«Approve»
Vice-rector for research and strategic development, c.m.s.
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02 2026

THE PROGRAM

of the entrance exam for doctoral studies in the educational program 8D10140 “Pharmacy”

Shymkent, 2026

The entrance examination program has been developed based on Order № 600 of the Minister of Education and Science of the Republic of Kazakhstan dated October 31, 2018, "On Approval of the Standard Rules for Admission to Educational Institutions Implementing Higher and Postgraduate Education Programs."

The entrance examination program was discussed at a meeting of the Scientific Committee on Pharmacy

«16» «02» 2026, protocol № 6

Chairman of the scientific committee on pharmacy — K.K. Orynbasarova

Secretary of the scientific committee on pharmacy — A.A. Abilova

Approved by the scientific council of the SKMA
Protocol № 3 from «19» 02 2026

Introduction

The training of competitive, competent scientific and pedagogical personnel with professional and scientific competencies and skills of implementation in practical and scientific activities to meet the needs of science, education and the health care system is the goal of the doctoral degree program in the specialty "Pharmacy".

The training of competitive, competent scientific and pedagogical personnel with professional and scientific competencies and skills of implementation in practical and scientific activities to meet the needs of science, education and production in the field of pharmacy is the goal of the doctoral degree program in the specialty "Pharmacy".

In the context of improving the field of pharmacy, it became necessary to master the knowledge and skills of managing the activities of pharmaceutical organizations and enterprises based on the achievements of modern science in the field of pharmacy management and marketing, drug production, quality control and safety of medicines, research of various types of medicinal plant raw materials, with the aim of their industrial development and expansion of the range of domestic phytopreparations.

The educational program for the preparation of a doctor of philosophy (PhD) in the specialty "Pharmacy" has a scientific and pedagogical orientation and involves fundamental educational, methodological and research training and in- depth study of pharmaceutical disciplines for the system of higher, postgraduate education and the research sector.

1. The purpose of the entrance exam: Identification of the knowledge and competencies necessary for the successful development of the educational program with the further application of the acquired knowledge in professional activities in the field of science, education and pharmacy.

2. The tasks of the entrance exam:

- formation of students' ability to self-improvement and self-development, the needs and skills of independent creative mastery of new knowledge throughout their active life;
- formation and solution of modern scientific and practical problems, teaching at universities, successfully carrying out research and management activities;
- to know modern research methods;
- to know the basics of pedagogy in higher education;
- to know all types of activities in the field of control and licensing system, organizational models, methods of effective management of human behavior in the labor process and their improvement, the main components in the organization of

the supply chain, methods for determining market capacity, market potential, maintaining competitive advantages of pharmaceutical enterprises;

- to know marketing planning in the implementation of pricing policy, promotion and distribution of ideas, products and services in the field of drug supply to the population, the structure of marketing research, basic methods of searching, collecting, processing information, mechanisms, models and technologies of marketing and management in pharmacy;
- to know the current state and prospects for the development of pharmaceutical technology in order to create new effective and safe medicines;
- to know modern methods of drug production in accordance with the requirements of national and international pharmacopoeias, biopharmaceutical aspects of drug production technology and factors affecting bioavailability;
- to know the state system of standardization and certification of medicines, regulatory documents regulating the quality of medicines, the system for ensuring effectiveness, safety and quality at all stages of the life cycle of medicines;
- to know modern physical, chemical and physico-chemical methods used in pharmaceutical analysis, general pharmacopoeial research methods used to control the quality of medicines;
- to know the international standards that ensure the quality of medicines (rules of laboratory, clinical, industrial and pharmaceutical practice - GLP, GCP, GMP, GDP, GPP);
- to know the phytochemical and pharmacognostic methods of studying medicinal plants of the flora of Kazakhstan.

3. The name of the disciplines and their main sections

3.1 Management and marketing at pharmaceutical enterprises.

Organizational models. Management as a management tool for a pharmaceutical enterprise. Strategic management in pharmacy.Personnel management. Quality management of pharmaceutical activities.Office work at pharmaceutical enterprises. Marketing planning in the implementation of pricing policy, promotion and distribution of ideas, products and services. The SMART principle and situational analysis. Assortment management. Maintaining the competitive advantages of pharmaceutical companies.

3.2 Management in pharmaceutical logistics. The main components in the organization of the supply chain are: production, acceptance of goods and entrance control, storage, exit control, movement of the finished batch of goods to the expedition area, shipment of the finished batch of goods. Implementation of the principle of a systematic approach in logistics. Development of logistics services. Logistics management. Adaptation of logistics systems in the face of environmental uncertainty.

3.3 Good distribution practices. Infrastructure, its place and importance in good distribution practice.Features of drugs as a consumer product.The principles of Good Distribution Practice adopted in the EU and recommended by the World Health Organization (WHO) A unified approach to the organizational process of wholesale sale of medicines. Compliance with all operational procedures and their documentation.

3.4 Organizational behavior in pharmaceutical enterprises. Approaches to the study of organizational behavior. Systematization of human behavior in various situations arising in the process of work. Explanation of the reasons for the actions of individuals in certain conditions.Personality and team. Leadership in pharmaceutical enterprises.. Management of people's behavior in the process of work and their improvement. Managing innovations in the organization.

3.5 The tasks of pharmaceutical education. Trends in the development of pharmacy and the current state of pharmaceutical science in the world and in the Republic of Kazakhstan.The social significance of the future profession in the field of professional activity.

Objects of scientific and pedagogical training: organizations of higher and postgraduate education, organizations of science, pharmaceutical organizations and enterprises, standardization and certification of medicines, health management bodies, health and social security organizations. Learning styles. Teaching methods. Features of teaching pharmaceutical disciplines.

3.6 Fundamentals of the methodology of scientific research in pharmacy. Scientific and research programs by funding sources. Search for grantees, classification of grants, types of grants, priority areas for universities. Rules for

attracting and using grants. Research methodology. Descriptive and analytical research. Information collection and data processing. Stages and types of research. Methods of collecting information. Analysis tools. Information analysis capabilities. The main types of data processing.

3.7 The current state of production of medicines and medical products in the Republic of Kazakhstan. The main directions of the strategy of the State Program for the development of the pharmaceutical and medical industry of the Republic of Kazakhstan.Prospects for the development of the production of medicines from natural plant raw materials. The advantages of herbal medicines.Regulatory and technical documentation for medicines and dosage forms. The State Pharmacopoeia. Pharmacopoeia articles, temporary pharmacopoeia articles. Industrial regulations. The material balance. Calculation of technical and economic indicators.

3.8 Biopharmaceutical as the main direction of pharmaceutical technology. The applied importance of biopharmaceutical and pharmacokinetic research in the production of medicines. Ways to control pharmaceutical factors to ensure the necessary therapeutic effect of drugs. Excipients and their effect on the therapeutic efficacy of drugs. Bioavailability of drugs and methods of its determination**.**

3.9 Liquid dosage forms. Classification and characterization of liquid medicines. The specifics of their manufacture. Stability of liquid dosage forms. Correction and prolongation of the action of drugs in liquid medicines. Technological equipment (devices and principles of operation) used in the production of solutions (for mixing and cleaning). Suspensions and emulsions for external, intravenous and parenteral administration. Features of obtaining and ways to improve the technology of suspensions, emulsions and ointments in pharmaceutical production. Factors that ensure the bioavailability of drugs from these dosage forms.

3.10 Extraction preparations. Ways to increase the intensity of extraction. Modern methods and features of obtaining aqueous extracts from plant raw materials containing active substances of various natures. Tinctures. Extracts: liquid, dry, thick. Oil extracts. Preparations from vegetable raw materials, organo preparations, enzyme and hormonal preparations.

3.11 Tablet preparations. Classification. Excipients used in the preparation of tablet preparations. Technological scheme of tablet production. The meaning and types of granulation. Evaluation of the quality of the granulate. The effect of the type of granulation on the database of medicinal substances in tablets. Pressing. Direct pressing. The device and the principle of operation of tablet machines. Coating of tablets with shells. The purpose of applying the shells. Methods of coating tablets. Modern methods of evaluating the quality of tablets. Biopharmaceutical factors affecting the therapeutic efficacy of solid dosage forms.

Capsules as a competitive and promising dosage form (classification, preparation, technological schemes, excipients, quality assessment).

3.12 Patches. Patches as an applicative dosage form. Classification, technology, equipment used. Prospects for the development of applicative dosage forms: dermatological, eye films, transdermal therapeutic systems, etc.Rectal dosage forms, their biopharmaceutical characteristics. Methods of preparation of rectal medicines in the factory. Aerosols. The theory of pharmaceutical aerosols and their production. Classification of pharmaceutical aerosols.

3.13 Sterile and aseptically prepared dosage forms for injection. Production conditions. Cleanliness classes of industrial premises.Problems of drug stabilization. Decomposition of drugs in dosage forms. The nature of the reaction. Forecasting the stability of drugs and dosage forms. Methods of drug stabilization.Dosage forms for injection. Technology of injection solutions. The basic principles of their stabilization, filtration, and sterilization. Asepsis, its importance in the manufacture of medicines.Ocular dosage forms. The problem of stabilization, sterilization, isotonation and prolongation of the action of eye drops. Packaging of eye dosage forms. Eye medicinal films. The shape of their packaging. Problems of prolonging the effect of drugs. The theoretical foundations of prolonging the action of drugs. Packaging of finished medicines. Types of packaging, containers and closures for eye dosage forms. Packaging materials and requirements for them; equipment for packaging medicines.

GMP is a good manufacturing practice. The main provisions of GMP. The concept of good practices in pharmacy is GXP. Approaches to the implementation of GMP rules in Kazakhstan.The current state of drug development. Factors influencing the development of new medicines. Rules of good laboratory practice. Scope of application. Preclinical research. Stages and types of preclinical research. The goals, basic principles and requirements of the GCP. Implementation of GCP in Kazakhstan.

3.14 State principles and regulations governing the quality of medicines. Introduction. The system of certification of medicines. The quality control system of medicines. Validation of analytical techniques. Pharmaceutical analysis. General methods and techniques of drug research. Physical properties used to establish the authenticity of medicines. Chemical properties used to identify medicines.

3.15 Issues of general pharmaceutical chemistry General pharmacopoeia provisions for determining the purity of medicines. General pharmacopoeia methods of quantitative analysis of medicines. Inorganic medicines.

3.16 Issues of special pharmaceutical chemistry. Organic medicines. Aromatic compounds. Iodized derivatives of aromatic and aryliphatic amino acids. Arylalkylamines, oxyphenylalkylamines and their derivatives. Benzenesulfanilamides and their derivatives. Heterocyclic compounds of natural

and synthetic origin. Oxygen-containing heterocycles. Sulfur-containing heterocycles. Nitrogen-containing heterocycles.

3.17 Phytochemical and pharmacognostic methods of studying medicinal plants of the flora of Kazakhstan. The goals and objectives of pharmacognosy at the present stage of the development of pharmacy medicine. The chemical composition of medicinal plants. Commodity analysis. Standardization of medicinal plant raw materials.

3.18 Latin, Kazakh names, raw material base, application, preparations. Medicinal plants, raw materials containing polysaccharides. Inulin containing medicinal plants. .Mucus-containing plants. Gum-bearing plants. Vegetable sources of pectin substances and fiber. Medicinal plants, products, fat content, fat- like substances. Medicinal plants containing vitamins. Medicinal plants, raw materials containing essential oils and terpenoids. Medicinal plants, raw materials containing cardiac glycosides. Medicinal plants, raw materials containing saponins. Medicinal plants, raw materials containing monoterpene glycosides. Medicinal plants, raw materials containing sesquiterpene lactones. Medicinal plants, raw materials containing alkaloids. Medicinal plants, raw materials containing phenologycosides, etc. Medicinal plants, raw materials containing lignans. Medicinal plants, raw materials containing anthracene derivatives and their glycosides. Medicinal plants, raw materials containing flavonoids and their glycosides. Medicinal plants, raw materials containing coumarins, chromones. Medicinal plants, raw materials containing tannins.

3.19 Analysis of medicinal plant raw materials. Features of harvesting, drying, and storage. Security measures during harvesting. Preparations, application.

4. The list of questions for the entrance exam

1. Management as a management tool for a pharmaceutical enterprise.
2. Combining the theory of management with the experience of pharmacy management in the Republic of Kazakhstan.
3. Strategic planning at different levels of the pharmaceutical service. SWOT analysis. Business planning. Operational management at different levels of the pharmaceutical service.
4. Methods and models of decision-making in pharmacy.
5. Personnel management, personnel management. Staff of pharmacy organizations. Regulation of official rights and duties.
6. Quality management models. The concept of quality in the healthcare and pharmacy system.
7. Organizational models in pharmaceutical practice. Management of a pharmaceutical organization. Management levels.
8. Marketing planning in the implementation of pricing policy, promotion and distribution of ideas, products and services.
9. Ethical and scientific criteria for the promotion of medicines on the

pharmaceutical market. Product promotion strategy.

10. The marketing research system. Methods of marketing research of the pharmaceutical market.

11. Studying the demand for pharmacy products. The product is in the marketing system.

12. Assortment management. Assortment analysis. Positioning of goods.

13.Maintaining the competitive advantages of pharmaceutical companies

14. The main components in the organization of the supply chain: production, acceptance of goods and entrance control, storage, exit control, movement of the finished batch of goods to the expedition area, shipment of the finished batch of goods.

15. Implementation of the principle of a systematic approach in logistics.

16. Storage of medicines and medical devices. Definition, resources, documentation, procedures.

17. Organization of logistics management. Strategy and planning in logistics. Organization of service management in logistics.

18. Adaptation of logistics systems in conditions of environmental uncertainty.

19. Infrastructure, its place and importance in good distribution practice. Features of the drug as a consumer product.

20. Principles of Good Distribution Practice adopted in the EU and recommended by the World Health Organization (WHO).

21. The purpose and objectives of the logistics inventory management system. Types of inventory management systems.

22. Compliance with all operational procedures and their documentation.

23. The procedure for self-inspection. Monitoring of information in distribution. Information collection cards. Labeling of products in the distribution network.

24. Regulatory and legal support of pharmaceutical distribution activities.

25. Models of corporate culture. The ethical values and mission of the organization.

26. The communicative competence of the head of a pharmaceutical organization.

27. Resistance to change and overcoming it. Types of changes. The attitude of different types of employees to changes in the organization. Behavioral marketing.

28. Business ethics: principles, stereotypes and patterns of behavior in the organization.

29. Leadership in pharmaceutical enterprises.

30. Management of people's behavior in the process of work and their improvement. Managing innovations in the organization.

31. Trends in the development of pharmacy and the current state of pharmaceutical science in the world and in the Republic of Kazakhstan.The social significance of the future profession in the field of professional activity.

32. Objects of scientific and pedagogical training: organizations of higher and

postgraduate education, organizations of science, pharmaceutical organizations and enterprises, standardization and certification of medicines, health management bodies, health and social security organizations.

33. Teaching styles and methods. Features of teaching pharmaceutical disciplines. The professional orientation of the training of pharmacists. Teaching general education, basic and core disciplines in the training of specialists. A competent specialist is the basis for providing high quality and safe medical care. The importance of industrial practice in the training of specialists.

34. Scientific research in pharmacy. Directions of scientific research in pharmacy. Scientific schools. Scientific research in pharmaceutical specialties: drug technology, pharmaceutical management organization, pharmaceutical chemistry, pharmacognosy. Scientific and research programs by funding sources. Search for and attract grants. Research methodology.

35. The current state of production of medicines and medical products in the Republic of Kazakhstan. The main directions of the strategy of the State Program for the development of the pharmaceutical and medical industry of the Republic of Kazakhstan.Prospects for the development of the production of medicines from natural plant raw materials. The advantages of phytopreparations.

36. Regulatory and technical documentation for medicines and dosage forms. The State Pharmacopoeia. Pharmacopoeia articles, temporary pharmacopoeia articles. Industrial regulations. The material balance. Calculation of technical and economic indicators.

37. Biopharmaceutical as the main direction of pharmaceutical technology. The applied importance of biopharmaceutical and pharmacokinetic research in the production of medicines.Ways to control pharmaceutical factors to ensure the necessary therapeutic effect of drugs.

38. Excipients and their effect on the therapeutic efficacy of drugs.Bioavailability of drugs and methods of its determination.

39. Liquid dosage forms. Classification and characterization of liquid medicines. The specifics of their manufacture. Stability of liquid dosage forms.

40. Suspensions and emulsions for external, intravenous and parenteral administration. Features of obtaining and ways to improve the technology of suspensions, emulsions in pharmaceutical production. Factors that ensure the bioavailability of drugs from these dosage forms.

41. Extraction preparations. Features of extraction of raw materials with a cellular structure. Ways to increase the intensity of extraction. Modern methods and features of obtaining aqueous extracts from plant raw materials containing active substances of various natures.Tinctures. Extracts: liquid, dry, thick. Oil extracts, polyextracts. Preparations from vegetable raw materials, organopreparations, enzyme and hormonal preparations.

42. Tablet preparations. Classification. Excipients used in the preparation of tablet preparations. Technological scheme of tablet production. The meaning and types of granulation. Evaluation of the quality of the granulate. The effect of the type of granulation on the database of medicinal substances in tablets.

43. Pressing. Direct pressing. The device and the principle of operation of tablet machines.Coating of tablets with shells. The purpose of applying the shells. Methods of coating tablets.

44. Modern methods of evaluating the quality of tablets. Biopharmaceutical factors affecting the therapeutic efficacy of solid dosage forms.

45. Capsules as a competitive and promising dosage form (classification, preparation, technological schemes, excipients, quality assessment).

46. Plasters. Patches as an applicative dosage form. Classification, technology, equipment used. Prospects for the development of applicative dosage forms: dermatological, dental, eye films, transdermal therapeutic systems, etc.

47. Ointments, pastes, liniments. Methods for determining the activity of ointments and their stability during storage. Rectal dosage forms, their biopharmaceutical characteristics. The problem of suppository bases. Methods of preparation of rectal medicines in pharmacy and factory conditions.

48. Aerosols. The theory of pharmaceutical aerosols and their production. Classification of pharmaceutical aerosols.

49. New dosage forms. Immobilized enzymes. Liposomes. Solid dispersions. Therapeutic systems.

50. New dosage forms. Characteristics of drug carriers in various dosage forms. Magnetically controlled systems. Modified release dosage forms and the technology of their creation.

51. Problems of microbial contamination of medicines. Sources and causes of microbial contamination of medicinal products. Ways to prevent microbial contamination.

52. Sterile and aseptically prepared dosage forms for injection. Production conditions. Cleanliness classes of industrial premises. Isotonic and physiological solutions. Classification. The nomenclature. Features of preparation.

53. Problems of drug stabilization. Decomposition of drugs in dosage forms. The nature of the reaction. Forecasting the stability of drugs and dosage forms. Methods of drug stabilization.

54. Dosage forms for injection. Technology of injection solutions. The basic principles of their stabilization, filtration, and sterilization. Asepsis, its importance in the manufacture of medicines.

55. Ocular dosage forms. The problem of stabilization, sterilization, isotonation and prolongation of the action of eye drops. Packaging of eye dosage forms. Eye medicinal films.

56. Problems of prolonging the effect of drugs. Theoretical foundations of prolongation of the action of drugs.

57. Packaging of finished medicines. Types of packaging, containers and closures for eye dosage forms. Packaging materials and requirements for them; equipment for packaging medicines.

58. GMP is good manufacturing practice. The main provisions of GMP. The concept of good practices in pharmacy is GXP. Approaches to the implementation of GMP rules in Kazakhstan.

59. The current state of drug development. Factors influencing the development of new medicines. Rules of good laboratory practice. Scope of application.

60. Preclinical research. Stages and types of preclinical research. The goals, basic principles and requirements of the GCP. Implementation of GCP in Kazakhstan.

61. General methods of drug research as a branch of pharmaceutical chemistry that studies general principles and approaches to methods of pharmaceutical analysis. Introduction to pharmaceutical chemistry. The main problems, objects of pharmaceutical chemistry.

62. Standardization of medicines. State standards for the quality of medicines: general Pharmacopoeia article (OFS) and pharmacopoeia article (FS). Quality standards of the company's medicines: analytical regulatory document (ANDA) and temporary analytical regulatory document (VAND).

63. Pharmaceutical analysis. Specific features and types of pharmaceutical analysis. Criteria for pharmaceutical analysis depending on the object and the tasks set.

64. Physical properties used to establish the authenticity of medicines. Description of the appearance and its solubility as a general indicative characteristic of the test substance. The value of physical constants for the identification of medicinal substances.

65. General pharmacopoeia provisions for determining the purity of medicines. Sources and causes of substandardness of medicinal substances. Classification of impurities. Unification of tests. General requirements for purity tests.

66. General pharmacopoeia provisions for determining the purity of medicines. Reference and non-reference methods for determining impurities. General tests for impurity ions. Purity tests for physical and chemical properties: determination of the pH of the medium, acidity or alkalinity, transparency and degree of turbidity, chromaticity of solutions of medicinal substances.

67. General pharmacopoeia provisions for determining the purity of medicines. General methods for the determination of ash, water and volatile substances, residual amounts of organic solvents, impurities of organic and reducing substances in medicinal substances.

68. General pharmacopoeia methods of quantitative analysis of medicines.Optical methods: UV, IR and NMR spectroscopy, visible-field spectrophotometry.

69. Medicinal substances of the phenol group: phenol, thymol, resorcinol. Properties, quality requirements, and general and particular methods of analysis.

70. Naphthoquinone derivatives are vitamins of group K. Natural compounds: phylloquinones and farnoquinones. The relationship between structure and biological activity. Synthetic vitamin K1 is a phytomenadion. A synthetic water- soluble analog in action is vikasol. Methods of analysis.

71. Esters of p-aminobenzoic acid: anesthesin, novocaine, dicaine. The main prerequisites and methods for obtaining locally anesthetic drugs. General and specific methods of analysis

72. Pyrazole derivatives. Research in the pyrazolone group for the production of targeted drugs: antipyrine, analgin, butadiene. The general method of drug synthesis. Quality requirements and methods of analysis.

73. Pyridine derivatives. Pyridine methanol preparations – vitamin B6 (pyridoxine hydrochloride), pyridoxal phosphate, pyriditol, parmidine. Physical and chemical properties. Quality requirements and methods of analysis.

74. Tropane derivatives. Atropine sulfate, scopolamine hydrobromide. Physical and chemical properties. Quality requirements and methods of analysis. Stereoisomerism.

75. Isoquinoline derivatives. Benzylisoquinoline preparations: papaverine hydrochloride and its synthetic analogue – drotaverine hydrochloride (no-shpa). Quality requirements and methods of analysis.

76. Phenanthrenisoquinoline derivatives: morphine, codeine and their preparations, ethylmorphine hydrochloride. Sources of receipt. Quality requirements, methods of analysis. Storage conditions and vacation rules.

77. Semi–synthetic derivatives of morphine are derivatives of aporphine: apomorphine hydrochloride, glaucine hydrochloride. Quality requirements, methods of analysis. Storage conditions.

78. Derivatives of phenanthrenisoquinoline. The problem of creating morphine-type analgesics. The relationship of the chemical structure with the pharmacological action of morphine. Procrastination. Quality requirements, methods of analysis.

79. Derivatives of pyrimidine–2, 4, 6-trione (barbituric acid). The relationship of pharmacological action with the chemical structure of drugs. General synthesis methods. Barbital, ethaminal-sodium, phenobarbital, hexenal, benzonal, barbamyl, hexamidine. Quality requirements and methods of analysis.

80. Benzodiazepine derivatives. Chlordiazepoxide, diazepam, oxazepam, nitrazepam, phenazepam. The relationship of chemical structure with pharmacological action. General chemical methods of drug quality control.

81. Estrogens and their synthetic analogues. Estrone and estradiol as medicinal substances. The relationship between structure and biological action. Prerequisites for the production of derivatives: ethinyl estradiol, mestranol, estradiol esters - octestrol. Quality requirements, analysis methods

82. Purine derivatives. Caffeine, theophylline, theobromine and their salts, diprophylline, xanthinol nicotinate. General methods of analysis. Cleanliness requirements.

83. Indole derivatives. Serotonin adipinate, indomethacin, sumatriptan, tropisetron, vinpocetine. Biochemical transformations in the serotonin series as a prerequisite for the creation of new drugs. Quality requirements and analysis methods

84. Derivatives of phenylacetic acid. Diclofenac and its salts - diclofenac sodium (orthophen.) Quality requirements, methods of analysis.

85. Sulfonamides substituted by the amide group, derivatives of the aliphatic series: streptocide, sodium sulfacyl. Quality requirements and methods of analysis.

86. Sulfonamides substituted by the amide group, derivatives of the aliphatic series: streptocide, sodium sulfacyl. Quality requirements and methods of analysis.

87. Chromane compounds – tocopherols (vitamins gr. E), redox properties. Quality requirements, methods of analysis.

88. Nitrophenylalkylamines: levomycetin and its esters – levomycetin stearate and succinate. The relationship between structure and biological action, the role of stereoisomerism. Quality requirements and methods of analysis.

89. Isoalloxazine derivatives. B2 vitamins: riboflavin and riboflavin mononucleotide. Quality requirements and methods of analysis.

90. Proline derivatives: captopril, enalapril. The relationship of chemical structure with pharmacological action. Physical and chemical properties, features of analysis methods. Quality requirements and methods of analysis in accordance with the use of drugs in medicine.

91. Medicinal plants and raw materials containing polysaccharides. Latin, Kazakh, Russian names, raw material base, application, preparations.

92. Medicinal plants, raw materials and products containing fats and fat-like substances. Latin, Kazakh, Russian names, raw material base, application, preparations.

93. Medicinal plants and raw materials containing vitamins. Latin, Kazakh, Russian names, raw material base, application, preparations.

94. Medicinal plants and raw materials containing essential oils and terpenoids. Latin, Kazakh, Russian names, raw material base, application, preparations.

95. Medicinal plants and raw materials containing cardiac glycosides. Latin, Kazakh, Russian names, raw material base, application, preparations.

96. Medicinal plants and raw materials containing saponins. Latin, Kazakh, Russian names, raw material base, application, preparations.

97. Medicinal plants and raw materials containing monoterpene glycosides. Latin, Kazakh, Russian names, raw material base, application, preparations.

98. Medicinal plants and raw materials containing sesquiterpene lactones. Latin, Kazakh, Russian names, raw material base, application, preparations.

99. Medicinal plants and raw materials containing alkaloids. Latin, Kazakh, Russian names, raw material base, application, preparations.

100. Medicinal plants and raw materials containing phenologycosides. Latin, Kazakh, Russian names, raw material base, application, preparations.

101. Medicinal plants and raw materials containing lignans. Latin, Kazakh, Russian names, raw material base, application, preparations.

102. Medicinal plants and raw materials containing anthracene derivatives and their glycosides. Latin, Kazakh, Russian names, raw material base, application, preparations.

103. Medicinal plants and raw materials containing flavonoids and their glycosides. Latin, Kazakh, Russian names, raw material base, application, preparations.

104. Medicinal plants and raw materials containing coumarins, chromones. Latin, Kazakh, Russian names, raw material base, application, preparations.

105. Medicinal plants and raw materials containing tannins. Latin, Kazakh, Russian names, raw material base, application, preparations.

106. Medicinal plants and raw materials containing biologically active substances of poorly studied composition. Latin, Kazakh, Russian names, raw material base, application, preparations.

107. Analysis of medicinal plant raw materials used as choleretics. Features of harvesting, drying, and storage. Security measures during harvesting. Preparations, application.

108. Analysis of medicinal plant raw materials used as an expectorant. Features of harvesting, drying, and storage. Security measures during harvesting. Preparations, application.

109. Analysis of medicinal plant raw materials used as diuretics. Features of harvesting, drying, and storage. Security measures during harvesting. Preparations, application.

110. Analysis of medicinal plant raw materials used as a hemostatic agent. Features of harvesting, drying, and storage. Security measures during harvesting. Preparations, application.

111. Analysis of medicinal plant raw materials used as multivitamins. Features of harvesting, drying, and storage. Security measures during harvesting. Preparations, application.

112. Analysis of medicinal plant raw materials used as sedatives. Features of harvesting, drying, and storage. Security measures during harvesting. Preparations, application.

113. Analysis of medicinal plant raw materials used as laxatives. Features of harvesting, drying, and storage. Security measures during harvesting. Preparations, application.

114. Analysis of medicinal plant raw materials used as anthelmintic agents. Features of harvesting, drying, and storage. Security measures during harvesting. Preparations, application.

115. Analysis of medicinal plant raw materials used as antihypertensive agents. Features of harvesting, drying, and storage. Security measures during harvesting. Preparations, application.

116. Analysis of medicinal plant raw materials used as appetizing, bitter, digestive-enhancing drugs. Features of harvesting, drying, and storage. Security measures during harvesting. Preparations, application.

117. Analysis of medicinal plant raw materials used as sweatshops. Features of harvesting, drying, and storage. Security measures during harvesting. Preparations, application.

118. Analysis of medicinal plant raw materials used as cardiotonic agents.

Features of harvesting, drying, and storage. Security measures during harvesting. Preparations, application.

119. Analysis of medicinal plant raw materials used as astringents. Features of harvesting, drying, and storage. Security measures during harvesting. Preparations, application.

120. Analysis of medicinal plant raw materials used as antispasmodics. Features of harvesting, drying, and storage. Security measures during harvesting. Preparations, application.

5. The list of recommended literature Main sources:

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8. Shertaeva, K. D. communication skills in the field of Pharmacy: textbook-Shymkent: Zhasulan, 2013. - 72 pages

9. Urkunchieve.M. production management [text]: educational tool / E. M. Urkunchiev, a.m. Zhusanbayev; MES of the Republic of Kazakhstan; M. H. Dulatidagtarazmeml. "No," he said. "I Don't Know," He Said. Recommended by the UN-scientific council. - Almaty: Evero, 2013. - 160 pages.

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13. Menshutina N. V., Mishina Yu.V., Alves S. V., Gordienko M. G., Guseva E. V., Troyankin A. Yu.innovative technologies and provision of pharmaceutical production.- Vol. 2. - M.: Izdatelstvo Binom, 2013. - 480 s., IL.

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