

**ODESSA NATIONAL MEDICAL UNIVERSITY**  
**Department of General and Clinical Pharmacology and Pharmacognosy**

**METHODOLOGICAL DEVELOPMENT**

**Course: "Pharmacognosy"**

**practical lesson for students on the topic:**

**"Vitamins. General characteristics. LR and raw materials containing vitamins:  
rose hips, black currants, mountain ash, buckthorn, buckthorn, nettles, nettles,  
corn, buckthorn. "**

**Course: 3rd Faculty: medico-pharmaceutical**

**Approved on methodical  
meeting of the department  
"30" August 2024  
Protocol № 1  
Head department  
MD, prof. JV Rozhkovsky**



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**Odessa - 2024**

**1. The topic of the lesson:** "Vitamins. General characteristics. LR and raw materials containing vitamins: rose hips, black currants, mountain ash, buckthorn, buckthorn, nettles, nettles, corn, buckthorn. " - 6 hours.

**2. Relevance of the topic:**

Vitamins are a group of organic substances of various chemical nature, required in minimal quantities for the normal functioning of the body. Together with hormones and enzymes, they form a group of biocatalysts and play a huge role in metabolic processes in the body. Vitamins are involved in cellular respiration, affect the functions of the nervous system, endocrine glands, enhance immunobiological processes, increase the body's resistance to functional diseases, have anti-inflammatory effects, etc. In medicinal plants, vitamins are permanent components, and some of them accumulate in significant quantities. Currently, about 30 vitamins are known, of which about 20 enter the human body with plant and animal foods. Vitamin-containing drugs are used in medical practice for the treatment of various diseases.

**3. The purpose of the lesson:**

*3.1. General goals:* to study medicinal plants containing vitamins, and to perform work on morphological and anatomical analysis of medicinal plant raw materials studied in this topic.

*3.2. Educational goals:* formation of a professionally significant substructure of personality with relevant aspects of deontological, ecological, legal, psychological, patriotic, professional responsibility.

*3.3. Specific goals:*

**-know** (level of assimilation according to Bezpalk - II):

1. Terms, methods of collection and rules of storage of LRS containing vitamins.
2. Morphological characteristics of plants, their habitats (harvesting areas), places of growth.
3. Possible impurities to nettle and their main differences.
4. The chemical composition of the LRS of the research topic.

Based on theoretical knowledge of the topic and laboratory work:

**- master the techniques (be able)** (level of assimilation according to Bezpalk - III):

1. Recognize the external features of the plant (official species of dog rose, mountain ash, calendula, nettle, sea buckthorn, viburnum, black currant) and distinguish them from possible impurities;
2. Determine the identity of raw materials by external features and anatomical structure.
3. Know the ways of using raw materials and its medical application.

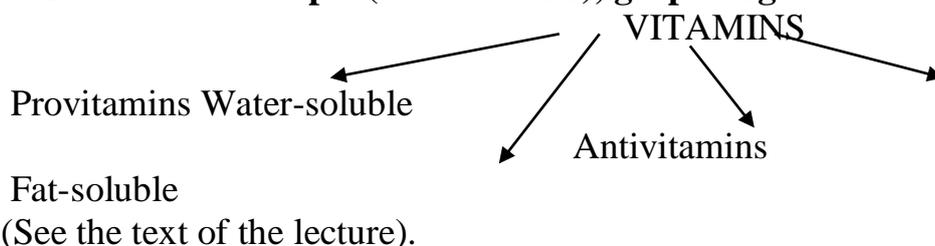
#### 4. Interdisciplinary integration

№ p.p.	discipline	know	be able
1	2	3	4
1.	<p>Previous disciplines:</p> <p>1. Botany</p> <p>2. Organic chemistry</p> <p>3. Analytical chemistry</p>	<p>Characteristic features of the families of the studied plants. Morphology of stem, bark, leaves, flower, fruit, root and rhizome. Anatomical structure of the leaf, bark, fruit, root, rhizome.</p> <p>Physical and chemical properties of polysaccharides, glycosides, terpenoids, aromatic derivatives, heterocycles.</p> <p>Methods of acid-base titration (neutralization) and permanganometry</p>	<p>Use a microscope, prepare surface preparations and cross-sections.</p> <p>Carry out qualitative reactions; purification of organic compounds.</p> <p>Work with analytical scales, measuring vessels, photoelectro-colorimeter, use methods of chromatography on paper and in a thin layer of sorbent.</p>
2.	<p>The following disciplines:</p> <p>1. Physical and colloid chemistry</p>	<p>Solubility of solids and liquids in liquids. Distillation. Raoul's law. Konovalov's law. Vapor pressure and composition over mutually insoluble liquids. Buffer solutions. Polarography. Potentiometric</p>	

	<p>2. Pharmacy technology of drugs</p> <p>3. Industrial technology of medicines</p> <p>4. Clinical pharmacology</p> <p>5. Pharmaceutical chemistry</p> <p>6. Organization and economics of pharmacy</p>	<p>titration. Adsorption. Ion exchange adsorption. Chromatography: paper, column, in a thin layer of sorbent, gel chromatography.</p> <p>Methods of measuring mass and volume. Preparation of powders or liquid drugs for internal and external use. Analysis of prepared liquid drugs using a burette system.</p> <p>Conditions of industrial preparation of medicines. Principles of organization of pharmaceutical production of various dosage forms: liquid, solid, soft, injectable solutions, etc. Machines, devices, equipment for the production of medicines.</p> <p>Pharmacodynamics and pharmacokinetics of drugs. The pattern of action of drugs on the human body and its corresponding reactions. Basic principles of treatment in terms of drug selection, evaluation of their effectiveness and safety.</p> <p>Methods of qualitative and quantitative study of drugs.</p> <p>Pharmaceutical service management. Storage of medicines. Control and analytical service, organization of its work. Accounting for inventory and cash. Economic analysis of the pharmacy.</p> <p>Management and entrepreneurship. Organization as an object of management. Connecting processes in management. Human Resource Management Pharmaceutical</p>	
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		Marketing Management. Pharmaceutical market research. International marketing.	
	7. Management and marketing in pharmacy		

**5. Content of the topic (text or thesis), graphological structure of the lesson.**



**6. Plan and organizational structure of the lesson.**

<b>№№ p.p.</b>	<b>The main stages of the lesson, their functions and content.</b>	<b>Learning objectives in the levels of mastery.</b>	<b>Means of training and control.</b>	<b>Materials on methodical forensuring the visibility of the lesson, control the knowledge of those who teachis.</b>	<b>Term (in minutes or in%) of the total class time.</b>
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
<b>1</b>	<i>Preparatory stage</i> Organization of classes Setting learning goals Homework check	II	Oral interview on the topic	Methodical works for students, album	1% 2% 25%
<b>2</b>	<i>The main stage</i> Conducting a practical lesson	III	Herbariums of medicinal plants, LRS, reagents		50%
<b>3</b>	<i>The final stage</i> Testing and assessment of practical skills	II- III  II- III	Herbariums of medicinal plants, LRS, reagents	Methodical works for students, album  Tests and	5%  15%

	Checking the final level of knowledge			situational tasks	
	Providing homework with a reference to the literature				3%

## **7. Materials on methodological support of the lesson.**

### **7.1. Control materials for the preparatory stage of the lesson: questions, tasks, tests.**

#### **Tests.**

1. A group of natural substances, diverse in chemical structure, united by its biological significance and the need to nourish the body, which is part of enzymes or coenzymes and acts as a catalyst for chemical transformations occurring in the body:

- A. vitamins
- B. polysaccharides
- C. tannins
- D. glycosides
- E. hormones

2. Name a medicinal plant, the fruits of which are used in medical practice as a multivitamin raw material with a predominant content of  $\beta$ -carotene. Fresh berries are processed into vitamin syrup, and also used in the alcoholic beverage industry:

- A. mountain ash is common
- C. rose hips
- S. sea buckthorn
- D. hawthorn
- E. joster

3. From flower baskets of this plant prepare tincture, ointment and recommended for cuts, purulent wounds, ulcers and burns, and the tincture is used for gargling with sore throat. Inside is prescribed for gastric ulcer and as a choleric:

- A. nails
- B. chamomile

S. St. John's wort

D. nettles

E. low

4. Liquid extract of the bark of this plant is used for uterine bleeding in gynecological practice. The fruits are used in vitamin collections:

A. viburnum

V. rowan

S. hawthorn

D. sea buckthorn

E. elderberry

5. The leaves of which plant are rich in multivitamin raw materials, which contain a significant amount of vitamin K, vitamin C, carotenoids ( $\beta$ -carotene, xanthophyll, violaxanthin, etc.) Vitamin B2, pantothenic acid, urticin glucoside, tannins, formic acid, chloric acid and mineral salts:

A. nettles

B. thyme

S. yarrow

E. low

E. St. John's wort

6. The grass contains a significant amount of vitamin K1 and ascorbic acid. In addition, they contain amines: choline, acetylcholine, tyramine and histamine, flavonoids diosmin and organic acids (fumaric, lactic, etc.), as well as traces of alkaloids, essential oil. Up to 40% of potassium is found in the ash. Name this plant:

A. buckwheat

B. motherwort

S. you argue

D. sage

E. celandine

7. A large group of natural pigments of yellow or orange color, which includes up to 70 substances. They are found in most plants (except some fungi) and in all animal organisms. In the leaves of plants with retention of these substances is usually insignificant, but in other parts of plants they can accumulate in significant quantities:

A. carotenoids

B. tannins

C. polyphenolic compounds

D. catechins

E. isoflavonoids

8. From the fruits of which plants produce the drug holosas, used for cholecystitis and hepatitis:

A. dog rose

B. sea buckthorn

S. joster

D. hawthorn

E. chokeberry

9. Branched shrub with long-petiolate palchatolopastnye leaves bearing on the lower surface of the resin glands, attach-

The plant has a pleasant aroma. The flowers are collected by drooping racemes.

Fruit - black fragrant multi-seeded berry. Grows wild in forests and floodplains rivers of Ukraine. Cultivated as a berry bush.

A. black currant

B. elderberry

S. blueberries

D. dope

E. chokeberry

10. Which of the scientists in 1912 proposed the term "vitamins":

A. K. Funk

VD Mendeleev

SM Lomonosov

D. L. Pasteur

EI Mechnikov

**Question:**

1. Definition of "vitamins".
2. Distribution of vitamins in the plant world and resources of the studied raw materials.
3. Terms, methods of collection and storage rules of LRS containing vitamins.
4. Measures for the protection and rational use of wild medicinal plants containing vitamins.
5. Latin and Russian names of ARS, which produce plants and families of all objects of the research topic.
6. Morphological characteristics of plants, their habitats (cultivation areas), habitats.
7. External signs of the studied types of medicinal raw materials.
8. Possible impurities to nettle and their main differences.
9. The main anatomical diagnostic signs of nettle leaves, cinnamon rose hips, viburnum.
10. Ways of use and medical application of ARS containing vitamins.

**7.2. Materials of methodical support of the main stage of employment: professional algorithms, orientation maps for formation of practical abilities and skills, educational tasks.**

**The list of educational practical tasks that must be performed during the practical lesson:**

**Task 1.** To study dioecious nettles and to carry out the analysis of raw materials on AND (Sections: external signs, microscopy).

1. To study the appearance of nettle and possible impurities - nettle burning, hemp, deaf white nettle on herbarium specimens (scheme № 1).

Write the Latin and Russian names of raw materials, plants and families.

Scheme № 1

DEFINITIONS OF PRODUCING PLANTS By external SIGNS

- Life form (herbaceous plant, shrub, tree).
- Type of underground organs (root, rhizome, tuber, etc.).
- The structure of the stem (shape, nature of branching, pubescence, diameter, etc.).
- Sheet placement (alternate, opposite, whorled).
- Leaves (simple or complex, the shape of the leaf blade or leaves, edge, veining, color, size).
- Flowers (single or inflorescence, flower structure, color, size, etc.).
- Fruit (type, shape, color, size).
- Bark (in woody species), (color, presence, shape and color of lenticles, thorns, etc.).

2. Describe the appearance of a nettle leaf on the example of a sample of raw materials (Scheme № 2).

Scheme № 2

ANALYSIS OF RAW MATERIALS "LEAVES" On external signs

- Type of leaf and dissection of the leaf blade: (simple: palchatorassechennaya, palchato- or peristorozdilnym, peristolopastnye, three- or five-lobed).
- Stem stem or sessile.
- Shape (round, elliptical, ovoid, lanceolate, linear).
- The edge of the leaf (solid, serrated, toothed, crenate, etc.).

- character of veining (arcuate, reticular, finger, pinnate, parallel).
- Opushenie.
- Color of the upper and lower sides.
- The size of the sheet or leaves.
- Odor when rubbing the object or wetting
- Taste (for non-toxic objects).
- Specific features

3. Prepare a micropreparation of the leaf from the surface, study it at low and high magnification (scheme № 3).

#### Scheme № 3

#### Microscopic analysis of RAW MATERIALS "GOODS"

- Structure (dorziventral, isolateral).
- Mesophile (nature of palisade and spongy tissues).
- Inclusions are crystalline (single crystals, crystal-bearing coating, friends, Rafida, crystalline sand, cystolites); secretory (containers, milk vessels, canals).
- Epidermis of the upper and lower sides of the sheet (shape and contour of cells: isodiametric, erect, convoluted; stomatal type: diabetic, parasitic, anisocytic, anomonite; number and location of periosteal cells.
- Type of trichomes: hairs, glands.
- Cuticle: thin, thick, straight, folded, "warty".

Draw and mark diagnostic signs:

- a) cells of the epidermis of the upper side of the leaf are polygonal or weak tortuous;
- b) cells of the lower epidermis are tortuous;
- c) stomata, located on the underside of the sheet and surrounded by 3-5 epidermal cells;
- d) cells contain cystoliths-lithocysts;
- e) hairs:

burning, having the form of a hollow needle ending in a small head  
who. Their basis is expanded, immersed in the stand - the growth of epidemic  
rmisa;  
retort-shaped (in the place of their attachment epidermal cells are often selected  
socket);  
capitate with a two-celled head and a unicellular stalk;  
e) friends of calcium oxalate, located in a chain along the large veins  
4. Note the compliance of the test sample of raw materials (on external grounds  
and microscopy) the requirements of GF XI, Article 25.

**Task 2.** Examine the official species of dog rose and analyze the raw materials for  
AND.

Examine the appearance of the official species of dog rose by herbarium  
samples (see diagram № 1). Write down Latin and Russian names  
raw materials produced by plants and families.

2. Carry out a macroscopic analysis of rose hips on the example of samples of raw  
materials (scheme № 4).

Scheme № 4.

ANALYSIS OF RAW MATERIALS "FRUITS AND SEEDS" By external signs

- Commodity type of raw materials.
- Type of fruit (berry, box, perianth, drupe, achene, bean).
- The shape of the fruit (spherical, oblong, crescent-shaped, etc.).
- The nature of the surface (smooth, pitted, ribbed, wrinkled, shiny, matte, etc.).
- The form and features of the pericarp (pericarp).
- The number of seeds or seeds, their shape and structure, surface structure.
- Color.
- Dimensions (length, thickness).
- Smell (when rubbing or scraping).

- Taste (for non-toxic objects).

3. Prepare a micropreparation of rose hip powder, study it when low and high magnification. Draw and mark diagnostic signs:

a) cells of the outer epidermis are polyhedral or quadrangular with unevenly thickened walls;

b) cells of the parenchyma of the pulp are thin-walled with orange-red lumps pigment and friends of calcium oxalate;

c) stony cells of nuts;

d) unicellular hairs: very long, stiff, thick-walled, straight, thin-walled, slightly curved.

4. Note the compliance of the sample of raw materials (on external grounds<sup>0</sup> and microscopy) to the requirements of GF-XI, Article 38.

**Task 3.** To study a mountain ash and to carry out the analysis of raw materials on AND (Section: external signs).

1. Examine the appearance of mountain ash on a herbarium sample (see scheme № 1). Write down the Latin and Russian names of the raw materials produced plants and families.

2. Describe the appearance of rowan berries on the example of a sample of raw materials (see Scheme № 4).

3. Note the compliance of the test sample of raw materials (on external grounds) requirements of GF-XI, Article 39.

**Task 4.** To study calendula and to carry out the analysis of raw materials on AND (section: external signs).

1. Examine the appearance of calendula on a herbarium sample

(Scheme № 5). Write down the Latin and Russian names of the raw materials that produce plants and families (give synonyms).

#### Scheme № 5

##### ANALYSIS OF RAW MATERIALS "GRASS" On external signs

- "Commodity type" of raw materials (unharvested, cut, threshed)
- Stem structure (shape, branching, pubescence, color, size, specific features).
- The nature of the leaf arrangement (alternate, opposite, whorled).
- Leaves
- The location of the flowers on the stem.
- Flowers
- Fruits and seeds
- Sizes of stems, leaves, flowers.
- Coloring.
- Запах when rubbing.
- Taste (in non-toxic objects).

2. Describe the appearance of calendula flowers on the example of a sample of raw materials (scheme № 6).

#### Scheme № 6

##### ANALYSIS OF RAW MATERIALS "FLOWERS" By external signs

- Commodity type of raw material (inflorescences, single flowers or their parts).
- Type of inflorescence (ear, ear, brush, basket, shield, umbrella, etc.), or single flowers.
- The structure of the flower (features of the perianth, the number of petals, sepals, etc.).
- The shape and nature of the inflorescence (conical, flat, hollow inside or solid).
- Dimensions.
- Odor.
- The presence of bracts.
- Запах when rubbing.

- Taste (in non-toxic objects).

3. Note the compliance of the test sample of raw materials (on external grounds) requirements of GF-XI, Article 5.

**Task 5.** To study gritsiki and to carry out the analysis of raw materials on AND (section: external signs).

1. Examine the appearance of buckthorn on the herbarium sample (see Scheme № 1). Write down the Latin and Russian names of the raw materials that produce races tapeworm and family.

2. Describe the appearance of grass buckthorn on the example of a sample of raw materials

(See Scheme № 5).

3. Note the compliance of the test sample of raw materials (on external grounds) requirements of GF-XI, Article 46.

**Task 6.** To study a buckthorn buckthorn and to carry out the analysis of raw materials on AND (section: external signs).

1. Examine the appearance of sea buckthorn buckthorn in a herbarium pattern (See Scheme № 1). Write down the Latin and Russian names of raw materials produced of the plant and family.

2. Describe the appearance of sea buckthorn fruit on the example of a sample of raw materials (see scheme № 4).

3. Note the compliance of the test sample of raw materials (in appearance) trebovaniam FS 42-1052-76.

**Task 7.** To study viburnum ordinary and to carry out the analysis of raw materials on AND (sections: external signs, microscopy and qualitative reactions).

1. Examine the appearance of viburnum ordinary herbarium pattern (See Scheme № 1). Write down the Latin and Russian names of the raw materials leading plant and family.
2. Carry out a macroscopic analysis of the bark of viburnum on pre-measure of the raw material sample (scheme № 7).

#### Scheme № 7

#### ANALYSIS OF RAW MATERIALS "KORA" According to external signs

- Commodity type of raw materials.
- Shape (pieces of tubular, grooved or flat, etc.).
- The nature of the outer surface (smooth, rough, etc. ; the presence and shape of lentils).
- Color of a stopper, the form of lentils.
- Internal surface (smooth, longitudinal-ribbed, etc.).
- Color.
- Fracture (smooth, rolling, granular, fibrous, bristly, etc.).
- Dimensions (length, thickness).
- Taste (for non-toxic objects).
- Characteristic features

3. Prepare a cross section of viburnum bark.

Draw a general diagram of its structure. To study the micropreparation at low and high magnification (scheme № 8).

#### Scheme № 8

#### Microscopic analysis of RAW MATERIALS "KORA".

- The nature of the structure (primary, secondary).
- Periderm (structure, color).
- The main parenchyma (cell shape).
- Core rays (single-row, multi-row).
- Crystal inclusions (single crystals, friends, crystal-bearing cover).

- Mechanical elements (bast fibers, bast fibers with crystal coating, stony cells).

Draw and mark diagnostic signs:

- a) the cortical layer is multi-row;
- b) two-, four-layer collenchyma;
- c) bast fibers, single or in small groups, located on the border of the primary and secondary bark;
- d) core rays are narrow, single-row;
- e) parenchymal cells of the primary cortex are large, oval, and secondary - smaller, rounded or polygonal;
- e) stony cells located in small groups in the secondary bark;
- g) friends of calcium oxalate in parenchymal cells.

4. Carry out a qualitative reaction for the presence of tannins. results observations recorded in the laboratory journal.

5. Note the compliance of the sample of raw materials (by external signs, microscopy and qualitative reactions) to the requirements of GF-XI, Article 4.

**Task 8.** To study black currants and to carry out the analysis of raw materials on AND (section: external signs).

1. Examine the appearance of black currants on a herbarium sample (see Scheme № 1). Write down the Latin and Russian names of the raw materials that produce plants and families.

2. Describe the appearance of black currant fruits on the example of a sample of raw materials (See Scheme № 4).

3. Note the compliance of the test sample of raw materials (on external grounds) to the requirements of the AND.

**Instructional materials for mastering professional skills, abilities:**

Methods of work performance, stages of performance:

- a) get the necessary ARS
- b) to study and describe the appearance of the obtained ARS, to draw ARS
- c) to conduct ARS training
- d) record the observations in a laboratory journal

### **7.3. Control materials for the final stage of the lesson: tasks, tasks, tests, etc.**

#### **Question:**

1. From which plants are produced allowed to harvest rose hips on GF XI?
2. On what external signs fruits of vitamin types of a dog-rose differ from fruits of a dog-rose of a dog?
3. What is the botanical name of rose hips, what is the name?
4. What assessment of the quality of raw rose hips can be given if the micropreparation has a lot of hairs?
5. Indicate diagnostic signs of rose hip powder (micropreparation).
6. What are the external signs characteristic of the leaves of nettle?
7. What may be impurities in the leaves of nettle; on what grounds are they recognized?
8. What is cystolith? In the micropreparation of which plant do they occur?
9. What types of hairs are found in the leaves of nettle?
10. Does the nature of veining, leaf petiole matter for the diagnosis of raw primrose; what is their specificity?
11. Is it possible to establish the authenticity of the primrose leaf in the micro preparation on only one basis, the type of hairs?
12. Is it easy to establish the authenticity of black currant fruit, on what grounds?
13. Do the fruits of mountain ash change greatly in shape and color in comparison with fresh ones?
14. What is the fruit of sea buckthorn? Which plant produces a source of raw materials?
15. What elements make up the inflorescence of calendula?
16. Which raw calendula will be more valuable in terms of medicine: with bright orange or yellow flowers?

**Tests:**

1. What fruits are a valuable source of raw materials to obtain important therapeutic drug - oil (oil extract obtained from fruit meal after squeezing the juice). The oil has an analgesic effect, accelerates granulation and epithelialization of tissues. It is used in peptic ulcer disease, as well as a preventive measure to reduce degenerative tissue changes:

- A. sea buckthorn
- B. sunflower
- C. pumpkin seeds
- D. soy
- E. corn

2. For the production of drugs with reparative action in the treatment of wounds, lesions, ulcers, erosions often use plant raw materials containing:

- A. carotenoids
- B. lignano
- S. xanthones
- D. iridoids
- E. coumarins

3. On the basis of rose hips produce a number of drugs with different types of pharmacological action. Specify the drug that has a reparative (wound-healing) effect:

- A. rosehip oil
- B. rose hip syrup
- S. holosas
- D. vitamin collection
- E. decoction of dog rose

4. Determination of the quantitative content of ascorbic acid in rose hips is carried out by the method of:

- A. titration-neutralization
- B. back titration
- C. colorimetry
- D. spectrometry
- E. chromatography

5. Raw calendula is used for the production of tinctures and ointments. At what stage of the growing season should be harvested calendula flowers:

- A. horizontal arrangement of ligulate flowers
- B. the beginning of flowering
- C. budding
- D. fruiting
- E. the whole flowering period

6. Microanalysis of the surface preparation of the leaf revealed the presence of crystalline inclusions of calcium carbonate in the form of cystolites, rubble oxalate calcite, as well as hairs of several types: burning, retort, head. The listed signs are characteristic of:

- A. nettle leaves
- B. leaf of white nettle
- S. foxglove leaf
- D. lily of the valley leaf
- E. plantain leaves

7. Herbal preparation "Holosas" is used as a cholagogue. The herbal source of this remedy is:

- A. rose hips
- B. fruits of mountain ash

- S. hawthorn fruit
- D. chokeberry fruits
- E. berries laxative laxative

8. For the treatment of cholecystitis use the drug "Holosas", the source of which is:

- A. Fructus Rosae
- B. Fructus Padi
- C. Fructus Juniperi
- D. Fructus Rhamni catharticae
- E. Fructus Ribis nigri

9. Upon receipt of vegetable raw materials to the warehouse pharmacognostic analysis, including analysis of its authenticity and benignity. What kind of analysis should be performed last:

- A. determination of the taste of vegetable raw materials
- B. determination of external signs of vegetable raw materials
- C. determination of anatomical features of plant raw materials
- D. determination of the smell of vegetable raw materials
- E. determination of the degree of grinding of vegetable raw materials

10. What vegetable raw materials are used in the production of the drug "Aromelin":

- A. fruits of chokeberry
- C. elderberries
- S. fruits of viburnum
- D. hawthorn fruit
- E. fruits of mountain ash

## **8. Literature**

### **Basic literature**

1. Фармакогнозія: підручник (I—III р. а.) / І.А. Бобкова, Л.В. Варлахова. – 3-є видання Всеукраїнське спеціалізоване видавництво «Медицина» 2018, 504с.
2. Фармакогнозія: базовий підручн. для студ. вищ. фармац. навч. закл.(фармац. ф-тів) IV рівня акредитації / В.С. Кисличенко, І.О. Журавель, С.М. Марчишин та ін.; за ред. В.С. Кисличенко. – Харків: НФаУ: Золоті сторінки, 2015. - 736 с.
3. Навчальний посібник з дисципліни «Фармакогнозія» / Я. В. Рожковський, Б. В. Приступа, І. А. Бойко, Н. В. Герасимюк, В. В. Черногорюк -: Методична розробка кафедри фармакогнозії ОНМедУ. – Одеса: ОНМедУ, 2019 – 51 с.
4. Державна Фармакопея України: в 3 т. / Державне підприємство «Український науковий фармакопейний центр якості лікарських засобів». – 2-е вид. – Харків: Державне підприємство «Український науковий фармакопейний центр якості лікарських засобів», 2015. – Т. 1. – 1500 с.

**Additional literature:**

- 1 Державна Фармакопея України: в 3 т. / Державне підприємство «Український науковий фармакопейний центр якості лікарських засобів». – 2-е вид. – Харків: Державне підприємство «Український науковий фармакопейний центр якості лікарських засобів», 2014. – Т. 3. – 732 с.
2. Практикум з ідентифікації лікарської рослинної сировини: навч. посіб. / [В. М. Ковальов, С. М. Марчишин, О. П. Хворост та ін.] ; за ред. В. М. Ковальова, С. М. Марчишин. – Тернопіль: ТДМУ, 2014. – 250 с.

**10. The topic of the next lesson:**

"Terpenoids. Iridoids. Medicinal plants and raw materials that contain terpenoids (isoprenoids): iridoids and bitters. Yellow yarrow, three-leaved legume, golden umbrella and beautiful, dandelion, valerian, viburnum. " - 4 years.

*Methodical recommendations were made by*  *associate professor Boyko IA*

(Signature)

