Exam questions (at the end of the 4th year of study)

List of theoretical questions tobefore the exam:

1. General principles of production of finished medicinal forms. Ready medicines, their role in providing the population. Expanding the assortment of industrially produced medicinal products,organizing the production of pharmaceutical enterprises.
2. Workshop principle of production organization. Complex mechanization and aesthetics. Safety equipment and labor protection. Technological process.
3. The most purified preparations and preparations of individual substances, obtaining new galenic preparations. Methods of cleaning BAS.
4. Grinding. Types of grinding. Peculiarities of crushing of solid bodies. The main methods of grinding. Grinding work (energy consumption).
5. Powders Classification. Powder technology: grinding of the raw material, separation by particle size, mixing of individual components. Packing and packaging. Biopharmaceutical aspects of powders.
6. Medical solutions. Classification (water, alcohol, glycerin, oil, aromatic waters, syrups). Methods of their preparation at chemical and pharmaceutical enterprises (dissolution, chemical interaction).
7. Standardization of solutions according to the content of active substances and density. Solutions of hydrogen peroxide, formaldehyde, Burov's solution, basic lead acetate solution. Alcoholsolutions of iodine. packaging Packaging. Storage.
8. Extractive preparations. Theoretical foundations of extraction. Extraction of plant, animal, microbiological raw materials and tissue culture.
9. Factors that influence the extraction process: histological structure, degree and nature of grinding,porosity, leaching and absorption coefficient, raw material surface area, concentration difference,temperature, duration of extraction, influence of the extractant (extractive abilities, selectivity, resorption, viscosity, amount surface tension and the reaction of the environment to increase the speed and completeness of extraction). Viscosity. Surfactants. Hydrodynamics of a layer of plantmaterial.
10. Methods of extraction: maceration and its modifications, percolation, repercolation with division of raw materials into equal and unequal parts, countercurrent extraction in a battery of extractors and continuous extractors, circulating extraction.
11. Intensification of the extraction process - turboextraction (vortex), extraction of raw materials on a rotary-pulsation apparatus RPA, extraction using ultrasound, variable pressure (four-body "carousel-type" installation), extraction using electric charges, extraction using electroplasmolysisand electrodialysis.
12. Theoretical foundations of the extraction process: desorption, dissolution, leaching, diffusion, osmosis. Use of the basic provisions of the theory of molecular and convective diffusion in the extraction process.
13. New technologies for the production of phytopreparations.
14. Equipment for extraction: maceration tanks, communicated and non-communicated batteries of extractors. Extractors of continuous action.
15. Recovery and rectification of alcohol. Recovery of alcohol from spent raw materials by displacement with water and distillation with a water pore. Equipment.
16. Tinctures. Classification. Obtaining. Maceration, possibilities of its intensification (partial, vortex,extraction with the use of vibrators, pulsators, rotary-pulsation devices, ultrasound, extraction in asuspended layer of raw materials). Percolation.

17. Extracts. Characteristic. Classification by consistency and extractant used. Liquid extracts - production methods (remaceration, percolation, repercolation, countercurrent extraction).
18. Cleaning. Standardization. Storage. Nomenclature of liquid extracts. Thick and dry extracts - production methods (bismaceration, percolation, repercolation, countercurrent extraction,circulation extraction).

19. Cleaning of water hoods. Cleaning of alcohol hoods. Evaporation. Drying of extracts. Standardization. Nomenclature of aqueous thick extracts (wormwood, dandelion, licorice), dry (licorice).
20. Extracts-concentrates. Characteristic. Classification. Methods of obtaining liquid extracts- concentrates: percolation, repercolation, the SANDI method. Methods of obtaining dry extracts- concentrates: fast-flowing repercolation, maceration. Standardization. Polyextracts. Storage.
21. Production of enzyme preparations from animal raw materials of proteolytic action (pepsin, trypsin, chymotrypsin). Production of enzyme preparations from animal raw materials withhyaluronidase action (lidase, ronidase). Application. Storage.
22. Tablets. Definition. Characteristic. Types and nomenclature. Theoretical foundations of tableting.
23. The main groups of auxiliary substances that are used in the production of tablets: binders, disintegrants, antifriction agents, dyes, substances that prolong the action of medicines. Diluting substances. The effect of excipients on the therapeutic effectiveness of drugs.

24. Stages of the technological process of obtaining tablets. Preparation of auxiliary and medicinal substances, mixing of ingredients.
25. Features of the production of some parenteral dosage forms. Production of non-aqueous solutionsfor injections.
26. Cultivation of cells and tissues in animals and humans and plants.
27. The value of granulation. Granulation is dry, wet (pressing, in a coating boiler and plate granulators, suspended layer, spray drying), powdering of granulate. The influence of the type of granulation on the bioavailability of drugs. Analysis of granulate: determination of physicochemical properties, particle size composition, humidity, flowability, compressibility. Granulators and wiping machines, granulator dryers (SG-30).

28. Pressing. Tablet presses: impact and rotary. Comparative characteristics of tablet presses and their principle of operation. The effect of pressing pressure on the therapeutic effectiveness of tablets. Direct pressing.
29. Methods of coating. Purpose of application. Teasing technology: rolling, grinding, glossing, polishing. Abductors. Film coatings.
30. Types and properties of film coatings. Assortment of film formers, plasticizers, solvents. Technology of film coatings. Apparatus. Pressed coatings. Technology of film coatings. Apparatus.

31. Pressing coating technology. Double and triple pressing machines. Tablets of prolonged action. Multilayer tablets. Fools Magnetic controlled tablets.
32. Evaluation of the quality of tablets: appearance, deviation from the average weight, dosage accuracy, quantitative content of active substances, disintegration, solubility, crushing and abrasion strength. Monitoring devices (rotating baskets, Stokes device, etc.).
33. Medical capsules. Microcapsules. Types of medical capsules. Assortment. Excipients in the production of gelatin capsules. Methods of obtaining: dipping ("soaking"), pressing, drip method.
34. Disintegration, solubility, strength and thickness of shells, speed and completeness of drug release from capsules. Factors influencing the bioavailability of medicinal substances. Rectal, vaginal capsules. Tubatyn Prospects for the development of capsules. Packaging.
35. Microencapsulation of medicines. Methods of obtaining microcapsules. Prospects for the development of the technology of microencapsulation of drugs.
36. Plasters. Mustard seeds. Characteristic. Classification. Receiving technology. Equipment: reactors, USPL-I installations, chamber-loop dryer, etc. Lead, compound, epiline, resin wax, rubber, adhesive plaster elastic smeared, bactericidal, callus, pepper, liquid (cleol, collodion, glue BF-6, colaplast, microplast, furoplast, Novikov's liquid, callus liquid).

37. Manufacturing featuresof ophthalmic, nasal and ear medicines, requirements for them, their quality control according to the SPhU and types of packaging.
38. Mustard seeds. Technology of mustard seeds. Packaging. Storage.
39. Rectal dosage forms. Characteristics of suppositories. Equipment for the production and packagingof suppositories: Franco-Crespi (Italy), the line of the company "Hefliger & Karg", "Sarong 200S"(Germany). Standardization. Nomenclature. Storage.
40. Aerosols. Characteristic. Classification. Inhalation aerosols. The composition and principle of operation of an aerosol can.
41. Types of aerosol systems. Characterization of the contents of an aerosol can. Compositions issuedfrom packaging in the form of foam (water-alcohol, non-aqueous foams). Auxiliary substances forobtaining aerosols (solvents, solubilizers, surfactants, film formers, etc.), propellants.
42. Ways of perfecting aerosol packaging. Modern systems of aerosol preparations.
43. Methods of filling aerosol cans (under pressure and at low temperature). Quality assessment: strength and tightness of the packaging. Content dosing accuracy. Qualitative and quantitative composition. Prospects for the development of pharmaceutical aerosols. Nomenclature. Ingalipt. Cameton. Proposal Legrazol. Nitazol. Neotisol. Lifusol. Transportation and storage of medical aerosols.

44. Sterile and aseptically produced dosage forms. Solutions for injections in ampoules. Medicines offactory production, prepared in aseptic conditions. Medicinal forms for injections: solutions in ampoules, suspensions, emulsions, powders, tablets.
45. Requirements for dosage forms for injections: absence of mechanical inclusions, sterility, pyrogenicity, stability, etc. Sources of contamination of injection solutions. Classes of cleanlinessof premises. Requirements for personnel, overalls, equipment.
46. Solvents. Obtaining water for injections in factory conditions. Distillation devices. Demineralized water. Methods of obtaining: electrodialysis, ion exchange, reverse osmosis. Use of demineralizedwater. Factory devices for obtaining it. Non-aqueous solvents. Fatty oils and their requirements. Preparation of vegetable oils. Alcohols, ethers, amides.
47. Materials for making ampoules and vials. Glass. Obtaining, technical requirements for it. Classesof glass. Research of chemical and thermal stability of ampoules. Use of polymer packaging materials, syringe tubes.
48. Filtering materials. Filtering devices (mushroom filters, Salnikov, Zeitz). Metal, ceramic, glass, fluoroplastic membrane filters. Sterilization by filtration.
49. Filling ampoules. Vacuum, syringe, vapor condensation methods, their features and disadvantages. Apparatus for filling. Sealing ampoules, linear and rotary machines. Soldering in a stream of inertgases. Sealing quality control.
50. Methods of sterilization of solutions in ampoules. Thermal sterilization. Steam sterilization under pressure. Radiation and cryoradiation sterilization. Sterilization mode control. Leakage test.
51. Evaluation of the quality of finished products. Concept of sterile series. Control of sterility and pyrogenicity, pH of the medium, quantitative content of active substances, purity. Labeling and packaging of ampoules. Packaging machines. Problems of complex mechanization and automationof ampoule production. Creation of current lines.
52. Features of factory production of solutions of glucose, calcium chloride, magnesium sulfate, ascorbic acid, hexamethylenetetramine, ergot, euphyllin, oil solutions of camphor, hormones, andtheir analogs.
53. Ocular dosage forms. Features of the technology of ophthalmic dosage forms of factory production. Eye drops. Aqueous solutions. Oil solutions. Suspensions. Nomenclature: solutions ofatropine sulfate, sodium sulfacyl, pilocarpine hydrochloride, scopolamine hydrochloride, ascorbicacid, phosphacol and others.
54. Biotechnology in the production of medicinal products. Biotechnology, its place in the development of scientific and technical progress in medicine and pharmacy. Modern trends in theproduction of medicines based on biotechnology.
55. Packaging of finished medicinal forms. Packaging materials. Container. Packaging of medicinal forms.
56. State-wide standards for containers and packaging materials. A modern range of containers and packaging material used in the pharmaceutical industry.
57. Prospects for the development of the technology of dosage forms. The main directions ofdevelopment of the technology of medicinal forms. Systems with regulation of the release of active substances. Multilayer tablets, microcapsules, microdrags. Immobilized drugs: enzymes,hormones, mucopolysaccharides, iron-derived dextran, albumins, γ-globulins, nucleic acids, interferons.

58. Suspensions. Emulsions. Ointment Methods of industrial production of suspensions, emulsions, ointments. Phase mixing. Painting in a liquid environment. Grinding using ultrasound. Equipment.
59. Bases for ointments and auxiliary substances used in their industrial production. Prospects for the development of production and scientific research of ointments. Production of ointments in the conditions of pharmaceutical enterprises.
60. Features of obtaining modern nano- and radiopharmaceuticals, their role and place in modern pharmacy and medicine.

List of practical skills, the mastery of which is controlled during the exam

1. Determine the disintegration of tablets.
2. Fill out a working prescription for obtaining a specified number (20) of ampoules of a specified capacity (1 ml) of a 20% solution of camphor in oil.
3. Control the injection solution in ampoules for the absence of mechanical inclusions.
4. Fill out a working prescription for obtaining the given amount (1000 ampoules) and the given concentration (20%, 1 ml ampoule) of caffeine-sodium benzoate solution.
5. Prepared 250 ml of caffeine-sodium benzoate solution. The analysis showed that the solution contains 21% of the drug. How much water is needed to obtain a 20% solution?
6. Prepared 250 ml of caffeine-sodium benzoate solution. The analysis showed that the solution contains 19% of the drug. How much should be added to caffeine sodium benzoate to make a 20% solution?
7. Determine the content of ethyl alcohol in an alcohol-water mixture usingglass alcohol meter.
8. Fill out a working prescription and prepare a 30% sulfacyl-sodium solution of eye drops in bottlesof 5 and 10 ml.
9. Prepare in vials of 5 and 10 ml a few drops of a solution of pilocarpine hydrochloride 1% with methylcellulose.
10. Make and research lily of the valley tincture.
11. Make and research calendula tincture
12. Prepare 100 ml of coriander fruit water by steam distillation.
13. Prepare 20 kg of 52% alcohol from 96.6%.
14. Prepare and research sugar syrup.
15. Compile the equation of the material balance, determine the output, consumption, consumption ratio. Compile the consumption standards for obtaining 100 g of the finished product, if during the manufacture of sodium chloride salt, instead of 100 g, 99.7 g of the finished product is obtained.
16. Protocol for crushing solids in a ball mill.
17. Prepare complex licorice powder.
18. Grind 10 kg of rowan fruits and stem the working recipe.
19. Determine the shape, size, nature of the powder surface.
20. Determine the fractional composition of the powder.
21. Calculate the working prescription for the production of 100 kg of tablets of 0.5 acetylsalicylic acid, the average weight of the tablets is 0.55. K=1.05.
22. Determine the amount of starch for the production of 200,000 0.1 g phenobarbital tablets with anaverage weight of 0.2 g (sugar 0.08, talc 0.0036).
23. Determine the pressing of tablets.

24. Determine the force of pushing the tablets out of the matrix.
25. Fill out production regulations for the production of streptocide tablets.
26. Coat amitriptyline tablets with the suspension method of irritation.
27. Make "Hexavit" dragee.
28. Apply a gastro-dissolving film coating on the tablets.
29. Make granules of plantaglucid.
30. Determine the strength of tablets for abrasion.