25,2% is used only for the preparation of solution number 2 by the name Demyanovicha, where in calculations this concentration is also taken per unit.

A solution of acetic acid and ammonia is always prepared taking into account the actual content of the substance in the initial liquid.

9. When preparing complicated RLF, special technological techniques are used: grinding (galling, copper sulfate), the use of auxiliary substances (iodine, furatsilin), freshly boiled, filtered warm water purified (potassium permanganate), etc.

SOLUTIONS WITH SLOWLY SOLUBLE DRUGS.

The slow solubility of medicinal substances in water can be due to various factors: the strength of the crystal lattice, the low diffusion rate of heavy ions or the relatively poor wettability of the drug substance with a solvent. To accelerate the dissolution, additional technological techniques are used: dissolving in a hot solvent or grinding in a mortar.

Medicinal substances that slowly dissolve in cold water include heat-resistant: boric acid, sodium tetraborate, alumina, codeine, calcium gluconate, copper sulfate, ethacridine lactate, furatsilin, and others.

Rp .: Solution Acid boric 2% 200 ml
Da Signa For rinsing the oral cavity

1.0 g of boron acid dissolves in 25 ml of cold water and 4 ml of boiling water, so it is dissolved in hot water when shaking.

Measuring cylinder is measured 200 ml of hot water, poured into a stand and dissolved when stirred 4.0 g of boric acid. After cooling, the solution is filtered to the vial for delivery.

Rp .: Solution Cupri sulfate 3% 200 ml
Da. Signa: For swaddling

A solution for external use with a slowly soluble co-crystalline drug. The solubility of copper sulphate in water is good 1: 3. However, due to poor water absorption of crystals (a substance of a coarse-grained crystal), dissolution accelerates by rubbing in a mortar with water.

In the stand, 200 ml of water are measured. In a mortar, 6,0 g of copper sulphate are placed and dissolved when rubbed with a portion of water, then the remaining water is added. The solution is for dipping, so it is filtered into a vial for delivery. The vial is sealed and drawn up for leave.

Rp .: Solution Furacilini (1: 5000) 250 ml
Da Signa To rinse

Solution for external use with low solubility in water (1: 4200) substance. Furacillin solutions are prepared on an isotonic sodium chloride solution (0.9%), which enhances the pharmacological action of furatsillin.

In a flask of heat-resistant glass, measure 250 ml of purified water, add 2.25 g of sodium chloride and 0.05 g of furatsillin (weighed according to the rules for coloring matters). The contents are heated in a flask until the furatsilin is completely dissolved and filtered to the vial for delivery. Make up for leave.

Solutions of calcium gluconate.

Calcium gluconate is slowly dissolved in cold water (1:50), easily insoluble in boiling (1: 5), practically insoluble in ethanol. Solutions are prepared in 5-10% concentration using special technological techniques because when heated it can form persistent supersaturated solutions. To clean the solutions of calcium gluconate add activated charcoal in the amount of 3-5% of the mass of the substance.

Rp .: Solution Calcii gluconatis 5% in 100 ml
Da Signa 1 teaspoon 2-3 times daily before meals

5.0 g of calcium gluconate is placed in a flask of heat-resistant glass, 97.5 ml of purified water is added and heated until the substance is completely dissolved. To the solution add 0,25 g of chopped activated charcoal and boil on low heat for 10 minutes, shaking the contents of the flask several times.

The solution is filtered through a paper filter. After cooling (20 ° C) the resulting solution is brought to a volume of 100 ml, checked for transparency (the solution should be colorless) and poured into a vial, which clogs and make up for leave.

Solution for external use with fragrant medicinal substance.
Phenol solutions.

Rp .: Solution Phenol purée 2% 100 ml
Da Signa To rinse

Phenol crystalline (carbolic acid) is very slowly dissolved in water. For ease of preparation, its aqueous solutions come from liquid phenol (Phenolum purum liquefactum) which is prepared by adding to the 100.0 g phenol molten in the10 ml water bath. On this basis, the liquid phenol is taken on 10% more than the crystalline. According to the recipe for preparation of the solution 97.8 ml of water are measured and 2.2 ml of liquid phenol is added.

Phenol in pure form or in solutions with a concentration above 5% is released with the labels "Be careful", "Carbolic acid".

Solutions with drugs are strong oxidants.

Silver nitrate and potassium permanganate are strong oxidizers. They are easily destroyed in the presence of organic matter, in particular, when filtering solutions. In addition, the filter paper adsorbs silver ions (up to 3 milligrams per 1.0 g of paper). Therefore, oxidants are better dissolved in pre-filtered or filtered water and filtered through a glass filter number 1 or number 2. It is established that the destruction of oxidants is reduced with a decrease in the concentration of solutions (up to 5%) and especially if the filter and cotton wool is pre-rinsed with hot water then the concentration does not change significantly.

Rp .: Solution Calcium Permanganate 0.1% 300 ml
Da Signa For wounds

In a pre-prepared vial for the release of orange glass, weigh 300 ml of freshly distilled filtered water purified and dissolve 0,3 g of potassium permanganate in it, carefully weighed on BP-1 on a circle of parchment paper (colorant, dust of potassium permanganate irritates the nasopharynx).

After complete dissolution of the substance, the solution is prepared for release in a dark vial (to avoid activating the recovery process).

An important condition for obtaining stable solutions is the use of cleaned water that does not contain organic matter. Only freshly distilled water should be used. Water stored for more than a day is often found to be contaminated with microorganisms and products of their vital capacity which have a restorative ability.

If potassium permanganate is prescribed in the form of concentrated solution (3, 4, 5%) then to accelerate the dissolution, carefully rub it in a mortar with a portion of warm, filtered purified water and after add the rest of the amount of solvent.

Rp .: argentine nitrate 0.12
Aquae purificatae 200 ml
Da in vitro nigro
Signa: 1 tablespoon 3 times daily before meals

Mixture is a solution that is easily decomposed by poisonous medicinal substance. It is necessary to check the single and daily dose. In a bottle for the removal of dark glass, 200 ml of filtered water is purified and dissolved in it 0,12 g silver nitrate. In case of contamination, the solution is filtered through a glass filter No. 1. In the absence of a glass filter it is possible to strain the solution through a cotton swab carefully washed with hot water. Solutions of silver nitrate are released in sealed form with the label "Be careful". Release of solutions with a concentration above 2% is done only in the hands of the doctor. When preparing, all rules of work with poisonous substances are observed. Make a signature (with the inscription "For internal use").

Iodine solutions

Crystalline iodine soluble in water 1: 5000. For medical purposes, solutions of iodine with a concentration of at least 1% are used. To obtain more concentrated solutions use the ability of iodine to form readily soluble complex compounds of potassium or sodium iodides. The most commonly used in the medical practice is the solution of Lugol: 5% for internal and 1% for external use.

If potassium does not contain iodide in the recipe, it is added in duplicate in relation to the weight of the prescribed iodine.

In pharmacies most often water and glycerol solutions Lugol. Aqueous solutions are used internally for 5-10 drops of milk for the treatment and prevention of endemic goiter and other diseases as well as for external lubrication of the mucous membrane of the pharynx, larynx; Glycerol solutions of iodine are used only externally.

Rp .: Solution Lugoli 20 ml
Da Signa At 7 drops 3 times a day after eating in milk

Weigh 2.0 g of potassium iodide, place it in a vial and let it dissolve in approximately 2 ml of purified water (solubility 1: 0 75), pre-measured in a vial (20 ml). On a circle of parchment paper weigh 1.0 g of iodine and pour into a stand. Due to the volatility of iodine and the ability of its vapor to act on the metal (prisms and gyro scales), weighing should be made as an opportunity quickly. After weighing iodine weighing cups are wiped with cotton wool, soaked with strong alcohol (to remove iodine residues, a pair of poisonous ones). After complete dissolution of crystalline iodine in a concentrated solution of potassium iodide, add all solvent and, if necessary, filter the solution through a small cotton swab in a vial for dispensing from orange glass, clamping with a rubber or polyethylene stopper.

5. Plan and organizational structure of employment.

Number	**The main stages of employment, their function and meaning.**	**Learning Objectives levels of assimilation.**	**Means of instruction and control.**	**Materials on methodological Secured Lock class visibility, control of knowledge of students.**	**Duration (in minutes or in%) of the total time employment.**
1	**2**	**3**	**4**	**5**	**6**
1	**Preparatory** - organizing classes - setting educational goals - control the output level of knowledge - monitoring skills of students, their willingness to accept this material class	I		Slideshow table	15-20

2	**Basic** tasks	II, III			50-60
3	**Final** -control of professional skills - supply results of studies - granting homework from sending literature	IV			15-20

6. Methodological materials for the classes.
6.1. The task source for self-knowledge skills
1. A pharmacist prepared solution osarsols. Enter technology features of the solution:
* A. dissolved in a solution of sodium bicarbonate
B. Dissolve in water freshly distilled
C. Dissolve in hot water
D. Dissolve in sodium chloride
E. Dissolve in cold water
2. How much Ethacridine lactate should weigh the pharmacist (1: 1000) To prepare 200 ml of solution?
A. 0.2 *
B. 0,1
0.02 C.
0.04 D.
E. 2,0
3. Pharmacist compounded 1% aqueous solution of iodine. Specify particular solution preparation.
A * dissolve in a solution of potassium iodide
B. Dissolving in hot water
C. dissolved in water freshly distilled
D. Grinding in a mortar with water
E. dissolve in cold water
4. The pharmacist must prepare Furacilinum (1: 5000). Add feature dissolving furatsillin:
A. * In boiling water purified in the presence of sodium chloride
B. In cold purified water
C. a minimum quantity of ethyl
D. In purified water after previous grinding
E. In pre-filtered purified water
5. The patient should prepare a solution of potassium permanganate. What solvent used in this case to ensure the stability of the active ingredient?

A. freshly purified water *
B. purified water
C. Ethanol
D. demineralized water
E. Glycerin

6. Pharmacist compounded drops for internal application structure: adonizydi 5 ml of tincture of valerian and lilies equal to 10 ml, 0.1 g menthol, 2.0 g of potassium bromide .. What should dissolve potassium bromide:

A. * In adonizyde
B. In tincture lily
C. In valerian tincture
D. In a mixture of liquors
E. Enter a vial least

7. In preparing solutions of some drugs should take into account the peculiarities of dissolution. What is the result from substances dissolved in the presence of sodium bicarbonate?

A. * Osarsol
B. furatsillin
C. Calcium gluconate
D. Lead acetate
E. Iodine

8. A pharmacist prepared a 2% solution of potassium permanganate. Please indicate which option he should choose:

A * dissolve by grinding in a mortar with freshly distilled, purified filtered water
B. To dissolve a vial of purified water
C. dissolve in the base of purified water, filtered
D. dissolve a vial of freshly distilled, filtered purified water
E. dissolve in the stand in a hot solution of sodium chloride

9. A pharmacist prepared solution of iodine. Specify how he had dissolved iodine:

A * dissolve in a saturated solution of potassium iodide
B. dissolve in hot water
C. dissolve in alcohol
D. dissolve in a dilute solution of potassium iodide
E. dissolve in cold water

10. Pharmacist compounded medicine by given words. What technology he chose:

Rp .: Acidi borici 0,1
10.0 Glycerini
Misce.Da.Signa. Ear drops.
A. * The vial placed boric acid, glycerol and then heated
B. In a mortar stamped boric acid with glycerol
C. In the vial placed glycerin, boric acid is added, heated
D. In the stand placed glycerin dissolved therein boric acid

E. In a porcelain cup placed glycerin dissolved therein boric acid

6.2. Information necessary for the formation of knowledge, skills can be found in textbooks:

Basic

20. Aseptic drug forms, extemporaneous compounding: Guidelines /O.I.Tyhonov, L.V.Bondareva, T.H.Yarnyh, N.F.Orlovetska etc .; Ed. O.I.Tyhonova and T.H.Yarnyh. - H .: Izd pharmacy; Original, 2005. - 184 p.
21. Solid dosage forms: extemporaneous compounding: Guidelines /O.I.Tyhonov, L.V.Bondareva, T.H.Yarnyh, N.F.Orlovetska etc .; Ed. O.I.Tyhonova and T.H.Yarnyh. - H .: Izd pharmacy; Original, 2003. - 176 p.
22. Soft medicinal forms: extemporaneous compounding: Guidelines /O.I.Tyhonov, L.V.Bondareva, T.H.Yarnyh, N.F.Orlovetska etc .; Ed. O.I.Tyhonova and T.H.Yarnyh. - H .: Izd pharmacy; Original, 2003. - 128 p.
23. Liquid formulations: extemporaneous compounding: Guidelines /O.I.Tyhonov, L.V.Bondareva, T.H.Yarnyh, N.F.Orlovetska etc .; Ed. O.I.Tyhonova and T.H.Yarnyh. - H .: Izd pharmacy; Original, 2005. - 160 p.
24. Workshop on pharmaceutical drug technology; for students. Pha. HI. teach. schools / AI Tikhonov, T. Yarnyh, V. Sobolev et al .; Ed. AI Tikhonov. - H .: Izd pharmacy: Golden Pages, 2002. - 256 p.

Additional Reading:

4. Dictionary-guide for pharmacy specialists in management and economics / Ed. prof. Black VP // Kharkov: Publishing pharmacy "Golden storynky" - 2001 - 281 p.

6.3. Table for independent work with literature on the lecture topic.

№	Main tasks	Directions	Responses (literature)
1	2	3	4
1.	Difficult cases of preparation of aqueous solutions	What are drugs that cause difficulty in dissolution.	4, 5
2.	Preparation of cases hindered aqueous solutions	What technological methods that overcome difficulties	4, 5
3.	Characteristics of drops as the dosage form	Define drops, bring their classification	4, 5
4.	Preparation drops for internal and external use	What are the main technological preparation of stage drops	4, 5
5.	Evaluation of the quality of water solutions and drops	Add documentation and quality solutions and water drops	4, 5

7. Materials for self-training quality.

A. ***Questions***

1. Types of cases hindered preparation of aqueous solutions that are most commonly found in pharmacies:
a) slow and heavy drugs dissolve in cold water;
b) the disintegration of substances that are potent oxidants in the process of preparation of the solution;
c) the insolubility of drugs prescribed in the solvent;
d) deterioration solubility when dissolved two or more substances.
2. Special processing methods that overcome difficulties in solutions preparing:
a) pre-shredding materials and the use of heated solvent;
b) use freshly distilled purified water and appropriate filtering materials for solution of oxidants;
c) addition of excipients and the use of chelation in the preparation of solutions;
d) separate dissolution.
3. Methods of assessing the quality of water solutions according to the requirements of technical standards, packaging, design to delivery, retention policies.
4. Characteristics of drops as the dosage form, their classification according to the method of application and the nature of the solvent.
5. Checking doses of toxic and potent drugs in drops.
6. Preparation of purified water drops and in non-aqueous solvents. The formation of eutectic mixtures.
7. When preparing difficulty drops and their technology.
8. Methods of assessing the quality drops and non-aqueous solutions according to the requirements of technical standards, packaging, design to delivery, retention policies.

B. **Tests for self-control with standard answers.**

1. A pharmacist prepared solution Ethacridine lactate. Indicate which feature dissolving the substance he used:

A * dissolve in hot water
B. dissolve when crushed
Posted by C. stabilizer
D. dissolve in cold water
E. dissolve in water freshly distilled

2. Pharmacy got a prescription for ear drops:

Rp .: Camphorae
Mentholi ana 1,0
Olei Vaselini 25,0
Misce. Da. Signa. Ear drops.

What difficulties may arise pharmacist in the preparation of this drug?

* A. The formation of eutectic mixtures
B. Insolubility ingredients
C. Coagulation of colloidal systems
D. Change the color
E. Adsorption of drugs

3. Pharmacist compounded 2% aqueous solution dissolving the drug in a mortar while grinding. Specify a matter which is characterized by the technology:

A. Potassium permanganate *
Calcium gluconate B.
C. Osarsol
D. boric acid
E. Potassium bromide

4. When preparing Furacilinum (1: 5000) of 250 ml was weighed furatsillina:

A. 0.05 g *
B. 0.02 g
C. 0.04 g
D. 0,1 g
E. 0,5 g

5. The doctor wrote a prescription, comprising 0.5 g of iodine and 10 ml of purified water. What additional component for the preparation of this drug should be used?

* A. 1.0 g of potassium iodide
B. 1.0 g of potassium bromide
C. 0,5 g of sodium bicarbonate
D. 0,5 g of potassium iodide
E. 1.0 g of sodium bromide

6. To prepare the aqueous pharmacist freshly distilled used purified water. Specify a substance solution prepared with these characteristics.

A. Silver nitrate *
B. Glucose
C. Sodium acetate
D. Sodium tetraborate
E. pepsin

7. Pharmacist compounded drug, dissolving the active ingredient in hot water. Indicate which are substances characteristic of this technology:

A. boric acid *
B. Sodium bicarbonate
C. Sodium chloride
D. Sodium bromide
E. Ascorbic acid

8. What technological method additionally should be used when preparing solutions of copper sulfate?

A. * grinding in a mortar with water
B. heating
C. previous dissolution in glycerine
D. previous dissolution in 95% alcohol
E. adding activated carbon

9. Which technologies should choose a pharmacist for the preparation of a liquid dosage form if it is composed of calcium gluconate?

A * dissolve in hot solvent or heated until dissolved
B. Pre-ground in dry form or with a small amount of solvent
C. Dissolve in free water from renewable materials
D. Add an equal amount of sodium chloride matter
E. dissolved in an alkaline environment

10. Pharmacy got the prescription for preparation of 100 ml of 2% solution of phenol. What amount of liquid phenol pharmacist should take?

A. 2.2 ml *
B. 2.0 ml
C. 20 ml
D. 0,2 ml
E. 22 ml

11. It is necessary to prepare a solution of iodine for outdoor use. What are the properties of iodine pharmacist should consider for the dissolution of the drug:

A. Complex *
B. dissolution in acid medium
C. Dissolution in alkaline medium
D. Interaction with carbon dioxide air
E. Ability to raise the temperature of the solution

12. In what concentration iodine solution should be prepared for internal use?

A. * 5%
B. 1%
C. 10%
D. 0,5%
E. 3%

13. Supporting materials for dissolution in water:

A. Yoda *
B. boric acid
C. analginum
D. Copper sulfate
E. Potassium permanganate

14. Additional labeled "handle with care" draw up solutions:

A. Silver nitrate *
B. boric acid
C. furatsillin
D. Copper sulfate
E. Yoda

***C.* Tasks for self-control with answers.**

1. The doctor wrote a prescription: iodine 0.5 purified water and 10 ml. Is it possible to prepare a drug from the prescription data without the consent of a doctor? If possible, how?

Answer. Yes, this specification is possible to prepare without consulting a doctor. For dissolution of iodine in water it is necessary to add potassium iodide in the double quantity of the mass of iodine. Potassium iodide is dissolved in the minimum amount of water in the solution of dissolved iodine and the remaining water is added.

2. Pharmacy got a prescription for 150 ml of 0.5% solution osarsol. Which components and how much should be taken for the preparation of this drug?

Answer. For dissolution of osarsol sodium bicarbonate should be added at the rate of 0.61 grams of sodium bicarbonate 1.0 of osarsol.

Osarsol = $0.5 \cdot 150/100 = 0.75$

Sodium bicarbonate:

0.61 - 1.0

x - 0.75; x = 0.46

3. To produce 0.5% Furacilinum pharmacist measured in treated water stand and added furatsillin but not dissolve the powder. What is a mistake of pharmacist?

Answer. Furatsillin Solubility in water is 1: 4200 or about 0.02%. Furatsillin is prepared at a concentration of 1: 5000 using as solvent 0.9% sodium chloride. Dissolution of lead when heated.

4. Pharmacy received the prescription stuff: camphor and menthol equal to 1.0; vaseline oil 10.0. Pharmacist weighed menthol, camphor and put them in a vial; then tarrified bottle and weighed vaseline oil. What is it wrong?

Answer. Camphor when mixed with menthol forms a eutectic mixture that is insoluble in vaseline oil. It is necessary to separate dissolve camphor and menthol in heated oil.

5. Pharmacist weighed in dry the preparation of a 1% solution of copper sulfate matter base then added purified water and filtered a vial. Were his actions correct?

Answer. Copper sulfate is slowly soluble in water. To speed up the dissolution of copper sulphate ground in a mortar with a little water.

8.Materials for audience independent preparation:

8.1. List of educational practical tasks to be performed during the practical (laboratory) classes:

1. Take:	The solution of boric acid 2% 200 ml Give. Mark. For washing.	2. Take:	25 ml Lugol's solution Give. Mark. 5 drops. 2 times a day with milk.
3. Take:	The solution of copper sulfate 200 ml of 2% Give. Mark. For irrigation.	4. Take:	Solution of calcium gluconate 5% 100 ml Give. Mark. 1 teaspoon before meals.
5. Take:	Furacilinum 1: 5000 500ml Give. Mark. To rinse.	6. Take:	Potassium permanganate 0,25 25 ml of purified water Give. Mark. 30 drops in a glass of water for gargling.
7. Take:	Phenol 2.0 150 ml of purified water Mix. Give. Mark. For disinfection.	8. Take:	Potassium permanganate 0.1% 50 ml Give. Mark. To lubricate the skin burns.
9. Take:	25 ml Lugol's solution Give. Mark. To lubricate the throat.	10. Take:	The solution of silver nitrate 0.1% 50 ml Give. Mark. 1 tablespoon 3 times a day 15 min before meal.
11. Take:	The solution of silver nitrate 150 ml 0.05% Give. Mark. 1 tablespoon 3 times a day 15 min before meal.	12. Take:	Silver nitrate 1.5 150 ml of purified water Give. Mark. For washing.
13.	Boric acid 0.3	14.	5 ml Adonizydu

Take:	Ethyl alcohol 70% 20 ml Mix. Give. Mark. 2 drops in each ear.	Take:	Valerian tincture 10 ml Vodka 20 ml lily Mix. Give. Mark. 25 drops 3 times a day.
15. Take:	Nitroglycerin solution 2 ml of 1% valerian tincture Dog nettle tincture 10 ml Menthol 0.3 Mix. Give. Mark. 20 drops 2 times a day.	16. Take:	Tincture of belladonna 5 ml valerian tincture Vodka 10 ml lily Potassium bromide 3.0 Menthol 0.2 Mix. Give. Mark. 20 drops 3 times a day.
17. Take:	Phenol crystalline 0.2 camphor 0.1 Oil peach 15.0 Mix. Give. Mark. 2 drops in the nose 2 times a day.	18. Take:	The solution platifillin hydrotartrate 20 ml 0.5% Give. Mark. 10 drops 2 times a day.
19. Take:	thymol 0.05 menthol Camphor 0.1 Oil vaseline 50.0 Mix. Give. Mark. 2-3 drops in the nose.	20. Take:	camphor 2.0 Menthol 1.5 chloral hydrate 1.0 Mix. Give. Mark. Drops tooth.

9. Instructional materials for acquiring professional skills:
9.1. Methods of work performance stages.

Write down the recipe and place an accordance with MOH Ukraine number 360 of 19/07/05. Describe drugs. If a prescription toxic and potent substances and check single daily dose. Describe the best option medicine technology with theoretical justification and necessary calculations give an assessment of its quality. Specify design to drug delivery. Please see the written passport control.

10. Materials for self-mastery of knowledge, skills provided by this work.
10.1. Tests of different levels

1. Pick a pair:

Drug substance water solutions	Features
A. boric acid	1 complexing
B. Potassium permanganate	2. Strong oxidizing
B. Iodine	3. Insoluble in water
G. furatsillin	4 slowly dissolved in cold water

Answer. A-4; B-2; B-1; D-3.

2. Pick a pair:
Technology features of the medicinal substances

A. Copper sulfate . Prepare in water purified
B. Boric Acid 2. ground in a mortar with a little of water
B. Calcium gluconate 3. Dissolve by heating
G. silver nitrate addition of activated carbon 4. Dissolve by heating with
Answer. A-2; B-3; B-4; G-1.

3. Pick up a pair
Pharmaceutical excipient substance in water solutions
A. furatsillin 1. Potassium iodide
B. Codeine 2. Sodium bicarbonate
C. Iodine 3. Alcohol 90%
G. Osarsol 4. Sodium chloride
Answer. A-4; B-3; B-1; G-2.

11. The theme of next session

Production of liquid dosage forms by dilution of standard pharmacopoeial liquids. Non-aqueous solutions.

Topic of the lesson №10: «Production of liquid dosage forms by dilution of standard pharmacopoeial liquids. Non-aqueous solutions» – 2 hours.

1. Relevance of the topic: in the pharmacy practice, it is often necessary to prepare medicines by diluting standard pharmacopoeias liquids as well as using non-aqueous solvents (alcohol, glycerol, various vegetable and mineral oils). Therefore, knowledge of the properties and concentrations of pharmacopoeias liquids, the ability to make calculations depending on the method of prescribing them in prescription as well as the features of the technology of liquid dosage forms on non-aqueous solvent that is necessary for the qualitative preparation of medicinal preparations.

2. Objectives classes:

To learn how to prepare non-aqueous solutions and solutions of standard pharmacopoeias liquids, evaluate their quality and make up for release.

2.1. General objectives:

To learn how to prepare a non-aqueous solutions and standard solutions pharmacopoeia liquids, evaluate their quality and arrange to release. Use the State Pharmacopoeia, reference literature and other normative documentation to find the necessary information on the preparation of solutions with standard pharmacopoeias fluids.

2.2. Educational objectives:

Formation of professionally important characteristics and personality traits of future pharmacists. Students education of professional liability in the manufacture of drugs.

To calculate the amount of water and pharmacopoeias liquids according to the prescription.

To cultivate pharmacopoeias fluids.

To calculate the amount of alcohol and water to prepare the alcohol of the given concentration, using the formula of dilution and alcoholometric tables.

To carry out basic technological operations for the preparation of non-aqueous solutions (weigh, measure, heat, dissolve, if necessary, strain).

2.3. Specific goals:

- to know:

- Nomenclature pharmacopoeia standard liquids, their concentration, chemical and conventional titles.
- The settlement rules pharmacopoeia of water and liquids depending on how the prescription instructions in order MOH Ukraine of 07.09.93 number 197.
- Preparation of solutions pharmacopoeia fluids. Safety rules for working with acids and alkalis.

•Characteristics of non-aqueous solvents (ethyl alcohol, vegetable oils, vaseline oil, glycerol, chloroform, esylonu-4 dimexide, polyethylene-400) requirements.

•Preparation of solutions to volatile and non-volatile solvents. Safety when working with flammable and explosive solvents.

•Quality assessment and storage solutions in accordance with the requirements of normative documents, closing and clearance to release.

2.4. Based on theoretical knowledge on the topic:

- to master the methods /be able to:

•Evaluate the accuracy of writing prescriptions and to verify the dose of potent substances (if necessary).

•Using the State Pharmacopoeia other standard documentation and reference books to find the necessary information for the preparation of solutions with standard pharmacopeia liquids.

•Calculate the amount of water and fluids pharmacopoeia depending on how their prescription.

•Provide breeding pharmacopoeia fluids.

•Pick the appropriate cards and closing material considering physical and chemical properties of the ingredients that make up the drug.

•Take safety precautions when working with flammable and explosive solvents as well as acids and alkalis.

•Assess the quality and clog dispensing prepared to execute drug.

•Fill written passport control.

3. Materials of before class of independent preparation (interdisciplinary integration).

Disciplines	To know	To be able
1. Preliminary		
Latin	Basics of grammar. Spelling Latin names of medicines and chemicals, herbs, families, and raw materials of vegetable and animal origin. Recipe.	Evaluate the accuracy of prescriptions
Anatomy and Physiology	The structure and functional properties of the body at different levels: molecular, cellular, organ system.	Evaluate the functional state of the organism as a whole and individual organs and systems

General and Inorganic Chemistry	The main provisions of the atomic-molecular theory.	Calculate the molar mass and equivalent compounds.
Physics	Physical methods of analysis of drugs.	Identify key quality hard drugs.
Organic chemistry	Physical, chemical properties of organic compounds and basic methods of analysis.	Conduct elemental analysis and identification of organic compounds.
Analytical chemistry	Methods of qualitative and quantitative analysis of inorganic and organic substances	Perform qualitative and quantitative analysis of individual substances and mixtures, make the necessary calculations for data analysis.
2. The following Organization and economics of pharmacy	Total liquid dosage form technology for internal use	Make payments dosage, excipients and purified water
Tech industrial production of drugs	Technology solutions for internal use	Technological stage production solutions for internal use
3. Intersubjective integration Injection solutions and eye drops	Workflow solution for internal use. Preparation of solutions mass-volume method	Prepare solutions for internal use, taking into account physical and chemical properties of the ingredients. To carry out calculations of solids and water

4. Content themes (text or abstracts)

Standard pharmacopoeias solutions (liquids) are aqueous solutions (factory-made) of certain medicinal substances at a certain concentration specified in the relevant articles of the DF.

These include solutions of solid, liquid or gaseous substances (potassium acetate solution, hydrochloric acid, ammonia solution, hydrogen peroxide, formalin, etc.). When preparing liquid dosage forms from the listed standard solutions, the provisions of "Instructions for the preparation of pharmaceutical forms with liquid dispersion medium in pharmacies" (Order of the Ministry of Health of Ukraine No. 197 of 09.09.93). These liquids are easily mixed with water and their solutions are prepared directly in the bottle for delivery which first measure the water and then the calculated amount of liquid. If necessary, the solution is filtered.

Standard pharmacopoeia solutions can be prescribed under two names: conditional and chemical which determines the calculation of their number.

If in the formulation the liquid is prescribed under the conventional name then at calculations the concentration of standard solution is taken as unit (100%).

If the chemical name is given then the calculations are based on the actual content of the substances in standard solutions, using the following formula:

$$\mathbf{X = V * B / A,}$$

where X is the volume of standard liquid, ml;
V is volume of solution to be prepared;
A is the actual concentration of standard liquid to be diluted,%;
B is prescribed concentration of solution,%.

The amount of water in both cases is calculated by the difference between the total volume of the prepared solution and the calculated amount of standard liquid.

A solution of hydrogen peroxide is used as a disinfectant for washing and rinsing with stomatitis, tonsillitis, gynecological diseases, etc.

SPh contains two solutions of hydrogen peroxide: diluted (Solutio Hydrogenii peroxydi diluta) and concentrated - perhydrol (Solutio Hydrogeni iperoxydi concentratas eu Perhydrolum). If in the prescription the doctor prescribed a solution of hydrogen peroxide without indicating its concentration, then release 3% solution.

Rp .: Solution Hydrogeniiperoxydi 2% 60 ml
Da Signa For washing purulent wounds

In this case, a 2% hydrogen peroxide solution is prescribed under the chemical name. It can be prepared by dilution or perhydrol or a solution of hydrogen peroxide of 3% water based on the actual content of hydrogen peroxide in the initial solution.

The calculation follows the formula given above:

3% solution of hydrogen peroxide:
Water purified = 60 - 40 = 20 ml or
Perhydrol 30%
Purified water = 60 - 4 = 56 ml

In a chosen vial for dispensing from orange glass, 20 ml of purified water are measured and add 40 ml of 3% hydrogen peroxide solution. Make up for release.

Rp .: Solution Perhydroli 5% 200 ml
Da Signa To wash the wound

In this case the solution of hydrogen peroxide is dispensed under the conventional name. In calculations, the concentration of standard hydrogen peroxide solution is taken per unit, ie 100%.

Calculation:
hydrogen peroxide solution
5.0 - 100 ml
x 200 ml; x = 10.0
Water purified = 200 - 10 = 190 ml

A solution of formaldehyde (formalin).

Rp .: Solution Formalin 5% 100 ml
Da Signa To disinfect the premises

The solution is dispensed under the conventional name.

Calculation:
Formaldehyde solution 36.5-37.5%
Water purified 100 - 5 = 95 ml

In a vial of orange glass, weigh out 95 ml of purified water and 5 ml of standard formaldehyde solution. Make up for release.

Formalin solution solutions can be used formaldehyde solutions with a content of the latter less than 36.5%, but taking into account its actual content. The pharmacy can receive formalin containing 30-35% formaldehyde.

According to the above formulation solution with a concentration of formaldehyde 36.5-37.5%, it is necessary to take 5 ml, but it is admissible that the pharmacy has a 34% solution of formaldehyde.

Then this dosage form is prepared taking into account the conversion factor (CP):

A sticker "Formalin 34%, KP = 1,08" is affixed on the barbell.

So if the prescription contains 5 ml of formalin (based on pharmacopoeial) then with the use of formalin containing 34% of formaldehyde the latter should be taken in amount of 5.4 ml ($5 \cdot 1.08 = 5.4$), 94.6 ml of purified water ($100-5.4 = 94.6$). The passport of written control indicates the actual concentration of formalin.

Thus, 94.6 ml of water and 5.4 ml of 34% formaldehyde solution are placed in the bottle for the preparation of the solution under this recipe. To close tightly, mark and prepare for release with a signature:

Rp .: Solutio Formaldegydi 10% 100 ml
Da Signa Dilute 1 teaspoon of solution in a glass of water for wetting your feet.

In this case, a solution of formaldehyde is prescribed under the chemical name.

Calculation: Formaldehyde solution 37%:

The solution of acid hydrochloric acid is intended, mainly for internal use in the form of drops and mixtures with insufficient acidity of gastric acid. Given that it is intended for both adults and children, the prescribing and concentration of hydrochloric acid may be different at the same time. Therefore, the calculations associated with the preparation of these solutions require special attention.

In all cases, when the hydrochloric acid is prescribed without concentration indication, release dilute hydrochloric acid (Acidum hydrochloricum dilutum 8.3%). Release as much as is prescribed in the recipe.

Rp.: Acidihydrochlorici 4 ml
Aquae purificatae 200 ml
Misce. Da. Signa. 1 tablespoon 3 times daily before meal.

In a bottle for release, 200 ml of purified water is measured, then 4 ml of acid is diluted with hydrochloric acid 8,3% and shaken until complete mixing of liquids. Appearance of solutions of hydrochloric acid to release does not differ any features.

If a solution of hydrochloric acid (with a denomination of concentration) is prescribed for internal use then it is used to prepare the hydrochloric acid dilute acid (8.3%) taking it in calculations per unit (100%).

Rp .: Solution Acid hydrochloric 2% in 100 ml
Da Signa For 1 teaspoon 3 times a day before meal

Calculation:
Hydrochloric acid dilute acids - 2 ml
Water purified 100 - 2 = 98 ml

However taking into account the volatility of hydrogen chloride in order to improve the accuracy of the prepared solutions it is recommended to use prepare breeding of this acid (intraperitoneally) SolutioAcidi hydrochloric dilution (1:10), which contains 0.83% hydrogen chloride.

The solution of acid hydrochloric acid dilute (1:10) is prepared by diluting the hydrochloric acid (8.3%) with the appropriate amount of water. For example, to prepare 1 liter of solution, take 900 ml of purified water and add 100 ml of hydrochloric acid (8.3%).

This solution is taken 10 times more against the prescribed amount of acid in the recipe.

Hydrochloric acid (24,8-25,2%) is used in the pharmacy as a reagent, and it is used for external purposes in the preparation of a liquid of Demyanovich (author's copy), in calculations taking it per unit.

NON-AQUEOUS SOLUTIONS

In medical practice, solutions are widely used in non-aqueous solvents (non-aqueous solutions) as lotions, rinses, lubricants, washing, intranasal drops, inhalations.

Depending on the properties of the solvent, non-aqueous solutions are distinguished between volatile, non-volatile and combined solvents.

Volatile liquids used as solvents include ethyl alcohol, chloroform, ether. To non-lethal - glycerin, fatty oils (peach, almond, sunflower), vaseline oil, dimethoxide, PEO-400, etc., the characteristics of which are presented in the section "Solvents". Naturally, the more solvents are used, the more the formulation of this group of solutions is more diverse.

Preparation of solutions on volatile solvents. In this case, it is necessary to consider the possibility of significant losses of the solvent and the corresponding increase in the concentration of the solution due to evaporation in the process of preparation. To avoid these losses, undesirable operations such as heating, filtering or straining are unwanted. In addition, ethyl alcohol, ether with the exception of chloroform is flammable so the dissolution in this case should be done with the safety (far from the fire).

Alcohol, ether and chloroform solutions are prepared directly in release bottles. Vials should be clean and dry as water is poorly mixed with organic solvents (except for alcohol) and changes their solubility.

In the preparation of alcoholic solutions, unlike aqueous in a dry bottle for release put a medicinal substance (if it is volumetric and loose, then use a dry funnel), which is first dissolved and then the solvent because the pouring of the powder through the alcohol-soaked neck of the bottle is difficult.

The process of these solutions is produced, if necessary, through a small dry cotton wool using a funnel covered with a glass. The process of ether solutions is not particularly desirable. The precipitated ether solution should be weighed and the solvent loss should be filled with an increase of the ether. As an volatile solvent, alcohol is most often used in pharmacy practice.

Alcoholic solutions. Ethyl alcohol and its aqueous solutions are used to dissolve many medicinal substances (organic acids, alkaloids, essential oils, iodine, camphor, resorcinol, menthol, hydrogen peroxide, formalin and other substances). Ethyl alcohol can also be used as a disinfectant, with a refreshing and irritating properties, for compresses, etc.

Preparation of alcoholic solutions of medicinal substances is regulated by the "Instruction on the preparation of pharmaceutical forms with liquid dispersion media in pharmacies" (Order of the Ministry of Health of Ukraine No. 197 of 09.09.93).

If the prescription does not indicate the concentration of ethyl alcohol, then use 90%. The exception is 10% iodine solution which is prepared using 95% alcohol based on DF preservatives as well as some solutions according to the approved normative and technical documentation.

If the strength of ethyl alcohol is indicated as a percentage, the volume percentages should be understood.

Rp .: Acidisalicylici 0.3
Spirits aethylici 30 ml
Misce Da Signa Wipe off your feet

The recipe must be decorated with a stamp of a medical institution, personalized seal and a physician's signature and printed by the medical institution "For recipes".

To prepare 1% solution of salicylic acid, 70% alcohol is used. In a clean, dry bottle, with well-chosen cork, place 0,3 g of salicylic acid, measure 30 ml of 70% ethyl alcohol with a measuring cylinder and quickly close the stopper to prevent alcohol sweating. Medicinal product is signed up.

If the pharmacy has finished 70% alcohol, it is prepared from the alcohol available concentration.

The dilution of alcohol with ethyl water to the desired concentration requires the proper calculations. For this purpose, alcohol-metric SPh of Ukraine tables are used.

The amount of water needed to prepare 70% alcohol can not be calculated by subtracting 90% of alcohol from the total volume of the solution because it is necessary to take into account the contract - the decrease in volume. The detected amount of 90% alcohol (23.3 ml) is measured by measuring cylinder at 20 ° C, add about 7 ml of water, stir the solution and cool to 20 ° C and then bring it to the desired volume of 30 ml. In the absence of the necessary measuring dishes, the amount of water for dilution of ethyl alcohol is calculated according to the table.

Preparation of solutions on non-volatile solvents. Solutions of medicinal substances on non-volatile solvents are prepared by weight since the high viscosity of these solvents results in large losses in the measurement. The mass of such solutions consists of the sum of the quantities of medicinal substances and solvent. Taking into account that dissolution in viscous solvents proceeds slowly it is expedient to carry it out with heating taking into account the properties of medicinal substances. However, in this case the preparation of saturated solutions should be avoided since when cooling such a solution the soluble substance may the precipitate can appear. Solutions on viscous solvents are prepared directly in the vials for release and filtered only in extreme cases and only through the gauze.

Glycerin solutions are widely used as lubrication. In the form of glycerol solutions, prescribe acid boron, sodium tetraborate, iodine, tannin, ihtiol and other substances. Glycerin has a significant viscosity so the preparation of glycerine solutions can occur with heating and without heating which completely depends on the thermostability of the medicines included in the solution. When heated to 40-50^{o} C, the viscosity of glycerin decreases and the dissolution process is accelerated. Sodium tetraborate and boron acid are better dissolved in heated glycerol, when dissolved, they form a glycosyric acid, which gives the solutions acidic reaction. To neutralize glycosyric acid, sodium bicarbonate is often prescribed in combination with boric acid. It should be added carefully in small portions, as the neutralization reaction proceeds violently and spray solution can occur.

Oil solutions. Fatty oils as well as vaseline oil are good solvents for many medicines that are widely used in the form of ear and intranasal drops. In order to accelerate the dissolution light heating should be applied.

If a volatile substance such as menthol camphor is prescribed in an oil solution then in order to eliminate the loss of dissolution, preheated oil is carried out at a temperature not higher than 40°C.

5. Plan and organizational structure of employment.

Number	The main stages of employment,	Learning Objectives	Means of instruction	Materials on	Duration (in

	their function and meaning.	**levels of assimilation.**	**and control.**	**methodological Secured Lock class visibility, control of knowledge of students.**	**minutes or in%) of the total time employment.**
1	**2**	**3**	**4**	**5**	**6**
1	**Preparatory** - organizing classes - setting educational goals - control the output level of knowledge - monitoring skills of students, their willingness to accept this material class	I		Slideshow table	15-20
2	**Basic** tasks	II, III			50-60
3	**Final** -control of professional skills - supply results of studies - granting homework from sending literature	IV			15-20

6. Methodological materials for support classes.
6.1. The task source for self-knowledge skills

1. From recipe issued 5% formalin solution is 200 ml. Calculate the amount of standard solution of formaldehyde and purified water that is necessary for the preparation of this drug:

A. * 10 ml of standard solution of formaldehyde and 190 ml of purified water
B. 10 ml of standard solution of formaldehyde and 200 ml of purified water
C. 27 ml of standard solution of formaldehyde and 173 ml of purified water
D. 5 ml of standard solution of formaldehyde and 195 ml of purified water

E. 25 ml of standard solution of formaldehyde and 175 ml of purified water

2. The process of blending ethyl alcohol and water the phenomenon of contraction. What it is?

A. * Decrease the total volume by mixing alcohol and water
B. Increase the total volume by mixing alcohol and water
C. immiscibility of water and alcohol of various concentrations
D. Mutual dissolution alcohol and water
E. Equalization concentration by mixing alcohol and water

3. The recipe was discharged 5% formalin solution 100ml. What amount of 37% formaldehyde pharmacist should take for solution
A. * 5 ml
B. 12.5 ml
C. 4,5 ml
D. 10 ml
E. 15 ml

4. The solution of hydrogen peroxide is released from pharmacies in different concentrations. What concentration of solution the patient needs if the recipe was observed concentrations?
A. * 3%
B. 30%
C. 20%
D. 10%
E. 2%

5. The patient is prescribed lotion:
Rp .: Sol. Liquoris Burovi 10% 100 ml
Da. Signa. Lotion.
What volume of drilling fluid necessary measure to make this drug?
A. * 10 ml
B. 90 ml
C. 20 ml
D. 80 ml
E. 50 ml

6. The patient is prescribed mixture:
Rp .: Sol. Acidi hydrochlorici 2% 100 ml
Da. Signa. 1 tbsp. l. 3 g. Per day with meals
What volume of diluted hydrochloric acid solution (1:10) is necessary to measure its preparation?
A. * 20 ml
B. 25 ml

C. 15 ml
D. 2 mL
E. 5ml

7. The patient is prescribed 3% alcohol solution of boric acid. Wherein the concentration of ethanol used for the preparation of the solution required by regulations?
A. * 70%
B. 95%
C. 90%
D. 60%
E. 40%

8. A pharmacist prepared oil solution of menthol. Select the correct way to dissolve the drug:
A. * Dissolve the butter in a vial
B. ground in a mortar with oil
C. Dissolve oil in a stand
D. ground in a mortar with alcohol, then add oil
E. Dissolve in a porcelain cup with oil
9. necessary to prepare the drug for prescription:
Rp .: Sol. Acidi hydrochlorici 1% 100 ml
Da. Signa. One tablespoon 3 times a day.
Specify the number hydrochloric acid solution (1: 10) and water to prepare:
A. * 10 ml and 90 ml
B. 1 ml and 99 ml
C. 20 ml and 80 ml
D. 10 ml and 100 ml
E. 3 ml and 97 ml

10. Pharmacist compounded oil solution. Specify the sequence of process stages
A. * Dry Matter placed in a vial and weighed oil
B. In a bottle weighed and added solvent dry matter
C. substance is mixed in a mortar with measured amounts of solvent
D. In a base oil and dissolved substance in a bottle
E. substance is placed in a stand and weighed solvent

6.2. Information necessary for the formation of knowledge, skills can be found in textbooks: / basic literature provided with the designation of pages /:

Basic
25. Aseptic drug forms, extemporaneous compounding: Guidelines /O.I.Tyhonov, L.V.Bondareva, T.H.Yarnyh, N.F.Orlovetska etc .; Ed. O.I.Tyhonova and T.H.Yarnyh. - H .: Izd pharmacy; Original, 2005. - 184 p.

26. Solid dosage forms: extemporaneous compounding: Guidelines /O.I.Tyhonov, L.V.Bondareva, T.H.Yarnyh, N.F.Orlovetska etc .; Ed. O.I.Tyhonova and T.H.Yarnyh. - H .: Izd pharmacy; Original, 2003. - 176 p.
27. Soft medicinal forms: extemporaneous compounding: Guidelines /O.I.Tyhonov, L.V.Bondareva, T.H.Yarnyh, N.F.Orlovetska etc .; Ed. O.I.Tyhonova and T.H.Yarnyh. - H .: Izd pharmacy; Original, 2003. - 128 p.
28. Liquid formulations: extemporaneous compounding: Guidelines /O.I.Tyhonov, L.V.Bondareva, T.H.Yarnyh, N.F.Orlovetska etc .; Ed. O.I.Tyhonova and T.H.Yarnyh. - H .: Izd pharmacy; Original, 2005. - 160 p.
29. Workshop on pharmaceutical drug technology; for students. Pha. HI. teach. schools / AI Tikhonov, T. Yarnyh, V. Sobolev et al .; Ed. AI Tikhonov. - H .: Izd pharmacy: Golden Pages, 2002. - 256 p.

Additional

5. Dictionary-guide for pharmacy specialists in management and economics / Ed. prof. Black VP // Kharkov: Publishing pharmacy "Golden pages " - 2001 - 281 p.

6.3.Orienteering Map on independent work with literature on the topic occupation.

№	Main tasks	Directions	Responses (literature)
1	2	3	4
1.	Characteristics of non-aqueous solvents, requirements to them	What range of non-aqueous solvents. NTD.	4, 5
2.	The rules on the preparation of solutions of volatile and non-volatile solvents.	Spend dilution calculations on alcohol. What are the main technological solutions preparation stage.	4, 5
3.	The settlement rules pharmacopoeia standard liquids	Place your calculations depending on prescription	4, 5
4.	Quality assessment solutions pharmacopoeia standard liquids and non-aqueous solutions	Add documentation and quality solutions and non-aqueous liquids pharmacopoeia standard	4, 5

7. Materials for self-training quality.

A. *Questions*

1. Characteristics of non-aqueous solvents, requirements to them.
2. Calculations of dilution of ethyl alcohol using formulas and breeding alcohol metric tables.
3. The rules on the preparation of solutions volatile and non-volatile solvents according to the MOH Ukraine number 197 of 09/07/93.

4. Safety when working with flammable and explosive solvents, acids and alkalis.

5. The nomenclature standard pharmacopoeias liquids, concentration and means prescribing a recipe.

6. Rules for calculating the amount of purified water and standard pharmacopoeias liquids depending on how their prescription by MOH Ukraine number 197 of 09/07/93.

7. Features cooking and storing solutions pharmacopoeias standard liquids.

8. Methods of assessing the quality of non-aqueous solutions and solutions pharmacopoeia standard liquids in accordance with the requirements of technical documentation, packaging, design to delivery, retention policies.

B. ***Tests for self-control with standard answers.***

1. The pharmacy must prepare the alcoholic solution of salicylic acid which is not specified concentration of alcohol. Wherein the concentration of alcohol should take?

A. * 70%
B. 90%
C. 75%
D. 80%
E. 60%

2. Pharmacist compounded glycerine solution of boric acid. Enter the correct way of putting boric acid.

A. * Dissolve vial with warming up
B. Dissolve by grinding in a mortar
C. Dissolve to stand at room temperature
D. rubbed with alcohol in a mortar and mixed with glycerol
E. dissolved in a volumetric flask

3. Pharmacist compounded solution of 100 ml and 1% solution of ammonia. Specify how much 10% solution of ammonia and water should be used?

A. * 10 ml and 90 ml
B. 5 ml and 95 ml
C. 15 ml and 85ml
D. 20 ml and 80 ml
E. 5 ml and 100 ml

4. A pharmacist prepares a non-aqueous solution by prescription:
Rp: Natrii tetraboratis 5,0
Glycerini ad 20,0
Misce. Da. Signa. For lubrication.
What technology it needs to choose?

A. * In the vial placed sodium tetraborate, weighed hlitseryn, heated
B. Sodium tetraborate grind in a mortar with glycerol

C. In a vial weighed glycerin, sodium tetraborate placed, heated
D. In the stand measured glycerin, sodium tetraborate dissolved
E. In stand weigh glycerin added sodium tetraborate, heated, filtered in a vial

5. Pharmacy got prescription for preparation of an alcohol solution. Specify which ethanol concentration pharmacist must be used in the absence of instructions in the recipe
A. * 90%
B. 70%
C. 45%
D. 60%
E. 30%

6. A pharmacist prepared prescription dosage form following:
Rp: Sol. Acidi acetici 3% 100ml
Da. Signa. To cool off.
Specify the number of standard pharmacopeia fluid and water:
A. * 10 ml and 90 ml
B. 3 ml and 100 ml
C. 3 ml and 97 ml
D. 15 ml and 85 ml
E. 10 ml and 100 ml

7. pharmacist standard pharmacopeia calculated amount of liquid water and words. Choose the correct answer:
Rp: Sol. Perhydroli 6% 100ml
Da. Signa. To wipe the skin.
A. * 6 ml and 94 ml
B. 35 ml and 65 ml
C. 20 ml and 80 ml
D. 60 ml and 40 ml
E. 6 ml and 100 ml

8. Specify the amount of hydrochloric acid solution (1:10) and purified water for solution for words:
Rp: Sol. Acidi hydrochlorici 1% 150ml
Da.Signa. Po1 century. boxes. 3 times a day.
A. * 15 ml and 135 ml
B. 10 ml and 150 ml
C. 95 ml and 55 ml
D. 15 ml and 150 ml
E. 10 ml and 100 ml

9. Pharmacist used for solution by following the words 34% formaldehyde solution. Add water and standard pharmacopeia liquid:

Rp: Sol. Formalini 30% 100ml
Da. Signa. To disinfect footwear.
A. * 67 ml and 33 ml
B. 20 ml and 80 ml
C. 30 ml and 100 ml
D. 70 ml and 30 ml
E. 60 ml and 40 ml

10. Specify the number of standard pharmacopeia liquid (34%) and water to prepare the drug for prescription:
Rp .: Sol. Kalii acetatis 10% 200ml
Da. Signa. 1 tbsp. boxes. 3 times a day
A. * 58.8 ml and 141.2 ml
B. 10 ml and 190 ml
C. 20 ml and 180 ml
D. 22 ml and 178 ml
E. 20,2 ml and 179.8 ml

B. Tasks for self-control with answers.

Situational tasks

1. A pharmacist prepared 5% solution of hydrogen peroxide prescription where its concentration is not available. Is it correct action?

Answer. No. If the recipe is not indicated concentration of hydrogen peroxide 3% solution is prepared.

2. In preparing the hydrochloric acid solution for internal use a pharmacist has calculated its number by a formula based on its actual content. Are these calculations correct?

Answer. No. In preparing solutions of hydrochloric acid, 100% diluted hydrochloric acid count (8.3%).

3. Pharmacist compounded solution of boric acid at 95% alcohol by prescription in which the concentration of alcohol is not indicated. Did he right?

Answer. No. According to the order №197 boric acid solution is prepared by 70% alcohol.

4. Pharmacist measured the vial for the required number of 70% alcohol dissolved therein salicylic acid and filtered. Whether he had used the right technology?

Answer. No. Alcohol solution prepared in the vial. First measured dry matter, then measured alcohol. The solution is not filtered.

5. Pharmacy received the prescription which issued formalin solution. To prepare the drug pharmacist used a 30% solution of formaldehyde taking it in payment for 1 (100%). Was the medication prepared correctly?

Answer. No. Need to calculate the correction.

8.Materials for audience independent preparation:

8.1. List of educational practical tasks to be performed during the practical (laboratory) classes:

A set of individual tasks

1. Take:	benzocaine Novocaine 1,0 Menthol 2.5 Ethyl alcohol 70% Mix 100 ml. Are. Mark. For grinding pain	2. Take:	salicylic acid Boric acid 0.2 Ethyl alcohol 70% 50 ml Mix. Give. Mark. Wipe the skin.
3. Take:	menthol Camphor 0.05 Oil vaseline 10.0 Mix. Are. Mark. For inhalation	4. Take:	alum 1.0 Boric acid 2.0 Glycerin 20.0 Mix. Give. Mark. To stop the bleeding.
5. Take:	salicylic acid Resorcinol 0.2 Ethyl alcohol 70% 20 ml Mix. Give. Mark. For grinding.	6. Take:	novocaine 0.5 Boric acid 1.0 Ethyl alcohol 70% 30 ml Mix. Are. Mark. Friction
7. Take:	Menthol 0.2 Oil vaseline 10.0 Oil drops eucalyptus XX Mix. Give. Mark. For inhalation.	8. Take:	camphor 1.5 Sunflower oil to 15.0 Mix. Give. Mark. For grinding.
9. Take:	novocaine 0.6 Sodium citrate 0.25 Glycerin 75.0 Mix. Are. Mark. For lubrication gum	10. Take:	Menthol 1.0 5.0 methyl salicylate Oil vaseline 20.0 Mix. Give. Mark. For grinding.
11. Take:	Sodium tetraborate 1.5 Glycerin 12.0 Mix. Give. Mark. For treatment of oral mucosa with thrush.	12. Take:	salicylic acid Camphor to 3.0 10 ml of ethyl alcohol methyl salicylate 15.0 Mix. Are. Mark. For rubbings
13. Take:	Alcohol Menthol 0.5 Salicylic acid 2.0 Ethyl alcohol 70% 50 ml	14. Take:	camphor 2.0 14 ml of ethyl alcohol 2 ml of purified water Mix. Give. Mark. For the

	Mix. Give. Mark. To wipe the face.		prevention of pressure ulcers.
15. Take:	Peppermint Oil 5.0 camphor 2.0 Ether 10.0 30 ml of ethanol Mix. Are. Mark. For rubbings	16. Take:	tannins 1.0 1.5 ml of ethyl alcohol Glycerin 25.0 Mix. Give. Mark. To lubricate the throat.
17. Take:	Peppermint Oil 5.0 camphor 2.0 30 ml of ethyl alcohol Mix. Give. Mark. For grinding.	18. Take:	Oil terebinthine 5.0 15.0 chloroform Ether 30.0 Mix. Are. Mark. At a distance of 5-7 cm inhale cough
19. Take:	Yoda 0.2 Potassium iodide 0.5 1 ml of purified water Glycerin 20.0 Mix. Give. Mark. For the treatment of wounds.	20. Take:	salicylic acid Resorcinol 0.75 Yoda 1.0 Boric acid 1.5 Ethyl alcohol 50ml 70% Mix. Give. Mark. For lubrication.

2. Calculate how much of 95% ethanol should be taken for:

1.	500 ml 40% alcohol	2.	600 ml 70% alcohol
3.	200 ml 30% alcohol	4.	400 ml 50% alcohol
5.	100 ml 50% alcohol	6.	1000 ml of 40% alcohol
7.	700 ml 60% alcohol	8.	300 ml 60% alcohol
9.	200 ml 70% alcohol	10.	100 ml 30% alcohol
11.	50 ml of 90% alcohol	12.	150 ml 35% alcohol
13.	120 ml 45% alcohol	14.	150 ml 70% alcohol
15.	300 ml 35% alcohol	16.	200 ml 50% alcohol
17.	300 ml 70% alcohol	18.	300 ml 90% alcohol
19.	150 ml 40% alcohol	20.	400 ml 60% alcohol

9. Instructional materials for acquiring professional skills:
9.1. Methods of work performance stages.

Write down the recipe and place an accordance with MOH Ukraine number 360 of 19/07/05 p. Describe drugs. If a prescription toxic and potent substances and check single daily dose. Describe the best option technology solution with the theoretical justification and necessary calculations give an assessment of its quality. Specify design to drug delivery. Please write the passport control.

10. Materials for self-mastery of knowledge, skills provided by this work.
1. What amount of 95% alcohol and water should be taken to prepare 150 ml of 60% alcohol?
Answer. To calculate the need to use alcohol metric table:
To make 1 liter of 60% alcohol need 632 ml of 95% alcohol and 397 ml of water.
To prepare 150 ml is needed:
Alcohol 95% = 932 · 0.15 = 139.8 ml
Water = 397 · 0.15 = 59.6 ml

2. Calculate the ingredients for solution of hydrogen peroxide 5% 140 ml.
Answer. Because the solution is discharged by chemical name, the calculations carried out based on the actual content of hydrogen peroxide.
Hydrogen peroxide = 5 × 140/100 = 7.0
Perhidrol:
30 - 100;
7 - x; x = 23.3
Water - 140 ml

3. Calculate ingredients for solution perhidrol 5% 150 ml.
Answer. Since the solution was discharged under the code name for unit receiving standard liquid solution.
Perhidrolyu = 5 × 150/100 = 7.5
Purified water - to 150.0 ml

11. The theme of next session
Naval solutions. Colloidal solutions.

1. Topic of lesson №11: «Naval solutions. Colloidal solutions»- 4 hours

2. Actuality of the topic: In recent decades, interest has increased in solutions of high-molecular compounds. This group of medicinal substances has high bioavailability, they are non-toxic, which allows their use in gynecology, ophthalmology, otolaryngology, gastroenterology, in pediatric and geriatric practice. A rational combination of active ingredients, methods of their introduction and preparation allows you to create highly effective drugs. This explains the practical need to study this topic.

3. Objectives of the lesson:

3.1 General objectives

Learn how to prepare solutions of high-molecular compounds, evaluate their quality and arrange for the release.

3.2 Educational goals:

Formation of professionally important properties and personality traits of the future pharmacist.Educating students of professional responsibility in the manufacture of medicines.

3.3 Specific objectives:

-know:

- Characteristics of high-molecular compounds (HMC), their classification and use in pharmacy.
- The influence of the structure of the HMC on the dissolution process is limited and unlimited swelling substances.
- Features of the preparation of solutions of pepsin, gelatin, starch, methylcellulose, sodium carboxymethylcellulose, plant extracts.
- Rules for adding drugs to HMC solutions.
- Assessment of the quality and storage of HMC solutions, registration for tempering in accordance with the requirements of the State Pharmacopoeia and relevant instructions.

3.4. **Based on theoretical knowledge on the topic:**

-able to:

- Evaluate the correctness of prescriptions and check the doses of toxic and potent substances in solutions.
- Use the SPh, other regulatory documentation and reference books to find the necessary information on the preparation of HMC solutions.
- Calculate the amount of water and medicinal substances.
- Select and justify the optimal technology solutions HMC on individual records.
- To carry out the main technological operations for the preparation of solutions of high molecular compounds (weigh, measure, heat, dissolve, filter).
- Assess the quality of the prepared solution, clog it and arrange it for vacation.
- Fill in the passport of the written control.

4. Materials for classroom self-preparation (interdisciplinary integration).

Disciplines	Know	Be able to
1. Prev Latin tongue	The basics grammar. Spelling Latin names of medicinal and chemical substances, medicinal plants, families and raw materials plant and animal origin. Recipe.	Assess the correctness of the recipe design.
Anatomy and physiology human	The structure and functional characteristics of the organism at different levels: molecular, cellular, organ, system.	Assess the functional state of the body as a whole and individual organs and systems
General and in organic chemistry	The main provisions of the atomic-molecular teachings. The processes that take place in aqueous solutions of electrolytes.	Calculate molar and equivalent masses of chemical compounds. To characterize the processes that take place in aqueous solutions of electrolytes.
Physics	Methods of analysis of drugs.	Determine the main indicators of the quality of liquid drugs: refractometry, polarimetry, mass spectrometry, UV, IR spectrophotometry, photocolorimetry.
Physical and colloid chemistry	Characteristics and properties of the high molecular weight compounds.The solubility of the high molecular weight compounds in liquids.	Determine the molar mass, the concentration of the substance solutions.
Organic chemistry	Physical, chemical properties of organic compounds and the main methods of their analysis.	To carry out elemental analysis and identification of organic compounds.
Analytic chemistry	Methods for the qualitative and quantitative analysis of inorganic and organic substances	Perform qualitative and quantitative analysis of individual substances and their mixtures, to carry out the necessary calculations

		according to the analysis.
2. ***The following discipline*** Organization and Economics of Pharmacy	General technology of liquid dosage forms for internal use	Calculate the medicinal, auxiliary substances and purified water
Industrial Medicine Technology	Solution technology for internal use	Technological stages of preparation of solutions for internal use
Biopharmacy	Theoretical fundamentals and production processes processing medicinal funds in medicinal drugs, their standardization, storage and release. Trituration, liquid medicinal funds, ointments, etc.	Cooking cosmetic medicinal forms. Make calculations medicinal, auxiliary substances and water purified .
Technology medicinal funds industrial production	Overall technology cosmetic medicinal funds industrial production.	Technological stages making cosmetic medicinal funds industrial production .
Biopharmacy	The technological process of preparing solutions for internal use.	Prepare solutions for internal use, taking into account the physico-chemical properties of the ingredients.
3. *Intra-subject integration* Injection solutions and eye drops	Preparation of solutions by the mass-volume method	Calculate the amount of dry matter and water

5. Subject content:

SOLUTIONS HIGH MOLECULAR WEIGHT COMPOUNDS

High-molecular compounds are called natural or synthetic substances with a molecular weight of from several thousand (no less than 10-15 thousand) to a million or more.

The properties of an HMC depend on the size and shape of their molecule. Thus, HMCs with spherical molecules (hemoglobin, glycogen, pepsin, trypsin, pancreatin, etc.) usually do not swell when powdered and when dissolved. Solutions of these substances have a low viscosity even at relatively high concentrations and obey the laws of diffusion and osmotic pressure.

HMCs with highly asymmetric linear (branched), pulled molecules (gelatin, cellulose and its derivatives) swell up strongly and dissolve and form highly viscous solutions that do not obey the laws inherent in solutions of low molecular weight substances. Dissolution of HMC with linear molecules is accompanied by swelling, the latter is the first stage of their dissolution. After this, the HMC dissolves.

It should be borne in mind that the swelling of such a compound does not always end with its dissolution. Very often, after reaching a certain degree of swelling, the process stops. Swelling can be unlimited and limited.

Unlimited swelling ends in dissolution. The compound absorbs the solvent first and then goes into solution at the same temperature.

With limited swelling, the high-molecular compound absorbs the solvent and does not dissolve in it, no matter how long it is in contact. The limited swelling of such a compound always ends with the formation of an elastic gel (jelly). However, limited swelling due to limited dissolution often changes to unlimited as conditions change. So gelatin and agar-agar swell sparingly in cold water, in warm water swell indefinitely, than they use when dissolving these substances.

HMC solutions, if they are in thermodynamic equilibrium, are, like true solutions, aggregatively stable. However, with the introduction of large amounts of electrolytes, HMC is released from the solution. This phenomenon is called salting out. This process is explained by a simple decrease in the solubility of the HMC.

The dehydration of the dissolved compound, and hence its salting out, can also be caused by non-ionized substances, such as alcohol. Concentrated sugar solutions (syrups) also act visually. Sugar and alcohol show a strong dehydrating effect when introduced in significant quantities, so they need to be added to the solution of the HMC with parts with agitation.

Under the action of these factors, the phenomenon of coacervation is also observed - the separation of the system into two layers.

Under the influence of low temperatures, such phenomena as gelation or solidification and syneresis are possible.

HMC s and their solutions are very important in various industries, agriculture, as well as medicine and pharmacy. In medicine, they are used as medicines (enzymes, polysaccharides, mucus, extracts, etc.) And as excipients in the preparation of various dosage forms (bases for suppositories and ointments, emulsifiers, stabilizers, prolongators, solubilizers, flavoring agents as additives in the preparation of blood substitutes), as well as packaging material for dispensing drugs, for the manufacture of bottles, films, corks, cans and other packaging products.

Preparation of HMC ***solutions, swell indefinitely.***

HMCs swell indefinitely, which are most often used in pharmaceutical practice, include pepsin, licorice extracts, belladonna, etc. When preparing solutions of substances, they swell without limit, follow the general rules for the preparation of solutions of low-molecular substances, taking into account the properties of medicinal substances and solvents.

example:

Rp.: Pepsini 2.0

Acidi hydrochlorici 5 ml
Aquae purificatae 200 ml
Misce. Da. Signa. 1-2 tbsp. l 2-3 times a day with meals

Mixture-solution, which includes the fact that the unlimited swells HMC (enzyme) - pepsin, soluble in water, and a potent substance - hydrochloric acid.

The peculiarity of pepsin mixture technology is the observance of the sequence of mixing the components. Since pepsin is inactivated in strong acids, mixing of the prescribed components is carried out in the following sequence: first, an acid solution is prepared and pepsin is dissolved in it.

payment:
Pepsin - 2.0 g
The solution of hydrochloric acid (1:10) - 50 ml
Water purified 205 - 50 = 155 ml

technology:

Into the stand measure 155 ml of purified water, add 50 ml of hydrochloric acid solution at a dilution of 1:10 and dissolve 2.0 g of pepsin in the resulting solution, stir until it is completely dissolved. necessary, the solution is filtered through gauze folded in several layers (preferably through glass filter No. 1 or No. 2) into a vial for tempering. The solution should be clear. The clouding of the solution indicates an impurity in the pepsin soluble foreign proteins. In the presence of sediment, it must be removed by straining. Filtration of pepsin solutions through paper filters is not recommended, because pepsin is easily absorbed by the paper filter due to the fact that in an acidic environment, the protein as an amphoteric compound acquires a positive charge, and the paper is negatively charged as it hydrolyzes. Release pepsin solutions in orange glass bottles with an additional label "Keep in a dark, oh-cold place."

Preparation of HMC solutions, partially swell.

An example of a substance that swells to a limited extent is that in cold water and gelatin and starch swell indefinitely when heated.

example:

Rp.: Solutionis Gelatinae 5% 50.0
Da. Signa.1 tablespoon after 2:00

technology:

2.5 g of dry gelatin is weighed out, placed in a tared porcelain cup, filled with 10 times the amount of cold water and left to swell for 30-40 minutes. Then the rest of the water is added, the mixture is placed in a water bath (temperature 60-70 ° C) and, with stirring, complete dissolution of gelatin is achieved and a clear solution is obtained. Bring water to the required mass.

The resulting solution, if necessary, filtered into a vial and released with the label "Keep in a cool place", as under the influence of microorganisms, spoilage of the solution may occur. The patient needs to be explained that the dosage form should be heated before use, because the solution can condense.

For internal use and enemas prepare a 2% starch solution. Solutions of this concentration are prepared in cases where their concentration is not indicated in the recipe.

For example:

Rp.: Solutionis Amyli 2% 100.0
Da. Signa. 2 enemas
Can be simply written out
Rp.: Mucilaginis Amyli 100.0
Da. Signa. 2 enemas

technology:

The solution is prepared by weight as follows: 2 parts of starch are mixed with 8 parts of cold water and added with stirring to 90 parts of boiling water. Stir, heating to boiling. If necessary, you can strain through gauze. The solutions are unstable, are subject to microbial spoilage, therefore, they are prepared ex temrore.

Methylcellulose (MC) refers to substances that swell limitedly in hot water and swell indefinitely in cold water.

For the preparation of aqueous solutions, MC is filled with water heated to 80-90 ° C (for complete and rapid dissolution) in an amount of 1/2 of the required volume of the resulting solution. After cooling to room temperature, add another cold water, mix and leave in the refrigerator for 10-13 hours until complete dissolution of methylcellulose.

A clear solution of methylcellulose formed is filtered through a No. 2 glass filter. The cooled solutions are transparent.

It is necessary to take into account that HMC solutions are more often prescribed in combination with various medicinal substances that can react with them, therefore, each time it is necessary to take into account their compatibility.

COLLOIDAL SOLUTIONS

Colloidal solutions are ultramicroheterogeneous systems in which the structural unit is a complex of molecules, atoms and ions, the so-called micelles.

The core of the micelle is formed due to the accumulation of individual molecules of a hydrophobic substance. The double layer of ions surrounding the nucleus (adsorption and diffuse) arises as a result of either the adsorption of ions, or the dissociation of surface molecules of the nucleus under the influence of the external environment. The compounds that form the double layer ions are called ionic groups.

Due to the large particle size, colloidal solutions have characteristic properties: low diffusion capacity, low osmotic pressure, had the ability to dialysis, the ability to scatter light in all directions when considering solutions in reflected light (a characteristic Tyndall cone is formed). The micelles in the colloidal solution are in a chaotic motion. They are characterized by Brownian motion.

Colloidal solutions can be stable only in the presence of the third component - stabilizer, - high-molecular compound (HMC) or surface-active substance (surfactant), which, adsorbed on the particle-medium interface, prevents coagulation. The stability of colloidal systems is also improved due to the appearance of solvation layers of solvent molecules.

The mechanism of the stabilizing action of the HMC and Surfactants is that they adsorb on the surface of the particles and orient themselves at the interface so that the polar part faces the polar liquid and the non-polar liquid faces the non-polar particles, forming a monomolecular adsorption layer on the surface. The surfactant ions, being adsorbed on the interface, have surface activity, while the repulsive forces between particles increase and their surface tension decreases, which contributes to aggregative stability. In addition, around the surfactant film surrounding the particle, the molecules of the solvation layer are oriented (in water, the hydrate shell). Such colloids are called "protected."

Preparation of solutions of protected colloids.

In pharmaceutical practice, mainly three colloidal preparations are used. These are Collargol, protargol and ichthyol.

Collargol and protargol are used as astringents, antiseptics, anti-inflammatory agents. Their solutions are used for lubrication of the mucous membranes of the upper respiratory tract, in the eye practice, for washing the bladder, purulent wounds, etc.

Protargol (silver protein) - Argentum proteinicum is an amorphous brown-yellow powder, odorless, slightly bitter and slightly tart taste, easily soluble in water, is protected by a colloidal silver preparation, contains 7.3-8.3% (average 8%) of silver oxide . Protein hydrolysis products (albuminates) play the role of a protective colloid.

For example:

Rp.: Solutionis Protargoli 2% 100 ml
Da. Signa. For washing the nasal cavity

When preparing solutions of protargol, its ability to swell is used due to the content of a large amount (about 90%) of protein. After swelling protargol independently goes into solution.

technology:

2.0 g of protargol is poured in a thin layer onto the surface with 100 ml of water and left alone. The drug swells, and the particles of protargol, gradually dissolving, sink to the bottom of the stand, giving access to the next portions of water to the preparation. It is not recommended to agitate the protargol solution , as when agitating the powder coalesces into clumps, a foam is formed that envelops the particles of protargol and slows down its peptization.

The resulting solution, if necessary, filtered into a vial for wasteland through a loose lump of cotton washed with hot water. Protargol solutions can be filtered through ash-free filter paper or No. 1 and No. 2 glass filters.

If glycerin is prescribed in the solution, in addition to water, then protargol is first triturated in a mortar with glycerin, and after its swelling, water is gradually added. In addition, it should be borne in mind that the solutions of protargol should be released in glasses made of dark glass. The solution of protargol should not be prepared as a stock.

Collargol solutions (silver colloid) - Argentum colloidale are greenish or bluish-black plates with metallic luster, are soluble in water, contain 70% silver oxide and 30% protein hydrolysis products (sodium salts of lysalbic or protalbinic acids), which serve as a protective colloid. Due to the small amount of protein (about 30%), the drug slowly dissolves in water. Therefore, to speed up the dissolution, you can apply two methods of preparation, depending on the concentration of the prescribed solution.

1. In a glass bottle for release, filtered (can be strained), purified water, pour collargol and the contents of the glass are shaken until the collagen is completely transferred into the solution. This method is convenient at small concentrations of collargol (up to 1%).

2. If you have to prepare solutions of greater concentration, then proceed as follows: collargol is placed in a mortar, add a small amount of purified water, leave the mixture 2-3 minutes for swelling, rub, and then gradually add to the stirring amount of remaining water.

The collagen swelling is relatively long, so it is more rational to apply the second method. If necessary, the solution of collargol is filtered through a glass filter No. 1 or No. 2 or filtered through a loose lump of cotton wool, washed with hot water. The solution is photosensitive, therefore it is released in a bottle of dark glass.

Solutions of ichthyol (ammonium salt of sulfuric acid shale oil) - Ichtyolum - it is almost black or brown syrup liquid of a peculiar sharp smell and taste. Soluble in water, glycerol, alcohol-ethereal mixture. Water solutions shake vigorously when shaking. It is a natural protected colloid.

For example:

Rp .: Solutionis Ichtyol 1% 200 ml
Da. Signa. For lotion

Technology:

Weigh 2.0 g of ihthiol into an old porcelain cup (or in the contents of the parchment paper), gradually add 200 ml of water, continuously stirring with a glass rod, then, if necessary, filter into the bottle for delivery.

6. Materials of methodical provision of classes

6.1. Task for self-checking of the initial level of knowledge-skills

Tests with answers

1. To macromolecular substances that infinitely swell, include:
   A. * Pepsin
   B. Starch
   C. Polyvinyl alcohol
   D. Gelatin
   E. Methylcellulose

2. The warning label "Pre-Use Heater" provides solutions::
   A. * Gelatin

B. Krohmaly
C. Pepsin
D. Methylcellulose
E. Nazotozi

3. The pharmacist prepared the drug, dissolving the active substance in water, acidified with a solution of hydrochloric acid (1:10). Specify for which substance this technology is characteristic:
A. * Pepsin
B. Tannin
C. Osarsol
D. Kolargol
E. Copper sulphate

4. The patient is prescribed a solution under the following word:
Rp .:Acidihydrochloric 2% - 100 ml
Pepsin 2.0
Da. Signa. On a tablespoon 3 times a day during meals.
How to dissolve pepsin to provide therapeutic activity of the drug?
A. * In a pre-prepared solution of hydrochloric acid
B. In 20 ml of hydrochloric acid solution
C. In 98 ml of purified water
D. Rub off 10 ml of purified water
E. In 20 ml of hydrochloric acid solution

5. For the preparation of drugs, solutions of high molecular weight compounds are used. What kind of technological operation should be carried out in advance for the preparation of solutions of swollen substances?
A. * Pour the optimum amount of water purified to swell
B. Dissolve in a small amount of hydrochloric acid
C. Dissolve in purified filtered water
D. Rub with a small amount of cleaned water
E.Dissolve in water purified when heated

6.Indicate which technology the pharmacist used to prepare the starch solution:
A. * Blended with cold water, poured into boiling water and boiled for 1-2 minutes
B. Blended with hot water, poured into cold water
C. Dissolved in cold water, then heated
D. Dissolved in a vial for release in freshly distilled, filtered water purified
E. Dissolved in boiling water

7. Which of the following macromolecular compounds refers to infinitely swollen :
A.*Whitefish extract

B.Gelatin
C.Methylcellulose
D.Polyvinylpyrrolidone
E.Starch

8. The patient needs to prepare a solution of gelatin. What is the feature of dissolving gelatin?
A.*After swelling gelatin is dissolved in water when heated
B.Gelatin dissolves in boiling water
C.Gelatin dissolves in acidified water
D.Gelatine is rubbed with alcohol and dissolved in water when heated
E.Gelatin dissolves in the submerged water

9.The pharmacy received a recipe:
Rp .: Mucilaginis Amyli 50.0
Da. Signa. For an enema
What amount of starch and purified water was used by a pharmacist while cooking?
A.*1.0 starch; 49 ml of purified water
B. 1.0 starch; 50 ml of purified water
C. 2.0 starch; 48 ml of purified water
D. 5,0 starch; 45 ml of purified water
E. 10.0 starch; 40 ml of purified water

10.The pharmacist prepared 100 ml of starch solution 2%. Specify the rational technology:
A.*2.0 starch is poured into 8 ml of purified water; 90 ml of purified water is brought to a boil, poured into a suspension of starch, boiled under constant stirring for 1 min, filtered in a vial for release
B. In the stand, measure 198 ml of purified water, dissolve 2,0 starch, filter in a vial for release
C. In 98 ml of boiling water purified, dissolve 2,0 starch, filter in the vial for release
D. 2.0 starch is poured into 8 ml of purified water, boiled for 1 min, cooled, add the remaining purified water
E. In a bottle for leave, measure 98 ml of purified water, dissolve 2,0 starch, shake

11.Pharmacist has prepared a prescription drug:
Rp.: Sol. Protargoli 0.3% - 10 ml
Glycerin 1.0
DS For washing.
Specify the best technology option
A. * Protargol rub in a mortar with glycerol and add water

B. Glycerol dissolves in water and add protargolum
C. Dissolve the protargol in the support and add glycerol
D. In a vial weigh the protargol, dissolve in water, add glycerol
E. In a vial we glycerin, water, protargol are sequentially weighed

12.A pharmacist prepares a solution of a protected colloid by the following technology: measures the water purified in a porcelain cup, pours on the surface of the water a thin layer and does not mix. Specify the substance for which this technology is characteristic:
A. * Protargol
B. Kolargol
C. Ichthyol
D. Starch
E. Pepsin

13.The pharmacist prepared an aqueous solution of protargola. Specify which technology the pharmacist chose:
A. * Poured on the surface of water and left to completely dissolve
B. Dissolved in the bottle for purification in the water
C. Dissolve when rubbed
D. Dissolved in warm water
E. Dissolved in cold water

14. The pharmacist prepared a solution of ihtiol. Specify the peculiarity of the dissolution of ichthyol:
A. * Weighed ichthyol in a porcelain cup and, stirring, adding water, strain into the vial
B. In an old vial we weighed the ichthyol, added water and filtered
C. Ichthyol was weighed into an old mortar and torn with water
D. Put in a bottle water, added ichthyol, filtered
E. Weighed the ichthyol in the stool, added water, dissolved and strained into the vial for release

15.The pharmacist prepared a 2% solution of collargolum. Specify which technology is chosen by the pharmacist?
A. *Dissolve when rinsed with water purified in a mortar
B.Poured on the surface of the water and left to completely dissolve
C. Dissolved in the bottle for purification in the water
D. Dissolved in hot water in the stand
E. Diluted in cold water, brought to a boil under constant stirring .

16.Specify the features of the collargol solution preparation:
A.*Disperse with water or glycerol
B. Dissolved in acidified water purified

C. Pour onto the surface, do not shake the water
D. Add to boiling water as a suspension
E. Leave to swell at room temperature

17. Pharmacist prepared a 2% solution of collargol. Indicate which technology the pharmacist chose:
A. * Dissolved when rubbed with water in a mortar
B. Dissolved in the bottle for purification in the water
C. Pour onto the surface of the water and leave to completely dissolve
D. Dissolved in hot water in the stand
E. Dissolved when rubbed with alcohol in a mortar

18. In medical practice, solutions of protected colloids are used. Specify a substance that belongs to the specified group:
A. * Protargol
B. Bismuth nitrate is basic
C. Potassium iodide
D. Camphor
E. Sodium chloride

19.The pharmacist filtered the water in a vial for dispensing, collagen collapsed and shoved to prepare the collargol solution. For what concentrations of collargol is this technology desirable?
A. * up to 1%
B. up to 2%
C. up to 5%
D. up to 10%
E. up to 20%

6.2 Information needed for knowledge-skills development can be found in the textbooks:

A) Basic

1. Aseptic drug forms, extemporaneous compounding: Guidelines / O.I.Tyhonov, L.V.Bondareva, T.H.Yarnyh, N.F.Orlovetska etc .; Ed. O.I.Tyhonova and T.H.Yarnyh. - X .: View of NFaU ; Original, 2005. - 184 p.

2. Solid dosage forms: extemporaneous compounding: Guidelines / O.I.Tyhonov, L.V.Bondareva, T.H.Yarnyh, N.F.Orlovetska etc .; Ed. O.I.Tyhonova and T.H.Yarnyh. - X .: View of NFaU ; Original, 2003. - 176 pp.

3. Soft medicinal forms: extemporaneous compounding: Guidelines / O.I.Tyhonov, L.V.Bondareva, T.H.Yarnyh, N.F.Orlovetska etc .; Ed. O.I.Tyhonova and T.H.Yarnyh. - X .: View of NFaU ; Original, 2003. - 128 p.

4. Liquid formulations: extemporaneous compounding: Guidelines / O.I.Tyhonov, L.V.Bondareva, T.H.Yarnyh, N.F.Orlovetska etc .; Ed. O.I.Tyhonova and T.H.Yarnyh. - X .: View of NFaU ; Original, 2005. - 160 p.

5. Practicum on pharmacy technology of medicines; for students. Pha. HI. teach. institutions / O. I. Tikhonov, T. G. Yarnykh , V. O. Sobolev, and others; Ed. OI Tikhonova. - X .: View of the NFPA: Golden Pages, 2002. - 256 p.

B) additional literature:

1. Dictionary-Directory for Pharmacy Specialists in Management and Economics, ed. prof. Chernykh V.P. // Kharkiv: Publishing House of the National Academy of Sciences of Ukraine «Golden Stars»- 2001 - 281 pp.

6.3. Orienteering card for self-study with literature on the topic.

№ № PP.	Main tasks	Instructions	Answers (literature)
1	2	3	4
1	HMC Characteristics	Give the HMCdefinitions and their classification. Describe the properties of the HMC, depending on the structure	4, 5
2	Features of technology of HMC solutions	Specify the peculiarities of the technology of solutions of pepsin, gelatin, starch and methyl cellulose.	4, 5
3	Assessment of the quality and storage of solutions of the HMC.	Name the NTD and the quality of the solutions of the HMC.	4, 5

7. Materials for self-control of the quality of preparation

A. Questions for self-control

1. Characterization and classification of macromolecular compounds (HMC), their classification.
2. Use of the HMC in pharmacy.
3. Dependence of dissolution of the HMC on the structure of their molecules.
4. Features of the technology of solutions of pepsin, gelatin, starch and methyl cellulose.
5.Rules for adding drugs to HMC solutions.
6.Assessment of the quality and storage of solutions of the HMC

B. Tests for self-control with benchmark answers.

1. The patient needs to prepare a solution of gelatin. What is the feature of dissolving gelatin?

A. * Gelatin after swelling dissolves in water when heated
B. Gelatin dissolves in suspended water
C. Gelatin dissolves in boiling water
D. Gelatin dissolves in acidified water
E. Gelatine is rubbed with alcohol and dissolved in water when heated

2. The pharmacy has received a recipe, which includes a macromolecular compound. Which of the following substances belongs to a limited swelling group?
A. * Gelatin
B. Ichthyol
C. Tannin
D. Pepsin
E. Liquorice extract

3.Which of the reduced macromolecular compounds is a substance that is limited to swell in hot water and unlimited in cold?
A. * Methylcellulose
B. Gelatin
C. Starch
D. Pepsin
E. Dense extract of belladonna

4.Which of the following macromolecular compounds refers to infinitely swollen:
A. * Extract of belladonna
B. Starch
C. Gelatin
D. Methylcellulose
E. Polyvinylpyrrolidone

5.The doctor prescribed a recipe for preparing a starch solution without determining its concentration. Specify the solution of starch which concentration should be prepared by the pharmacist.
A. * 2%
B. 1%
C. 5%
D. 10%
E. 15%

6.A pharmacy receives the recipe:
Rp .: Mucilaginis Amyli 50.0
Da. Signa.For an enema
What amount of starch and purified water was used by the pharmacist to prepare the drug?

A. * 1.0 starch; 49 ml of purified water
B. 1.0 starch; 50 ml of purified water
C. 2.0 starch; 48 ml of purified water
D. 5,0 starch; 45 ml of purified water
E. 10.0 starch; 40 ml of purified water

7. Laying the solution of the HMC into two layers: the first - a concentrated solution of the HMC , the second - a diluted solution of the same HMC, it is -
A. * coacervation
B. coagulation
C. syneresis
D. fastening
E. vulgaris

C. Tasks for self-control with answers
Situational tasks
1. Pharmacist mixed starch with hot water in a water bath. Prepared solution of strains. Is the medicine properly prepared?
Answer. No. Starch solutions are prepared as follows. 2 parts of starch are mixed with 8 parts of cold water and when stirred add up to 90 parts of boiling water. Mix, warming up to boil. If necessary, you can strain through the gauze.

2. When preparing a solution of tannin, the pharmacist weighed it in the stool, added water purified and filtered. Did he do it right?
Answer. No. A solution of tannin is prepared as follows. In the stand, the tannin is dissolved in warm water. The resulting solution is filtered into the vial for delivery.
3. The pharmacist weighed 5.0 methylcellulose in a flask, filled with purified water and left for 30 minutes to swell, after which heheted. Specify the bugs in the technology.
Answer. Methylcellulose belongs to the HMC, which is swollen in hot water and infinitely cold. Therefore, the correct technology for obtaining methylcellulose solution is as follows. Methylcellulose is filled with water heated to 80-90 ° C in an amount of half of the required volume of the resulting solution. After cooling to room temperature add another cold water, mix and leave in the refrigerator for 10-13 hours until the complete dissolution of methyl cellulose.

8. Materials for classroom self-study:
8.1 List of educational individual practical tasks to be performed during practical classes:
A set of individual tasks

1. Take:	Pepsin 2.0 Hydrochloric acid 5 ml Water purified 200 ml Mix up. Give it mark: By 1-2	2. Take:	Pepsin solution 1% 180 ml Hydrochloric acid 10 ml Mix up. Give it mark: For 1 tablespoon 3-4 times a day during

	st. l 3-4 times a day		meals.
3. Take:	Gelatin solution 2% 100.0 Give it mark: After 1 dessert spoon after 3 hours.	4. Take:	Chloralhydrate 0.2 Broth of starch 50,0 Mix up. Give it mark: 1 enema.
5. Take:	Mucus starch 100.0 Sodium Bromide 2.0 Mix up. Give it mark: On 2 enemies.	6. Take:	Sodium bromide 1.5 Chloralhydrate 1.0 Mucus starch 100.0 Mix up. Give it mark: On 2 enemies.
7. Take:	Pepsin solution 2% 150 ml Hydrochloric acid 5 ml Mix up. Give it mark: For 1 tablespoon 3-4 times a day during meals.	8. Take:	Medical Gelatin 3.0 Syrup Sugar 20 ml Water purified to 100 ml Mix up. Give it mark: 1 dessert spoon 4 times a day.
9. Take:	Medical Gelatin 2.0 Glycerin 10.0 Purified water 5 ml Mix up. Give it mark: For lubrication	10. Take:	Pepsin 2.0 Hydrochloric acid solution 2% 200ml Mix up. Give it mark:1 tablespoon 3 times a day during meals.

9. Instructive materials for mastering professional skills:

9.1. Method of work execution, stages of execution.

Write down and arrange the recipe according to the requirements of the Order of the Ministry of Health of Ukraine No. 360 dated July 19, 2006. Describe the medicinal product. Describe the optimal version of the solution technology of the HMC and protected colloid with the theoretical justification and necessary calculations, give an assessment of its quality. Specify the preparation of the drug for leave. Write the passport of written control.

10. Materials for self-control of mastering the knowledge, skills, skills provided by this work.

1. Name, to which group of HMC (limited or infinitely swollen) include pepsin, gelatin, starch.

Answer. Pepsin - infinitely swells. Starch, gelatin - limited swelling in water at room temperature.

3. Pick up the bet

Medicinal substance	Features of the technology
1. Extract of belladonna 2. Methylcellulose 3. Pepsin temperature 4. Starch	A. Unlimited swells B. Limited swelling at room B. Limited swelling in hot water G. Unlimited swells, dissolves in alkaline water

Answer. 1-A; 2-B; 3-G; 4-B

11. The theme of the next lesson: «Suspensions».

Topic of lesson №12: «Suspensions»-4 hours

1. Actuality of the topic: Many medicinal substances, despite their physicochemical properties, the eyes do not dissolve in water. And other solvents, so they are introduced into the dosage form in a finely divided state. With dispersion of the drug, its free surface increases, which allows increasing the contact of drugs with tissues and body fluids and, as a result, the possibility of interaction between them. The above indicates the relevance of the study of this topic.

2. Objectives of the lesson:

2.1 General objectives

To learn how to prepare suspensions with medicinal substances of different physicochemical properties, to evaluate their quality and arrange them for delivery.

2.2 Educational goals:

Formation of professionally important properties and personality traits of the future pharmacist. Educating students of professional responsibility in the manufacture of medicines.

2.3 Specific objectives:

know:

-Characteristics of suspensions as a dosage form and dispersion system; requirements for them. Cases of the formation of suspensions.

- Factors affecting the stability of heterogeneous systems.
- Dispersion method of preparing suspensions with hydrophilic (swelling and non-swellable) medicinal substances.
- Characteristics of stabilizers and their mechanism of action. Features of the technology of suspensions of hydrophobic substances with sharply and unsharply pronounced properties.

2.4 Based on theoretical knowledge of the topic:

-able to:

- Evaluate prescription accuracy and verify doses of toxic and potent substances.
- Use the SPh, other regulatory documentation and reference books to find the necessary information on the preparation of suspensions.
- Select and justify the optimal suspension technology.
- To carry out the main technological operations for the preparation of suspensions with various medicinal substances and dispersion medium (weigh, disperse, mix, measure).
- Assess the quality of the prepared suspension, clog it and arrange it for release.
- Fill in the passport of the written control.

3. Materials for classroom self-preparation (interdisciplinary integration).

Disciplines	Know	Be able to
1. Prev Latin tongue	The basics grammar. Spelling Latin names of medicinal and chemical substances, medicinal plants, families and raw materials plant and animal origin. Recipe.	Assess the correctness of the recipe design.
Anatomy and physiology human	The structure and functional characteristics of the organism at different levels: molecular, cellular, organ, system.	Assess the functional state of the body as a whole and individual organs and systems
General and in organic chemistry	The main provisions of the atomic-molecular teachings. The processes that take place in aqueous solutions of electrolytes.	Calculate molar and equivalent masses of chemical compounds. To characterize the processes that take place in aqueous solutions of electrolytes.
Physics	Methods of analysis of drugs.	Determine the main indicators of the quality of liquid drugs: refractometry, polarimetry, mass spectrometry, UV, IR spectrophotometry, photocolorimetry.
Physical and colloid chemistry	Characteristics and properties of the high molecular weight compounds.The solubility of the high molecular weight compounds in liquids.	Determine the molar mass, the concentration of the substance solutions.
Organic chemistry	Physical, chemical properties of organic compounds and the main methods of their analysis.	To carry out elemental analysis and identification of organic compounds.
Analytic chemistry	Methods for the qualitative and quantitative analysis of inorganic and organic substances	Perform qualitative and quantitative analysis of individual substances and their mixtures, to carry out the necessary calculations

		according to the analysis.
2. ***The following discipline*** Organization and Economics of Pharmacy	Internal Medicine Technology	Calculate the medicinal, auxiliary substances and purified water
Industrial Medicine Technology	The technological process of preparation of mixtures for internal use.	Technological stages of manufacturing mixtures for internal use
Biopharmacy	Theoretical fundamentals and production processes processing medicinal funds in medicinal drugs, their standardization, storage and release. Trituration, liquid medicinal funds, ointments, etc.	Cooking cosmetic medicinal forms. Make calculations medicinal, auxiliary substances and water purified .
Technology medicinal funds industrial production	Overall technology cosmetic medicinal funds industrial production.	Technological stages making cosmetic medicinal funds industrial production .
Biopharmacy	The technological process of preparing solutions for internal use.	Prepare solutions for internal use, taking into account the physico-chemical properties of the ingredients.
3. *Intra-subject integration* Injection solutions and eye drops	Preparation of solutions by the mass-volume method	Calculate the amount of dry matter and water

4. Subject content:

Suspensions -a liquid dosage form containing, as a dispersed phase, one or more finely ground powdered medicinal substances distributed in a liquid dispersion medium.

Depending on the method of application, suspensions are distinguished for internal, external and parenteral administration. If medicinal substances for internal use are prescribed in the form of suspensions, they are called suspension mixtures. As external means, suspensions are prescribed for lubrication, douching, etc. Less commonly, the suspension is used for injections, mainly intramuscular (not used for intravenous administration).

Factors affecting the stability of suspensions.

Suspensions do not have the ability to diffuse, osmotic pressure, they do not observe spontaneous chaotic movement of particles. A characteristic feature of suspensions is their ability to settle. Therefore, one of the important requirements for suspensions is their stability.

There are aggregative and sedimentation stability of suspensions.

Aggregative stability - it is resistant to the adhesion of particles.

Sedimentation stability - it is resistant to sedimentation of particles without them, only with their size.

During the sedimentation of suspensions, two different cases can be observed: in one case, each particle settles separately, not connecting with each other. Draft occurs more slowly. Such a dispersed system is called aggregatively resistant.

However, it is also possible that a solid suspension particles coagulate under the action of molecular attractive forces and settle in the form of whole flakes. Such systems are called aggregatively unstable.

In general, the deposition rate is found in the Stokes law in the Stokes law: the sedimentation rate is directly proportional to the particle radius of the dispersed phase, the difference in the density of the dispersed phase and the dispersion medium, and is inversely proportional to the viscosity of the dispersion medium.

When applying the Stokes formula it must be borne in mind that the particles of the dispersed phase must be strictly spherical in shape, absolutely hard and smooth; In addition, the Stokes formula does not reflect the phenomena occurring at the interface, depending on whether the substances are hydrophobic or hydrophilic.

Based on the Stokes formula, in order to increase the stability of suspensions, they resort to the following methods:

- to increase the viscosity of the dispersion medium. This is achieved by introducing surfactants, viscous liquids (glycerol, syrups), hydrophilic colloids, starch, and others;

- strive to disperse the solid particles of the dispersed phase as thin as possible. This is achieved by carefully grinding the substance in a mortar, first dry, then in the presence of a small amount of liquid.

The need to increase fluid explained that decreases. The content of the substance to be ground and, in addition, wetting liquids penetrate into small cracks of solid particles, which are formed during the grinding of the substance and exert a wedging pressure. Microcracks expand, and further grinding of the substance occurs. This phenomenon is known as the Rebinder Effect. The higher the wetting energy, the more pronounced the wedging effect and the better the splitting of the substance.

BV Deryagin found that the maximum effect of dispersion in a liquid medium is observed when adding 0.4-0.6 ml of liquid per 1.0 g of solid matter (40-60%).In accordance with this, in the technology of drugs there is the Deryagin rule: for fine grinding of a solid powdered substance, liquid is taken in half the amount of its mass.

Stabilization of suspensions. Aggregative stability of a suspension is acquired when their fractions are coated with solvation shells consisting of molecules of the dispersion medium.Such envelopes prevent the coarsening of particles, being a stabilization factor for dilute suspensions.

In order to increase the stability of suspensions of hydrophobic substances that do not form protective layers of hydrates on their surface, they should be lyophilized, that is, they should add a hydrophilic colloid (stabilizer), thus the Messages-wettability properties.Natural or synthetic high-molecular substances are used as stabilizers: gum, proteins, gelatose, vegetable mucus, natural polysaccharide complexes, methylcellulose, sodium carboxymethylcellulose, polyvinylpyrrolidone, polyglucin, tweens, Spen, bentonites, etc.

The ratio between the solid phase of the suspension and the protective IUD depends on the degree of hydrophobicity of the drug and the properties of the protective substance, hydrophilicate

Methods for the preparation of suspensions.

Suspensions of medicinal substances are prepared in two ways:

- ***dispersive***
- ***condensation***

DISPERSION METHODS

The basis of the dispersion method is the principle of obtaining a certain degree of dispersion by grinding powdered drug substance.

In the preparation of suspensions by the dispersion method, large particles (coarse suspensions) are released, and in the preparation of suspensions by the condensation method, small particles (thin suspensions).

The technology of suspensions should include such technological methods that would ensure the preparation of suspensions with particles, finely dispersed. Suspensions with a drug concentration of 3% or more are prepared by weight.

Preparation of suspensions by the dispersion method. Depending on what substances are included in the suspension (hydrophilic or hydrophobic), the method of dispersion will be different.

Hydrophilic substances include magnesium oxide, zinc oxide, starch, white clay, bismuth basic nitrate, etc.

To hydrophobic - camphor, menthol, thymol, sulfur, phenyl salicylate and other similar substances.

Preparation of suspensions with hydrophilic substances. When prepared in the suspension bath of hydrophilic substances, the solid medicinal substance is first triturated in a mortar in a dry form, and then (according to the Deryagin rule) with half the amount of liquid (by weight of dry matter). The resulting mixture in the form of a slurry (pulp) is diluted with water and poured into a vial for tempering.

For example:

Rp.: Zinci oxydi 10.0
Aquae purificatae 100 ml
Misce. Da. Signa. For lotions

technology:

suspension for external applications, at composition which enters hydrophilic substance – zinc oxide. 10.0 g of zinc oxide is ground in a mortar, first dry, then 4-6 ml of water are added and triturated to ensure maximum dispersion.

Then the remaining amount of water is added in parts and transferred to the vial for tempering, trying to quantitatively transfer the zinc oxide dispersions from the mortar walls.

Label "Exterior" and "Shake before use."

Reception shaking. In order to obtain thinner and more stable suspensions, agitation is used, which is a type of dispersion method. It is used for the preparation of suspensions with hydrophilic substances, characterized by high density.

For example:

Rp.: Bismuthi subnitratis 2.0
Aquae Menthae 200 ml
Misce. Da. Signa. 1 tablespoon 3 times a day

technology:

In this case, 2.0 g of bismuth nitrate basic is thoroughly triturated in a mortar, then 1 ml of mint water is added (according to Deryagin's rule), pounded, 5 - or 10-fold amount of mint water (about 10 ml) is added, stirred and left alone for 2-3 minutes so that the large particles settle, and the thin mixture is poured into the vial for dispensing. The residue is again ground, added 5-10 times the amount of water, stirred, left alone, and then poured into a vial for tempering. This operation is repeated until all the matter has been transferred to a finely divided state. After agitation with water, a marked sedimentation is observed after 2-3 hours. The initial dispersion of the mixture is easily restored by shaking before the former yum.

Preparation of suspensions with hydrophobic substances. Get wait a suspension of hydrophobic substances by simple rubbing with a liquid fails. In such cases, hydrophobic substances are mixed with a hydrophilic colloid to form adsorption casings on the surface of solid particles, providing the suspension with the necessary stability.

For substances ***with mild hydrophobic properties*** (terpinehydrate, phenyl salicylate, sulfanilamide preparations, etc.) Apricot gum, gelatin, 5% methylcellulose or tween-80 are used as stabilizers.

For substances ***with pronounced hydrophobic properties*** (menthol, camphor, etc.) The number of stabilizers is increased by 2 times. The properties of these protective hydrophilic substances appear in the presence of water. For the formation of primary pulp, a quantity of water equal to the half sum of the preparation and the protective substance is required.

For example:

Rp.: Therpini hydrati 2.0
Natrii hydrocarbonis 1.0
Aquae purificatae 100 ml

Misce. Da. Signa. 1 tablespoon 3 times a day

technology:

Mixture suspension with terpinhydrate ohm - a substance with a mild expression their hydrophobic properties. Therefore, suspensions with terpinehydrate are prone to flocculation. This leads to rapid precipitation.

80 ml of distilled water and 20 ml of a 5% solution of sodium bicarbonate are measured with a burette into the stand. In a mortar, rub down 2.0 g of terpinghydrate with 10 drops of alcohol (important substance), then add 1.0 g of gelatos and 1.5 ml of sodium bicarbonate solution.

All carefully ground to obtain a pulp (homogeneous mixture). Then add (in small portions) a solution of sodium bicarbonate, the resulting suspension into the vial for tempering.

When preparing suspensions with hydrophobic substances, a special approach requires the preparation of sulfur suspensions, since it refers to special substances with pronounced hydrophobic properties. Sulfur is adsorbed on the surface of air bubbles and its fractions float to the surface in the form of a foam layer. The use of common substances for the stabilization of sulfur suspensions is not always advisable, since they reduce its pharmacological activity. As a stabilizer for sulfur suspensions for external use, potash or green soap is used per 1.0 g of sulfur, 0.1-0.2 g of soap. Soap is not used if the suspension includes salts of heavy or alkaline-earth metals, since this forms insoluble precipitates. It should also be borne in mind that medical soap is incompatible with acids.

For example:

Rp.: Sulfuris praecipitati 2.0
Glycerini 5.0
Aquae purificatae 100 ml
Mis ce. Da. Signa. Rub into scalp

technology:

Sulfur is ground with a part of glycerin of 0.8-1.2 g. Glycerin has high hydrophilic properties, wets the surface of sulfur particles and promotes their grinding. To the resulting pulp add another glycerin and purified water, rinsing the mixture into a vial for tempering. At least 0.2 g of potash soap is added and the bottle is thoroughly shaken.

Preparation of condensation method suspensions.

In pharmacy practice, widespread use in the preparation of suspension suspensions denational method. In this case, the following cases of the formation of suspensions are distinguished:

- due to chemical interaction;
- due to the replacement of the solvent.

The basis of the condensation method is the combination of molecules into larger particles — aggregates characteristic of suspensions.

Condensation method The preparation of suspensions is based on the preparation of highly dispersed particles of substances of the dispersed phase, which are in the molecular or ionic state. The process of formation of these compounds depends on a number of conditions: on temperature; on the concentration of solutes; from mix order.

In pharmacy conditions, such mixture-suspensions are most often released as a result of the reaction of exchange decomposition, more rarely due to the reaction of hydrolysis, redox and other reactions.

To obtain fine dispersions, it is necessary that the starting materials be in the state of dilute solutions or colloidal systems.

For example:

Rp .: Calcii chloridi 10.0
Natrii hydrocarbonatis 4.0
Aquae purificatae 200 ml
Misce. Da. Signa. 1 tablespoon 3 times a day

technology:

An insoluble substance is formed by mixing solutions of calcium chloride and sodium bicarbonate. As a result of the exchange decomposition, freshly precipitated calcium carbonate is formed.

In order to obtain calcium carbonate in a finely dispersed state, it is necessary to prepare first solutions of calcium chloride and sodium bicarbonate, and then drain them. The result is a thin precipitate of calcium carbonate. It is better to use concentrated solutions of 50% calcium chloride and 5% sodium bicarbonate. Then 100 ml of purified water is measured in a bottle for tempering, 20 ml of 50% calcium chloride solution and 80 ml of 5% sodium bicarbonate solution are added.

QUALITY EVALUATION, STORAGE AND IMPROVEMENT of suspensions

The evaluation of the quality of the suspensions is carried out according to the following parameters: homogeneity of particles of the dispersed phase, time of settling, resuspendiveness , dry residue.

Homogeneity of the particles of the disperse phase. Determined by microscopic bathing. There should not be heterogeneous large particles. The size of the particles should correspond to those specified in the private articles.

Defending time. By the size of the layered layer, when stored, they judge the stability of the suspensions. The lower the height of the layered layer, the greater the stability.

Resuspendiveness . In violation of the stability of the suspensions, they must restore the uniform distribution of particles in all volume after 24 hours of storage during shaking for 15-20 seconds, after three days of storage - within 40-60 seconds.

Dry residue. Determine in order to check the accuracy of the dosage of suspensions. To do this, measure the required amount of suspension, dry and set the mass of dry residue.

Deviation in the content of active substances in 1 g (ml) suspension should not exceed ± 10%.

All suspensions are dispensed in vials of colorless glass so that you can see the results of shuffle, with the additional label "Shake before use". Store suspensions in a cool place.

Now promising is the preparation of "dry suspensions" (in the form of powders or granules), which represent a mixture of medicinal substances with a stabilizer, sometimes with the addition of preservatives. Prepare them in factory conditions. Dry slurries are convenient for transportation, can be stored for a long time.

The main directions of improvement of suspensions include: the search for new stabilizers, preservatives; introduction of instrumental methods for assessing quality; development of means of small mechanization.

6. Materials of methodical provision of classes

6.1. Task for self-checking of the initial level of knowledge-skills

Tests with answers

1. The pharmacist prepared a suspension consisting of 2 grams of streptocide. What amount of methyl cellulose should be used to stabilize the suspension?

A. 2,0
B. 0,5
C. 1.0
D. 5.0
E. 0,2

2. The pharmacist prepares a suspension containing 2.0 phenylsalicylate . Specify the optimal amount of methylcellulose required to stabilize the suspension:

A. 2,0
B. 1.0
C. 3.0
D. 4,0
E. 5.0

3. Suspensions are characterized by the following positive features:

A. * The ability to correct the taste
B. Accurate dosage
C. The impossibility of their release in the form of dry semifinished products (granules)
D. Aggregate resistance
E. Sedimentary stability

4. The instability of the disperse system in the form of suspensions is positively influenced by:

A. * Reduced viscosity of dispersed medium
B. Increased viscosity of dispersed medium
C. Minimum particle dispersion

D. Small magnitude of the difference between the density of the phase and the medium

E. Reduced temperature

5. To hydrophilic medicinal substances include:

A. * Zinc oxide
B. Menthol
C. Terpinhydrate
D. Timol
E. Sulfur

6. To substances with expressed hydrophobic properties include:

A. * Menthol
B. Magnesium oxide
C. Sulfur
D. Terpinhydrate
E. White clay

7. The method of preparation of suspensions depends on the properties of the substance that is part of their composition. Specify substances that have hydrophobic properties:

A. * Terpinhidrat, fenilsalitsylat
B. Sulfur, Bismuth Nitrate Basic
C. Zinc oxide, white clay
D. Terpinhydrate, zinc oxide
E. Phanylsilicylate , talc

8. It is necessary for the patient to prepare a suspension consisting of 2 grams of menthol. What amount of 5% solution of methyl cellulose should be added to stabilize the suspension?

A. * 4.0
B. 0,5
C. 1.0
D. 0,4
E 2.0

9. The pharmacist prepared a suspension with a hydrophobic substance. Specify the disperse system stabilizer:

A. * Twin-80
B. Sodium chloride
C. A solution of hydrochloric acid
D. A solution of sodium hydroxide
E. Esilon

10. When preparing suspensions, the medicinal substance is triturated with a small amount of liquid. Specify its optimal amount according to Deryagin's rule , which is necessary for grinding 20 g zinc oxide.

A. * 10 ml
B. 5 ml
C. 2 ml

D. 1 ml
E. 0.5 ml

11. Sustainability of suspensions increases when substances are added to them, which increase the viscosity of the dispersion medium. Specify the substances that have these properties.
A. * Glycerin
B. Water is purified
C. Ethyl alcohol
D. Dimexid
E. Ether

12. Seed-up stability is directly proportional to:
A. * Viscosity of the dispersion medium
B. Radius of particles
C. The values of acceleration of free fall
D. Differences in the value of the density of the disperse phase and the dispersive medium-high
E. Storage time

13. To obtain a stable dispersion system, the stabilizer needs to be added up to:
A. * Terpinhydrate
B. Ichthyol
C. Protargol
D. Bismuth of basic nitrate
E. Krohmaly

14. By mass, water suspensions are prepared with the concentration of medicinal products:
A. * 3% and more
B. 1% or more
C. Up to 2%
D. 2% or more
E. Up to 5%

15. Completeı: There is no stage in the manufacture of slurries ...
A. * Filtration
B. Shredding
C. Mixing
D. Packings
E. Registration

16. The pharmacist prepared a suspension by a method of scabbing. With which of the listed substances he prepared the drug:
A. Bismuth nitrate is basic
B. Menthol
C. Sulphadimezin
D. Sulfur is precipitated
E. Starch

17. The assistant prepared a slurry by condensation method. Which of the following substances form a sediment:

A. * Calcium chloride with sodium bicarbonate
B. Caffeine: Sodium benzoate from zinc oxide
C. Sodium Bromide with Camphor
D. Potassium bromide with sodium benzoate
E. Magnesium potassium sulfate with iodide

18. The pharmacist has prepared a suspension of sulfur. Specify which stabilizer to use:

A. * Soap medical
B. Lanolin
C. Gelatosis
D. Starch solution
E. The methylcellulose solution

19. The pharmacist prepared a suspension of hydrophobic substance, for which he took an equal amount of 5% solution of methyl cellulose. Specify this substance:

A. * Phyenylsalicylic acid
B. Zinc oxide
C. Timol
D. Talc
E. Sulfur

20. Indicate which basic suspension quality indicator is to be checked in accordance with the requirements of the DF:

A. * Resuspendiveness
B. Transparency
C. Volume
D. Color
E. Thermal stability

6.2 Information needed for knowledge-skills development can be found in the textbooks:

A) Basic

1. Aseptic drug forms, extemporaneous compounding: Guidelines / O.I.Tyhonov, L.V.Bondareva, T.H.Yarnyh, N.F.Orlovetska etc .; Ed. O.I.Tyhonova and T.H.Yarnyh. - X .: View of NFaU ; Original, 2005. - 184 p.
2. Solid dosage forms: extemporaneous compounding: Guidelines / O.I.Tyhonov, L.V.Bondareva, T.H.Yarnyh, N.F.Orlovetska etc .; Ed. O.I.Tyhonova and T.H.Yarnyh. - X .: View of NFaU ; Original, 2003. - 176 pp.
3. Soft medicinal forms: extemporaneous compounding: Guidelines / O.I.Tyhonov, L.V.Bondareva, T.H.Yarnyh, N.F.Orlovetska etc .; Ed. O.I.Tyhonova and T.H.Yarnyh. - X .: View of NFaU ; Original, 2003. - 128 p.

4. Liquid formulations: extemporaneous compounding: Guidelines / O.I.Tyhonov, L.V.Bondareva, T.H.Yarnyh, N.F.Orlovetska etc .; Ed. O.I.Tyhonova and T.H.Yarnyh. - X .: View of NFaU ; Original, 2005. - 160 p.
5. Practicum on pharmacy technology of medicines; for students. Pha. HI. teach. institutions / O. I. Tikhonov, T. G. Yarnykh , V. O. Sobolev, and others; Ed. OI Tikhonova. - X .: View of the NFPA: Golden Pages, 2002. - 256 p.

B) additional literature:

1. Dictionary-Directory for Pharmacy Specialists in Management and Economics, ed. prof. Chernykh V.P. // Kharkiv: Publishing House of the National Academy of Sciences of Ukraine"Golden Stars"- 2001 - 281 pp.

6.3. Orienteering card for self-study with literature on the topic.

№ № PP.	Main tasks	Instructions	Answers (literature)
1	2	3	4
1	Characteristics of suspensions	Give the definition of the suspension. Specify the requirements for suspensions. Describe the factors that affect the stability of the suspensions	4, 5
2	Dispersion method for preparing suspensions	Indicate the main technological steps of preparing suspensions of hydrophilic and hydrophobic substances by the dispersion method.	4, 5

7. Materials for self-control of the quality of preparation

A. Questions for self-control

1. Characteristics of suspensions, both dosage form and disperse system.
2. Requirements for suspensions.
3. Cases of formation of suspensions.
4. Classification of suspensions depending on the composition and method of preparation.
5. Factors influencing the stability of heterogeneous systems.
6. Dispersion method for the preparation of suspensions with hydrophilic and hydrophobic drugs. Accept scalping .
7. The value of the Rebinder effect and the rules of Deryagin in the preparation of suspensions.
9. Assessment of the quality of suspensions, packaging rules, design and storage in accordance with the requirements of the regulatory and technical documentation.
10Condensation method for obtaining suspensions (chemical dispersion, solvent replacement) requirements of normative and technical documentation.

B. Tasks for self-control with answers

1. In order to prepare a suspension, the pharmacist-technologist chose the method of scaling. The hydrophilic substance was disintegrated with the liquid phase according to the Deryagin rule. What amount of water should be taken by the pharmacist for maturation in relation to the mass of matter?
Answer: * 5 - 10 times

2. The pharmacist must prepare 100.0 suspensions containing 5.0 zinc oxide and starch and 2.0 sulfur. What amount of water should be measured for preparation of the medicinal product?
Answer. * 88 ml

3. Sustainability of the suspensions increases with the addition of uro syrup in their composition. Explain why this is happening.
Answer: the viscosity of the dispersion medium is increased

4. A pharmacist has manufactured a medicinal product:
Take: Magnesium oxide 2.0
Sodium bicarbonate solution 1% - 100 ml
Mix up Give it Mark 1 item spoon 3 times a day.
What method should I introduce magnesium oxide? Explain why.
Answer: * First, prepare a suspension of magnesium oxide by grinding, then add 20 ml of sodium bicarbonate in the form of 5% concentrated solution

5 A pharmacist in the bottle for the purpose of measuring the concentrated solutions of calcium chloride and sodium bicarbonate, and then added water. Did he properly prepare a slurry in terms of its dispersion?
Answer: No. To obtain a fine slurry you need to prepare as follows. Measured in a vial for dispensing water and add concentrated solutions of calcium chloride and sodium bicarbonate.

6 The pharmacist weighed camphor, placed it in a mortar, chopped with water, transferred to the bottle for leave, and added tinctures. Did he do it right?
Answer: No. Camphor suspensions need to be stabilized. As a stabilizer it is possible to use sulfate or methylcellulose.
7. A pharmacist for the preparation of a suspension of sulfur used as a stabilizer solution of methyl cellulose. Give a critical assessment of his actions.
Answer: For suspensions of sulfur as a stabilizer you should use a cute medical, or twin-80.

8. Is the pharmacist properly preparing the dosage form, rubbing in the mortar 2.0 terpinhydrate with 5 ml of sodium hydrogen carbonate solution, and then diluted with purified water and transferred to the bottle for release? Critically evaluate its actions.

Answer: No. Suspensions of terpinhydrate need to be stabilized. Suspension technology is as follows. 2.0 terpinhydrate is rubbed in mortar with 1.0 sootose and 1.5 ml of sodium bicarbonate solution. Then, the remainder of the liquid is added.

9 The pharmacist in the mortar tore the zinc oxide with the solution of methylcellulose, diluted with water and drained into the vial for release. Give an assessment of the actions of the pharmacist.
Answer: Zinc oxide is a hydrophilic substance and does not need to be stabilized. Suspensions of zinc oxide can be prepared using a clamping technique.

8. Materials for classroom self-study:
8.1 List of educational individual practical tasks to be performed during practical classes:
A set of individual tasks

1. Take:	Caffeine- sodium benzoate solution 0.5% 90 ml Bismuth nitrate is the main 1.0 Syrup is plain 10 ml Mix up. Give it mark: 1 tablespoon 2 times a day.	2. Take:	Sulfadimezine 2.0 Sodium benzoate 0.5 Glycerin 4.0 Water purified 100 ml Mix up. Give it mark: 1 tablespoon 3 times a day.
3Take:	Sodium benzoate 3.0 Terpinhydrate 2.0 Water purified 150 ml Syrup is plain 5 ml Mix up. Give it mark: 1 tablespoon 4 times a day.	4Take:	Caffeine sodium benzoate 0.5 Camphor 2.0 Sodium bromide solution 1% 150 ml Adoniside 10 ml Mix up. Give it mark: 1 tablespoon 3 times a day
5. Take:	Sodium benzoate Sodium salicylate by 3.0 Water purified 150 ml Fragrant-aniseed drops 5 ml Mix up .Give it mark: 1 tablespoon 3 times a day.	6. Take:	Camphor Sodium bromide by 2.0 Adoniside 10 ml Water purified 200 ml Mix up. Give it mark: 1 tablespoon 4 times a day.
7Take:	Sedes of sedimentation 1.5 Ethyl alcohol 70% 30 ml Glycerin 2.0 Purified water 90 ml Mix up. Give it mark: Wipe face skin.	8Take:	Menthol 0,3 Sodium hydrocarbonate Sodium chloride is 0.5 Water purified 200 ml Mix up. Give it mark: To rinse.
9. Take:	Bismuth nitrate is the main 2.0 Caffeine- sodium benzoate solution 0.5% 100 ml Syrup of sugar 10 ml Mix up. Give it mark: 1 tablespoon 2 times a day.	10. Take:	Extract of belladonna 0,2 Phenylsalicylate 2.0 Water purified 180 ml Mix up. Give it mark: 1 tablespoon 3 times a day.

9.1. Method of work execution, stages of execution.

Write down and arrange the recipe according to the requirements of the Order of the Ministry of Health of Ukraine No. 360 dated July 19, 2006. Describe the medicinal product. Describe the optimal version of the suspension technology with the theoretical justification and necessary calculations, give an assessment of its quality. Specify the preparation of the drug for leave. Write the passport of written control.

10. Materials for self-control of mastering the knowledge, skills, skills provided by this work.

1. Give the classification of liquid dosage forms according to the type of disperse system.

Answer. True solutions, solutions of macromolecular compounds , colloidal solutions, suspensions, emulsions.

2. Name the hydrophobic substances with mildly expressed hydrophobic properties.

Answer. Terpinhidrat, fenilsalitsylat, streptotsid and others.

3. Pick up the bet.

A. Hydrophobic substances B. Hydrophilic Substances	1. Zinc oxide 2. Streptocide 3. Menthol 4. Sulfur is precipitated 5. Bismuth nitrate is basic 6. Phenylsalicylate 7. Clay is white 8. Camphor

Answer. A-2, 3, 4, 6, 8. B - 1, 5, 7.

11. The theme of the next lesson: «Emulsions»

Topic of lesson №13: «Emulsions» - 4 hours

1. Actuality of the topic: Recently, interest in emulsions has increased significantly. Emulsion dosage forms are promising for use in medicine, since they can combine fluids that do not mix, mask an unpleasant taste, regulate the bioavailability of medicinal substances, eliminate the irritant effect of certain medicinal substances, which is the reason for the practical need to study this topic.

2. Objectives of the lesson:
2.1 General objectives
Learn how to prepare oil emulsions for internal use with different ingredients, evaluate their quality and arrange for the dispensing.
2.2 Educational goals:
Formation of professionally important properties and personality traits of the future pharmacist. Educating students of professional responsibility in the manufacture of medicines.
2.3 Specific objectives:
-know:
-Characteristics of emulsions as a dosage form and dispersion system, their classification.
-State Pharmacopoeia requirements for oil emulsions.
-Types of oil emulsions and methods for their determination.
-Characteristics of emulsifiers, their classification and mechanism of action.
-General rules and methods for the preparation of oil emulsions. Calculate the amount of emulsifier, water and oil.
-Stages of the technological process of preparation of emulsions.
2.4. Based on theoretical knowledge on the topic:
-able to:
-Evaluate prescription accuracy and verify doses of toxic and potent substances.
-Use the SPh, other regulatory and reference books to find the necessary information on the preparation of emulsions.
-Select the appropriate emulsifier, depending on the physico-chemical properties of the ingredients included in the recipe.
-Calculate the amount of oil, emulsifier and water for the preparation of emulsions.
-To carry out the main technological operations for the preparation of oil emulsion (weigh, measure, dissolve, heat, mix, emulsify, filter).

3. Materials for classroom self-preparation (interdisciplinary integration).

Disciplines	Know	Be able to
1. Prev Latin tongue	The basics grammar. Spelling Latin names of medicinal and chemical substances, medicinal	Assess the correctness of the recipe design.

	plants, families and raw materials plant and animal origin. Recipe.	
Anatomy and physiology human	The structure and functional characteristics of the organism at different levels: molecular, cellular, organ, system.	Assess the functional state of the body as a whole and individual organs and systems
General and in organic chemistry	The main provisions of the atomic-molecular teachings. The processes that take place in aqueous solutions of electrolytes.	Calculate molar and equivalent masses of chemical compounds. To characterize the processes that take place in aqueous solutions of electrolytes.
Physics	Methods of analysis of drugs.	Determine the main indicators of the quality of liquid drugs: refractometry, polarimetry, mass spectrometry, UV, IR spectrophotometry, photocolorimetry.
Physical and colloid chemistry	Characteristics and properties of the high molecular weight compounds.The solubility of the high molecular weight compounds in liquids.	Determine the molar mass, the concentration of the substance solutions.
Organic chemistry	Physical, chemical properties of organic compounds and the main methods of their analysis.	To carry out elemental analysis and identification of organic compounds.
Analytic chemistry	Methods for the qualitative and quantitative analysis of inorganic and organic substances	Perform qualitative and quantitative analysis of individual substances and their mixtures, to carry out the necessary calculations according to the analysis.
2. ***The following discipline*** Organization and Economics of Pharmacy	General technology of liquid dosage forms for internal use	Calculate the medicinal, auxiliary substances and purified water
Industrial Medicine	Solution technology for	Technological stages of

Technology	internal use	preparation of solutions for internal use
Biopharmacy	Theoretical fundamentals and production processes processing medicinal funds in medicinal drugs, their standardization, storage and release. Trituration, liquid medicinal funds, ointments, etc.	Cooking cosmetic medicinal forms. Make calculations medicinal, auxiliary substances and water purified .
Technology medicinal funds industrial production	Overall technology cosmetic medicinal funds industrial production.	Technological stages making cosmetic medicinal funds industrial production .
Biopharmacy	The technological process of preparing solutions for internal use.	Prepare solutions for internal use, taking into account the physico-chemical properties of the ingredients.
3. *Intra-subject integration* Injection solutions and eye drops	Preparation of solutions by the mass-volume method	Calculate the amount of dry matter and water

4. Subject content:

Emulsions - homogeneous type of dosage form, consisting of mutually insoluble finely dispersed liquids, intended for internal, external or parenteral use.

The particle size (droplets) of the dispersed phase in emulsions ranges from 1 to 50 microns. But more highly dispersed systems can be prepared.

Emulsions as a dosage form have their positive and negative qualities.

<u>Positive qualities include:</u>

- ability to assign in one means liquids do not mix, which is very important for the accuracy of their dosing;
- with the fragmentation of oil increases its free surface, which contributes to higher speeds th the action of medicinal substances dissolved in it, and also accelerates the process of hydrolysis of fats by enzymes of the gastrointestinal tract, leading to a more rapid therapeutic effect;
- in emulsions it is possible to alleviate the irritating effect on the gastric mucosa of certain medicinal substances;
- there is the possibility of masking the unpleasant taste and smell of fatty and essential oils, resins, balms and some medicines, it is easier to receive viscous oils that are poorly dosed;
- emulsions are valuable drugs in pediatric pharmacotherapy.

<u>Negative qualities include:</u>

- low stability, as they quickly collapse under the influence of various factors;
- emulsion is a favorable environment for the development of microorganisms;
- the relative duration of preparation (this requires appropriate technological methods, practical experience)
- the need to use emulsifiers to keep the phase in a dispersed state.

for preparations emulsions use peach, olive, sunflower, castor, vaseline and essential oils but also fishes "bovine fat, balms and others liquids NOT are mixed with water emulsions have be stabilized emulsifiers.

Types of emulsions. Two liquids do not mix, they can form two types of emulsions depending on which of the liquids will be turned into a dispersed phase and a dispersion medium. There are emulsions of the type oil-water (B / B) and water-oil (B / O).

In the I / B emulsions, the dispersion medium is water, and the dispersed phase is fatty or essential oils, balsams and other hydrophobic liquids. In B / O emulsions, oil is the dispersion medium, and water is the dispersed phase.

For internal or parenteral use, emulsions B / B are used, for external use - both B / B and B / O emulsions.

Emulsions of the type M / B are also called direct, or of the first kind (which are washed away with water), and of the type B / O are called reverse, or of the second kind (indelible with water). These types of emulsions differ significantly in their properties and formation conditions.

Emulsions - thermodynamically unstable systems. The task of preparing stable emulsions comes down mainly to finding the most effective emulsifier for this combination of components.

Emulsifiers - it is diphilic surfactants, oriented distributed on the interface of two liquids.

The mechanism of the stabilizing action of emulsifiers is that they, adsorbed on the phase boundary, reduce surface tension and accumulate at the interface, and most importantly, enveloping the droplets of the substance dispersed, form an adsorption film, which has mechanical strength, prevents the formation of large particles, the merging of droplets in a continuous layer (coalescence) and imparts emulsion resistance (it seems to arm the drops of the dispersed phase). School of academic Rebinder experimentally proved that the film formed - the main factor in the stabilization of emulsions.

The type of emulsion formed depends on the solubility of the emulsifier in one phase or another. The dispersion medium becomes the phase in which the emulsifier preferentially dissolves. Thus, to obtain stable emulsions of the M / V type, it is necessary to use hydrophilic emulsifiers - gum, proteins, alkaline soap, mucus, pectins, saponins, some plant extracts, polyoxyethylene glycol, and esters of higher fatty alcohols, acids, Spen (tween-80, OS preparation- 20) and others.

TECHNOLOGY OF EMULSIONS.

Oil emulsions are prepared by grinding an emulsifier with emulsified liquid and water in a mortar. If the emulsifier in the recipe is not specified, then the pharmacists at their discretion, given the purpose of the emulsion, the physico-chemical properties of the ingredients included, select the appropriate emulsifier.

It should be borne in mind that the emulsifier will have a proper emulsifying action only if the emulsifier, water and oil are taken in certain quantities.

In the absence of indication of the oil in the emulsion, use peach, olive or sunflower. In the absence of instructions on the concentration for the preparation of 100.0 g of the emulsion take 10.0 g of oil.

The preparation of oil emulsions consists of two stages:

· Getting the primary emulsion (housing)

· Breeding primary emulsion required amount of water.

Getting the primary emulsion - the most crucial moment of the preparation of the emulsion. If the emulsion does not come out, and after adding water you can see large drops of oil, then you should not correct it, but you need to cook it again.

When preparing the primary emulsion, it is necessary to adhere to certain technological receptions:

1. An emulsifier is first added to the mortar, which is thoroughly ground, and then oil and water are added.

2. The pestle must be rotated in a spiral with vigorous mass rubbing all the time in one direction. When the pestle moves in a viscous medium in one direction, the oil particles are drawn into the threads, which, when torn, allow the droplet to be coated with an emulsifier shell. If the movement of the pestle is done in different directions, then the stretching of the oil in the yarn decreases, and the balls formed in this process collide and coalesce, the process of dispersing becomes difficult. The pestle should be kept so that it collides with the walls of the mortar as much as possible. He must not only rub the emulsified mixture, but also drive air into it.

3. In the preparation of primary emulsions, it should also be borne in mind that very cold oils (at temperatures below 15 ° C) can be emulsified with difficulty. In such cases, the oil is slightly heated.

4. For a better mixing of the ingredients that make up the primary emulsion, it is recommended several times to collect a thick mass from the walls of the mortar and pestle with the celluloid plate in the center of the mortar.After this, gradually with stirring, add the amount of water remaining.

Three methods can be used to obtain the primary emulsion.

Continental (Bodrimont method). An optimum amount of emulsifier is placed in a dry mortar and thoroughly triturated, then the oil is added and the oil is mixed with the emulsifier with a uniform movement of the pestle until a homogeneous mass is obtained, and oleozol is formed. To this mixture, water is added dropwise in an amount equal to half the sum of the mass of oil and emulsifier, and the grinding is continued until a characteristic crackle.

In this case, the mixture takes the form of a creamy mass, and when applying a drop of water, which is lowered along the wall of the mortar, it leaves a white mark, which indicates that the primary emulsion is ready and there is no free oil surface. If the primary emulsion is not ready, then a drop of water deposited on its surface does not spread.

After the end of emulsification, it is advisable to leave the obtained primary emulsion alone for about 5-10 minutes to destroy the reverse type emulsion, it is always formed, and then stirred again. By this method, the emulsion works well only if the mortar and emulsifier are dry. If the emulsifier is wet, the oil will not be able to moisten it.

English way. An optimal amount of emulsifier is placed in the mortar, which is triturated, and then mixed with water until a homogeneous mass is obtained, and hydrosol is formed. An oil is added dropwise to this mixture with thorough stirring. When all the oil has been borrowed, the rest of the water is added to the primary emulsion.

This method is laborious in its execution, however, practice has shown that it gives good results. In this case, the emulsions are of good quality, even if the mortar and emulsifier are not sufficiently dry, which is very important, and especially if you have to work with an emulsifier such as gelatose, which is very hygroscopic and always contains moisture.

Russian way. The optimal amount of emulsifier is placed in the mortar. Water is weighed into a porcelain cup, and oil is weighed onto the surface of the water, the mixture is poured into a mortar and ground to a primary emulsion. This method is quite simple and convenient when the emulsion does not include substances soluble in oil.

The readiness of the body is determined by the appearance - the mixture has the appearance of a creamy mass, and when a drop of water is poured down the mortar wall, it leaves a white mark, which indicates that there is no free oil surface. If the primary emulsion is not ready, then a drop of water deposited on its surface does not spread.

Dilution of the primary emulsion. The finished primary emulsion is diluted with the necessary amount of water to a given mass. When this water is added in several stages with stirring. If it is diluted too quickly with water, the phases of the emulsion may be destroyed or reversed. Therefore, dilution of the primary emulsion is done gradually with stirring. The finished emulsion is filtered, if necessary, through two layers of gauze into a calibrated vial for tempering and adjusted to the desired mass with water.

Properly prepared emulsion is a homogeneous liquid, resembles milk, with a characteristic odor and taste depending on the oil taken.

Calculate the number of components. In determining the mass of oil, water and emulsifier are guided by the following provisions:

· The amount of oil is determined by the words in the recipe;

· Amount of emulsifier - its emulsifying ability;

· Amount water for the formation of the primary emulsion - the solubility of the emulsifier in water.

Therefore, the recipe for obtaining the primary emulsion is different depending on the emulsifier used. For example, if gelatose is used as an emulsifier for the preparation of 100.0 g of emulsion, then 5.0 g of gelatose is taken for 10.0 g of oil, water is half the amount of the amount of oil and emulsifier (10 + 5): 2 = 7.5 ml. Water for dilution of the primary emulsion 100 - (10 + 5 + 7.5) = 77.5 ml

When using other emulsifiers for 10.0 g of oil is taken:

· 2.0 g tween-80 (in 2-3 ml of water);
· 2.0 g of potash soap;
· 10.0 g of dry milk (in solution from 10 ml of water);
· 1.0 g methylcellulose (in the form of a 5% solution - 20 ml)
· 5.0 g of starch (in the form of 10% paste - 50 ml)
· 1.5 g of emulsifier T 2 (15% by weight of the oil).

The solubility of the Twins depends on the length of the polyethylene oxide chains.

For example, in the preparation of an oil emulsion with tween-20 per 10.0 g of oil, an emulsifier is taken of 5.0 g, water is 7.5 ml (half the amount of the amount of oil and emulsifier). The emulsifier in this case is layered on the oil, and then water is added and ground. A primary emulsion is obtained, which is diluted to 100.0 m. In the same way, emulsions are prepared with tween-40 and tween-60.

Nowadays, in pharmaceutical practice, tweens are widely used (as solubilizers) to obtain transparent solutions of oils. Using tween-20, an aqueous solution of mint oil was obtained. Twin-60 dissolves pink and mint oils, twin-80 - pink and lavender.

Emulsions - homogeneous type of dosage form, consisting of mutually insoluble finely dispersed liquids, intended for internal, external or parenteral use.

Emulsifiers - it is diphilic surfactants, oriented distributed on the interface of two liquids.

ADDITION OF MEDICINES TO EMULSION.

The composition of oil emulsions often include various medicinal substances, the introduction of which can have a significant impact on the therapeutic effect of drugs. Therefore, it is necessary to take into account the properties of these substances, their concentration and quantity.

1. If medicinal substances are soluble in water, they are dissolved in a portion of the water intended for diluting the primary emulsion. The solution of these substances is added to the finished emulsion last. It is impossible to introduce them into the primary emulsion, since the destruction of the emulsion can occur due to the action of the electrolyte or a large concentration of the substance, salted out. The use of concentrated solutions is permitted if their volume is 1 / 2-1 / 3 less than the volume of water intended for dilution of the primary emulsion.

For example:

Rp.: Emulsi olei Persicorum 100.0
Coffeini - na trii benzoatis 0,5

Misce. Da. Signa. 1 tablespoon 3 times a day
technology:

Oil emulsion type M/B with a water-soluble substance - caffeine-sodium benzoate.

5.0 g of gelatin is placed in a porcelain mortar and triturated, then 7.5 ml of water is added, mixed, hydrosol is obtained, and then 10.0 g of peach oil is gradually (preferably dropwise) added with careful grinding and emulsification. Masu kilka raziv iz stinok mortar i tovchikika zbirayut target plate. Transform the readiness of the primary emulsions, and then give water, yak rose,: 100 - (7.5 + 5.0 + 10.0) = 77.5 ml

If the coffee-benzoate natriy enters the emulsion, then for you it's about 20-25 ml of water (5 ml of 10% concentrated rosin), and the water is diluted with the first emulsion. After that, add rozchin coffe-benzoate natriy.

PWC

Date	No recipe at
Gelatosae	5.0
Aquae purificatae	85 ml
Olei Persicorum	10.0
Coffeini - natrii benzoatis	0.5
m total = 100.5	

Prepared (signature)
Checked (signed)

Similarly add chloral hydrate, sodium bromine and solutions, syrups, extracts.

2. If the medicinal substances are soluble in oils (camphor, menthol, thymol, as well as fat-soluble vitamins, hormonal and other preparations), they are dissolved in oil until it is introduced into the primary emulsion.In this case, the amount of emulsifier is calculated taking into account the mass of the oil solution.

An exception to this rule is an intestinal antiseptic phenylsalicylate. It is not recommended to dissolve in oil because it is badly hydrolyzed into the intestine , resulting in an oily solution that does not exhibit antiseptic action.

3. If the medicinal substances are not soluble in water and oils, then they are added in the form of fine powders by thorough rubbing with a finished emulsion, if necessary, add the emulsifier in the required amount.

Example:

Rp.:Emulsibe itRicini200.0
Camphorae 1.0
Misce. Da. Signa. On1dining roomspoon3timesinday

Technology:

Oily emulsion of type O / B with soluble in oil with fragrant, volatile substance - camphor.

In a porcelain cup weigh 20,0 g castor oil and dissolve in it 1,0 g of camphor, it is possible to heat (up to 40 ° C) in a water bath. 4.2 g tween-80 is added to the mortar, the camphor oilseed is added, mixed. In drops, add 5 ml of water and emulsify to obtain the primary emulsion. The finished primary emulsion is diluted water (201.0 - (21.0 + 4.2 + 5.0) = 170.8 ml), which is added to several techniques.

Example:

Rp.:Emulsioleos100.0
Phenyliisalicylate
Bismuth subnitta aa - 2.0
Misce.Da. Signa.1 tablespoon 3 times a day

Emulsion type O / B, which includes phenylsalicylate , which has unspeakably expressed hydrophobic properties, and bismuth nitrate is the main - a hydrophilic substance with a high density.

Technology:

In a small porcelain cup weigh 20,0 g of 5% solution of methyl cellulose, transfer to a mortar, add 10,0 g of almond or peach oil in small portions, carefully mix to the readiness of the primary emulsion, and then add 70 ml of purified water in parts.

2.0 g of phenylsalicylate is triturated in a mortar as a crushed substance with 20 drops of ethanol. After evaporation, the alcohol is mixed with 2.0 g of 5% solution of methylcellulose, then 2.0 g of the basic nitrate bismuth is added and to the mixture add approximately 4,0 g of emulsion with stirring, thoroughly rubbing.

The resulting mass is diluted with emulsion and transferred to a bottle for delivery.

Example:

Rp .: Benzylii benzoate 20.0
Sapphire viridis 2.0
Aquae purificatae 78 ml
Misce.Da. Signa.Lubricate skin of hands

Technology:

To prepare this emulsion, 1.0 g of medical soap can be replaced with equal amount of T-2 emulsifier. In a porcelain cup, emulsifier T-2 is molten, poured into a heated mortar, add 1-2 ml of purified water, stir until the formation of the cream-like mass, then add the remaining hot water with dissolved in it 1,0 g of medical soap and mix thoroughly. Then, at constant stirring, 20.0 g of benzyl benzoate are added in portions. Bonding of the emulsion is possible on the fourth day after cooking, which is easily restored when shaking. The emulsion is stable for two months.

In the pharmacy practice of other countries, for example, Bulgaria, the emulsion from benzyl benzoate is prepared by the word: benzyl benzoate 100.0 g, TEA 2.0 g, oleic acid 8.0 g, purified water to 300.0 m

In addition to the preparation of emulsions in the mortar, there are currently offered other ways:

- shaking in special installations;
- stirring with stirrers or turbine units;

- fragmentation using ultrasound or high frequency currents.

ASSESSMENT OF QUALITY, STORAGE AND IMPROVEMENT OF EMULSION

The assessment of the quality of the emulsions is carried out according to the following indicators: homogeneity of particles of the dispersed phase, time of flaking, thermal resistance, viscosity.

Homogeneity of the particles of the disperse phase. The size of the particles determined by microscopy should not exceed the rates specified in the private articles.

Time of flutter. The layers of emulsions are determined using a centrifuge. Emulsion is considered stable, if you do not observe the stratification of the system in a centrifuge with a speed of 1,5 thousand / min.

*Thermal stability of emulsions.*The emulsion is considered to be stable if it maintains a heating temperature of 50 ° C without stratification.

*Viscosity*in emulsions are determined by pharmacopoeial techniques using special devices - viscometers, etc.

When storing emulsions, their homogeneity as a result of defending may be affected. When defending the particles of the dispersed phase do not merge, but are collected in the upper layers, since the particles of oil dispersed, although coated with the adsorption shell of the emulsifier, but due to the fact that they are lighter than water, expose to the surface. This emulsion is easy to restore by vigorous shaking. Therefore, the emulsion, which is defending, is subject to the release, because defending - the process is reversible.

It is necessary to be able to distinguish between the process of defending the emulsion from the irreversible flutter process, which consists of slowly and gradually lowering the dispersion of the oil phase, if it is an O / B type emulsion, and an aqueous phase if it is an E / O type emulsion. When splitting first, the balloons of oil come to the surface, then begin to stick together (coalescence) into a solid mass, the liquids lay out, and such an emulsion can not be restored. Lamination is faster, the less rugged surface protective shell of balls (particles) of oil.

In accordance with this, the main trends in the improvement of pharmaceutical emulsions are increased physical stability and the prolongation of the action of medicinal substances included in their composition. The most promising ways of extending the action of the medical substances included in the emulsions are the development of medicinal preparations based on multiple emulsions, as well as the modification of the physical and chemical properties of the dispersion medium by the introduction of hydrophilic solvents, solubilizers , etc.

In order to increase the stability of emulsions, it is expedient to use a complex of synthetic nonionic surfactants (emulsifiers O / V and B / O) that have a pronounced stabilizing effect. Equally important role in the stabilization of emulsions belongs to rational technology, which includes not only certain temperature regimes and the order of mixing of components, but also the use of modern equipment.

Therefore, the promising direction of development of emulsions is the introduction of means of small mechanization (dispersants, homogenizers, etc.); expansion of the range of stabilizers; introduction of instrumental quality assessment methods.

6. Materials of methodical provision of classes

6.1. Task for self-checking of the initial level of knowledge-skills

Tests with answers

1. In the absence of a designation of oil in an emulsion, according to the instructions of the DF, the following are used:

A. * Peach
B. Ritsinov
C. Vaseline
D. Mitya
E. Balsam

2.What number oils and emulsifier(desires) necessary to take, in order to prepare150 ml oil emulsion?

A. * 15.0 and 7.5
B. 10.0 and 15.0
C. 7.5 and 10.0
D. 10.0 and 5.0
E. 1,5 and 0,75

3. According to the order of the Ministry of Health of Ukraine No. 197 dated September 7, oil emulsions are prepared:

A. By weight
B. Mass-volume method
C. By volume
D. With medicinal substances up to 3% - by mass-volume method, more than 3% by weight
E. With medicinal substances up to 5% - mass-volume method, more than 5% - by weight

4. The pharmacist has prepared 150.0 emulsions. Specify the amount of oil he took if the doctor did not specify in the recipe.

A. * 15.0
B. 10.0
C. 30.0
D. 5.0
E. 20.0

5. The recipe contains 100.0 oil emulsion. Specify the amount of oil, desiccant, and purified water required for the manufacture of the primary emulsion by the continental method:

A. * 10.0; 5,0; 7.5 ml
B. 20.0; 10.0; 30 ml
C. 5.0; 10.0; 7.5 ml
D. 10.0; 5,0; 1.5 ml
E. 5.0; 5,0; 5 ml

6. The pharmacist prepared an emulsion of type o / v. Specify what determines the type of emulsion:

A. * The nature of the emulsifier
B. Number of oils
C. Amount of water
D. Nature of medicinal substances
E. Method of administration of medicinal substances

7. A pharmacist prepares a 200.0 oil emulsion. Specify the scales that need to be used to weigh 20.0 peach oil:

A. Scales technical kilograms
B. Torsion balance
C. Scales manual twenty - gram
D. Scales manual stogram
E. Scales manually one - gram

8. A recipe came to the pharmacy:
Rp .: Emulsi oleos 100.0
Menthol 2.0
Misce. Da. Signa. 1 item l 3 times a day
As an emulsifier a pharmacist used desirable. How much of the purified water should be measured to prepare the primary emulsion?

A. 9 ml
B. 5 ml
C. 7.5 ml
D. 10 ml
E. 12 ml

9. The pharmacist prepared the primary emulsion and added to it a remnant of water to 100,0 - on a surface of an emulsion appeared greasy spots. What are his further actions?

A. Emulsion need to be re-prepared
B. Within 15 min. mix with a homogenizer type MR-302 and let go of the patient

C. Pour part of the emulsion, add 2 ml of potassium soap, shake and combine with the remainder of the emulsion

D.Add to the emulsion 20 ml of a 5% solution of methyl cellulose and shake

E. Paste the label "Before use shake" and release

10. The patient should prepare 100.0 emulsions containing 2.0 camphor. Specify the amount of desaturation required to prepare the emulsion:

A. 6,0 g

B. 12.0 g

C. 5.0 g

D. 1.0 g

E. 0 g

11. Identify a rational way of introducing into the emulsion of menthol:

A. * Dissolve in oil

B. Disperse with the addition of a finished emulsion

C. Dissolve in water intended to dilute the primary emulsion

D. Dissolve in the final emulsion when heated

E. Enter into the finished primary emulsion

12. The pharmacist prepared an emulsion of zinc oxide. Specify a rational way of administering the substance:

A. * Introduction to the type of suspension in the prepared emulsion

B. Solubility in oil

C. Shredding with water for dilution of the primary emulsion

D. Dissolution in water for the preparation of a primary emulsion

E. Dissolution in the ready emulsion

13.The doctor prescribed emulsion of olive oil, which includes anesthetic. Specify the anesthetic administration feature:

A. * Dissolve anesthezin in oil before cooking the emulsion

B. Dissolve anesthezine in a finished emulsion

C. Dissolve anestezin in purified water

D. Dissolve anestezin in the primary emulsion

E. Dissolve in alcohol and add to the primary emulsion

14. According to the prescription of a doctor in the pharmacy, it is necessary to prepare an emulsion, which includes phenylsalicylate . How does a pharmacist need to administer a drug in an emulsion so that the drug does not lose pharmacological effect?

A. * To grind under the rule of Deryagin with a finished emulsion

B. Rub with emulsifier and oil

C. Dissolve with finished emulsion

D. Dissolve in water for dilution of the emulsion

E. Dissolve in oil

15. The pharmacist has prepared oil emulsion. How does he need to enter a menthol?

A.*Dissolve in oil at 40-50 ° C
B. Mix with the emulsifier and add purified water
C. Add to the finished emulsion
D. Enter the type of suspension into the prepared emulsion
E. Dissolve at 40-50 ° C in purified water

16. Emulsions, like heterogeneous disperse systems, can be stratified by various factors. Which of the following factors leads to the coalescence of emulsions most quickly?

A. * Adding strong electrolytes
B. Adding an excess of emulsifier
C. Adding fragrant waters
D. Breeding with water
E. Insignificant temperature increase

17. The pharmacist has prepared emulsion. How to enter water-soluble substances?

A.*Dissolve in the part of purified water intended for dilution of the emulsion
B. Dissolve in purified water, intended for the preparation of the primary emulsion
C. Put into an oil phase
D. Enter in the primary emulsion
E. Add to the finished emulsion

18. The pharmacist has prepared emulsion. How did he introduce water soluble substances?

A. Dissolve in the part of water for dilution of the emulsion
B. Added to the finished emulsion
C. Introduced into the oil phase
D. Introduced in the primary emulsion
E. Dissolved in water to prepare a primary emulsion

19. The pharmacist prepares the oil emulsion. Indicate the optimal method for introducing camphor to the drug:

A. * Dissolve in oil
B. Dissolve in alcohol
C. Dissolve in water
D. Dissolve on air
E. Dissolve in glycerol

20. The composition of the emulsion is injected zhelatozu. Describe the role played zhelatoza in emulsions.

A. * Emulsifier

B. Preservative
C. Solvent
D. The taste flavor
E. Antioxidant

6.2The information you need to build knowledge-skills can be found in the textbooks:

A) Basic

1. Aseptic drug forms, extemporaneous compounding: Guidelines / O.I.Tyhonov, L.V.Bondareva, T.H.Yarnyh, N.F.Orlovetska etc .; Ed. O.I.Tyhonova and T.H.Yarnyh. - X .: View of NFaU ; Original, 2005. - 184 p.
2. Solid dosage forms: extemporaneous compounding: Guidelines / O.I.Tyhonov, L.V.Bondareva, T.H.Yarnyh, N.F.Orlovetska etc .; Ed. O.I.Tyhonova and T.H.Yarnyh. - X .: View of NFaU ; Original, 2003. - 176 pp.
3. Soft medicinal forms: extemporaneous compounding: Guidelines / O.I.Tyhonov, L.V.Bondareva, T.H.Yarnyh, N.F.Orlovetska etc .; Ed. O.I.Tyhonova and T.H.Yarnyh. - X .: View of NFaU ; Original, 2003. - 128 p.
4. Liquid formulations: extemporaneous compounding: Guidelines / O.I.Tyhonov, L.V.Bondareva, T.H.Yarnyh, N.F.Orlovetska etc .; Ed. O.I.Tyhonova and T.H.Yarnyh. - X .: View of NFaU ; Original, 2005. - 160 p.
5. Practicum on pharmacy technology of medicines; for students. Pha. HI. teach. institutions / O. I. Tikhonov, T. G. Yarnykh , V. O. Sobolev, and others; Ed. OI Tikhonova. - X .: View of the NFPA: Golden Pages, 2002. - 256 p.

B) additional literature:

1. Dictionary-Directory for Pharmacy Specialists in Management and Economics, ed. prof. Chernykh V.P. // Kharkiv: Publishing House of the National Academy of Sciences of Ukraine"Golden Stars"- 2001 - 281 pp.

6.3.Orienteering card for independent work with literature on the topic of study.

№№ PP.	Main tasks	Instructions	Answers (literature)
1	2	3	4
1	Characteristics of emulsions	Give the definition of the emulsion. Describe the emulsifiers.	4, 5
2	Technology of cooking oil emulsions	Specify the main technological steps of cooking emulsions using different methods.	4, 5

7. Materials for self-control of the quality of preparation

A. Questions for self-control

1. Characteristics of emulsions as a pharmaceutical form and disperse system, their classification.
2. SPh requirements for emulsions.
3. Types of oil emulsions and methods of their determination.
4. Characteristics of emulsifiers, IKi is used when cookingbath emulsions, their classification and mechanism of action.

B. Tests for self-control with benchmark answers.

1. A pharmacist prepared an emulsion of bismuth with basic nitrate. Specify which liquid he used to grind it:

A. * Ready emulsion
B. Oil
C. Water purified
D. Ethyl alcohol
E. Vaseline oil

2. The pharmacist prepared 100.0 g of the oil emulsion, using as an emulsifier a 5% solution of methylcellulose. Specify the amount of oil and emulsifier required to prepare the preparation:

A. * 10.0 g, 20.0 g
B. 20.0 g, 30.0 g
C. 10.0 g, 10.0 g
D. 10.0 g, 30.0 g
E. 20.0 g, 10.0 g

3. The doctor prescribed 300 grams of fish oil emulsion. How much fish oil should be weighed down by the pharmacist to prepare such an emulsion?

A. * 30.0 g
B. 60.0 g
C. 15.0 g
D. 3.0 g
E. 0.3 g

4. The pharmacist has prepared 100.0 grams of oil emulsion. Specify the required amount of twin-80.

A. *2,0
B. 4,0
C. 6.0
D. 10.0
E. 1.0

C. Tasks for self-control with answers

1. To prepare an oil emulsion, the pharmacist took castor oil, although the name of the oil was not specified in the prescription. Did he do it right?

Answer: No. If the oil is not listed in the recipe use peach oil.

2.When preparing the oil emulsion, the phenyl salicylate was dissolved in the oil. Evaluate the correctness of the pharmacist's actions.
Answer: Phenyl salicylate in the form of an oil solution does not exert a therapeutic effect. It should be administered as a suspension.

8. Materials for classroom self-study:

8.1 List of educational individual practical tasks to be performed during practical classes:
A set of individual tasks

1Take:	Emulsion oil 120,0 Bismuth nitrate is the main 2.0 Mix up. Give it mark: 1 tablespoon 3 times a day.	2Take:	Anesthetic 0.6 Sodium Bromide 2.0 Caffeine sodium benzoate 1.0 Fish oil 15.0 Mucus starch 150.0 Mix up. Give it mark: On 2 enemies.
3Take:	Extract of belladonna 0,1 Oil emulsions 150, 0 Sodium Bromide 1.0 Mix up. Give it mark: 1 tablespoon 3 times a day.	4Take:	Extract of belladonna dry 0,2 Emulsion oil 180,0 Camphor Phenylsalicylate by 2.0 Mix up. Give it mark: 1 tablespoon 3 times a day.
5. Take:	Sunflower oil emulsion 150,0 Camphor 2.0 Water mint 15 ml Mix up. Give it mark: 1 tablespoon 3 times a day.	6. Take:	Emulsion oil 100,0 Benzoic acid 0.15 Dill oil 7 drops Mix up. Give it mark: 1 teaspoon 3 times a day.
7Take:	Sunflower oil 15,0 Mucus starch 150.0 Sodium bromide 1.5 Extract of belladonna 0,2 Mix up. Give it mark: 1 tablespoon 3 times a day.	8Take:	Extract of belladonna 0,2 Camphor 1.5 Oil Emulsion 200.0 Mix up. Give it mark: 1 tablespoon 3 times a day.
9. Take:	Emulsion oil 100,0 Sodium bromide 1.5 Anesthetic 1.0 Mix up. Give it mark: 1 item lodges 3 times a day.	10. Take:	Resorcinol 1.0 Acid salicylic 2,0 Castor oil 10,0 Waters purified to 120 ml Mix up. Give it mark: Rub in the scalp.

9. Instructive materials for mastering professional skills, skills:
9.1. Method of work execution, stages of execution.

Write down and arrange the recipe according to the requirements of the Order of the Ministry of Health of Ukraine No. 360 dated July 19, 2006. Describe the medicinal product. Describe the optimal version of the emulsion technology with the theoretical justification and necessary calculations, using the most rational method of obtaining a feather emulsion. Give a rating of quality. Specify the preparation of the drug for leave. Write the passport of written control.

10. Materials for self-control of mastering the knowledge, skills, skills provided by this work.

Calculate the amount of oil, emulsifier (desulfurizer) and water for emulsion preparation with the following words:

Rp .: Emulsi You are Helianthi 150.0
Camphorae 3.0
Misce. Da. Signa. 1 item l 3 times a day.

Answer:

Number of oils:
10 - 100.0
X - 150,0; x = 15.0
Number of wishes :
5.0 - 10.0
X - 18,0 (15,0 oils + 3,0 camphor); x = 9.0
Number of water for the primary emulsion:
(18.0 + 9.0) / 2 = 13.5 ml
Amount of water for dilution of the primary emulsion
150.0 - (15.0 + 9.0 + 13.5) = 112.5 ml

11. The theme of the next lesson.

Infusions and fats from medicinal herbs.

Topic of lesson №14: «Infusions and fats from medicinal herbs» - 2 hours

1. Actuality of the topic: In recent years there has been an increased interest in herbal medicine. Water extracts from medicinal plant materials (MPM) have a high bioavailability, compared with individual medicinal substances, they have a milder effect on the body, with almost no side effects.

Now there can be no universal technology of water extraction from herbal raw materials containing various groups of active substances. For each raw material there should be an individual rational technology, with the help of which removal is possible. maximum active ingredients.

Proper preparation of water extracts is possible only with the necessary knowledge, indicates the need to study this topic.

2. Objectives of the lesson:

2.1 General objectives

Learn to prepare infusions and decoctions of medicinal plant materials, add to them medicinal substances, evaluate their quality and arrange for the holiday.

2.2 Educational goals:

Formation of professionally important properties and personality traits of the future pharmacist. Educating students of professional responsibility in the manufacture of medicines.

2.3 Specific objectives:

-know:

- Ways of prescribing infusions and decoctions.
- Theoretical bases of the extraction process from herbal raw materials.
- Factors affecting the extraction process (the ratio between the amount of raw materials and extractant, standardity, histological structure and degree of fragmentation of raw materials, infunirka material, temperature, duration of infusion and cooling, pH, chemical composition, etc.).
- Rules for the preparation of infusions and decoctions of vegetable raw materials and the addition of medicinal substances to them according to the requirements of the State Pharmacopoeia.
- Apparatus used for making infusions and decoctions. Features of the preparation of aqueous extracts from herbal raw materials containing alkaloids, cardioglycosides, essential oils, tannins, anthracenepohidni, saponins, etc.
- Special cases of preparing infusions and decoctions ("double" infusions, decoctions of senna leaves, etc.). Author's recipe of water extracts (Dryagin's mixture, Quater, Ravkin, etc.).
- Quality assessment, storage of water extracts, capping and their release in accordance with the requirements of the State Pharmacopoeia and other regulatory documents.

2.4 Based on theoretical knowledge of the topic:

-able to:

- Evaluate prescription accuracy and verify doses of toxic and potent substances.

- Use the SPH, other regulatory and reference books to find the necessary information on the preparation of infusions and decoctions of medicinal plant materials.
- Calculate the amount of medicinal plant materials and water for the preparation of infusions and decoctions.
- Select and justify the optimal technology of the drug according to individual formulations, taking into account the nature of the active and associated substances.
- To carry out the main technological operations for the preparation of infusions and decoctions (chop, sift, weigh, measure, extract, cool, strain, bring to volume).
- To use means of small-scale mechanization in the process of preparing water extracts (inflatable apparatus with electric heating, etc.).
- Introduce medicinal substances with different physicochemical properties into the composition of aqueous extracts.
- Assess the quality of the prepared water extracts, clog and arrange them for vacation.
- Write a passport to the written control.

3. Materials for classroom self-preparation (interdisciplinary integration).

Disciplines	Know	Be able to
1. Prev Latin tongue	The basics grammar. Spelling Latin names of medicinal and chemical substances, medicinal plants, families and raw materials plant and animal origin. Recipe.	Assess the correctness of the recipe design.
Anatomy and physiology human	The structure and functional characteristics of the organism at different levels: molecular, cellular, organ, system.	Assess the functional state of the body as a whole and individual organs and systems
General and in organic chemistry	The main provisions of the atomic-molecular teachings. The processes that take place in aqueous solutions of electrolytes.	Calculate molar and equivalent masses of chemical compounds. To characterize the processes that take place in aqueous solutions of electrolytes.
Physics	Methods of analysis of drugs.	Determine the main indicators of the quality of liquid drugs: refractometry, polarimetry, mass spectrometry, UV, IR spectrophotometry,

		photocolorimetry.
Physical and colloid chemistry	Characteristics and properties of the high molecular weight compounds.The solubility of the high molecular weight compounds in liquids.	Determine the molar mass, the concentration of the substance solutions.
Organic chemistry	Physical, chemical properties of organic compounds and the main methods of their analysis.	To carry out elemental analysis and identification of organic compounds.
Analytic chemistry	Methods for the qualitative and quantitative analysis of inorganic and organic substances	Perform qualitative and quantitative analysis of individual substances and their mixtures, to carry out the necessary calculations according to the analysis.
2. ***The following discipline*** Organization and Economics of Pharmacy	General technology of liquid dosage forms for internal use	Calculate the medicinal, auxiliary substances and purified water
Industrial Medicine Technology	Internal Medicine Technology	Technological stages of manufacturing mixtures for internal use
Biopharmacy	Theoretical fundamentals and production processes processing medicinal funds in medicinal drugs, their standardization, storage and release. Trituration, liquid medicinal funds, ointments, etc.	Prepare potions for internal use, taking into account the physico-chemical properties of the ingredients.
Technology medicinal funds industrial production	Overall technology cosmetic medicinal funds industrial production.	Technological stages making cosmetic medicinal funds industrial production .
Biopharmacy	The technological process of preparation of mixtures for internal use.	Prepare solutions for internal use, taking into account the physico-chemical properties of the ingredients.

3. *Intra-subject integration* Injection solutions and eye drops	Preparation of mixtures	Calculate the amount of drugs and auxiliaries

4. Subject content:

Infusions and decoctions - liquid dosage forms, are water extracts from medicinal plant materials, as well as aqueous solutions of dry or liquid extracts (concentrates).

The process of extracting active ingredients from raw materials is very complex and consists of the stages of swelling, the formation of primary juice inside the cells and mass transfer.

Factors affecting the completeness and speed of extraction of active substances. The dynamics of the extraction process, and consequently, the quality of the infusions and decoctions are influenced by the following factors:

- the ratio of the amount of raw materials and extractant;
- standard of raw materials;
- histological structure of raw materials;
- the degree of grinding of raw materials;
- material used equipment;
- temperature and time of infusion;
- influence of enzymes and microflora;
- chemical composition of active ingredients;
- pH of the medium.

The ratio of raw materials and extractant. Infusions and decoctions in recipes can be prescribed in various ways:

1. Indicate the amount of the original plant materials and the volume of water extraction.

For example:

Rp.: Infusi herbae Hyperici ex 10,0 - 200 ml
Da. Signa. For rinsing the mouth

According to this recipe, it is necessary to prepare 200 volume parts of the infusion from 10 weight parts of the herb St. John's wort.

2. Only the extraction volume is indicated. The doctor in this case provides the pharmacist to solve the problem of the amount of plant raw materials according to the instructions of the DF.

If the amount of medicinal plant materials in the general list in the recipe ***not indicated*** infusions and decoctions are prepared in the ratio **(1:10).**

For example:

Rp.: Infusi hebray Lenuri 200 ml
Da. Signa. 1 tablespoon 3 times a day

In this case, it is necessary to prepare 200 parts by volume of infusion from 20 parts by weight of the grass of motherwort.

R **to shake off** **1:30:**

- Infusion of adonis herb,
- Infusion of rhizomes with valerian roots
- water extracts of the uterine horns,
- Lily of the valley herbs
- root of the stream,
- senega,
- cyanosis,
- Mylnyanki,
- sea onion tubers.

Extracts from medicinal plant materials containing **potent substances** (Thermopsis herbs, foxglove leaves, etc.), Prepare **according to the recipe doctor,** and in the absence of instructions on the amount of raw materials **- in the ratio of 1: 400** and mainly from extracts, concentrates.

It must be borne in mind that after extraction, some of the liquid is always contained (absorbed) by the plant material, therefore, the finished extraction is less than what was taken of the water. By pressing the raw material, these losses can be somewhat reduced, however, you cannot completely get rid of them. In this regard, for the preparation of water extraction, it is advisable to take the water a little more than required by the recipe of the finished lift.

Water absorption coefficient (ac) indicates the amount of liquid contained 1.0 g of plant materials of the standard degree of grinding after it is pressed.

For the most commonly used types of raw materials **April are given in the order of the Ministry of Health of Ukraine No. 197 dated 07.09.93. (Appendix 3).** If April is not specified, it is recommended to use generally accepted coefficients:

for roots - 1.5;

bark, flowers and herbs - 2.0;

seeds - 3.0.

Thus, the amount of water needed to prepare the infusion or decoction is determined by summing the extraction volume indicated in the recipe and the additional amount of water, which is calculated by multiplying the mass of the raw material by the water absorption coefficient.

For example, to obtain 200 ml of infusion from the grass of the motherwort water should be taken 200 + (20,0 • 2) = 240 ml

However, when preparing extracts taking into account the water absorption coefficient, the extraction volume still turns out to be somewhat less, so the filtered extraction after pressing the raw material is added with water for the same raw material to the volume prescribed in the recipe.

Standard raw materials. The composition and concentration of aqueous extracts, the strength and nature of their effects on the body depends on the feedstock and, in particular, on at city in n the active ingredients. Standard is called raw materials ***meets requirements NTD*** Medicinal raw materials should come in ***pharmacies labeled*** packing content in the active ingredients (%) or her biological activity in units of action (UA).

For water extraction ***only standard raw materials can be used or with a high content of active ingredients and increased biological activity.***

It is unacceptable to use raw materials containing less active substances than that provided by the regulatory and technical documentation, as this results in aqueous extracts with a higher content of associated substances that are cloudy and less stable during storage.

Histological structure of raw materials. The rate of extraction largely depends on the structure of the cell membranes, which are a significant obstacle to the passage of the extractant and, moreover, to a greater degree than they are thicker and denser. If the cell wall is very dense, the cellular tissue is not sufficiently loose, and there are few intercellular passages and channels, then extraction proceeds more slowly.

In the preparation of aqueous extracts, the choice of the method of extraction of plant material, as a rule, is determined by its histological structure. With loose raw materials (flowers, leaves, herbs), usually infusions are prepared, from dense (bark, roots, rhizomes) - decoctions. Exception: roots with rhizome of valerian (prepare infusion), bearberry leaves, senna, lingonberries (prepare decoctions).

The degree of grinding of plant material. To obtain water extraction plant materials are used in dried, crushed and sifted form.

Temperature and duration of the extraction process (kinetics extraction). The extraction mode, that is, the temperature conditions of extraction and the duration of the contact of the plant material with the extractant, has a strong influence on the qualitative and quantitative composition of the extract.

According to the requirements of the DF ***infusions are heated in a boiling water bath for 15 decoctions - 30 minutes*** Upon expiration of the indicated withdrawal terms ***cool*** at room temperature: ***infusions - for 45, decoctions - 10 minutes***

When preparing water extracts from medicinal plant materials with a volume of 1000-3000 ml when heated in a water bath for infusions increases to 25 for decoctions - 40 minutes cooling time remains the same (45 and 10 minutes respectively).

In the case of instructions in the recipe "Cito" (if necessary, to quickly prepare the aqueous extract) infusions do for 25 minutes, followed by artificial cooling.

Cooking Water Vitya Jock is performed using and nfundirnyh (infundirno-sterilization) devices, which put 1-3 infunirki depending on the design.

For the preparation of infusions and decoctions according to the rules of DF, the crushed vegetable raw materials are placed in pre-warmed porcelain infunders, filled with a calculated amount of cold water (room temperature), covered with a lid and heated in a boiling water bath (infusions for 15 decoctions - 30 minutes) with periodic stirring. After the time specified above, the infunisher is removed from the water bath and cooled at room temperature (infusions - 45, decoctions - 10 minutes), then filtered into a measuring cylinder through a double layer of gauze and a cotton swab at the mouth of the funnel, wring out the rest of the plant material and add water (through the same plant material) to the specified exhaust volume.

Features of technology infusions of raw materials containing alkaloids.

In the preparation of infusions and decoctions of raw materials containing alkaloids (thermopsis grass, belladonna leaves, lamb moss grass, ipecac root, etc.) the alkaloids are extracted water ***acidified hydrochloric acid at a concentration of 0.83%.***

Usually alkaloids are found in plants as bases, tanat or salts of organic acids, which are difficult to dissolve in water. The processing of raw materials specified acid is needed for transfer of alkaloids to soluble salts, ensures their maximum transfer to exhaust hood

Acids take on mass as much as alkaloids are contained in a given amount of vegetable raw materials in terms of hydrogen chloride.

Features technology infusions of raw materials containing cardiac glycosides.

From raw materials containing cardiac glycosides (foxglove leaves, adonis grass, sea onion tubers, etc.), make infusions.

Features of the technology of this group of infusions:

- The pH of the medium should be neutral, since in acidic and alkaline media, cardiac glycosides are broken down to genin;
- compliance with the established step of grinding plant raw materials;
- strict observance of the temperature and time regimes of infusion in a boiling water bath for more than 15 minutes and the duration of cooling for at least 45 minutes.

Features of the technology of water extracts from plant materials containing essential oils.

From raw materials containing essential oils (rhizome with valerian roots, mint leaves, thyme herbs, oregano, chamomile flowers, etc.), mainly infusions are prepared, since the essential oils are volatile, especially when heated. The extraction process is carried out in infunky, tightly closed lids. Filter out only after complete cooling of the infusion.

Features of the technology of decoctions of raw materials, containing antraglycosides.

From raw materials containing antraglycosides (rhubarb roots, buckthorn bark, senna leaves, buckthorn berries, etc.) are usually prepared ***decoctions.*** Prolonged heating for more than 30 minutes in a water bath can lead to the decomposition of oxime. and lantrahinoniv. Broths from the rhizomes of rhubarb and buckthorn bark are filtered immediately after removing the infunirka from the water bath, since cooling even for 10 minutes can lead to a decrease in at city in the extraction of hydroxymethanthraquinone.

Features of technology of water extraction from raw materials containing saponins.

From raw materials containing saponins (root of the spring, senega, rhizome and root of cyanosis, licorice root, etc.), always decoctions are made. Saponins are extracted in an alkaline medium, more often in the presence of sodium bicarbonate, which is added at the rate of 1.0 g per 10.0 g of raw material, but only if it is prescribed in the recipe.

Features of technology of water extracts from raw materials containing tannins.

From raw materials containing tannins (oak bark, rhizome of the coil, rovatka rhizome, blueberries, bearberry letter, lingonberry leaves, etc.), always decoctions are prepared, not infusions, due to the density of the raw materials used.

Broths from this group of raw materials are filtered through the removal of the others from the water bath, since tannins are well soluble in hot water, and when cooled, they fall out in the form of flocculent sludge.

The introduction of medicinal substances in aqueous extracts.

Medicinal substances soluble in water are added only in the form of powders in absolutely ready, filtered and cooled aqueous extracts, after which the resulting solutions are again filtered.

Tinctures, liquid extracts, syrups are added to mixtures containing aqueous extracts, as a last resort, usually directly into the vial for tempering.

Insoluble substances are injected with a suspension or emulsion suspension. Some water extracts, for example, mucus, infusions, as well as decoctions containing saponins, have pronounced emulsifying and properties.

To ***special cases*** the technology of water extraction refers to the preparation of multicomponent infusions and decoctions, which are most often copyright prescriptions. If they are combined ***types of raw materials containing the same group of biologically active substances, irrespective of the histological structure of extraction are prepared simultaneously.***

For example, a double infusion called "quartz medicine"

Rp .: Infusi radicibus Valerianae ex	10.0
Infus foliorum Menthae ex	4.0 - 200 ml
Coffeine - Sodium Benzoate	0.4
Analgini	0.6
Magnesium sulfate	0.8
Sodium Bromide	3.0

Misce Da Signa 1 tablespoon 3 times a day

Hoods are cooked simultaneously in one infundirka, as both types of raw materials contain essential oils. Waters take:

200 (4.0-2.4) = 238.6 ≈ 239 ml

After bringing the infusion to a predetermined volume, dissolve the prescribed ingredients and filter the infusion into the bottle for delivery.

If extraction from raw materials is required, which requires a different insulating regime, the hoods are prepared separately with the maximum amount of water, but not less than 10 times in relation to the raw material, taking into account the coefficient of water absorption.

6. Materials of methodical provision of classes

6.1. Task for self-checking of the initial level of knowledge-skills

Tests with answers

1. Water extracts from the leaves of the martyr, if no instructions in the recipe, are prepared in the ratio:
   A. * 1:10
   B. 1:20
   C. 1:30
   D. 1: 5
   E. 1: 400
2. Water extracts from the herb thermopsis, if no instructions in the recipe, are prepared in the ratio:
   A. * 1: 400
   B. 1:30
   C. 1:20
   D. 1:10
   E. 1: 5
3. When making prescients of infusions "cito" and "statim", heating of a liquid in a water bath is carried out:
   A. * 25 minutes followed by immediate artificial cooling
   B. 30 minutes with cooling for 20 minutes
   C. 15 minutes followed by cooling for 30 minutes
   D. 25 minutes followed by cooling for 45 minutes
   E. 45 minutes with cooling for 15 minutes
4. To prepare 200 ml of water extract from the leaves of mint (Kvodopogl = 2,4 ml / g) you should take water:
   A. * 248 ml
   B. 210 ml
   C. 180 ml
   D. 218 ml
   E. 260 ml
5. A pharmacist prepared a decoction of oak bark. Specify the ratio of vegetable raw material and extractant:
   A. * 1:10
   B. 1: 400
   C. 1:30
   D. 1:20
   E. 1: 5
6. A pharmacist has prepared an infusion of grass gorse. Specify the feature of the removal of active substances:
   A. * Remove in a neutral environment
   B. Removed in a light-footed environment
   C. Remove in alkaline medium
   D. Remove in weakly acid medium
   E. Isolated in acidic medium

7. A pharmacy receives a recipe for infusion of mylnyanka. Specify the feature of removing saponins:

A. * Remove in alkaline medium
B. Remove in a strongly acidic medium
C. Remove in a neutral medium
D. The environment has no effect
E. Isolated in a weakly acid medium

8. The pharmacist prepared 100 ml of chamomile infusion. Specify what amount of raw material and extractant he used to make the extract (Quota = 3.4)

A. * 10 g of chamomile tickets, 134 ml of water
B. 20 g of chamomile tickets, 234 ml of water
C. 10 g chamomile tickets, 200 ml of water
D. 20 g of chamomile tickets, 200 ml of water
E. 5 g chamomile tickets, 234 ml of water

9. The pharmacist has prepared 200 ml of broth of oak bark. Specify how to extract this extract:

A. * Immediately
B. After 10 minutes
C. After complete cooling
D. After 3-4 hours
E. After 45 min

10. A patient who leaves the pharmacy leaves mint. What recommendations regarding the preparation of infusion should give pharmacist at the release of medicinal plant material?

A. * Cook the infusion in a tightly closed vessel
B. To cook infusion on an open flame
C. Cook the infusion at room temperature
D. After 15 min. Tightening the extract to cool artificially
E. After 15 min. Tightening the extract to cool artificially

6.2 Information needed for knowledge-skills development can be found in the textbooks:

A) Basic

1. Aseptic dosage forms: Extemporal formulation: Methodical recommendations / O.I.Tihonov, L.V.Bondareva, T.G.Yarnykh, N.F.Orlovetska and others; Ed. OI Tikhonov and TG Yarnyh. - X .: View of NFaU; Original, 2005. - 184 p.
2. Solid dosage forms: Extemporal formulation: Methodical recommendations / O.I.Tihonov, L.V.Bondareva, T.G.Yarnykh, N.F.Orlovetska and others; Ed. OI Tikhonov and TG Yarnyh. - X .: View of NFaU; Original, 2003. - 176 pp.
3. Soft dosage forms: Extemporal formulation: Methodical recommendations / O.I.Tihonov, L.V.Bondareva, T.G.Jarnykh,

N.F.Orlovetska, and others; Ed. OI Tikhonov and TG Yarnyh. - X .: View of NFaU; Original, 2003. - 128 p.
4. Liquid dosage forms: Extemporal formulation: Methodical recommendations / O.I.Tihonov, L.V.Bondareva, T.G.Yarnykh, N.F.Orlovetska and others; Ed. OI Tikhonov and TG Yarnyh. - X .: View of NFaU; Original, 2005. - 160 p.
5. Practicum on pharmacy technology of medicines; for studio Pharmacist higher tutor institutions / O. I. Tikhonov, T. G. Yarnykh, V. O. Sobolev, and others; Ed. OI Tikhonova. - X .: View of the NFPA: Golden Pages, 2002. - 256 p.

B) additional literature:

1. Dictionary-Directory for Pharmacy Specialists in Management and Economics, ed. prof. Chernykh V.P. // Kharkiv: Publishing House of the National Academy of Sciences of Ukraine "Golden Stays" - 2001 - 281 p.

6.3. Orienteering card for self-study with literature on the topic.

№№ pp	Main tasks	Instructions	Answers (literature)
1	2	3	4
1	Characteristics of infusions and decoctions	Give the definition of infusion and decoctions	4, 5
2	Theoretical foundations of the extraction process	What are the main stages of the extraction process from plant raw materials?	4, 5
3	Technology of preparation of infusions and decoctions	What are the main technological stages of preparation of infusions and decoctions according to DF. Rules for the introduction of drugs into infusions and decoctions	4, 5
4	Special cases of preparation of infusions and decoctions	Rules for making infusions and decoctions from raw materials containing different groups of BAC.	4, 5
5	Quality assessment, packaging rules, design and storage of infusions and decoctions	Name the NTD and indicators of the quality of infusions and decoctions	4, 5

7. Materials for self-control of the quality of preparation

A. Questions for self-control

1. Characteristics of infusions and decoctions as dosage forms and disperse systems. Ways of prescribing infusions and decoctions.
2. Theoretical basis of the process of extraction from plant raw materials.

3. Factors influencing the extraction process.
4. Rules for the preparation of infusions and decoctions from medicinal plant raw materials and the addition of various medicinal substances to them in accordance with the requirements of the normative and technical documentation.
5. Equipment used for the preparation of infusions and decoctions.
6. Features of technology of infusions and decoctions from raw materials containing alkaloids, cardiac glycosides, essential oils, tannins, saponins.
7. Special cases of preparation of infusions and decoctions ("double" infusions, decoctions of leaves of a stool, etc.).
8. Written notes of water extracts.
9. Features of the preparation of water extracts from raw materials containing mucus (altea root, flax seed, etc.).
10. Characteristics of standardized extract concentrates.
11. Rules for making infusions and decoctions using extracts of concentrates and adding different medicinal substances to them.
12. Evaluation of quality, rules for packaging, design and storage of infusions and decoctions in accordance with the requirements of the normative and technical documentation.

B. Tests for self-control with benchmark answers.

1. The doctor has prescribed a medicine containing several names of the Russian medicinal raw material. Specify the types of raw materials, the extract from which you can prepare in one infundirka.
    A. * Mint leaves, chamomile flowers
    B. Leaves of mint, leaves of mint
    C. Leaves of mint, altea root
    D. Mint leaves, jester bark
    E. Leaves of mint, flax seed
2. The patient leaves the pharmacy of sage leaves. What recommendations for the preparation of infusion should give pharmacist at the release of medicinal plant material?
    A. * Cook the infusion in a tightly closed vessel
    B. To cook infusion on an open flame
    C. Cook only broth
    D. After the tightening, remove the drain immediately
    E. After 15 min. Tightening the extract to cool artificially
3. A pharmacist prepared 180 ml of lily herb infusion. Specify the amount of raw material required for the preparation of this medicinal product:
    A. * 6.0
    B. 10.0
    C. 18.0
    D. 0.5
    E. 9.0

4. A pharmacist prepared a water infusion of mint herbs. Specify which extraction mode he has selected:

A. * Infused for 15 minutes and cooled for 45 minutes
B. Insisted 30 minutes and cooled for 10 minutes
C. Insisted for 10 minutes and cooled for 2 hours
D. Insisted for 12 minutes and cooled for 5 hours
E. Insisted for 25 minutes and cooled artificially

5. At the pharmacy, water infusion is prepared from the thermophile herb. Indicate which components should be used by a pharmacist to prepare the required water infusion.

A. * Herb Thermopsis, solution of hydrochloric acid 1:10, purified water
B. Herb Thermopsis, sodium bicarbonate, purified water
C. Herb Thermopsis, Sodium Chloride, Purified Water
D. Herb Thermopsis, water purified
E. Tincture of thermosyx, water purified

6. Pharmacists need to cook infusion of grass germplasm. In what ratio is it necessary to take the raw material and the extractor?

A. * 1:30
B. 1:10
C. 1: 100
D. 1: 400
E. 1:20

7. A pharmacy receives a recipe for the preparation of infusion. From what medicinal plant material can you prepare this dosage form?

A. * Rhizomes with roots of valerian
B. Roots of the Rhubarb
C. Oak bark
D. Bark of cranberry
E. Bark jester

8. A pharmacist needs to prepare a water extract. Extraction in infundirki with tightly closed lids is carried out from medicinal plant material, which contains:

A. * Essential oils
B. alkaloids
C. Heart glycosides
D. Anthraglucosides
E. Slice

9. Cooked 100 ml broth from oak bark. What amount of water was taken by the pharmacist to prepare it (Kv = 2,0 ml / g)?

A. * 120 ml
B. 160 ml
C. 100 ml
D. 130 ml
E. 200 ml

10. A pharmacist prepared a decoction of the leaves of the hay. Specify the time for its cooling:

A. * 3 hours
B. 45 min
C. 10 min
D. 15 min
E. Not cooled

11. Pharmacist prepared infusion of medicinal plant material. How did he introduce water-soluble medicinal substances to him?

A. Dry in solution, dissolving in a filtered extract
B. In the form of concentrated solutions, adding them to the finished removal
C. Dry, dissolving them in an infantry
D. Dissolved in the mortar in a mortar with a ready to remove
E. In the form of concentrated solutions, adding them to the infundir

12. A pharmacist prepared an infusion of a thermophilic herb. What is the feature of extracting alkaloids from plant raw materials?

A. * Extract in a weakly acid medium
B. The environment has no effect
C. Extract in alkaline medium
D. Extract in a neutral environment
E. Extract in a light-footed environment

C. Tasks for self-control with answers.

1. Water extracts from the leaves of the martyr, if no instructions in the recipe, are prepared in the ratio:

A. * 1:10
B. 1:20
C. 1:30
D. 1: 5
E. 1: 400

2. Water extracts from the herb thermopsis, if no instructions in the recipe, are prepared in the ratio:

A. * 1: 400
B. 1:30
C. 1:20
D. 1:10
E. 1: 5

3. When making prescients of infusions "cito" and "statim", heating of a liquid in a water bath is carried out:

A. * 25 minutes followed by immediate artificial cooling
B. 30 minutes with cooling for 20 minutes
C. 15 minutes followed by cooling for 30 minutes
D. 25 minutes followed by cooling for 45 minutes
E. 45 minutes with cooling for 15 minutes

4. To prepare 200 ml of water extract from the leaves of mint (Kvodopogl = 2,4 ml / g) you should take water:

A. * 248 ml
B. 210 ml
C. 180 ml
D. 218 ml
E. 260 ml

8. Materials for classroom self-study:

8.1 List of educational individual practical tasks to be performed during practical classes:

A set of individual tasks

1. Take:	Infusion of rhizomes with valerian roots from 20.0 to 200 ml Potassium bromide Sodium bromide by 3.0 Adoniside 4 ml Mix up. Give it mark 1 tablespoon 3 times a day.	2. Take:	 Codeine phosphate is 0.15 Broth Althea root 150 ml Sodium hydrogen carbonate 2.0 Fragrant-aniseed drops 4ml Mix up. Give it mark 1 dessert spoon 3 times a day.
3. Take:	Barbitol sodium 1.0 Herbal infusion of canine herbs 200 ml Sodium Bromide 3.0 Mix up. Give it mark 1 tablespoon 3 times a day.	4. Take:	Infusion of Althea root from 6.0 - 200 ml Sodium hydrogen carbonate 2.0 Sodium benzoate 1.5 Breast elixir 3 ml Syrup is plain 20 ml Mix up. Give it mark 1 tablespoon 3 times a day.
5. Take:	Infusion of grass griffin 180 ml Potassium bromide 6.0 Lavender tinctures Valerian tincture of 10 ml Mix up. Give it mark For 1tablespoon 3 times a day (grass gorilla contains 80 NON).	6. Take:	Licorice root broth 150 ml Magnesium sulfate 3.0 Mix up. Give it mark 1 tablespoon 3 times a day.
7. Take:	Infusion of grass thermos from 0.5 - 200 ml Sodium benzoate Ammonium chloride by 3.0 Fragrant-aniseed drops 4 ml	8. Take:	The infusion of Althea root from 4.0 - 200 ml Sodium hydrogen carbonate 2.0 Breast elixir 1.5 ml Syrup is plain 20 ml

	Mix up. Give it mark 1 tablespoon 3 times a day (grass thermosyp contains 1.8% alkaloids).		mix up. Give it mark 1 tablespoon 3 times a day.
9. Take:	Infusion of Althea root from 2.0 - 100 ml Sodium hydrocarbonate Sodium benzoate by 1.5 Nashatryno-anisovye drops . 1.5 ml Syrup is plain 10 ml Mix up. Give it mark 1 teaspoon 3 times a day.	10. Take:	Broth of oak bark 160 ml Galuna 4.0 Glycerin 5.0 Mix up. Give it mark To rinse.
11. Take:	Infusion of leaves of sage with 10,0 Infusion of chamomile flowers from 15.0 - 200 ml Acid boric 5.0 Mint tincture 2 ml Mix up. Give it mark Rinsing.	12. Take:	Infusion of rhizomes with roots valerian 200 ml Sodium bromide 6.0 Adoniside 8ml Mix up. Give it mark 1 tablespoon 3 times a day.
13. Take:	Infusion of grass thermophile 180 ml Sodium hydrocarbonate Sodium benzoate equals 2.0 Syrup is a simple 15 ml mix up. Give it mark 1 tablespoon 3 times 1 per day.	14. Take:	Infusion of mint leaves from 4.0 - 120 ml Magnesium sulfate 2.0 Mix up. Give it mark 1 tablespoon 2 times a day
15. Take:	Infusions of blackberry leaves 200 ml Potassium bromide 6.0 Nettle Tinctures Dog 10ml Hawthorn liquid extract 5 ml Mix up Give it Mark For 1 tablespoon 3 times a day (Dumpling Letters contains 75 DEG).	16. Take:	Broth of cornflour 180 ml Sodium sulfate 4.0 Mix up. Give it mark 1 tablespoon 3 times a day
17.	Codeine 0.1	18.	Codeine 0.15

Take:	Sodium hydrogen carbonate 2.0 Broth Almond root 120 ml Mix up Give it Mark 1 dessert spoon 3 times a day	Take:	Infusion of rhizomes with roots valeriani from 6.0 - 200 ml Sodium Bromide 5.0 Mix up. Give it mark 1 tablespoon 3 times a day.
19. Take:	Broth Almond root 100 ml Thoracic Elixir Fragrant-aniseed drops of 3 ml Syrup is plain 20 ml Mix up Give it Mark 1 tablespoon 3 times a day	20. Take:	Infusion of grass thermosyx 150 ml Sodium hydrogen carbonate 3.0 Fragrant-aniseed drops Breast Elixir 2 ml Mix up. Give it mark 1 tablespoon 3 times a day.

9. Instructive materials for mastering professional skills, skills:
9.1. Method of work execution, stages of execution.
Write down and arrange the recipe according to the requirements of the Order of the Ministry of Health of Ukraine No. 360 dated July 19, 2006. Describe the medicinal product. Describe the optimal version of the technology of water extraction with theoretical justification and necessary calculations. Give a rating of quality. Specify the preparation of the drug for leave. Write the passport of written control.

10. Materials for self-control of mastering the knowledge, skills, skills provided by this work.
Pick a bet

Medicinal herbal raw materials	Features of the technology
1. Grass Thermopsis 2. Mint grass 3. Oak bark 4. Root licorice	A. Prepare in a tightly closed infundirca B. Strain immediately after heating B. Removal is carried out in alkaline medium G. Extraction is carried out in an acid medium

Answer. 1-Г; 2-A; 3-B; 4-B

11. The theme of the next lesson:
Slides. RLF technology using extract concentrates.

Topic of the lesson №15: «Slimes. LDF technology using extract concentrates» - 2 hours

1. Actuality of the topic: In recent years there has been an increased interest in herbal medicine. Water extracts from medicinal plant materials (MPM) have a high bioavailability, compared with individual medicinal substances, they have a milder effect on the body, with almost no side effects.

Now there can be no universal technology of water extraction from herbal raw materials containing various groups of active substances. For each raw material there should be an individual rational technology, with the help of which removal is possible maximum active ingredients.

Proper preparation of water extracts is possible only with the necessary knowledge, indicates the need to study this topic.

2. Objectives of the lesson:

2.1 General objectives

Learn to prepare Slimes and LDF using extract concentrates of medicinal plant materials.

2.2 Educational goals:

Formation of professionally important properties and personality traits of the future pharmacist. Educating students of professional responsibility in the manufacture of medicines.

2.3 Specific objectives:

-know:

- Ways of prescribing Slimes and LDF prepared using extract-concentrates.
- Rules for the preparation of slimes and LDF prepared using extract-concentrates and the addition of medicinal substances to them according to the requirements of the State Pharmacopoeia.
- Quality control, storage of slimes and LDF prepared using extract-concentrates, capping and their release in accordance with the requirements of the State Pharmacopoeia and other regulatory documents.

· **2.4 Based on theoretical knowledge of the topic:**

-able to:

- Use the SPH, other regulatory and reference books to find the necessary information on the preparation of slimes and LDF prepared using extract-concentrates.
- Calculate the amount of medicinal plant materials and water for the preparation of slimes and LDF prepared using extract-concentrates.
- To carry out the main technological operations for the preparation of slimes and LDF prepared using extract-concentrates
- To use means of small-scale mechanization in the process of preparing slimes and LDF prepared using extract-concentrates
- Assess the quality of the prepared slimes and LDF prepared using extract-concentrates, clog and arrange them for vacation.

· Write a passport to the written control.

3. Materials for classroom self-preparation (interdisciplinary integration).

Disciplines	Know	Be able to
1. Prev Latin tongue	The basics grammar. Spelling Latin names of medicinal and chemical substances, medicinal plants, families and raw materials plant and animal origin. Recipe.	Assess the correctness of the recipe design.
Anatomy and physiology human	The structure and functional characteristics of the organism at different levels: molecular, cellular, organ, system.	Assess the functional state of the body as a whole and individual organs and systems
General and in organic chemistry	The main provisions of the atomic-molecular teachings. The processes that take place in aqueous solutions of electrolytes.	Calculate molar and equivalent masses of chemical compounds. To characterize the processes that take place in aqueous solutions of electrolytes.
Physics	Methods of analysis of drugs.	Determine the main indicators of the quality of liquid drugs: refractometry, polarimetry, mass spectrometry, UV, IR spectrophotometry, photocolorimetry.
Physical and colloid chemistry	Characteristics and properties of the high molecular weight compounds.The solubility of the high molecular weight compounds in liquids.	Determine the molar mass, the concentration of the substance solutions.
Organic chemistry	Physical, chemical properties of organic compounds and the main methods of their analysis.	To carry out elemental analysis and identification of organic compounds.
Analytic chemistry	Methods for the qualitative and quantitative analysis of inorganic and organic substances	Perform qualitative and quantitative analysis of individual substances and their mixtures, to carry out

		the necessary calculations according to the analysis.
2. ***The following discipline*** Organization and Economics of Pharmacy	General technology of liquid dosage forms for internal use	Calculate the medicinal, auxiliary substances and purified water
Technology medicinal funds industrial production	Overall technology cosmetic medicinal funds industrial production.	Technological stages making cosmetic medicinal funds industrial production .
Biopharmacy	The technological process of preparation of mixtures for internal use.	Prepare solutions for internal use, taking into account the physico-chemical properties of the ingredients.
3. ***Intra-subject integration*** Infusions and decoctions	Preparation of Infusions and decoctions	Calculate the amount of medicinal raw material and water

4. Subject content:

Slimes / mucus (mucilagines) - nitrogen-free substances close to polysaccharides. Infusions of this medicinal plant raw material are used as emollients and enveloping drugs for external and internal use, for example, in cough mixtures for diseases of the upper respiratory tract. Most often use the mucus of marshmallow root (Althaea *radix*), less flax seeds (*Linum usitatissimum*) and salep tubers (*Órchis máscula*).

The method of preparation of mucus from LRS depends on its histological structure, as well as on the physicochemical properties of mucous substances.

When preparing aqueous extracts containing mucus, it is necessary to determine:

- physico-chemical properties of mucous substances;
- histological structure of vegetable raw materials;
- the presence of concomitant substances.

The most commonly used raw materials containing mucus marshmallow root, flax seeds, quince seeds, plantain seeds, etc. (table 1).

Table 1

Name of raw material containing mucus	The location of mucus in the raw material	Features of technology	The ratio of raw materials and extractant
Marshmallow root	Inside the cell	spend infusion at room temperature for	1:20

		30 minutes	
flax seeds	In the surface layer of seeds	shake with hot water for 15 minutes	1:30
quince seeds	In the epidermis	shake with cool water for 5 minutes	1:50
plantain seeds	In the surface layer of seeds	shake with hot water for 15 minutes	1:10
salep tubers	Inside the cell	add ethanol, cold and boiled water, shake to cool	1:100

Althaea root (*Radix Althaeae*) contains up to 35% mucus and 38% starch. The main active ingredient is mucus, which has an enveloping, expectorant and anti-inflammatory effect. Therefore, it is necessary to obtain an extract with the maximum mucus content and the minimum amount of starch. It is known that when removing starch infusions become very viscous, and the viscosity of the medium prevents the removal of mucus during infusion. Given that marshmallow root mucus is an indefinitely swellable high molecular substance and well soluble in cold water, and starch is a limitedly swollen macromolecular substance and soluble only in hot water, infusion of marshmallow root is prepared by cold infusion at room temperature.

In order to prevent the mechanical transition of starch grains into the extract, the raw material after infusion is not squeezed, as is done when obtaining extracts from other types of vegetable raw materials. This reduces not only the volume of the extract, but also the amount of mucus in it. Therefore, to calculate the amount of water added to a given volume of infusion, and to ensure the required content of mucus use experimentally established water consumption factor, rather than water absorption coefficients.

When making the infusion of Althaea root, it is necessary to take into account that if the recipe prescribes an infusion, decoction or mucus, then always prepare the infusion by maceration - cold extraction (30 minutes at room temperature). The raw material is not squeezed out after extraction, because when squeezed, swollen starch grains and scraps of tissue cells fall into the extract. The infusion wiil be cloudy and spoil quickly.

In the absence of an indication in the recipe of the amount of marshmallow root on the basis of the order № 197 dated September 7, 1993 year prepare a 5% (1:20) infusion. Take 5 parts of marshmallow root and 100 parts of purified water. The cut root is filled with cold water, infused at room temperature for 30 minutes, after which the liquid is drained without squeezing the residue, and filtered.

It has been experimentally established that when infused with 5.0 g of marshmallow root, only 77 ml of extract is obtained from 100 ml of water (without squeezing the root). It follows that 5.0 g of marshmallow root contains 23 ml of water, and 1.0 g of root - 4.6 ml ($X = 1 \cdot 23/5 = 4.6$ ml). In this case, it is necessary to use the water consumption coefficient - this is the ratio of the written volume of the extract to the volume of the obtained extract, which for 5% infusion of marshmallow root is 100/77 = 1.3.

The consumption coefficient (C_{cons}) can be calculated on the basis of the water absorption coefficient obtained experimentally:

$$C_{comp} = \frac{100}{100 - (5 \cdot 4{,}6)} = \frac{100}{77} = 1{,}3$$

The consumption coefficient shows how many times you need to increase the amount of root and water to get the required amount of extract.

Thus, to obtain a 5% infusion of marshmallow root raw materials need to take 6.5 (5.0 * 1.3) and 130 ml of water (100 * 1.3).

To obtain an infusion of marshmallow root in different ratios of raw materials to water, different consumption factors are used (According to the order № 197 from 07.09.1993y):

Table 2

The consumption coefficient for Althea root infusions

The ratio of the raw material and water extraction	C_{cons}
1:100	1,05
2:100	1,1
3:100	1,15
4:100	1,2
5:100	1,3

Infusion of marshmallow root can be prepared using a dry extract-concentrate in a ratio of 1: 1.

Example:

Rp.: Infusi radicis Althaeae 200 ml
Natrii benzoatis 1,0
Misce. Da. Signa. 1 tablespoon 3 times a day

This drug is a mixture-infusion containing a soluble substance of the general list - sodium benzoate.

Calculations:

Althaea roots: 10.0 x 1.3 = 13.0 g (C_{cons} = 1.3).
Purified water: 200 x 1.3 = 260 ml.
Sodium benzoate: 1.0 g

Technology:

Weigh 13.0 g of crushed, sifted marshmallow root on BP-20 and place in a stand, add 260 ml of purified water (taking into account the consumption coefficient) and infuse at room temperature for 30 minutes with stirring with a glass rod. Then filter into a measuring cylinder through a funnel without squeezing the raw material, bring the purified water to the required volume. The infusion is transferred to a stand and dissolved in it 1.0 g of sodium benzoate. Strain into a vial (container) for release. Seal and fill in the front side of the passport of written control.

PWC

Rp.: Radices Althaeae 13,0
Aquae purificatae 260 ml
Infusi Radicis Althaeae ad 200 ml
Natrii benzoatis 1,0
Prepared by: (signature)
Checked (signature)
Released by: (signature)

Shelf life: store in a dry, dark place for 2 days.

Mucus from flax seeds is prepared in a ratio of 1:30. Flax seeds are quickly washed from the dust with cold water, then add hot water (about 95 ° C) and shake for 15 minutes. The mucus through the tissue is filtered into a vial. Flax seeds are not crushed because the mucus is in the epidermis of the seed coat and is quickly removed. When the seeds are crushed, fatty oils, proteins and dyes will turn into an extract. Obtaining mucus from flax seeds is possible by cold infusion for 2 hours with periodic stirring.

Mucus from salep tubers. Salep tubers contain up to 50% mucus, so the dosage forms are prepared in a concentration of 1: 100. 1 g of salep tuber powder is moistened with 1 ml of ethanol in order to displace air from the mass of the powder and better wettability with water. Add 10 ml of cold water and immediately add 88 ml of boiling water. Shake until cool. The mucus is filtered through gauze into a glass and used freshly prepared, because it is quickly susceptible to microbial contamination. Salep mucus has the ability to stabilize many suspensions of hydrophobic substances.

IMPROVEMENT OF THE WATER EXTRACTS FORMULATION. THE AUTHOR'S FORMULAS

Formulation of multi-component infusions and decoctions

Rp.: Infusi radicibus Valerianae	ex 10.0
Infusi foliorum Menthae	ex 4.0 -200 ml
Coffeini-natrii benzoatis	0.4
Analgini	0.6
Natrii bromidi	3.0
Magnesii sulfatis	0.8

Misce. Da. Signa. One tablespoon 3 times a day.

The extraction is prepared simultaneously in one infuser, because both types of the raw material contain essential oils.

The amount of water is: 200 + (10.0 x 2.9) +(4.0 x 2.4) = 238.6 239 ml. After making the infusion to the volume required dissolve the prescribed components and strain in the bottle for dispensing.

If the extraction is prescribed from the raw material requiring various modes of infusion, the extracts are prepared separately with the maximum amount of water, but not less than 10 times in relation to the raw material taking into account the water absorption coefficient.

Rp.: Infusi radicis Althaeae ex 10.0
Infusi herbae Leonuri ex 20.0
Infusi foliorum Farfarae ex 20.0
Decocti corticis Viburni ex 25.0 - 1000 ml
Misce. Da. Signa. Two tablespoons 4 times a day.

The amount of water is divided into 3 parts:

- for the Marshmallow root infusion: 200 ml x 1.3=260 ml;
- for the SnowbalI bark decoction: 250 ml + (25.0 x 2.0) =300 ml:
- for the Motherwort herb and Foalfoot leaves infusion:
  1000 ml - (260 +300) + (20.0 x 2.9) + (20.0 x 2.0) =646 ml

The total volume of the multi-component water extraction should be:
200 + 250 + 550=1000 ml

EXTRACT-CONCENTRATES

Extracts-concentrates are a special group of extracts; they serve as the initial material for preparing extracts (infusions and decoctions) at the chemist's.

FORMULATION OF WATER EXTRACTS USING THE EXTRACT-CONCENTRATES

By their consistence they can be:

- liquid
- dry

The extract-concentrates dissolve well in water with the formation of transparent solutions. Their use in the conditions of a chemist's accelerates the process of preparing medicines. Extract-concentrates are stable and convenient for storage and transportation, their application eliminates the necessity of storing the plant raw material.

Liquid concentrates are usually prepared in a ratio of 1: 2, and dry - 1: 1. Under factory conditions, it is prepared by extraction of raw materials with weak alcohol (20-40%) by special methods, which make it possible to obtain full compliance of the extract with the amount of active and auxiliary substances of infusion or decoction obtained from a certain amount of raw materials.

Dry extract-concentrates are obtained as follows: evaporate liquid extracts and add auxiliary substances such as lactose or dextrin, mix the active substances in the ratio of 1: 1 or 1: 2.

The pharmaceutical industry produces some concentrates
There are such dry extracts as:
Althea root 1: 1, Adonis 1: 1,
Thermopsis 1:1, Convallaria 1:1,
Digitalis 1: 1.
There are such liquid extracts-concentrate as:
Valeriana 1: 2, Leonuri 1: 2,
Adonis 1: 2.

Extracts-concentrates are well soluble in water with the formation of clear solutions. Their use in pharmacies not only speeds up the process of preparation of drugs, but also improves their quality and standardization.

Dry concentrates are stable and convenient for storage and transportation. Their use frees from the need to store vegetable raw materials.

However, along with certain advantages, the use of concentrates has some disadvantages.

Some dry concentrates are hygroscopic. During storage, they are often dehumidified, which violates the correct dosage and makes it difficult to weigh. To eliminate this shortcoming and stabilize the extracts, a method of microencapsulation using cellulose derivatives, aerosil, ie film-forming substances is proposed.

Infusions prepared from concentrates and directly from plant raw materials often have external differences in color intensity and degree of transparency, especially infusions from marshmallow root and dry marshmallow extract concentrate (1: 1). At patients these differences cause doubts in correctness of preparation of medicines therefore at release of the infusions prepared from concentrates, it is recommended to make the corresponding mark on the prescription or a signature that at repetition of medicines they could be prepared in the same way, as the first time.

In correspondence with the instruction of St. Pharm. XI the quality of an extract should be equal to the quantity of the plant raw material prescribed. The preparation of infusions from extract-concentrates corresponds to technology of liquid medicines from dry and liquid medicinal substances. In this case other medicinal substances can be added both in a dry form and as concentrated solutions.

The dry extract-concentrates should be dissolved in water at first and after that they are mixed with the concentrated solutions of salts. While mixing the concentrated solutions of salts with dry extract-concentrates a precipitate or turbidity can be formed.

FORMULATION OF WATER EXTRACTS USING THE EXTRACT-CONCENTRATES

Exemple 1:

Rp.: Infusi radicis Althaeae ex 5.0 - 100 ml

Natrii benzoatis

Elixiri pectoralis aa 1.5

Misce. Da. Signa. One dessert spoon 2 times a day.

The given medicine is a mixture containing the infusion of Marshmallow root, sodium benzoate - a readily soluble in water substance - and an odourous liquid - pectoral elixir, which requires the special conditions of its addition.

Calculate:

While preparing the infusion from the Marshmallow dry extract-concentrate 5.0 g should be taken, it is more than 3 % from the total volume of the medicinal form. Thus, it is necessary to take into account the volume increase coefficient (VIC), which is 0.61 for the Marshmallow dry extract.

Then the amount of the purified water is:

100 - (5 x 0.61) = 97 ml

and if the concentrated solution of sodium benzoate (1: 10) is used:

100 - (5 X 0.61) - (1.5 X 10) = 82 ml.

Technology:

Measure 82 ml of the purified water in the bottle, dissolve 5.0 g of the Marshmallow dry (1: 1) extract-concentrate, filter in the bottle for dispensing and add 15 ml of the sodium benzoate concentrated solution (1: 10) measured by the burette system. Then weigh 1.5 g of the pectoral elixir in the small vessel and measure approximately 2 ml of the mixture obtained, mix and add to the total volume in the bottle for dispensing.

Exemple 2:

Rp.: lnfusi rhizomatis cum

radicibus Valerianae	ex 5.0 -	200 ml
Coffeini-natrii benzoatis	0.6	
Tincturae Convallariae	5 ml	

Misce. Da. Signa. One tablespoon 3 times a day.

The opalescence mixture consists of the infusion from the raw material volatile oils and caffeine sodium benzoate, a strong-effective substance soluble in water.

Technology:

Take a double amount of an extract-concentrate from the liquid extract-concentrates instead of the amount of the plant raw material indicated in the formula.

Measure 184 ml of water, 6 ml of 10 % caffeine-sodium benzoate solution (1: 10), 10 ml of the liquid Valerian extract-concentrate (1: 2) and 5 ml of the May lily tincture in the bottle for dispensing.

THE QUALITY CONTROL, STORAGE AND IMPROVEMENT OF WATER EXTRACTS

Water extracts, as well as all liquid medicines containing water extracts, should be dispensed only freshly prepared because of their little stability with the labels: "Keep in a cool place" and "Shake well before use".

The quality control is carried out following the same parameters as ones for other liquid medicinal forms, namely, the correspondence of the formula and WCP, colour, taste, odour, the absence of mechanical inclusions (transparency), deviation in the volume, packing, and registration for dispensing.

The general directions of improving the formulation of infusions and decoctions are: the extension of the assortment of extract-concentrates; application of modern methods of extraction of the plant raw material using ultrasound, ionizing radiation, adding surface active substances; introducing the means of mechanization of auxiliary operations; developing the equipment of a new design.

6. Materials of methodical provision of classes

6.1. Task for self-checking of the initial level of knowledge-skills

Tests with answers

1. The pharmacist used dry standardized extract of thermopsis (1: 1) to prepare 200 ml of infusion of thermopsis. How much extract is needed to prepare the infusion?

A. * 0.5 g.
B. 1.0 g.
C. 2.0 g.
D. 5.0 g.
E. 10.0 g.

2. The pharmacist used a liquid standardized mustard extract (1: 2) to prepare 150 ml of mustard infusion. How much extract did the pharmacist measure:

A. * 10 ml.
B. 5 ml.
C. 2 ml.
D. 7.5 ml.
E. 20 ml.

3. The pharmacist used the following technology to prepare an aqueous extract: MRM washed with cold water, filled with hot water in a ratio of 1:30 and shaken for 15 minutes, then filtered. Indicate which raw materials were used:

A. * Flax seeds.
B. Elder flowers.
C. Buckthorn bark.
D. Althaea root.
E. Viburnum fruits.

4. The pharmacist prepared an infusion of marshmallow root. In what ratio did he take the amount of medicinal plant raw materials and extractant:

A. * 1:20.
B. 1:10.
C. 1:30.
D. 1: 100.
E. 1: 400.

5. Pharmacist before using the heating infuser in a boiling water bath for 15 minutes. Specify the material from which it is made:

A. * Porcelain.
B. Stainless steel.
C. Aluminum.
D. Enameled metal.
E. Tree.

6. The pharmacist prepared an aqueous extract of MRM by method of cold infusion. Specify the type of this raw material:

A. * The roots of marshmallow.
B. Buckthorn bark.
C. Mint leaves.
D. Bearberry leaves.
E. Thermopsis grass.

7. The pharmacist prepared an infusion of marshmallow root. Specify the correct technology option:

A. * Cold infusion for 30 minutes and filtering without squeezing the raw material.

B. Heating for 30 min, cooling -10 min, filtering.

C. Heating for 30 min, filtering without cooling.

D. Heating in a boiling water bath for 15 minutes and squeezing.

E. Squeezing of raw materials after infusion at room temperature.

8. Pharmacies often prepare infusions using standardized concentrate extracts instead of plant raw materials. Specify the method of their introduction:

A. * Dissolve in water in a stand.

B. Dissolve in hot water.

C. Soluble in concentrated solutions.

D. Dissolve in a mixture of water and concentrated solutions.

E. Dissolve in tinctures.

9. The pharmacist prepares an infusion of marshmallow root by cold extraction. Specify the infusion time:

A. * 30 min.

B. 20 min.

C. 40 min.

D. 50 min.

E. 60 min.

10. The pharmacist prepares water extracts from medicinal plant raw materials. Specify the correct procedure for administration of drugs into the following mixtures:

A. * In dry form, dissolve in the stand in the filtered extract;

B. In the form of a concentrated solution, adding to the finished extract.

C. In dry form, dissolving in the infusion tube;

D. Dissolve in the infusion in a vial for release;

E. In a separate glass, mix with part of the infusion and add to the finished infusion.

6.2 Information needed for knowledge-skills development can be found in the textbooks:

A) Basic

6. Aseptic dosage forms: Extemporal formulation: Methodical recommendations / O.I.Tihonov, L.V.Bondareva, T.G.Yarnykh, N.F.Orlovetska and others; Ed. OI Tikhonov and TG Yarnyh. - X .: View of NFaU; Original, 2005. - 184 p.

7. Solid dosage forms: Extemporal formulation: Methodical recommendations / O.I.Tihonov, L.V.Bondareva, T.G.Yarnykh, N.F.Orlovetska and others; Ed. OI Tikhonov and TG Yarnyh. - X .: View of NFaU; Original, 2003. - 176 pp.

8. Soft dosage forms: Extemporal formulation: Methodical recommendations / O.I.Tihonov, L.V.Bondareva, T.G.Jarnykh, N.F.Orlovetska, and others; Ed. OI Tikhonov and TG Yarnyh. - X .: View of NFaU; Original, 2003. - 128 p.
9. Liquid dosage forms: Extemporal formulation: Methodical recommendations / O.I.Tihonov, L.V.Bondareva, T.G.Yarnykh, N.F.Orlovetska and others; Ed. OI Tikhonov and TG Yarnyh. - X .: View of NFaU; Original, 2005. - 160 p.
10. Practicum on pharmacy technology of medicines; for studio Pharmacist higher tutor institutions / O. I. Tikhonov, T. G. Yarnykh, V. O. Sobolev, and others; Ed. OI Tikhonova. - X .: View of the NFPA: Golden Pages, 2002. - 256 p.

B) additional literature:

2. Dictionary-Directory for Pharmacy Specialists in Management and Economics, ed. prof. Chernykh V.P. // Kharkiv: Publishing House of the National Academy of Sciences of Ukraine "Golden Stays" - 2001 - 281 p.

6.3. Orienteering card for self-study with literature on the topic.

№№ pp	Main tasks	Instructions	Answers (literature)
1	2	3	4
1	Characteristics of infusions and decoctions	Give the definition of infusion and decoctions	4, 5
2	Theoretical foundations of the extraction process	What are the main stages of the extraction process from plant raw materials?	4, 5
3	Technology of preparation of infusions and decoctions	What are the main technological stages of preparation of infusions and decoctions according to St.Ph. Rules for the introduction of drugs into infusions and decoctions	4, 5
4	Special cases of preparation of infusions and decoctions	Rules for making infusions and decoctions from raw materials containing different groups of BAC.	4, 5
5	Quality assessment, packaging rules, design and storage of infusions and decoctions	Name the NTD and indicators of the quality of infusions and decoctions	4, 5

7. Materials for self-control of the quality of preparation

A. Questions for self-control

1. Characteristics of infusions and decoctions as dosage forms and disperse systems. Ways of prescribing infusions and decoctions.

2. Theoretical basis of the process of extraction from plant raw materials.
3. Factors influencing the extraction process.
4. Special cases of preparation of infusions and decoctions ("double" infusions, decoctions of leaves of a stool, etc.).
5. Features of the preparation of water extracts from raw materials containing mucus (altea root, flax seed, etc.).
6. Characteristics of standardized extract concentrates.
7. Rules for making infusions and decoctions using extracts of concentrates and adding different medicinal substances to them.
8. Evaluation of quality, rules for packaging, design and storage of infusions and decoctions in accordance with the requirements of the normative and technical documentation.

B. Tests for self-control with benchmark answers.

1. The doctor prescribed 100 ml of infusion of 0.25 g of thermopsis herb. Specify the amount of dry extract-concentrate of thermopsis herb (1: 1) that the pharmacist must weigh:

A. * 0.25 g.
B. 0.5 g.
C.0.3 g.
D. 0.2 g.
E. 0.1 g.

2. The pharmacist prepares an infusion of marshmallow roots by cold extraction. Specify the infusion time:

A. * 30 min.
B. 20 min.
C. 40 min.
D. 50 min.
E. 60 min.

3. The pharmacist must prepare 200 ml of infusion of marshmallow roots. How much dry marshmallow extract (1: 1) should he use for this?

A. * 20.0 g.
B. 10.0 g.
C. 13.0 g.
D. 6.5 g.
E. 5.0 g.

4. An infusion of marshmallow root is prepared for the patient. What infusion regimen should the pharmacist use to prepare this mixture?

A. * 30 min at room temperature.
B. 60 min at room temperature.
C. 15 min infusion in a water bath and 45 min cooling at room temperature.
D. 30 min infusion in a water bath and 10 min cooling at room temperature.
E. 30 min infusion in a water bath and immediate filtration without cooling.

5. The pharmacist prepares an aqueous extract of raw materials by cold infusion, when calculating the amount of raw materials and extractant take into account the

consumption coefficient, when filtering without squeezing the raw materials. Indicate which medicinal plant raw materials are characterized by the following features of the technology:

A. * Althaea root.
B. Oak bark.
C. Rhizomes with valerian roots.
D. Bearberry leaves.
E. Chamomile flowers.

6. The pharmacist must prepare 200 ml of water extract from marshmallow root. How much vegetable raw materials need to be taken for preparation of this extract (Ccons - 1,3)?

A. * 13.0 g.
B. 20.0 g.
C. 10.0 g.
D. 6.5 g.
E. 5.0 g.

7. The pharmacist prepares 120 ml of infusion of marshmallow root. How much raw and purified water does he need to use (Ccons-1.3)?

A. * 7.8 g and 156 ml.
B. 6.0 g and 126 ml.
C. 7.8 g and 112 ml.
D. 6.0 g and 156 ml.
E. 12.0 g and 135 ml.

8. The pharmacist prepared an aqueous extract of flax seeds. What is the ratio of raw materials and extractant he used?

A. * 1:30;
B. 1:10.
C. 1: 400.
D. 1:20.
E. 1: 5.

9. The pharmacy received a prescription:

Rp .: Infusi radicis Althaeae
Infusion herbae Leonuri
Infusion of Farfarae foliorum ana 20.0
Decocti corticis Viburni ex 25: 1000 ml
M. D. S. 2 tablespoons 4 times a day

Which technology option should a pharmacist use, taking into account the chemical composition and type of medicinal plant raw materials used?

A. * Used three modes of infusion: maceration at room temperature for marshmallow root, prepared an infusion of motherwort and mother-and-stepmother leaves, as well as a decoction of viburnum bark;

B. Raw materials simultaneously insisted on a water bath in one infuser;

C. Insisted separately infusion of marshmallow root in part of the water and mixed with extracts of motherwort, mother-and-stepmother and viburnum;

D. Prepared separately infusions of motherwort, marshmallow and mother-and-stepmother, and then added a decoction of viburnum bark;

E. Insisted viburnum bark at room temperature and mixed with infusion prepared in infuser dog nettle, marshmallow and mother-and-stepmother.

10. While preparing the infusion of marshmallow root, the pharmacist made a mistake in choosing the water temperature for the preparation of this drug, and the final product turned out muddy. What temperature does water need to extract this raw material?

A. Room.
B. * 40 ° C.
C. 100 ° C.
D. 60 ° C.
E. 80 ° C.

C. Tasks for self-control with answers.

1. Rp.: Mucum salep ficos 80ml
Phenylsalicylate 2.0
Sacchari siropus 5ml
Misce. Da.
Signa. 1 tablespoon 3 times a day.

Situation. The student weighed 0.8 g of medium-sized powder of cuckoo root, poured 79.2 ml of boiling water and shaken for 15 minutes. The mixture was filtered through gauze into a beaker, added phenylsalicylate and sugar syrup. Capped, issued before the dispensing.

2. Rp.: Codeine phosphate 0,2
Infusion cum herba thermopsis 0.5 - 200 ml
Infusion cum radices Althea 5.0 - 200 ml
Ammonium chloride 4.0
Liquor Ammonii anisatus 3 ml
Sacchari siropus 5ml
Misce. Da.
Signa. 1 tablespoon 3 times a day.

Situation. In the manufacture of this combined aqueous extract was infused in a water bath of thermopsis grass (0.5 g of crushed to 3 mm grass) with the addition of 10 drops of 1% citric acid solution and 200 ml of purified water for 15 minutes, followed by cooling for 45 minutes. To extract mucus from the root of marshmallow infusion was performed at room temperature from finely ground raw materials with stirring. Then both portions of the infusion were poured together into a measuring cylinder. The volume was adjusted to 400 ml, 0.2 g of codeine phosphate, 4.0 g of ammonium chloride were dissolved, filtered into a beaker. Cork the bottle and register for dispensing:the labels "Internal", "Store in a cool place".

8. Materials for classroom self-study:

8.1 List of educational individual practical tasks to be performed during practical classes:

A set of individual tasks

1. Take:	Adonis herbal infusions 180 ml Theophylline 2.0 Mix. Give. Indicate: 1 tablespoon every 3-4 hours daily a day for acute bronchitis	2. Take:	Althea root infusion 100 ml Sodium bicarbonate Sodium benzoate ana 5,0 Simple syrup 20 ml Mix. Give. Indicate: 1 teaspoon 3 times a day
3. Take:	Thermopsis grass infusion 100 ml Sodium bicarbonate 1,5 Ammonia-anisic drops 2 ml Mix. Give. Indicate: 1 tablespoon 3 times a day for tracheitis	4. Take:	Althea root infusion of 5,0 -100 ml Mix. Give. Indicate: 5-10 ml for inhalation for bronchitis
5. Take:	Liquid aloe extract 5 ml Novocaine solution 10.0 ml Glycerin 5.0 Mix. Give. Indicate: 10 ml for inhalation in acute bronchitis	6. Take:	Decoction of senega root 6.0: 180 ml Sodium benzoate 2.0 Aromatic-anise drops 2 ml Mix. Give it out. Indicate. 1 tablespoon 3-4 times a day.
7. Take:	Infusion of plantain leaves 10.0: 200 ml Give it out. Indicate. 1 tablespoon 3 times a day for bronchitis	8. Take:	Decoction of soap root 6.0: 200 ml Mix. Give it out. Indicate. 1 tablespoon 2-5 times a day for lung abscess
9. Take:	Infusion of oregano 15.0: 200 ml Sodium benzoate 4.0 Mix. Give it out. Indicate. 1 tablespoon 3 times a day for pneumonia	10. Take:	Infusion of marsh herb ordinary 10.0: 150 ml Aromatic-anise drops of 4 ml Mix. Give it out. Indicate. 1 tablespoon 2-5 times a day for lung abscess
11. Take:	Infusion of mustard herb 20.0: 200 ml Give it out. Indicate. 1 tablespoon 3 times a day for bleeding	12. Take:	Infusion of chamomile flowers 10.0: 150 ml Boric acid 4 ml Glycerin 20.0 Mix. Give it out. Indicate. To gargle 3-5 times a day.
13. Take:	Decoction of hay leaves 200 ml Mix. Give it out. Indicate. 1 tablespoon 2 times a day for dyspeptic disorders	14. Take:	Infusion of cumin fruits 100 ml Magnesium sulfate 2.0 Give it out. Indicate. 1 tablespoon 2 times a day for flatulence
15.	Infusion of nettle leaves 15.0:	16.	Decoction of viburnum bark 200 ml

Take:	200 ml Give it out. Indicate. 1 tablespoon 3 times a day for ulcers of the hole and duodenum	Take:	Mix. Give it out. Indicate. 1 tablespoon 2 times a day for stomach ulcers
17. Take:	Decoction of ergot roots 200 ml Mix. Give it out. Indicate. For baths and enemas for hemorrhoids	18. Take:	Liquid sand cumin extract 50 ml Give it out. Indicate. 1 teaspoon per glass of hot water. Take 2 glass 2 times a day 30 minutes before meals 3 times a day
19. Take:	Decoction of dandelion root 40.0: 400 ml Mix. Give it out. Indicate 1 glass 2 times daily before meals with biliary tract dissection	20. Take:	Althea root infusion 200 ml Sodium benzoate 13,0 Mix. Give. Indicate: 1 teaspoon 3 times a day

9. Instructive materials for mastering professional skills, skills:

9.1. Method of work execution, stages of execution.

Each student performs one task from the proposed set of individual tasks.

Method of execution.

1. Prescription prescriptions

Write down and arrange the recipe according to the requirements of the Order of the Ministry of Health of Ukraine No. 360 dated July 19, 2006. Describe the medicinal product. Describe the optimal version of the technology of water extraction with theoretical justification and necessary calculations. Give a rating of quality. Specify the preparation of the drug for leave. Write the passport of written control.

2. Theoretical questions.

Answer (in writing) the questions of one of the following individual tasks.
Preparation of water extracts on "cito!".
Difficult cases that occur in the manufacture of water extracts.

10. Materials for self-control of mastering the knowledge, skills, skills provided by this work.

Pick a bet

Medicinal herbal raw materials	Features of the technology
1. Marshmallow root 2. Flax seeds 3. Quince seeds 4. Salep tubers	A. Shake with hot water for 15 minutes B. Shake with cold water for 5 minutes C. Add ethanol, cold and boiled water, shake to cool D. Infuse at room temperature for 30 minutes

Answer. 1-D; 2-A; 3-B; 4-C

11. The theme of the next lesson:

«Final control 1»

Topic of the lesson№16: «Final control №1» - 2 hours

1. Actuality of the topic: Final modular control will assess students' knowledge of the main areas of regulation of drug production in Ukraine, methods of dosing drugs and excipients, technology of powders of any composition, types of solvents, general rules and special cases of preparation of liquid dosage forms, quality control and register before dispensing.

2. Specific objectives:

As a result of studying the discipline, students should **know** the following:

• modern assortment of medications and the possibility of their adequate replacement;

• classification of medications and pharmaceutical dosage forms;

• the composition of medicinal products, characteristics and assortment of pharmaceutical and auxiliary substances used in their manufacturing;

• the highest single and daily doses of narcotic, poisonous, intoxicating, potent, and other substances, norms for their single-leave;

• physicochemical properties of pharmaceutical substances;

• the basic rules for the introduction of pharmaceutical substances into pharmaceutical dosage forms;

• quality control of pharmaceutical dosage forms.

Students should also **be able to**:

• use normative, background, educational, and scientific literature to accomplish professional tasks;

• read and write recipes in Latin;

• prepare dosage forms based on extemporal recipes with the implementation of successive technological operations, accomplish tasks of preparation and release of pharmaceutical dosage forms, taking into account the compatibility of the components of the prescription;

• choose the optimal option of technology of medications for stages of preparation with a quality assessment at each stage;

• check the doses of narcotic and potent medications and the norms for the release of narcotic and intoxicating substances by prescription;

• calculate components of a recipe;

• evaluate the quality of the finished pharmaceutical dosage form;

• identify frequently repeated medications recipes in a pharmacy and make their intra-pharmaceutical procurement;

• conduct a set of measures ensuring pharmacies compliance with the sanitary regime and control of the aseptic preparation of dosage forms;

• use means of small mechanization in the preparation and packaging of dosage forms and medications;

• ensure the safety of goods and materials;

• observe the rules for the occupational safety and health;

• comply with the deontological principles of relationship with employees of pharmacies, patients and their relatives, physicians of medical and preventive institutions;
• conduct sanitary education training among patients.

3. TASKS FOR INDEPENDENT EXTRACURRICULAR WORK:

3.1. Repeat the theoretical material of the topics:

1.Technology of medications as a scientific discipline, its objectives and development direction. Determination of technological terms.
2. The main directions of state regulation of drug production in Ukraine. Recipe, its meaning. Rules for prescribing according to regulations. The main AND, which regulates the conditions of preparation, storage and release of drugs from the pharmacy.
3. Rules of weighing of medicinal and auxiliary substances on manual and prescription scales. Dosage of drugs by volume and drops.
4. Powders as a dosage form. The main stages of the technological process of powders. Rules for mixing components of complex powders.
5. Features of the technology of powders with toxic, narcotic and potent substances, prescribed in small quantities.
6. Features of technology of powders with coloring, hardly crushing substances, extracts and semi-finished products, their packing and registration before release.
7.Characteristics of liquid dosage forms, their classification.
8. Methods of prescribing and indicating the concentration of solutions. Checking the doses of toxic and potent drugs in potions and drops.
9. Solvents for liquid dosage forms, their characteristics. Requirements for purified water and methods of its production.
10. Concentrated solutions and rules of their preparation.
11. Features of the technology of potions with different dry matter content.
12.Characteristics of drops as a dosage form, their classification.
13. Cases of difficulties in the technology of solutions and ways to eliminate them.
14. Standard pharmacopoeial liquids, features of their prescribing and calculations.
15. Non-aqueous solutions.
16. Features of preparation of solutions of the Navy and protected colloids.
17. Registration for release and quality control of drugs with liquid dispersion medium.
18. Characteristics of suspensions as a dosage form and dispersed system; requirements for them. Factors influencing the stability of heterogeneous systems. Dispersion method of making suspensions with hydrophilic drugs. Characteristics of stabilizers and the mechanism of their action.
19. Characteristics of emulsions as a dosage form and dispersed system, their classification. Requirements of the State Pharmacopoeia for oil emulsions. Types of oil emulsions and methods of their determination. Characteristics of emulsifiers, their classification and mechanism of action. General rules and methods of making oil emulsions.

20. Characteristics of infusions and decoctions as a dosage forms, their classification. Requirements of the State Pharmacopoeia for infusions and decoctions. General rules and methods of making infusions and decoctions. General rules and methods of making liquid dosage forms with use mucus and extracts-concentration.

3.2. To repeat the basic normative documentation regulating the prescription, conditions of preparation, technology, storage and release of solid dosage forms and medicinal products with liquid dispersion medium.

LIST OF QUESTIONS FOR ORAL DISUSION:

1. Technology of medications as a scientific discipline, its objectives and development direction. Determination of technological terms: medication, pharmaceutical substance, pharmaceutical dosage form, medicinal product.

2. Classification of dosage forms: dispersological (physicochemical), by the aggregation state, depending on the method of use and administration.

3. Main directions of state normalization of medications production. Normative documents, determining quality, storage and release conditions of medications.

4. Determination of the State Pharmacopoeia of Ukraine, its structure. Specify how the SPU control the quality of particular dosage forms and medications.

5. The recipe, its structure and prescribing rules according to the order of the MoH of Ukraine №360 dated 19.07.2005 p.

6. Types of weighting scales used in pharmaceutical practice, their accuracy class. The configuration of balance and hand scales.

7. The metrological characteristics of scales: accuracy (correctness), sensitivity, stability, persistence of results.

8. Rules for weighting on pharmaceutical balance and hand scales of granular, liquid and viscous substances. Specify a minimum amount of substances of A, B, and general lists which can be weighted on the hand one-gram scales.

9. Determination of powders as a dosage form, their classification and requirements of the SPU for them. Technological stages of complex powders preparation and their characteristics.

10. Methods of powders prescribing. Preparation of complex powders, which contain pharmaceutical substances which are different in density, bulk weight, and particles structure.

11. Rules for writing prescriptions of medications that contain poisonous, narcotic, and intoxicating substances. Recording of prescription of the above-mentioned substances at doses that exceed single or daily doses. Normative documentations that regulate these rules.

12. Rules for work with poisonous, potent, and narcotic substances. Trituration, their purpose, storage, and recording. Technology of trituration in the example 10.0 triturations of atropine sulfate (1:100); triturations used in powders.

13. Preparation of complex powders with poisonous, narcotic, potent, and other substances in different prescribed concentrations. The rules for registration of their release.

14. The degree of disintegration of pharmaceutical substances into powders depending on the medical use in accordance with the SPU requirements. Hardly-disintegrated substances. The role of auxiliary liquids and their amount in the process of disintegration.

15. Examples of odorous and coloring substances and their storage in accordance with the order of the MoH of Ukraine. Particularities of the technology of powders containing odorous and coloring substances.

16. Classification of extracts by the aggregation state, their storage conditions. Technology of thick extracts solutions, their use. Methods of the introducing different extracts into powders.

17. Types of packaging material, which are used in powder technology for substances with different physicochemical properties. Assessment of the powders quality (particles size, homogenity, dispensing accuracy, etc.).

18. Characteristics of liquid dosage forms, their classification. Methods of prescribing and marking the solutions' concentration; checking the doses of poisonous and potent pharmaceutical substances in mixtures.

19. Methods of the purified water preparation; equipment used for this purpose. Purified water quality requirements, types of control, and the storage conditions in accordance with the SPU requirements.

20. Rules for the preparing concentrated solutions for a burette system in accordance with the instruction to the order of the MoH of Ukraine.

21. Configuration of a burette system; rules for care and use of it. Concentrated solutions quality control, correcting their concentrations; storage conditions.

22. Technological stages of aqueous solutions preparing; small mechanical means used at various stages. Preparation of medications by the volumetric method using concentrated solutions, tinctures, extracts, syrups in accordance with the order of the MoH of Ukraine.

23. Technology of medications which include dry medicinal substances in amounts up to 3% or more in accordance with the order of the MoH of Ukraine. Their quality assessment, registration to release, liquid medicaments storage conditions in accordance with the SPU requirements.

24. Definition of standard stactometer. Factors that affect the accuracy of dosing. Terms of stactometer use; non-standard stactometer calibration.

25. Particularities of the technology of aqueous solutions with hardly and slightly soluble substances (ethacridine lactate, copper sulfate, furacilin, boric acid, etc.).

26. The standard pharmacopeia liquids nomenclature, methods of prescribing them in recipes and storage conditions. Preparation of ammonia and acetic acid solutions. Provide the relevant calculations.

27. Features of preparing hydrochloric acid solution for internal and external use (provide examples).

28. Preparation of solutions of hydrogen peroxide, formaldehyde, basic aluminum acetate, potassium acetate. Provide all the necessary calculations using specific examples.

29. Features of dilution of formalin, Burow's liquid, perhydrol, liquid potassium acetate.

30. Assortment and characteristics of non-aqueous solvents. What concentration of ethanol is used to prepare the solutions of boric acid, salicylic acid, and iodine, according to the order of the MoH of Ukraine? Packaging and storage of non-aqueous solutions. Occupational safety for working with combustible and explosive pharmaceutical substances.

31. Particularities of the technology and calculations for ethanol dilution using dilution formulas and alcohol-metric tables. Rules for prescriptions with ethanol execution, registration of ethanol solutions release.

32. Technology of oil and glycerol solutions (provide examples).

33. Characteristics of drops as a dosage form, their classification. Checking of doses of poisonous and potent substances in drops. Rules for preparation of drops using concentrated solutions and by dissolving the solid compounds.

34. Preparation of easily-oxidized compounds solutions (silver nitrate, potassium permanganate, iodine). Specify the iodine concentration in the Lugol's solution for internal and external use.

35. Characteristics and classification of macromolecular compounds. Influence of the molecular structure on the dissolution process of limited and unlimited swelling compounds.

36. Use of high-molecular compounds in a pharmacy. Preparation of solutions of unlimited swelling substances by the example of pepsin.

37. Particularities of the technology of limited swelling high-molecular compounds solutions: gelatin, starch, methyl cellulose.

38. Characteristics and features of colloids solutions. Factors that determine their stability. The meaning of the colloid protection. Name the protected colloids medications.

39. Features of the ichthiol solution technology. Particularities of introducing pharmaceutical substances into high-molecular compounds solution and colloids solutions.

40. Technology of protargol and colloid silver solutions depending on their physicochemical properties.

41. Determination of suspensions as a dosage form and a dispersion system. Cases of suspensions formation. Factors that affect the stability of suspensions. Assessment of the suspensions quality and registration of their release in accordance with the SPU requirements.

42. Dispersion method of obtaining suspensions from hydrophilic substances. Using the Deryagin rule and Rehbinder effect in the suspension technology.

43. Methods of the suspensions preparation. The principle of the resuspension method. For what medications is it used?

44. Preparation of suspensions of medications with pronounced and mild hydrophobic properties. Stabilizers, their quantitative selection. Sulfur suspensions technology.

45. Condensation method of preparing suspensions. Opalescent and muddy mixtures, conditions for their formation. Particularities of the technology of preparing mixture with ammonia-anisic drops and extracts of different consistencies.

46. Determination of emulsions as a dosage form and a dispersion system. Classification of emulsions, requirements for them. Emulsifiers, their brief characteristics.

47. Types of oil emulsions and methods of their determination. Stages of the emulsions technology. Calculations of oil, emulsifier, water. Determination of the primary emulsion readiness.

48. Mechanism of emulsions stabilization and emulsifiers selection principles. Causes of emulsions instability.

49. Introducing pharmaceutical substances with different physicochemical properties into oil emulsions. Assessment of the emulsions quality, storage and registration of their release.

50. Characteristics of infusions and decoctions as a disperse system and a dosage form; requirements for them. Technology of decoctions from raw materials containing tannins, anthraglycosides, saponins.

51. Theoretical bases of plant material extraction (processes of dialysis, diffusion, dissolution, osmosis, etc.). Influence of the degree of disintegration, the raw materials commonality, and its histological structure on the quality of aqueous extracts.

52. The meaning of the ratio of medicinal plant material and extractant, water saturation coefficient, temperature, and duration of the infusion and cooling for the preparation of infusions and decoctions.

53. The meaning of medium pH value for the aqueous extracts technology. Impact of the infused equipment material on the aqueous extracts quality. Particularities of the technology of infusions and decoctions of materials containing alkaloids, cardiac glycosides, and essential oils.

54. Slimes as a dosage form, their use in the medical practice. Particularities of preparation of althea roots infusions from raw material and concentrated extract (provide relevant calculations).

55. Characteristics of concentrated extracts of industrial production which are used in pharmacies instead of raw pharmaceutical material; their range and classification due to the aggregation state. The advantages of the infusions preparation with the usage of standardized concentrated extracts.

56. The differences in the technology and rules for introducing pharmaceutical substances into infusions and decoctions from medicinal plant extracts and standardized concentrates. Ways of improving the technology of aqueous extracts. Meaning of enzymes and microbial flora for the technology of infusions and decoctions.

4. INDEPENDENT AUDITOR'S WORK IN THE CLASS:
TASKS 1. Perform written work according to the proposed option.
TASKS 2. To answer questions from the list of questions for oral questioning.
TASK 3. Repeat the tests.

Tests with answers

1. The pilot-technologist received a prescription for the preparation of a dosage form for a child aged 5 years with the content of a potent substance. Which of the principles should be guided by when checking the dose of the drug?
   A. * Differentiate the dose depending on the age or weight of the child
   B. Take 1/2 doses of an adult
   C. Take 1/4 of the adult dose
   D. Take 1/12 adult dose
   E. Take 3/4 doses of an adult
2. A substance or a mixture of substances authorized by an authorized body for use in the treatment, prevention and diagnosis of a disease of a person or an animal.
   A. * Medicinal product
   B. Medicinal form
   C. Medicinal product
   D. Medicinal raw materials
   E. Pharmacologic means
3. Define the term "medicinal substance":
   A. * a medicinal product that is an individual chemical compound or biological substance
   B. Substance or mixture of substances with established pharmacological activity
   C. A unique medical condition suitable for use
   D. medicinal product in the form of a certain dosage form
   E. natural substances in the unprocessed form, which require application of one or another processing or purification
4. Define the term "medicinal product":
   A. * Medicinal product in the form of a certain dosage form
   B. Substance or mixture of substances with established pharmacological activity
   C. A pharmacological agent authorized by the authorized body for use in the treatment, prevention and diagnosis of a human or animal disease
   D. Medicinal product, which is an individual chemical compound or biological substance
   E. A state-of-the-art condition for the medicinal product or medicinal plant material in which the desired therapeutic effect is achieved
5. Biofarmation is a science that studies
   A. * dependence of therapeutic action of medicinal preparations on an organism from various factors

B. processes for the processing of medicinal products into medicinal products, by providing them with a certain dosage form

C. Changes in the quality of drugs during the shelf life

D. bioavailability of medicinal substances depending on the routes of administration

E. technology of manufacturing of medicinal preparations from natural raw materials

6. Polymorphism is

A. * the ability of one and the same substance to form different crystals in shape

B. one of the physical states of the drug substance

C. the ability of a substance to form various chemical compounds

D. the ability to administer a drug in different dosage forms

E. the process of formation of new compounds during the term of storage

7. Medicines prepared according to standard prescriptions by the pharmaceutical industry in large quantities are

A. * officinal preparations

B. Triggers

C. Extemporal drugs

D. Manuscripts

E. Normative drugs

8. The mainstay of prescription drugs is

A. * prescriptions prescribed by a doctor to a particular patient

B. standard prescriptions, repeatedly checked and included in the prescription reference books

C. prescriptions contained in the State Pharmacopoeia

D. prescriptions, the manufacture of drugs that are carried out as quickly as possible

E. prescriptions for medicinal preparations of industrial production

9. Part of the prescription, which contains information about a health care institution, is called

A. * Inscriptio

B. Invocatio

C. praescriptio

D. Subscription

E. Signature

10. How many types of prescription forms exist in Ukraine?

A. * 2

B. 1

C. 3

D. 4

E. 5

11.When making liquid dosage forms for Extent of dosing liquid ingredients following:

A * Tincture of valerian
B Dimexidum
C methyl salicylate
D-400 Polyethylene
E Perhiidrol

12. In the technology of dosage forms, the following ingredients are always dosed by weight

A * Perhidrol
B ammonia-anise Drops
C Solution citral 1 \% alcohol
D Belladonna Tincture
E elixir Chest

13. A pharmacist prepares 200.0 oil emulsion. Add a weight that can be used for weighing 20.0 peach oil:

A. * Balance pharmaceutical scales
B. torsion balance
C. VR-1
D. weighing
E. BP-5

14. A pharmacist must weigh drug candidates - glucose. What amount of glucose can weigh scales on hand?

A * 0,02
B 0.01
C 0.03
D 0.04
E 0,05

15. When dosing a small amount of liquid used droplometer. Specify the number of drops per 1 ml of purified water under standard droplometer.

A * 20
B 50
C 30
D 40
E 10

16. Patient dosing medicine tablespoon. Specify the number of milliliters of liquid in it:

A * 15
B 25
C 10
D 20
E 5

17. A pharmacist prepares powders with papaverine hydrochloride. Enter manual weight weighing 0.05 g ingredients:

A * BP 1.0
B. BP 5.0

C. BP 20.0
D BP 10.0
E. BP 2.0

18. A pharmacist prepares powders with hard-to-grind material. Specify substance is ground with a volatile liquid?
    A. * Camphor
    B. Magnesium oxide
    C. Zinc sulfate
    D. Copper sulfate
    E. Glucose

19. Pharmacist compounded powders which include camphor. What capsule should be taken for their packaging?
    A. * Butter
    B. Paper
    C. Paper
    D. Paraffin
    E. cellophane

20. Pharmacist compounded by prescription medication. Choose the best option Technology:
Rp .: Magnesii oxydi
Natrii hydrocarbonatis ana 0,2
M. f. 70ulv.
D. td №12
S. 1 powder 3 times a day.
    A. * grind sodium bicarbonate added magnesium oxide, mixed.
    B. grind magnesium oxide, sodium bicarbonate is added, mixed.
    C. grind sodium bicarbonate with alcohol added magnesium oxide, mixed.
    D. grind of magnesium oxide, sodium bicarbonate added, then the balance of magnesium oxide, mixed.
    E. grind magnesium oxide with alcohol added sodium bicarbonate, confused.

21. Pharmacist compounded by prescription medication,
Rp .: Papaverini hydrochloridi 0,01
Sachari 0,25
Mf pulv.
Dtd №10
S. 1 powder 3 times a day. Expect a lot of other powder
    A. * 0,26
    B. 0,23
    C. 0,22
    D. 0,28
    E. 0,25

22. When preparing powders in conditions of pharmacies into account physical and chemical properties of individual ingredients. Please indicate which drug is mixed with a powder without further crushing weight:

A. * Starch
B. Camphor
C. Menthol
D. salicylic acid
E. streptocide

23. Pharmacy received the prescription:
Rp .: Dibazoli 0.05
Papaverini hydrochloridi 0.15
Sacchari 2.5
M. fiat pulv.
Divide in partes aequales № 10. Add one powder weight
A. * 0,27
B. 2,7
C. 0,25
D. 0,26
E. 0,30
24. Among the drugs ex temporal preparation occupy a prominent position powders. Indicate which of the following components injected into the powder without grinding:
A. * basic bismuth nitrate
B. ascorbic acid
C. camphor
D. Xeroform
E. Calcium gluconate
25. A pharmacist prepares powders, rubbing one component of prescription from ethanol. Indicate which substances characteristic of this technology:
A. * streptocide
B. Starch
C. Talc
D. Zinc oxide
E. Clay White
26. Which drugs should grind of an auxiliary liquid in the manufacture of powder?
A. * salicylic acid, sodium tetraborate, streptotsid
B. glucose, sodium bicarbonate, dibazol
C. menthol, camphor, dermatol
D. iodine, magnesium oxide, salicylic acid
E. sodium tetraborate, thymol, zinc oxide
27. The pharmacy made effervescent powders. Specify a matter which, in addition to the citric acid is included in their composition.
A. * Sodium bicarbonate
B. Magnesium oxide
C. Sodium chloride
D. Sodium Sulfate

E. Sugar

28. Does the pharmacist use triturations in the manufacture of powders for words containing platifilline hydrotartrate 0.05 for all doses?

A. * Not used
B. used in a ratio of 1:10
C. used in a ratio of 1: 100
D. powders produced twice
E. recipe containing 0.05 grams of toxic substances not being prepared

29. Assistant prepared powder by prescription. What triturations he used in the process:

Rp: atropine sulfate 0,0005
phenobarbital 0,02
papaverine hydrochloride 0,02
mix. Give such doses number
Indicate. 10: 1 powder 2 times a day.

A. * 1: 100
B. 1:10
C. 1: 100 and 1:10
D. 1 1000
E. Not used

30. A pharmacist prepared substance by prescription:

Rp: Dibazole 0,1
papaverine hydrochloride 0,2
phenobarbital 1,0
Sugar 2,0
Mix to form a powder
Da tales doses 10 .
Indicate. 1 powder 3 times a day.

What is the equal mass of powder on prescription and what is allowed deviation in %?

A. * 0,33 ± 5%
B. 3,3 ± 3%
C. 0,033 ± 15%
D. 0,55 ± 15%
E. 0,33 ± 15%

31. Pharmacist has to prepare 5.0 atropine sulfate triturations (1: 100). How many toxic substances and lactose he should take:

A. * 0,05: 4, 95
B. 1,0: 4, 0
C. 0,1: 4, 9
D. 0,5: 4, 5
E. 0,01: 4, 99

32. Pharmacist-technologist prepared triturations 10.0 etylmorfine hydrochloride (1: 100). How many toxic substances and excipient he took?

A. * 0,1 g etylmorphine g / s and 9.90 grams of sugar
B. 0.01 g etylmorphine g / s and 9.99 grams of sugar
C. 0,1 g etylmorphine g / h and 10.0 grams of sugar
D. 0,05 g etylmorphine g / s and 9.95 grams of sugar
E. g etylmorphine 1.0 g / h and 9.0 grams of sugar

33. Prescription issued 0.0001 atropine sulfate. Specify the number of triturations atropine sulfate (1: 100), which is required for preparing 10 powders:
A. * 0,10
B. 0,20
C. 0,50
D. 0.01
E. 0.02

34. The pharmacist must prepare triturations platifilline hydrotartrate (1:10). Choose the best filler for making triturations:
A. * Lactose
B. Refined sugar
C. Modified starch
D. Rice Starch
E. mannitol

35. A pharmacist is preparing powders with platifilline gidrotartrate. Specify the minimum weight of toxic substances on the hand scales:
A. * 0,05
B. 0,02
C. 0.03
D. 0,1
E. 0,15

36. Pharmacist compounded 20.0 triturations atropine sulfate (1: 100). Specify the number of toxic substances and fillers:
A. * 0,20 and 19,8
B. 0.02 and 19.98
C. 0,1 and 19,0
D. 2,0 and 18,0
E. 0,20 20,0

37. Pharmacist compounded by prescription medication,
Rp .: Papaverini hydrochloridi 0,01
Saschari 0,25
Misce fiat pulvis
Da tales doses №10
Signa. 1 powder 3 times the mass of one den.
Calculate mass of the powder
A. * 0,26
B. 0,23
C. 0,22
D. 0,28

E. 0,25

38. A pharmacist prepared solution of 20.0 g of thick extract of belladonna (1: 2). Specify how much alcohol he had taken:

A. 1.0 *
B.6.0
C. 10.0
D. 12,0
E. 2,0

39. Pharmacist compounded powders. Which auxiliary liquid he has used as a grinding ingredient:

A. * Fenilsalitsylat
B. Sodium bicarbonate
C. furatsillin
D. Novocaine
E. Dibazol

40. Pharmacy got prescription for compounding powders, which include odorous substances. Indicate which of the following matters relating to odorous substances:

A. * Camphor
B. Fenilsalitsylat
C. Ethacridine lactate
D. streptocide
E. Bismuth nitrate core

41. The pharmacist received a prescription for powders with an extract of belladonna. Specify the amount of dry extract of belladonna should be used in powder technology:

Rp: Extr.Belladonnae 0,01
Papaverini hydrochloridi 0,02
sacchari 0,2
M.f. pulv.
Dtd№10
S. 1 powder 3 times a day

A. 0.20 *
B. 0,50
C. 0,46
D. 0,10
E. 0,15

42. The task is to prepare powders for prescription:

Rp: Camphorae 0,1
Glucosi 0,25
M.f. pulv.
Dtd N 10
S. 1 powder 3 times a day.

Choose the best technology option:

A. Glucose * wipe mortar, pour on the capsule crushed, in the presence of alcohol camphor, mix
B. In a mortar weigh camphor, add the glucose, mix
C. overwrite glucose mortar, pour in a capsule, crushed camphor, mix
D. Camphor placed between layers of glucose mix
E. Grind in a mortar glucose with alcohol, add camphor, mix

43. The pharmacist needs to prepare powders that contain menthol. How should he achieve the required degree of crushing menthol?
A. * grind with alcohol or ether
B. pound with glycerin or chloroform
C. pound with purified water
D. pound with other components of the recipe
E. Carefully grind with sugar

44. A pharmacist prepared powders comprising streptocide. Specify the correct way of adding the streptotside:
A. * rubs primarily with alcohol
B. Add as triturations
C. Use Method "three layers"
D. Add at the end and mixed to homogeneity
E. Add primarily by grinding with glycerin

45. A pharmacist prepared the powders by the prescription that contains an extract of belladonna 0,015 per dose, and took dry extract in ten doses:
A. 0.3 *
B. 0,15
C. 1,5
D. 0,2
E. 0,015

46. A pharmacist prepared from powder substance in a separate mortar on a separate workplace, using the "three layers" method. Specify a matter which is characterized by the technology?
* A. Methylene blue
B. Sulfur
C. Glucose
D. protargolum
E. Copper sulfate

47. To hard-to-grind substances include:
A. * Iodine, menthol, streptotsid, sodium tetraborate
B. camphor, menthol, boric acid, fenilsalitsylat
C. Menthol, streptocide, boric acid, magnesium oxide
D. streptocide, iodine, sodium tetraborate, riboflavin
E. Fenilsalitsylat, camphor, methylene blue, thymol

48. The pharmacist received a prescription for powders with an extract of belladonna. Specify the amount of dry extract of belladonna should be used in powder technology:

Rp: Extr.Belladonnae 0,01
Papaverini hydrochloridi 0,02
sacchari 0,2
M.f. pulv.
Dtd№10
S. 1 powder 3 times a day

A. 0.20 *
B. 0,50
C. 0,46
D. 0,10
E. 0,15

49. A pharmacist prepares powders with hard-to-grind material. Specify with what substance should be ground a volatile liquid?

A. * Camphor
B. Magnesium oxide
C. Zinc sulfate
D. Copper sulfate
E. Glucose

50. Pharmacist compounded powders which include camphor. What capsule should be taken for their packaging?

A. * Butter
B. Paper
C. Paper
D. Paraffin
E. cellophane

51. Pharmacist compounded by prescription medication. Choose the best option Technology:
Rp .: Magnesii oxydi
Natrii hydrocarbonatis ana 0,2
M. f. 70ulv.
D. td №12
S. 1 powder 3 times a day.

A. * grind sodium bicarbonate added magnesium oxide, mixed.
B. grind magnesium oxide, sodium bicarbonate is added, mixed.
C. grind sodium bicarbonate with alcohol added magnesium oxide, mixed.
D. grind of magnesium oxide, sodium bicarbonate added, then the balance of magnesium oxide, mixed.
E. grind magnesium oxide with alcohol added sodium bicarbonate, confused.

52. Pharmacist compounded by prescription medication,
Rp .: Papaverini hydrochloridi 0,01
Sachari 0,25
Mf pulv.
Dtd №10
S. 1 powder 3 times a day. Expect a lot of other powder

A. * 0,26
B. 0,23
C. 0,22
D. 0,28
E. 0,25

53. When preparing powders in conditions of pharmacies into account physical and chemical properties of individual ingredients. Please indicate which drug is mixed with a powder without further crushing weight:
A. * Starch
B. Camphor
C. Menthol
D. salicylic acid
E. streptocide

54. Pharmacy got prescription for compounding powders, which include odorous substances. Indicate which of the following matters relating to odorous substances:
A. * Camphor
B. Fenilsalitsylate
C. Ethacridine lactate
D. streptocide
E. Bismuth nitrate core

55. The drug received a prescription for powders with an extract of belladonna. Specify the amount of dry extract of belladonna should be used in powder technology:
Rp: Extr.Belladonnae 0,01
Papaverini hydrochloridi 0,02
sacchari 0,2
M.f. pulv.
Dtd№10
S. 1 powder 3 times a day
A. 0.20 *
B. 0,50
C. 0,46
D. 0,10
E. 0,15

56. Necessary to prepare powders for prescription:
Rp: Camphorae 0,1
Glucosi 0,25
M.f. pulv.
Dtd N 10
S. 1 powder 3 times a day.
Choose the best option technology:
A. Glucose * wipe mortar, pour on the capsule crushed, in the presence of alcohol camphor, mix
B. In a mortar weigh camphor, add the glucose, mix

C. overwrite glucose mortar, pour in a capsule, crushed camphor, mix
D. Camphor placed between layers of glucose mix
E. Grind in a mortar glucose with alcohol, add camphor, mix

57. The pharmacist needs to prepare powders that contain menthol. In what way a pharmacist must achieve the required degree of crushing menthol?
* A. grind with alcohol or ether
B. pound with glycerin or chloroform
C. pound with purified water
D. pound with other components of the recipe
E. Carefully grind with sugar

58. For a complete chemical analysis of purified water is sent to the analytical lab once:
A. * Quarter
B. Moon
C. Week
D. Year
E. Six months

59. The volume of purified water, taken for the manufacture of 200 ml of 20% magnesium sulfate concentration (VIC = 0.5 ml / g), is:
A. 180 ml *
B. 200 ml
C. 185.5 ml
D. 190 ml
E. 195 ml

60. Calculate how much potassium bromide (VIC 0.27 ml / g) and purified water should be taken to prepare 500 ml of 20% solution of potassium bromide:
A. * 100.0 potassium bromide and 472 ml of purified water
B. 100,0 potassium bromide and 500 ml of purified water
C. 200,0 potassium bromide and 300 ml of purified water
D. 200,0 potassium bromide and 944 ml of purified water
E. 110.0 potassium bromide and 500 ml of purified water

61. Pharmacist-technologist prepared concentrated solution of sodium bromide. Specify that his actions after the preparation of the solution:
A. * Gave pharmacist-analyst for the full chemical analysis
B. posted written passport control
C. designed to leave
D. placed in stagnal
E. filtered solution

62. A pharmacist prepared 1000 ml of a 10% solution of calcium gluconate. Specify how much material and water it took to prepare (VIC calcium gluconate = 0.5)
A. * 100.0 and 950 ml
B. 50,0 and 950 ml
C. 100,0 and 900 ml

D. 200,0 and 850 ml
E. 200,0 and 800 ml

63. Pharmacist-technologist prepared concentrated solution and delivered for analysis. Determine what would be his actions after receiving a positive test result:
A. filtered solution *
B. Filter solution
C. moved into the material stagnal
D. designed for use
E. dismissed

64. Concentrated solutions are prepared in a pharmacy in mass and volume concentration. Specify what is meant by the designation of concentration of the solution 1:10?
* A. 1.0 g of substance and solvent to obtain 10 ml
B. 10.0 g substance and 1 ml of solvent
C. 1.0 g and 10 g of substance solution
D. 1,0 g substance and 10 mL of solvent
E. 1,0 g of substance and 9 ml of solvent

65. Pharmacy received the prescription for solution in the ration of the active substance and solvent 1: 5000. Where in the concentration corresponding to this ratio:
A. * 0.02%
B. 5,0%
C. 0,5%
D. 0,1%
E. 0,05%

66. The number of purified water is calculated using the coefficient of volume increase, if the concentration of the solution is:
A. * 3%
B. 2%
C. 0,5%
D. 0,3%
E. 2,5%

67. To prepare 250 ml of 50.0 pharmacist used potassium iodide. What is the concentration of the resulting solution?
A. * 20%
B. 50%
C. 25%
D. 10%
E. 15%

68. A pharmacist prepared solution osarsols. Enter technology features of the solution:
A. * dissolved in a solution of sodium bicarbonate
B. Dissolve in water freshly distilled
C. Dissolve in hot water

D. Dissolve in sodium chloride
E. Dissolve in cold water

69. How much Ethacridine lactate should weigh the pharmacist (1: 1000) To prepare 200 ml of solution?
A. 0.2 *
B. 0,1
0.02 C.
0.04 D.
E. 2,0

70. Pharmacist compounded 1% aqueous solution of iodine. Specify particular solution preparation.
A * dissolve in a solution of potassium iodide
B. Dissolving in hot water
C. dissolved in water freshly distilled
D. Grinding in a mortar with water
E. dissolve in cold water

71. The pharmacist must prepare Furacilinum (1: 5000). Add feature dissolving furatsillin:
A. * In boiling water purified in the presence of sodium chloride
B. In cold purified water
C. a minimum quantity of ethyl
D. In purified water after previous grinding
E. In pre-filtered purified water

72. The patient should prepare a solution of potassium permanganate. What solvent used in this case to ensure the stability of the active ingredient?
A. freshly purified water *
B. purified water
C. Ethanol
D. demineralized water
E. Glycerin

73. Pharmacist compounded drops for internal application structure: adonizydi 5 ml of tincture of valerian and lilies equal to 10 ml, 0.1 g menthol, 2.0 g of potassium bromide. What should dissolve potassium bromide:
A. * In adonizyde
B. In tincture lily
C. In valerian tincture
D. In a mixture of liquors
E. Enter a vial least

74. In preparing solutions of some drugs should take into account the peculiarities of dissolution. What is the result from substances dissolved in the presence of sodium bicarbonate?
A. * Osarsol
B. furatsillin
C. Calcium gluconate

D. Lead acetate
E. Iodine

75. A pharmacist prepared a 2% solution of potassium permanganate. Please indicate which option he should choose:
A * dissolve by grinding in a mortar with freshly distilled, purified filtered water
B. To dissolve a vial of purified water
C. dissolve in the base of purified water, filtered
D. dissolve a vial of freshly distilled, filtered purified water
E. dissolve in the stand in a hot solution of sodium chloride

76. A pharmacist prepared solution of iodine. Specify how he had dissolved iodine:
A * dissolve in a saturated solution of potassium iodide
B. dissolve in hot water
C. dissolve in alcohol
D. dissolve in a dilute solution of potassium iodide
E. dissolve in cold water

77. Pharmacist compounded medicine by given words. What technology he chose:
Rp .: Acidi borici 0,1
10.0 Glycerini
Misce.Da.Signa. Ear drops.
A. * The vial placed boric acid, glycerol and then heated
B. In a mortar stamped boric acid with glycerol
C. In the vial placed glycerin, boric acid is added, heated
D. In the stand placed glycerin dissolved therein boric acid
E. In a porcelain cup placed glycerin dissolved therein boric acid

78. From recipe issued 5% formalin solution is 200 ml. Calculate the amount of standard solution of formaldehyde and purified water that is necessary for the preparation of this drug:
A. * 10 ml of standard solution of formaldehyde and 190 ml of purified water
B. 10 ml of standard solution of formaldehyde and 200 ml of purified water
C. 27 ml of standard solution of formaldehyde and 173 ml of purified water
D. 5 ml of standard solution of formaldehyde and 195 ml of purified water
E. 25 ml of standard solution of formaldehyde and 175 ml of purified water

79. The process of blending ethyl alcohol and water the phenomenon of contraction. What it is?
A. * Decrease the total volume by mixing alcohol and water
B. Increase the total volume by mixing alcohol and water
C. immiscibility of water and alcohol of various concentrations
D. Mutual dissolution alcohol and water
E. Equalization concentration by mixing alcohol and water

80. The recipe was discharged 5% formalin solution 100ml. What amount of 37% formaldehyde pharmacist should take for solution
A. * 5 ml
B. 12.5 ml

C. 4,5 ml
D. 10 ml
E. 15 ml

81. The solution of hydrogen peroxide is released from pharmacies in different concentrations. What concentration of solution the patient needs if the recipe was observed concentrations?
A. * 3%
B. 30%
C. 20%
D. 10%
E. 2%

82. The patient is prescribed lotion:
Rp .: Sol. Liquoris Burovi 10% 100 ml
Da. Signa. Lotion.
What volume of drilling fluid necessary measure to make this drug?
A. * 10 ml
B. 90 ml
C. 20 ml
D. 80 ml
E. 50 ml

83. The patient is prescribed mixture:
Rp .: Sol. Acidi hydrochlorici 2% 100 ml
Da. Signa. 1 tbsp. l. 3 g. Per day with meals
What volume of diluted hydrochloric acid solution (1:10) is necessary to measure its preparation?
A. * 20 ml
B. 25 ml
C. 15 ml
D. 2 mL
E. 5ml

84. The patient is prescribed 3% alcohol solution of boric acid. Wherein the concentration of ethanol used for the preparation of the solution required by regulations?
A. * 70%
B. 95%
C. 90%
D. 60%
E. 40%

85. A pharmacist prepared oil solution of menthol. Select the correct way to dissolve the drug:
A. * Dissolve the butter in a vial
B. ground in a mortar with oil
C. Dissolve oil in a stand
D. ground in a mortar with alcohol, then add oil

E. Dissolve in a porcelain cup with oil

86. necessary to prepare the drug for prescription:
Rp .: Sol. Acidi hydrochlorici 1% 100 ml
Da. Signa. One tablespoon 3 times a day.
Specify the number hydrochloric acid solution (1: 10) and water to prepare:

A. * 10 ml and 90 ml
B. 1 ml and 99 ml
C. 20 ml and 80 ml
D. 10 ml and 100 ml
E. 3 ml and 97 ml

87. Pharmacist compounded oil solution. Specify the sequence of process stages

A. * Dry Matter placed in a vial and weighed oil
B. In a bottle weighed and added solvent dry matter
C. substance is mixed in a mortar with measured amounts of solvent
D. In a base oil and dissolved substance in a bottle
E. substance is placed in a stand and weighed solvent

88. To macromolecular substances that infinitely swell, include:

A. * Pepsin
B. Starch
C. Polyvinyl alcohol
D. Gelatin
E. Methylcellulose

89. The warning label "Pre-Use Heater" provides solutions::

A. * Gelatin
B. Krohmaly
C. Pepsin
D. Methylcellulose
E. Nazotozi

90. The pharmacist prepared the drug, dissolving the active substance in water, acidified with a solution of hydrochloric acid (1:10). Specify for which substance this technology is characteristic:

A. * Pepsin
B. Tannin
C. Osarsol
D. Kolargol
E. Copper sulphate

91. The patient is prescribed a solution under the following word:
Rp .:Acidihydrochloric 2% - 100 ml
Pepsin 2.0
Da. Signa. On a tablespoon 3 times a day during meals.
How to dissolve pepsin to provide therapeutic activity of the drug?

A. * In a pre-prepared solution of hydrochloric acid
B. In 20 ml of hydrochloric acid solution

C. In 98 ml of purified water
D. Rub off 10 ml of purified water
E. In 20 ml of hydrochloric acid solution

92. For the preparation of drugs, solutions of high molecular weight compounds are used. What kind of technological operation should be carried out in advance for the preparation of solutions of swollen substances?
A. * Pour the optimum amount of water purified to swell
B. Dissolve in a small amount of hydrochloric acid
C. Dissolve in purified filtered water
D. Rub with a small amount of cleaned water
E.Dissolve in water purified when heated

93.Indicate which technology the pharmacist used to prepare the starch solution:
A. * Blended with cold water, poured into boiling water and boiled for 1-2 minutes
B. Blended with hot water, poured into cold water
C. Dissolved in cold water, then heated
D. Dissolved in a vial for release in freshly distilled, filtered water purified
E. Dissolved in boiling water

94. Which of the following macromolecular compounds refers to infinitely swollen :
A.*Whitefish extract
B.Gelatin
C.Methylcellulose
D.Polyvinylpyrrolidone
E.Starch

95. The patient needs to prepare a solution of gelatin. What is the feature of dissolving gelatin?
A.*After swelling gelatin is dissolved in water when heated
B. Gelatin dissolves in boiling water
C. Gelatin dissolves in acidified water
D. Gelatine is rubbed with alcohol and dissolved in water when heated
E. Gelatin dissolves in the submerged water

96.The pharmacy received a recipe:
Rp .: Mucilaginis Amyli 50.0
Da. Signa. For an enema
What amount of starch and purified water was used by a pharmacist while cooking?
A.*1.0 starch; 49 ml of purified water
B. 1.0 starch; 50 ml of purified water
C. 2.0 starch; 48 ml of purified water
D. 5,0 starch; 45 ml of purified water
E. 10.0 starch; 40 ml of purified water

97.The pharmacist prepared 100 ml of starch solution 2%. Specify the rational technology:

A.*2.0 starch is poured into 8 ml of purified water; 90 ml of purified water is brought to a boil, poured into a suspension of starch, boiled under constant stirring for 1 min, filtered in a vial for release
B. In the stand, measure 198 ml of purified water, dissolve 2,0 starch, filter in a vial for release
C. In 98 ml of boiling water purified, dissolve 2,0 starch, filter in the vial for release
D. 2.0 starch is poured into 8 ml of purified water, boiled for 1 min, cooled, add the remaining purified water
E. In a bottle for leave, measure 98 ml of purified water, dissolve 2,0 starch, shake

98.Pharmacist has prepared a prescription drug:
Rp.: Sol. Protargoli 0.3% - 10 ml
Glycerin 1.0
DS For washing.
Specify the best technology option
A. * Protargol rub in a mortar with glycerol and add water
B. Glycerol dissolves in water and add protargolum
C. Dissolve the protargol in the support and add glycerol
D. In a vial weigh the protargol, dissolve in water, add glycerol
E. In a vial we glycerin, water, protargol are sequentially weighed

99. A pharmacist prepares a solution of a protected colloid by the following technology: measures the water purified in a porcelain cup, pours on the surface of the water a thin layer and does not mix. Specify the substance for which this technology is characteristic:
A. * Protargol
B. Kolargol
C. Ichthyol
D. Starch
E. Pepsin

100.The pharmacist prepared an aqueous solution of protargola. Specify which technology the pharmacist chose:
A. * Poured on the surface of water and left to completely dissolve
B. Dissolved in the bottle for purification in the water
C. Dissolve when rubbed
D. Dissolved in warm water
E. Dissolved in cold water

101. The pharmacist prepared a solution of ihtiol. Specify the peculiarity of the dissolution of ichthyol:
A. * Weighed ichthyol in a porcelain cup and, stirring, adding water, strain into the vial
B. In an old vial we weighed the ichthyol, added water and filtered
C. Ichthyol was weighed into an old mortar and torn with water
D. Put in a bottle water, added ichthyol, filtered

E. Weighed the ichthyol in the stool, added water, dissolved and strained into the vial for release

102.The pharmacist prepared a 2% solution of collargolum. Specify which technology is chosen by the pharmacist?

A. *Dissolve when rinsed with water purified in a mortar
B.Poured on the surface of the water and left to completely dissolve
C. Dissolved in the bottle for purification in the water
D. Dissolved in hot water in the stand
E. Diluted in cold water, brought to a boil under constant stirring .

103.Specify the features of the collargol solution preparation:

A.*Disperse with water or glycerol
B. Dissolved in acidified water purified
C. Pour onto the surface, do not shake the water
D. Add to boiling water as a suspension
E. Leave to swell at room temperature

104. Pharmacist prepared a 2% solution of collargol. Indicate which technology the pharmacist chose:

A. * Dissolved when rubbed with water in a mortar
B. Dissolved in the bottle for purification in the water
C. Pour onto the surface of the water and leave to completely dissolve
D. Dissolved in hot water in the stand
E. Dissolved when rubbed with alcohol in a mortar

105. In medical practice, solutions of protected colloids are used. Specify a substance that belongs to the specified group:

A. * Protargol
B. Bismuth nitrate is basic
C. Potassium iodide
D. Camphor
E. Sodium chloride

106.The pharmacist filtered the water in a vial for dispensing, collagen collapsed and shoved to prepare the collargol solution. For what concentrations of collargol is this technology desirable?

A. * up to 1%
B. up to 2%
C. up to 5%
D. up to 10%
E. up to 20%

107. The pharmacist prepared a suspension consisting of 2 grams of streptocide. What amount of methyl cellulose should be used to stabilize the suspension?

A. 2,0
B. 0,5
C. 1.0
D. 5.0
E. 0,2

108. The pharmacist prepares a suspension containing 2.0 phenylsalicylate . Specify the optimal amount of methylcellulose required to stabilize the suspension:

A. 2,0
B. 1.0
C. 3.0
D. 4,0
E. 5.0

109. Suspensions are characterized by the following positive features:

A. * The ability to correct the taste
B. Accurate dosage
C. The impossibility of their release in the form of dry semifinished products (granules)
D. Aggregate resistance
E. Sedimentary stability

110. The instability of the disperse system in the form of suspensions is positively influenced by:

A. * Reduced viscosity of dispersed medium
B. Increased viscosity of dispersed medium
C. Minimum particle dispersion
D. Small magnitude of the difference between the density of the phase and the medium
E. Reduced temperature

111. To hydrophilic medicinal substances include:

A. * Zinc oxide
B. Menthol
C. Terpinhydrate
D. Timol
E. Sulfur

112. To substances with expressed hydrophobic properties include:

A. * Menthol
B. Magnesium oxide
C. Sulfur
D. Terpinhydrate
E. White clay

113. The method of preparation of suspensions depends on the properties of the substance that is part of their composition. Specify substances that have hydrophobic properties:

A. * Terpinhidrat, fenilsalitsylat
B. Sulfur, Bismuth Nitrate Basic
C. Zinc oxide, white clay
D. Terpinhydrate, zinc oxide
E. Phanylsilicylate , talc

114. It is necessary for the patient to prepare a suspension consisting of 2 grams of menthol. What amount of 5% solution of methyl cellulose should be added to stabilize the suspension?

A. * 4.0
B. 0,5
C. 1.0
D. 0,4
E 2.0

115. The pharmacist prepared a suspension with a hydrophobic substance. Specify the disperse system stabilizer:

A. * Twin-80
B. Sodium chloride
C. A solution of hydrochloric acid
D. A solution of sodium hydroxide
E. Esilon

116. When preparing suspensions, the medicinal substance is triturated with a small amount of liquid. Specify its optimal amount according to Deryagin's rule , which is necessary for grinding 20 g zinc oxide.

A. * 10 ml
B. 5 ml
C. 2 ml
D. 1 ml
E. 0.5 ml

117. Sustainability of suspensions increases when substances are added to them, which increase the viscosity of the dispersion medium. Specify the substances that have these properties.

A. * Glycerin
B. Water is purified
C. Ethyl alcohol
D. Dimexid
E. Ether

118. Seed-up stability is directly proportional to:

A. * Viscosity of the dispersion medium
B. Radius of particles
C. The values of acceleration of free fall
D. Differences in the value of the density of the disperse phase and the dispersive medium-high
E. Storage time

119. To obtain a stable dispersion system, the stabilizer needs to be added up to:

A. * Terpinhydrate
B. Ichthyol
C. Protargol
D. Bismuth of basic nitrate
E. Krohmaly

120. By mass, water suspensions are prepared with the concentration of medicinal products:

A. * 3% and more
B. 1% or more
C. Up to 2%
D. 2% or more
E. Up to 5%

121. Completeı: There is no stage in the manufacture of slurries ...

A. * Filtration
B. Shredding
C. Mixing
D. Packings
E. Registration

122. The pharmacist prepared a suspension by a method of scabbing. With which of the listed substances he prepared the drug:

A. Bismuth nitrate is basic
B. Menthol
C. Sulphadimezin
D. Sulfur is precipitated
E. Starch

123. The assistant prepared a slurry by condensation method. Which of the following substances form a sediment:

A. * Calcium chloride with sodium bicarbonate
B. Caffeine: Sodium benzoate from zinc oxide
C. Sodium Bromide with Camphor
D. Potassium bromide with sodium benzoate
E. Magnesium potassium sulfate with iodide

124. The pharmacist has prepared a suspension of sulfur. Specify which stabilizer to use:

A. * Soap medical
B. Lanolin
C. Gelatosis
D. Starch solution
E. The methylcellulose solution

125. The pharmacist prepared a suspension of hydrophobic substance, for which he took an equal amount of 5% solution of methyl cellulose. Specify this substance:

A. * Phyenylsalicylic acid
B. Zinc oxide
C. Timol
D. Talc
E. Sulfur

126. Indicate which basic suspension quality indicator is to be checked in accordance with the requirements of the DF:

A. * Resuspendiveness

B. Transparency
C. Volume
D. Color
E. Thermal stability

127. In the absence of a designation of oil in an emulsion, according to the instructions of the DF, the following are used:
A. * Peach
B. Ritsinov
C. Vaseline
D. Mitya
E. Balsam

128.What number oils and emulsifier(desires) necessary to take, in order to prepare150 ml oil emulsion?
A. * 15.0 and 7.5
B. 10.0 and 15.0
C. 7.5 and 10.0
D. 10.0 and 5.0
E. 1,5 and 0,75

129. According to the order of the Ministry of Health of Ukraine No. 197 dated September 7, oil emulsions are prepared:
A. By weight
B. Mass-volume method
C. By volume
D. With medicinal substances up to 3% - by mass-volume method, more than 3% by weight
E. With medicinal substances up to 5% - mass-volume method, more than 5% - by weight

130. The pharmacist has prepared 150.0 emulsions. Specify the amount of oil he took if the doctor did not specify in the recipe.
A. * 15.0
B. 10.0
C. 30.0
D. 5.0
E. 20.0

131. The recipe contains 100.0 oil emulsion. Specify the amount of oil, desiccant, and purified water required for the manufacture of the primary emulsion by the continental method:
A. * 10.0; 5,0; 7.5 ml
B. 20.0; 10.0; 30 ml
C. 5.0; 10.0; 7.5 ml
D. 10.0; 5,0; 1.5 ml
E. 5.0; 5,0; 5 ml

132. The pharmacist prepared an emulsion of type o / v. Specify what determines the type of emulsion:

A. * The nature of the emulsifier
B. Number of oils
C. Amount of water
D. Nature of medicinal substances
E. Method of administration of medicinal substances

133. A pharmacist prepares a 200.0 oil emulsion. Specify the scales that need to be used to weigh 20.0 peach oil:
A. *Scales technical kilograms
B. Torsion balance
C. Scales manual twenty - gram
D. Scales manual stogram
E. Scales manually one - gram

134. A recipe came to the pharmacy:
Rp .: Emulsi oleos 100.0
Menthol 2.0
Misce. Da. Signa. 1 item l 3 times a day
As an emulsifier a pharmacist used desirable. How much of the purified water should be measured to prepare the primary emulsion?
A. *9 ml
B. 5 ml
C. 7.5 ml
D. 10 ml
E. 12 ml

135. The pharmacist prepared the primary emulsion and added to it a remnant of water to 100,0 - on a surface of an emulsion appeared greasy spots. What are his further actions?
A. *Emulsion need to be reprepared
B. Within 15 min. mix with a homogenizer type MR-302 and let go of the patient
C. Pour part of the emulsion, add 2 ml of potassium soap, shake and combine with the remainder of the emulsion
D. Add to the emulsion 20 ml of a 5% solution of methyl cellulose and shake
E. Paste the label "Before use shake" and release

136. The patient should prepare 100.0 emulsions containing 2.0 camphor. Specify the amount of desaturation required to prepare the emulsion:
A. *6,0 g
B. 12.0 g
C. 5.0 g
D. 1.0 g
E. 0 g

137. Identify a rational way of introducing into the emulsion of menthol:
A. * Dissolve in oil
B. Disperse with the addition of a finished emulsion
C. Dissolve in water intended to dilute the primary emulsion

D. Dissolve in the final emulsion when heated
E. Enter into the finished primary emulsion

138. The pharmacist prepared an emulsion of zinc oxide. Specify a rational way of administering the substance:
A. * Introduction to the type of suspension in the prepared emulsion
B. Solubility in oil
C. Shredding with water for dilution of the primary emulsion
D. Dissolution in water for the preparation of a primary emulsion
E. Dissolution in the ready emulsion

139.The doctor prescribed emulsion of olive oil, which includes anesthetic. Specify the anesthetic administration feature:
A. * Dissolve anesthezin in oil before cooking the emulsion
B. Dissolve anesthezine in a finished emulsion
C. Dissolve anestezin in purified water
D. Dissolve anestezin in the primary emulsion
E. Dissolve in alcohol and add to the primary emulsion

140. According to the prescription of a doctor in the pharmacy, it is necessary to prepare an emulsion, which includes phenylsalicylate . How does a pharmacist need to administer a drug in an emulsion so that the drug does not lose pharmacological effect?
A. * To grind under the rule of Deryagin with a finished emulsion
B. Rub with emulsifier and oil
C. Dissolve with finished emulsion
D. Dissolve in water for dilution of the emulsion
E. Dissolve in oil

141. The pharmacist has prepared oil emulsion. How does he need to enter a menthol?
A.*Dissolve in oil at 40-50 ° C
B. Mix with the emulsifier and add purified water
C. Add to the finished emulsion
D. Enter the type of suspension into the prepared emulsion
E. Dissolve at 40-50 ° C in purified water

142. Emulsions, like heterogeneous disperse systems, can be stratified by various factors. Which of the following factors leads to the coalescence of emulsions most quickly?
A. * Adding strong electrolytes
B. Adding an excess of emulsifier
C. Adding fragrant waters
D. Breeding with water
E. Insignificant temperature increase

143. The pharmacist has prepared emulsion. How to enter water-soluble substances?
A.*Dissolve in the part of purified water intended for dilution of the emulsion

B. Dissolve in purified water, intended for the preparation of the primary emulsion
C. Put into an oil phase
D. Enter in the primary emulsion
E. Add to the finished emulsion

144. The pharmacist has prepared emulsion. How did he introduce water soluble substances?
A. *Dissolve in the part of water for dilution of the emulsion
B. Added to the finished emulsion
C. Introduced into the oil phase
D. Introduced in the primary emulsion
E. Dissolved in water to prepare a primary emulsion

145. The pharmacist prepares the oil emulsion. Indicate the optimal method for introducing camphor to the drug:
A. * Dissolve in oil
B. Dissolve in alcohol
C. Dissolve in water
D. Dissolve on air
E. Dissolve in glycerol

146. The composition of the emulsion is injected zhelatozu. Describe the role played zhelatoza in emulsions.
A. * Emulsifier
B. Preservative
C. Solvent
D. The taste flavor
E. Antioxidant

147. Water extracts from the leaves of the martyr, if no instructions in the recipe, are prepared in the ratio:
A. * 1:10
B. 1:20
C. 1:30
D. 1: 5
E. 1: 400

148. Water extracts from the herb thermopsis, if no instructions in the recipe, are prepared in the ratio:
A. * 1: 400
B. 1:30
C. 1:20
D. 1:10
E. 1: 5

149. When making prescients of infusions "cito" and "statim", heating of a liquid in a water bath is carried out:
A. * 25 minutes followed by immediate artificial cooling
B. 30 minutes with cooling for 20 minutes

C. 15 minutes followed by cooling for 30 minutes
D. 25 minutes followed by cooling for 45 minutes
E. 45 minutes with cooling for 15 minutes

150. To prepare 200 ml of water extract from the leaves of mint (Ccoms = 2,4 ml / g) you should take water:
A. * 248 ml
B. 210 ml
C. 180 ml
D. 218 ml
E. 260 ml

151. A pharmacist prepared a decoction of oak bark. Specify the ratio of vegetable raw material and extractant:
A. * 1:10
B. 1: 400
C. 1:30
D. 1:20
E. 1: 5

152. A pharmacist has prepared an infusion of grass gorse. Specify the feature of the removal of active substances:
A. * Remove in a neutral environment
B. Removed in a light-footed environment
C. Remove in alkaline medium
D. Remove in weakly acid medium
E. Isolated in acidic medium

153. A pharmacy receives a recipe for infusion of mylnyanka. Specify the feature of removing saponins:
A. * Remove in alkaline medium
B. Remove in a strongly acidic medium
C. Remove in a neutral medium
D. The environment has no effect
E. Isolated in a weakly acid medium

154. The pharmacist prepared 100 ml of chamomile infusion. Specify what amount of raw material and extractant he used to make the extract (Quota = 3.4)
A. * 10 g of chamomile tickets, 134 ml of water
B. 20 g of chamomile tickets, 234 ml of water
C. 10 g chamomile tickets, 200 ml of water
D. 20 g of chamomile tickets, 200 ml of water
E. 5 g chamomile tickets, 234 ml of water

155. The pharmacist has prepared 200 ml of broth of oak bark. Specify how to extract this extract:
A. * Immediately
B. After 10 minutes
C. After complete cooling
D. After 3-4 hours

E. After 45 min

156. A patient who leaves the pharmacy leaves mint. What recommendations regarding the preparation of infusion should give pharmacist at the release of medicinal plant material?

A. * Cook the infusion in a tightly closed vessel
B. To cook infusion on an open flame
C. Cook the infusion at room temperature
D. After 15 min. Tightening the extract to cool artificially
E. After 15 min. Tightening the extract to cool artificially

157. The pharmacist used dry standardized extract of thermopsis (1: 1) to prepare 200 ml of infusion of thermopsis. How much extract is needed to prepare the infusion?

A. * 0.5 g.
B. 1.0 g.
C. 2.0 g.
D. 5.0 g.
E. 10.0 g.

158. The pharmacist used a liquid standardized mustard extract (1: 2) to prepare 150 ml of mustard infusion. How much extract did the pharmacist measure:

A. * 10 ml.
B. 5 ml.
C. 2 ml.
D. 7.5 ml.
E. 20 ml.

159. The pharmacist used the following technology to prepare an aqueous extract: MRM washed with cold water, filled with hot water in a ratio of 1:30 and shaken for 15 minutes, then filtered. Indicate which raw materials were used:

A. * Flax seeds.
B. Elder flowers.
C. Buckthorn bark.
D. Althaea root.
E. Viburnum fruits.

160. The pharmacist prepared an infusion of marshmallow root. In what ratio did he take the amount of medicinal plant raw materials and extractant:

A. * 1:20.
B. 1:10.
C. 1:30.
D. 1: 100.
E. 1: 400.

161. Pharmacist before using the heating infuser in a boiling water bath for 15 minutes. Specify the material from which it is made:

A. * Porcelain.
B. Stainless steel.
C. Aluminum.

D. Enameled metal.
E. Tree.

162. The pharmacist prepared an aqueous extract of MRM by method of cold infusion. Specify the type of this raw material:
A. * The roots of marshmallow.
B. Buckthorn bark.
C. Mint leaves.
D. Bearberry leaves.
E. Thermopsis grass.

163. The pharmacist prepared an infusion of marshmallow root. Specify the correct technology option:
A. * Cold infusion for 30 minutes and filtering without squeezing the raw material.
B. Heating for 30 min, cooling -10 min, filtering.
C. Heating for 30 min, filtering without cooling.
D. Heating in a boiling water bath for 15 minutes and squeezing.
E. Squeezing of raw materials after infusion at room temperature.

164. Pharmacies often prepare infusions using standardized concentrate extracts instead of plant raw materials. Specify the method of their introduction:
A. * Dissolve in water in a stand.
B. Dissolve in hot water.
C. Soluble in concentrated solutions.
D. Dissolve in a mixture of water and concentrated solutions.
E. Dissolve in tinctures.

165. The pharmacist prepares an infusion of marshmallow root by cold extraction. Specify the infusion time:
A. * 30 min.
B. 20 min.
C. 40 min.
D. 50 min.
E. 60 min.

166. The pharmacist prepares water extracts from medicinal plant raw materials. Specify the correct procedure for administration of drugs into the following mixtures:
A. * In dry form, dissolve in the stand in the filtered extract;
B. In the form of a concentrated solution, adding to the finished extract.
C. In dry form, dissolving in the infusion tube;
D. Dissolve in the infusion in a vial for release;
E. In a separate glass, mix with part of the infusion and add to the finished infusion.

5. Information needed for knowledge-skills development can be found in the textbooks:

A) Basic

11. Aseptic dosage forms: Extemporal formulation: Methodical recommendations / O.I.Tihonov, L.V.Bondareva, T.G.Yarnykh, N.F.Orlovetska and others; Ed. OI Tikhonov and TG Yarnyh. - X .: View of NFaU; Original, 2005. - 184 p.
12. Solid dosage forms: Extemporal formulation: Methodical recommendations / O.I.Tihonov, L.V.Bondareva, T.G.Yarnykh, N.F.Orlovetska and others; Ed. OI Tikhonov and TG Yarnyh. - X .: View of NFaU; Original, 2003. - 176 pp.
13. Soft dosage forms: Extemporal formulation: Methodical recommendations / O.I.Tihonov, L.V.Bondareva, T.G.Jarnykh, N.F.Orlovetska, and others; Ed. OI Tikhonov and TG Yarnyh. - X .: View of NFaU; Original, 2003. - 128 p.
14. Liquid dosage forms: Extemporal formulation: Methodical recommendations / O.I.Tihonov, L.V.Bondareva, T.G.Yarnykh, N.F.Orlovetska and others; Ed. OI Tikhonov and TG Yarnyh. - X .: View of NFaU; Original, 2005. - 160 p.
15. Practicum on pharmacy technology of medicines; for studio Pharmacist higher tutor institutions / O. I. Tikhonov, T. G. Yarnykh, V. O. Sobolev, and others; Ed. OI Tikhonova. - X .: View of the NFPA: Golden Pages, 2002. - 256 p.

B) additional literature:

3. Dictionary-Directory for Pharmacy Specialists in Management and Economics, ed. prof. Chernykh V.P. // Kharkiv: Publishing House of the National Academy of Sciences of Ukraine "Golden Stays" - 2001 - 281 p.

6. The theme of the next lesson:

«Soft medical forms. Lineaments and ointments are homogeneous»