

MINISTRY OF HEALTH OF UKRAINE  
BOGOMOLETS NATIONAL MEDICAL UNIVERSITY

**HANDBOOK**  
**on Pharmacognostic Bases of Modern Aromology and**  
**Nutrition**  
**for auditory and independent students work**  
*laboratory handbook*

**Direction:** second (master's) level of higher education

**Specialty:** 226 "Pharmacy, industrial pharmacy"

**Department:** Pharmacognosy and botany

**Name**

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**Course**

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**Group**

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**UDC 615.322(076.5)**

**Handbook on Pharmacognostic Bases of Modern Aromology and Nutrition for auditory and independent students work (*laboratory handbook*) / Minarchenko V. M., Cholak I. S., Karpiuk U. V., Makhynia L. M., Pidchenko V.T., Kovalska N. P., Dvirna T. S. – Kyiv., 2024. – 45 c.**

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The publication contains tasks for independent work of students that allow them to successfully master the theoretical and practical course in the discipline Pharmacognostic bases of modern aromatology and nutrition in accordance with the program. The publication is supplemented with topics for extracurricular study for self-study of students.

For students of higher pharmaceutical and medical schools majoring in “226 Pharmacy, Industrial Pharmacy”.

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## **PREFACE**

The study guide for practical classes and independent work in the discipline “Pharmacognostic bases of modern aromatology and nutrition” is compiled in accordance with the requirements of the educational and professional training program for specialists in the specialty 226 - “Pharmacy, industrial pharmacy”, field of knowledge 22 - Health care for the second (master's) level of higher education.

The materials of the study guide are aimed at expanding the knowledge of future pharmacists in the field of aromatics and healthy nutrition as ways to optimize metabolic processes and normalize the functions and systems of the human body, to help alleviate the condition and recovery of sick people, as well as to prevent diseases in people belonging to certain risk groups; mastering students' knowledge and skills, taking into account modern ideas about the diversity and use of biologically active compounds from plants and other living organisms in aromatics and nutrition.

For each practical lesson, the Topic, didactic goals and motivation of the lesson for students to acquire basic practical skills, educational questions to determine the initial level of students' knowledge and practical tasks aimed at consolidating the educational material are defined.

**Topic 1. Pharmacognostic bases of aromatics. Terms, purpose, objectives, methods and objects of study of modern aromatology through the prism of pharmacognosy, its sections, development prospects and significance for pharmacy. Modern understanding of the sources of aromatic compounds**

**Aim:** learn the basic concepts of modern aromology

**To know:** terms and basic concepts of aromology

**To be able:** define terms and basic concepts of aromology

**Educational tasks**

**Task 1.** Write down the definitions of the main terms and concepts:

**Terms of aromology:**

Aromology

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Purpose and goals of aromology:

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Aromatherapy:

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Flavors

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Fragrant waters

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Aroma inhalation



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**Task 5.** Provide examples of medicinal plant materials containing essential oils, indicate their presence in the SPhU:

MP (eng./lat)	MPM (eng./lat)	SPhU (+/-)	Name of the substance or medicinal product	Pharmacological action
1.				
2.				
3.				
4.				
5.				
6.				

**Teacher's signature** \_\_\_\_\_

## INDEPENDENT WORK STUDENTS ON THE TOPIC 1

**Task 1.** Fill in the table:

MPM eng/lat	Secretory structure	Methods of obtaining essential oils
Peppermint leaves		
Damask rose flowers		
Anise fruits		
Inula roots		
Peel of citrus fruits		

**Task 2.** Give the ways to use essential oils:

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**Topic 2. Monoterpenoids and sesquiterpenoids as components of essential oils. Classification, sources, use, methods of identification.**

**Aim:** to gain knowledge about monoterpenoids and sesquiterpenoids as components of essential oils.

**To know:** classification of monoterpenoids and sesquiterpenoids as components of essential oils, sources of their production, use and methods of identification.

**To be able:** to learn to recognize the LRS containing monoterpenoids and sesquiterpenoids by external signs; to determine the authenticity of medicinal plant materia

**Educational tasks**

**Task 1.** Give an example of an MPM containing acyclic monoterpenoids:

MPM	Chemical composition of essential oil	Name of the substance or medicinal product	Pharmacological action

**Task 2.** Give an example of an MPM containing monocyclic monoterpenoids:

MPM	Chemical composition of essential oil	Name of the substance or medicinal product	Pharmacological action

**Task 3.** Give an example of an MPM containing bicyclic monoterpenoids:

MPM	Chemical composition of essential oil	Name of the substance or medicinal product	Pharmacological action


**Task 4.** Give an example of an MPM containing a monocyclic and bicyclic sesquiterpenoids:

MPM	Chemical composition of essential oil	Name of the substance or medicinal product	Pharmacological action

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## INDEPENDENT STUDENTS WORK ON THE TOPIC 2

**Task 1.** Give the classification of monoterpenoids

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**Task 2.** Give an example of an MPM containing tricyclic sesquiterpenoids:

MPM	Chemical composition of essential oil	Name of the substance or medicinal product	Pharmacological action

**Task 2.** Give the main quality indicators of essential oils:

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**Topic 3. Aromatic compounds and diterpenes as components of essential oils. Classification, sources, use, methods of identification**

**Aim:** Gain knowledge of aromatic compounds and diterpenes as components of essential oils.

**To know:** classification of aromatic compounds and diterpenes as components of essential oils, sources of their production, use and methods of identification.

**To be able:** to learn to recognize MPM containing aromatic compounds and diterpenes by external signs; to determine the authenticity of medicinal plant materials.

**Educational task**

**Task 1.** Give an example of an MPM that contains aromatic compounds:

MPM	Chemical composition of essential oil	Name of the substance or medicinal product	Pharmacological action
MPM containing n-cymene derivatives:			

MPM, which contains phenylpropane derivatives:			

**Task 2.** Give an example of an MPM containing diterpene compounds:

MPM	Chemical composition of essential oil	Name of the substance or medicinal product	Pharmacological action


**Task 3.** To get acquainted with the characteristics and requirements of PFCs for essential oils of oregano, thyme, fennel. Enter the relevant data in the table:

Essential oil name	Characteristics	Essential oil quality indicators	Pharmacological properties and application


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**INDEPENDENT WORK OF STUDENTS ON THE TOPIC3**

**Task 1.** Describe the characteristics and sources of resins and balms:

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**Topic 4. Features of collection, primary processing and storage of medicinal plant raw materials, commodity analysis. Methods of obtaining essential oils.**

**Aim:** to gain knowledge about the peculiarities of collection, primary processing and storage of medicinal plant raw materials containing essential oils, their standardization and production.

**To know:** rules for harvesting, drying and storage of liquid raw materials containing essential oils; quality indicators of essential oils and methods of their production.

**To be able:** collect raw materials, strictly following the rules for harvesting, drying and storing raw materials; standardize the MPM containing essential oils.

**Educational tasks**

**Task 1.** Provide examples of MPM, their rules of harvesting, drying and storage.

MPM	rules of harvesting	Drying temperature	Storage
Peppermint leaves			
Valerian roots and rhizomes			
Chamomile flowers			

Anise fruits			

**Task 2.** Describe the main stages of commodity analysis:

Batch analysis – \_\_\_\_\_

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**Task 3.** Describe methods of obtaining essential oils, give examples:

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**INDEPENDENT STUDENTS WORK ON THE TOPIC 4**

**Task 1.** Conduct a batch analysis of chamomile flowers:

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**Task 2.** Fill out a quality certificate for chamomile flowers:

**A protocol pattern**

\_\_\_\_\_

( MPM (eng, lat.)

Series (batch) number \_\_\_\_\_ Provider \_\_\_\_\_

Date of arrival \_\_\_\_\_

Quantity (kg, pcs., etc.) in a series (batch) \_\_\_\_\_

Gross batch weight \_\_\_\_\_, nett \_\_\_\_\_, tare \_\_\_\_\_

Packaging \_\_\_\_\_

Sample size \_\_\_\_\_

Results of the external inspection \_\_\_\_\_

\_\_\_\_\_

The average sample is allocated by SPhU weight \_\_\_\_\_.

Analytical samples were isolated from the average sample:

- 1) by weight \_\_\_\_\_ to establish identity, degree of grinding and impurity content,
- 2) by weight \_\_\_\_\_ or determining loss on drying ,
- 3) by weight \_\_\_\_\_ to determine the ash content and active ingredients.

Date of sample collection \_\_\_\_\_ I took a sample \_\_\_\_\_  
(surname)

The analysis of the analytical sample for identity, degree of grinding and impurity content was carried out in accordance with the SPhU according to \_\_\_\_\_

(name and № QCM)

Macroscopic features of raw materials \_\_\_\_\_

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Microscopic features of raw materials

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Chemical reactions

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№	Analyzed indicators	Indicators according to regulatory documents	Actual indicators
1	Loss in weight during drying	%	%
2	Active ingredients or extractive content	%	%
3	Total ash	%	%
4	Ash insoluble in 10% HCl	%	%
5	Determination of crushed particles	%	%
6	Determination of foreign impurities	%	%
7	Organic impurities	%	%
8	Mineral impurities	%	%
9	Determination of the degree of infestation of liquid bulk fuel with pests	%	%

Analysis completed \_\_\_\_\_  
(date, position, surname, initials) (signature)

Conclusions \_\_\_\_\_

Head \_\_\_\_\_  
(signature) (signature decryption) (date)

Head of the group  
of incoming control \_\_\_\_\_  
(signature) (signature decryption) (date)

**Teacher's signature** \_\_\_\_\_

**Topic 5. Aroma collections. Features of the selection of components and technology.**

**Aim:** to gain knowledge on the rational selection of components, formulation and analysis of the recipe, quality assessment of aromatic collections.

**To know:** requirements for the selection of components of aromatic collections and evaluation of their quality; technological stages of preparation of aromatic collections.

**Be able to:** select the components of aromatic collections, develop the technology of their preparation, analyze their quality.

### **Educational tasks**

**Task1.** To give examples of essential oil plant raw materials used for the production of aromatic collections:

Aroma collections -

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MPM	Essential oil composition	Pharmacological action and application

**Task 2.** Make a soothing aroma collection:

<b>MP, MPM</b>	<b>Chemical composition of essential oil</b>	<b>Pharmacological activity</b>
Eng. Lat Eng. Lat		
Eng. Lat Eng. Lat		
Eng. Lat Eng. Lat		
Eng. Lat Eng. Lat		
Eng. Lat Eng. Lat		

**Task 3.** Suggest a rational technology for preparing the next flavor collection:

Take: Fennel fruits

Calamus rhizomes

Chamomile flowers equally 15.0

Peppermint oil 10 drops

Mix to form a collection

Give

Directions: Pour 2 cups of boiling water, leave for 30 minutes. Take 1/2 - 1/3 cup 30 minutes before meals in case of chronic gastritis.

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**Task 4.** Propose quality control methods for the developed fee in accordance with the requirements of the SPhU

Identification A

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Identification B

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### INDEPENDENT STUDENTS WORK ON THE TOPIC 5

**Task 1.** Propose an aroma composition for inhalation in the treatment of bronchitis:

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**Task 2.** Solve a situational task:

A 66-year-old patient suffering from metabolic polyarthritis with small joints of the feet, without an exacerbation stage, is recommended to use local aromatherapy for the feet at home.

*What other methods of using aromatherapy are possible in this situation?*

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**Topic 6. The place of nutrition in pharmacy and medicine.**

**Aim:** to learn the basic concepts of modern nutrition

**To know:** terms and basic concepts of nutrition, modern achievements in the field of nutrition and the possibility of their use for nutrition optimization

**Be able to:** define the terms and basic concepts of nutrition, acquire practical skills in the formation of rational nutrition

**Educational tasks**

**Task 1.** Write down definitions of key terms and concepts:

**Terms of nutrition science:**

Nutritional science

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The aim of Nutritional science

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The task of Nutritional science

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Nutrients

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Macrourients

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Micronutrients

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Dietary supplements

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Nutraceuticals

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Parapharmaceuticals

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**Task 2.** Specify the differences between the work of a nutritionist and a nutritionist:

Dietitian

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Nutritionist

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**Topic 7. Sources of proteins, fats, carbohydrates and enzymes of plant and animal origin**

**Aims:** to form students' knowledge of the basics of rational nutrition

**To know:** the role and importance of proteins, fats, carbohydrates and enzymes of plant and animal origin in human nutrition

**To be able to:** acquire practical skills in the formation of rational nutrition

**Educational tasks**

**Task 1.** Give sources of proteins of plant and animal origin

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**Task 2.** Give sources of fats of vegetable and animal origin

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**Task 3.** Give sources of carbohydrates of plant origin

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**Task 4.** Give sources of enzymes of plant and animal origin

Source of enzymes	Enzymes	Use in pharmacy

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**INDEPENDENT STUDENTS WORK ON THE TOPIC 7**

**Task 1.** To select the necessary diet for people with a high level of physical activity:

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**Task 2.** It is necessary to develop a diet if you are overweight:

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**Topic 8. Vitamins. Macro- and microelements. Organic acids. General characteristics. Drugs and raw materials containing vitamins. Drugs and raw materials containing organic acids.**

**Aim:** to learn how to analyze the LRS containing vitamins, macro- and microelements, organic acids

**To know:** MPM and MP containing vitamins, macro- and microelements, organic acids; the role and importance of these substances in human nutrition

**Be able to:** acquire practical skills in the formation of a rational diet using vitamins, macro- and microelements, organic acids

**Educational tasks**

**Task1.** Give the MP and the MPM containing vitamins::

MP	MPM	Vitamins	Total number	Pharmacological action and application


**Task 2.** Give the MP and the MPM containing macro- and microelements:

Element name	The value of the element	MP	MPM


**Task 3.** Give the MP and the MPM containing organic acids:

MP	MPM	Organic acids	Pharmacological action and application

Teacher's signature \_\_\_\_\_

### INDEPENDENT STUDENTS WORK ON THE TOPIC 8

**Task 1.** Fill in the table:

Vitamin	Daily allowance	Consequences of vitamin deficiency in the body
1.		
2.		
3.		
4		
5.		

**Teacher's signature** \_\_\_\_\_

**Topic 9. Flavonoids, tannins, phenolic compounds and other biologically active substances in the restoration of the full functioning of the human body**

**Aim:** to study substances for therapeutic and prophylactic purposes (flavonoids, tannins, phenolic compounds, etc.)

**To know:** pharmacological action and purpose of flavonoids, tannins, phenolic compounds, etc. BAS

**Be able to:** rationally use products for therapeutic and prophylactic purposes, taking into account the content of flavonoids, tannins, phenolic compounds, etc. BAS

**Educational task**

**Task 1.** Give examples of MP, MPM, and DS containing flavonoids:

MP	MPM	Flavonoids	DS and application

**Task 2.** Give examples of MP, MPM, and DS containing tannins:

MP	MPM	Tannins	DS and application


**Task 3.** Give examples of MP, MPM, and DS containing simple phenols:

MP	MPM	Simple phenols	DS and application

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**INDEPENDENT STUDENTS WORK ON THE TOPIC 9**

**Task 1.** Give examples of dietary supplements and their use

Food supplement	Content	Uses

**Teacher's signature** \_\_\_\_\_

## **Topic 10. Organic foods, genetically modified foods, dietary supplements**

**Aim:** to understand the concept of organic and genetically modified foods, dietary supplements

**To know:** what products belong to organic and genetically modified products

**To be able to:** use organic and genetically modified foods in the formation of a rational diet

### **Educational task**

**Task 1.** Define the concepts of “organic products” and “genetically modified products”:

Organic products

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Genetically modified products

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**Task 2.** Give examples of genetically modified products

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**Task 3.** Outline the risks associated with the use of genetically modified foods

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**INDEPENDENT STUDENTS WORK ON THE TOPIC 10**

**Task 1.** Develop a DS with antioxidant effect:

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