«APPROVED»
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THE PROGRAM

of the entrance exam to the doctoral program in the educational program «Pharmacy»

Shymkent, 2022

The program of the entrance exam is compiled on the basis of state mandatory standards and standard professional training programs in medical and pharmaceutical specialties.

The program of the entrance exam was discussed at the meeting of the Scientific Committee on Pharmacy
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Chairman of the Scientific Committee on Pharmacy _____ K.K.Orynbasarova

Secretary of the Scientific Committee on Pharmacy _____ N.A.Asylova

Approved by the Scientific Council of the SKMA
Protocol № 5 from «24» 06 2022г.

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 production in the field of pharmacy is the goal of the doctoral program in the specialty "Pharmacy".

In the conditions of improving the sphere of circulation of medicines, it became necessary to acquire 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.

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:

• Identification of students' ability to self-improvement and self-development, needs and skills of independent creative mastery of new knowledge throughout their active life;

• To identify knowledge about modern scientific and practical problems, to teach at universities, to successfully carry out research and management activities;

• Identification of knowledge about modern research methods;

• Identification of knowledge about the basics of pedagogy in higher education;

• Identification of knowledge about all types of activities in the field of control and licensing system, organizational models, methods of effective management of people's behavior in the process of work and their improvement, the main components in the organization of the supply chain, methods of determining market capacity, market potential, maintaining competitive advantages of pharmaceutical enterprises;

• Identification of knowledge about marketing planning in the implementation of pricing policy, promotion and distribution of ideas, products and services in the field of drug provision of the population, the structure of marketing research, basic methods of search, collection, processing of information, mechanisms, models and technologies of marketing and management in pharmacy;

• Identification of knowledge about the current state and prospects for the development of pharmaceutical technology in order to create new effective and safe

medicines;

• Identification of knowledge about 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;

• Identification of knowledge about the state system of standardization and certification of medicines, regulatory documents regulating the quality of medicines, the system of ensuring the effectiveness, safety and quality at all stages of the life cycle of medicines;

• Identification of knowledge about modern physical, chemical and physico-chemical methods used in pharmaceutical analysis, as well as about general pharmacopoeial research methods used to control the quality of medicines;

• Identification of knowledge about international standards that ensure the quality of medicines (rules of laboratory, clinical, industrial and pharmaceutical practice - GLP, GCP, GMP, GDP, GPP);

• Identification of knowledge about phytochemical and pharmacognostic methods of studying medicinal plants of the flora of Kazakhstan.

3. Name of disciplines and their main sections

3.1 Management and marketing at pharmaceutical enterprises. Organizational models. Management as a management tool of 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 input control, storage, output control, movement of the finished batch of goods to the expedition zone, shipment of the finished batch of goods. Implementation of the principle of a systematic approach in logistics. Development of logistics service. Logistics management. Adaptation of logistics systems in conditions 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 people's 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 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 grant-givers, classification of grants, types of grants, priority areas for universities. Rules for attracting and using grants. Research methodology. Descriptive and analytical studies. 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. Advantages of phytopreparations. Regulatory and technical documentation for medicines and dosage forms. State Pharmacopoeia. Pharmacopoeia articles, temporary pharmacopoeia articles. Industrial regulations. Material balance. Calculation of technical and economic indicators.

3.8 Biopharmaceutical as the main direction of pharmaceutical technology. The applied value 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 characteristics 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 operating principles) 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 medicinal substances from these dosage forms.

3.10 Extraction preparations. Ways to increase the intensity of extraction. Modern methods and features of obtaining water extracts from plant raw materials containing active substances of various nature. Tinctures. Extracts: liquid, dry, thick. Oil extracts. Preparations from plant raw materials, organopreparations, 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 Plasters. Plasters as an applicative dosage form. Classification, technology, equipment used. Prospects for the development of application dosage forms: dermatological, eye films, transdermal therapeutic systems, etc. Rectal dosage forms, their biopharmaceutical characteristics. Methods of preparation of rectal medicines in factory conditions. Aerosols. 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 medicinal products in medicinal 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, sterilization. Asepsis, its importance in the manufacture of medicines. Eye 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. Theoretical foundations of prolongation of 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 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 studies. Goals, basic principles and requirements of 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 medicinal products.

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

3.16 Questions 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. Goals and objectives of pharmacognosy at the present stage of development of pharmacy medicine. 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 phenol glycosides, 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 preparation, drying, storage. Security measures during harvesting. Preparations, application.

4. List of questions for the entrance exam in the discipline

1. Management as a management tool of 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. Modern models of pharmaceutical care quality management.

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. Brand policy and PR management in a pharmaceutical organization. Product promotion strategy.

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

11. Application of the SMART principle in writing management goals and objectives. Situational analysis of the following characteristics: turnover, sales, capacity and market share, costs, coverage amount, nature of competition.

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 input control, storage, output control, movement of the finished batch of goods to the expedition zone, 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. Methodological foundations of designing an effective logistics inventory management system. The purpose and objectives of the logistics inventory management system. Types of inventory management systems. Methodology of designing an effective logistics inventory management system.

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. Ethical values and mission of the organization.

26. Principles of managing the behavior of the organization. The principle of consistency and complexity. The principle of legal protection of a management decision. The principle of management optimization. The principle of delegation of authority.

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 models 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. The current state of production of medicines 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.

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

33. Biopharmaceutical as a scientific direction of pharmaceutical technology. The importance of biopharmaceutical and pharmacokinetic research in the production of medicines.Pharmaceutical factors and their influence on the bioavailability of drugs.

34. Bioavailability of medicines.Absolute and relative bioavailability of drugs.Methods for determining the bioavailability of drugs.Methods for determining the bioavailability of hard and soft dosage forms.

35. Modern methods and devices for determining bioavailability in "in vitro" experiments. The "Dissolution" test. Methods for determining bioavailability in "in vivo" experiments.

36. Bioequivalence of drugs.Types of equivalence. Rules for the study of bioequivalence of medicines in the EAEU (2015)

37. Liquid dosage forms. Classification and characteristics of liquid medicines. Industrial production of pharmaceutical solutions. Nomenclature, equipment.

38. Extraction preparations. Theoretical foundations of extraction of medicinal plant raw materials. Features of extraction of raw materials with a cellular structure. Extraction as a mass-exchange process: diffusion, osmosis, dialysis, dissolution and desorption.

39. Technological factors affecting the completeness and speed of extraction. Methods of extraction of vegetable raw materials and raw materials of animal origin,

40. Extraction preparations: tinctures, extracts (liquid, dry, thick). Oil extracts, polyextracts.

41. Preparations from raw materials of animal origin: organopreparations, classification, production features. Enzyme and hormonal preparations.

42. Tablet preparations. Classification. Physico-chemical and technological properties of powdered medicinal substances and their influence on the technological process of tableting and the quality of tablets.

43. Auxiliary substances used in the production 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.

44. 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.

45. Capsules as a competitive and promising dosage form. Classification and varieties of capsules. Characteristics of the main and auxiliary substances included in the composition of solid gelatin capsules. Methods of obtaining capsules. Evaluation of capsule quality.

46. Plasters as an applicative dosage form. Classification of patches by purpose, composition, aggregate state. The technology of production of plasters, the equipment used.

47. Ointments, pastes, liniments. Features of the production of soft dosage forms in industrial conditions. Technological process of production of ointments in factory conditions, equipment.

48. Rectal dosage forms of industrial production. Technology of obtaining suppositories in industrial conditions, methods of obtaining. Biopharmaceutical evaluation of suppositories. Evaluation of the quality of the dosage form.

49. Aerosols. Theory of pharmaceutical aerosols and their production. Classification of pharmaceutical aerosols. Production technology.

50. New dosage forms. Immobilized enzymes. Liposomes. Solid dispersions. Therapeutic systems. Magnetically controlled systems.

51. Dosage forms with modified release and action. The technology of their creation. Auxiliary substances used in their development.

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

53. Sterile and aseptically prepared dosage forms. General characteristics. Requirements for injectable medicines. Asepsis, its importance in the manufacture of medicines. Technological scheme of production of ampulated injectable drugs. Stages of preparation for amputation.

54. GMP requirements (Good Manufacturing Practice) for the production of injectable drugs. Requirements for production facilities, personnel, equipment. Cleanliness classes of industrial premises and requirements for their creation.

55. Modern equipment in the production of injectable drugs. In-line technological lines for amputation of injectable solutions in ampoules. Stabilization, filtration and sterilization of injectable drugs.

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

57. Eye dosage forms. Classification. The problem of stabilization, sterilization, isotonation and prolongation of the action of eye drops. Eye medicinal films. Modern packaging for eye dosage forms.

58. Parapharmaceutical and nutraceutical preparations. Features of their technology, modern nomenclature, application in medicine.

59. The system of classification of medicines. Classification system of dosage forms. Classification system of excipients.

60. Biologically active additives used in medicine. The technology of their production. Classification of dietary supplements. Nomenclature.

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

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

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

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

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

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

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

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

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

70. Medicinal plants and raw materials containing phenologlycosides. Latin, Kazakh names, raw material base, application, preparations.

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

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

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

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

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

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

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

78. Analysis of medicinal plant raw materials used as an expectorant.

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

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

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

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

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

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

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

86. Analysis of medicinal plant raw materials used as appetizing, bitter, digestive-improving agents. Features of preparation, drying, storage. Security measures during harvesting. Preparations, application.

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

88. Analysis of medicinal plant raw materials used as cardiotonic agents. Features of preparation, drying, storage. Security measures during harvesting. Preparations, application.

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

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

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

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

93. Substituted sulfonylureas as antidiabetic drugs: butamide, bucarban, glibenclamide, glipizide, gliquidone, gliclazide. Quality requirements and methods of analysis.

94. Derivatives of chlorobenzenesulfonic acid amide: furosemide, dichlotiazide (hypothyazide), bumetanide. Quality requirements and methods of analysis.

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

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

97. Pyridine derivatives. Preparations of pyridine-3-carboxylic acid derivatives (nicotinic acid, nicotinamide, cordiamine, nicodine) and pyridine-4-carboxylic acids (isoniazid, ftivazid, nialamide). Quality requirements and methods of analysis.

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

99. Tropane derivatives. Homatropine hydrobromide, tropacin, aprofen, tropafen. Physical and chemical properties. Quality requirements and methods of analysis. Stereoisomerism.

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

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

102. 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.

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

104. The biochemical role of steroids in the body as a prerequisite for obtaining drugs. Sources of receipt. Structural features, stereochemistry of steroid compounds and biological activity. General physical and chemical properties. Methods of analysis, ways to improve methods of quality assessment.

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

106. Proline derivatives: captopril, enalapril. The relationship of chemical structure with pharmacological action. Physical and chemical properties, features of analysis methods.

107. Pyrrole derivatives: cyanocobalamin, hydroxycobalamin, cobamide. The relationship of chemical structure with pharmacological action. Physical and chemical properties, features of analysis methods.

108. Imidazole derivatives: pilocarpine hydrochloride, dibazole, clofelin, metronidazole. Physical and chemical properties, features of analysis methods.

109. 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.

110. Standardization of medicines. State standards for the quality of medicines: general pharmacopoeia article (GPA) and pharmacopoeia article (PA). Quality standards of the company's medicines: analytical regulatory document (ARD) and temporary analytical regulatory document (TARD).

111. Pharmaceutical analysis. Specific features and types of pharmaceutical analysis. Criteria of pharmaceutical analysis depending on the object and tasks.

112. General methods and techniques of drug research. Unification and standardization of the same type of tests in groups of medicinal substances. General provisions, general and particular articles of the pharmacopoeia, their relationship.

113. 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.

114. Chemical properties used to identify medicinal products. General reactions of identification of inorganic medicinal substances. Identification of organic medicinal substances by functional groups.

115. General pharmacopoeia provisions for determining the purity of medicines. 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, color of solutions of medicinal substances.

116. 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.

117. General pharmacopoeia methods of quantitative analysis of medicines. Unification of methods. General articles of the State Pharmacopoeia of the Republic of Kazakhstan. Determination of halogens, sulfur, phosphorus, nitrogen in organic medicines

118. General pharmacopoeia methods of quantitative analysis of medicines. Titrimetric methods: acid-base titration in aqueous and non-aqueous media, complexometry, argentometry, iodometry, nitritometry.

119. General pharmacopoeia methods of quantitative analysis of medicines. Optical methods: UV, IS and NMR spectroscopy, spectrophotometry in the visible region.

5. List of recommended literature

Main:

1. Шертаева, К. Д.Фармацевтикалық маркетинг [Мәтін]: оқулық / К. Д. Шертаева, К. Ж. Мамытбаева; ҚР денсаулық сақтау және әлеуметтік даму министрлігі. ОҚМФА. - Шымкент: [б. и.], 2016. - 152 б. с.
2. Арыстанов Ж. М. Менеджмент и маркетинг в фармации: учебное пособие / Ж. М. Арыстанов, А. Т. Токсеитова. - Алматы: Эверо, 2016. - 532 с
3. Шертаева, К. Д. Фармацевтический маркетинг: учебник / К. Д. Шертаева; М-во здравоохранения РК; Респ. центр инновационных технологий мед. образования; ЮКГФА. - Шымкент: Б. и., 2012. - 152 с.
4. Блинова, О. В. Фармацевтический менеджмент: учебник / О. В. Блинова; М-во здравоохранения РК; ЮКГФА. - Шымкент: Жасұлан, 2013. - 165 с
5. Асимова, Т. А. Биоэтика: учебник /. - Алматы: АҚНҰР, 2017. - 240 с.
6. Датхаев, У. М. Коммуникативтік дағдылар: оқулық / - Алматы : Эверо, 2016. - 260 бет.
7. Молотов-Лучанский, В. Б. Коммуникативные навыки : учеб. пособие. - Алматы : Эверо, 2014. - 138 с
8. Шертаева, К. Д. Фармация саласындағы коммуникативтік дағдылар : оқу құралы - Шымкент : Жасұлан, 2013. - 72 бет
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