

**Thematic plan of seminar-type classes  
in the discipline "Methods of pharmaceutical analysis"  
for students of the educational program  
of the specialty / area of training 33.05.01 Pharmacy,  
profile Pharmacy  
(specialist's level),  
form of study full-time  
for the 2023-2024 academic year**

	<b>Topics of seminar type classes (term IV)</b>	Hours (academic)
	General methods of pharmacopoeial analysis	
1	Pharmacopoeial analysis <sup>1</sup> . Classification and characteristics of pharmacopoeial analysis methods <sup>2</sup> .	2
	Legislative nature of pharmacopoeial analysis. Pharmacopoeias <sup>2</sup> .	1.6
2	Pharmacopoeial monograph. Structure and rules of use of pharmacopoeial articles <sup>1</sup> .	2
	Pharmaceutical substances. Sampling rules. Expiration dates of drugs. Storage conditions. Impurities <sup>2</sup> .	1.6
3	Methods of physical and physicochemical analysis. Classification <sup>1</sup> .	2
	Brief description of methods of physical and physicochemical analysis <sup>2</sup> .	1.6
4	Physical methods of pharmacopoeial analysis <sup>1</sup> . Determination of melting point <sup>2</sup> .	2
	Determination of melting points of several drug substances <sup>2</sup> .	1.6
5	Physical methods of pharmacopoeial analysis <sup>1</sup> . Determination of boiling point, temperature limits of distillation <sup>2</sup> .	2
	Determination of boiling points of drug solutions and solvents <sup>2</sup> .	1.6
6	Physical methods of pharmacopoeial analysis <sup>1</sup> . Refractometry <sup>2</sup> .	2
	Determination of the refractive index of drug solutions <sup>2</sup> .	1.6
7	Physical methods of pharmacopoeial analysis <sup>1</sup> : polarimetry <sup>2</sup> .	2
	Determination of optical activity of drugs <sup>2</sup> .	1.6
8	Solving test tasks.	2
	Concluding test 1	1.6
9	Physical methods of pharmacopoeial analysis <sup>1</sup> . Determination of highly volatile substances and water <sup>2</sup> .	2
	Titration according to Fischer's method. Weight loss on drying. Determination of ash content <sup>2</sup> .	1.6
10	Physical methods of pharmacopoeial analysis <sup>1</sup> . Determination of drug solubility <sup>2</sup> .	2
	Determination of the solubility of some drug substances <sup>2</sup> .	1.6

11	Physical methods of pharmacopoeial analysis <sup>1</sup> . Determination of transparency and degree of turbidity <sup>2</sup> .	2
	Determination of color of liquids. Preparation of color scales <sup>2</sup> .	1.6
12	Spectral methods of analysis. Classification of methods <sup>1</sup> .	2
	Brief description of spectral methods <sup>2</sup> .	1.6
13	Chromatographic methods of analysis. Classification of methods <sup>1</sup> .	2
	Thin-layer chromatography (TLC). High performance thin layer chromatography (HPTLC) <sup>2</sup> .	1.6
14	Physical methods of pharmacopoeial analysis <sup>1</sup> . Determination of density <sup>2</sup> .	2
	Physical methods of pharmacopoeial analysis <sup>1</sup> . Determination of viscosity <sup>2</sup> .	1.6
15	Determination of acidity and alkalinity of drug solutions <sup>1</sup> .	2
	Determination the pH of aqueous solutions of drugs <sup>2</sup> .	1.6
16	Solving test tasks.	2
	Concluding test 2.	1.6
Total for term		58

No.	Topics of seminar type classes (term V)	Hours (academic)
1	Safety precautions when working in a pharmaceutical chemistry laboratory <sup>1</sup> . Testing residual knowledge for the term IV of the discipline.	1.5
	Pharmaceutical analysis, its criteria <sup>1</sup> . Pharmacopoeial analysis - tests in accordance with the requirements of regulatory documentation <sup>2</sup> .	1.6
2	Pharmacopoeial analysis of preparations of group VII of the periodic table: alkali metal halides <sup>1</sup> . Objects of study: KCl, KBr, KI <sup>2</sup> .	1.6
	Pharmacopoeial analysis of drug substances: NaF, NaCl, NaBr, NaI <sup>2</sup> .	1.5
3	Research problem <sup>1</sup> .	1.1
	Complete pharmacopoeial analysis of one of the drugs as directed by teacher <sup>2</sup> .	2.0
4	Pharmacopoeial analysis of drugs from group VII of periodic table <sup>1</sup> : hydrochloric acid <sup>2</sup> .	1.6
	Iodine and its alcohol solutions. Calcium oxychloride <sup>2</sup> .	1.5
5	Pharmacopoeial analysis of drugs of group VI of periodic table <sup>1</sup> : hydrogen peroxide. Urea peroxide <sup>2</sup> .	1.1
	Pharmacopoeial analysis of magnesium peroxide <sup>2</sup> .	2.0
6	Pharmacopoeial analysis of drugs of group VI of the periodic table <sup>1</sup> : sodium thiosulfate <sup>2</sup> .	1.5

	Pharmacopoeial analysis of drugs of group V of the periodic Table <sup>1</sup> . Sodium nitrite <sup>2</sup> .	1.6
7	Pharmacopoeial analysis of drugs of group IV of the periodic Table <sup>1</sup> . Sodium bicarbonate <sup>2</sup> .	1.5
	Pharmacopoeial analysis of lithium carbonate <sup>2</sup> .	1.6
8	Pharmacopoeial analysis of compounds containing elements of group III of the periodic table <sup>1</sup> . Boric acid <sup>2</sup> .	1.6
	Assay of boric acid. Acid-base titration <sup>2</sup> .	1.5
9	Pharmacopoeial analysis of compounds containing elements of group III of the periodic table <sup>1</sup> : sodium tetraborate <sup>2</sup> .	1.5
	Pharmacopoeial analysis of aluminum hydroxide <sup>2</sup> .	1.6
10	Solving test assignments.	1.6
	Concluding test 1.	1.5
11	Pharmacopoeial analysis of compounds containing elements of group II of the periodic table <sup>1</sup> .	1.6
	Objects of research: magnesium oxide, magnesium sulfate <sup>2</sup> .	1.5
12	Pharmacopoeial analysis of compounds containing elements of group II of the periodic table <sup>1</sup> .	1.6
	Objects of study: calcium chloride, calcium sulfate <sup>2</sup> .	1.5
13	Pharmacopoeial analysis of compounds containing metals of group II of the periodic table <sup>1</sup> : zinc oxide, zinc sulfate <sup>2</sup> .	1.5
	Pharmacopoeial analysis of barium sulfate. Mercury oxide <sup>2</sup> .	1.6
14	Pharmacopoeial analysis of medicinal preparations containing metals of group I of the periodic table <sup>1</sup> . Silver nitrate <sup>2</sup> .	1.5
	Pharmacopoeial analysis of silver preparations. Colloidal silver for external use. Copper sulfate <sup>2</sup> .	1.6
15	Pharmacopoeial analysis of medicinal preparations of compounds of elements of group VIII of the periodic table <sup>1</sup> – iron and its compounds. Iron (II) sulfate <sup>2</sup> .	1.5
	Compounds containing Fe (II) and Fe (III). Analysis of iron (III) sulfate <sup>2</sup> .	1.6
16	Pharmacopoeial analysis of gadolinium complex compounds <sup>1</sup> .	1.5
	Drugs containing radioactive isotopes (radiopharmaceuticals) <sup>1</sup> .	1.6
17	Research study <sup>1</sup> .	1.1
	Analysis of single-component dosage form <sup>2</sup> .	2.0
18	Research study <sup>1</sup> .	1.1
	Analysis of multicomponent dosage form <sup>2</sup> .	2.0
19	Solving test assignments.	1.1
	Concluding test 2.	1.1
	Total for term	58

No.	Topics of seminar type classes (term VI)	Hours (academic)
	Chemical methods of pharmacopoeial analysis of organic drugs	
1	Safety rules in chemical laboratories.	1.5
	Halogen derivatives of aliphatic hydrocarbons <sup>1</sup> . Chloroethane (ethyl chloride), chloroform, fluoroethane (halothane), iodoform <sup>2</sup> .	1.6
2	Alcohols and ethers <sup>1</sup> . Diethyl ether. Oxidation reactions of medical ester, storage conditions of the drug. Ethyl alcohol – preparation, pharmacopoeial analysis. Application of iodoform test in the analysis of alcohols.	1.5
	Glycerol. Nitroglycerine. Explosion hazard, precautions, storage conditions. Amyl nitrite (isoamyl nitrite) <sup>2</sup> .	1.6
3	Aldehydes and their derivatives <sup>1</sup> : formaldehyde solution, hexamethylenetetramine (methenamine), chloral hydrate. Characteristics of the drugs. Features of storing formaldehyde as an unstable drug. Application of Nessler's reagent in the analysis of aldehydes.	1.6
	Carbohydrates: glucose, sucrose. Carbohydrates: lactose, galactose, starch <sup>2</sup> .	1.5
4	Aliphatic carboxylic acids and their derivatives <sup>1</sup> . Potassium acetate, calcium lactate, calcium gluconate. Complexometry.	1.5
	Salts of carboxylic acids: sodium citrate, sodium valproate. Titration in non-aqueous media <sup>2</sup> .	1.6
5	Aliphatic amino acids <sup>1</sup> . Glutamic acid, methionine, cysteine, aminaloni (gamma-aminobutyric acid, GABA).	1.5
	Aliphatic amino acids: piracetam, penicillamine, sodium-calcium edetate (tetacine-calcium). Proline derivatives: captopril, enalapril. Aminocaproic acid <sup>2</sup> .	1.6
6	Carbonic acid derivatives: urethanes and ureides <sup>1</sup> . Carbacholine, meprotane, carbromal, bromisoval.	1.6
	Dithiocarbamic acid derivatives: disulfiram (teturam). Application of acid-base titration methods in non-aqueous media and argentometry for the quantitative determination of urethanes and ureides <sup>2</sup> .	1.5
7	Phenols <sup>1</sup> . Specific reactions of phenols used in pharmaceutical analysis: interaction with iron (III) chloride, indophenol reaction, azo coupling reaction. Phenol, thymol, resorcinol, phenolphthalein <sup>2</sup> .	1.6
	Methods for quantitative assessment of phenols <sup>1</sup> : bromatometric and nitritometric methods in analysis of phenols. Phenol ethers: tamoxifen <sup>2</sup> .	1.5

8	Carboxylic acids <sup>1</sup> . Benzoic acid, salicylic acid, phenyl salicylate, acetylsalicylic acid.	1.6
	Aromatic amines: phenacetin, paracetamol. Application of Marquis reagent in pharmaceutical analysis. Derivatives of phenylacetic and phenylpropionic acids: diclofenac, ibuprofen <sup>2</sup> .	1.5
9	Solving test tasks.	1.5
	Concluding test on general methods of pharmaceutical analysis of organic drugs (based on materials of lessons 1 – 9).	1.6
10	Aromatic sulfonic acids <sup>1</sup> . Benzenesulfochloramide derivatives: chloramine B, dichloramine B, halazone <sup>2</sup> .	1.6
	Substituted sulfonylureas as antidiabetic agents <sup>1</sup> : butamide, chlorpropamide <sup>2</sup> . Substituted sulfonylureas as antidiabetic agents <sup>1</sup> : carbutamide, glibenclamide <sup>2</sup> .	1.5
11	Sulfanilic acid amides - sulfonamide drugs (part 1) <sup>1</sup> . History of the development of sulfonamide drugs. Structure-activity relationship. General methods for preparing sulfonamide drugs. General identification tests of sulfonamides.	1.6
	General methods for the quantitative determination of sulfonamide drugs (nitritometry, bromatometry, colorimetry, acid-base titration) <sup>2</sup> .	1.5
12	Sulfanilic acid amides - sulfonamide drugs (part 2) <sup>1</sup> . Sulfanilamide, sulfanilamide soluble, sulfacetamide sodium.	1.6
	Sulfonamide drugs: sulfaguanidine, sulfathiazole, aethazol, phthalylsulfathiazole <sup>2</sup> .	1.5
13	Sulfanilic acid amides - sulfonamide drugs (part 3) <sup>1</sup> .	1.6
	Long-acting sulfonamide preparations. Sulfadimethoxine, sulfalene. Sulfamethoxazole <sup>2</sup> .	1.5
14	Aromatic amino acids – derivatives of <i>para</i> -aminobenzoic acid <sup>1</sup> . Procaine, benzocaine, tetracaine. Sodium <i>para</i> -aminosalicylate.	1.6
	Diethylaminoacetanilides: trimecaine, lidocaine. Derivatives of <i>meta</i> -aminobenzoic acid: triombrast <sup>2</sup> .	1.5
15	Monocyclic terpenoids <sup>1</sup> . Menthol, validolum, terpene hydrate.	1.6
	Bicyclic terpenoids: camphor, bromocamphor, sulfocamphoric acid and its novocaine salt (sulfocamphocaine) <sup>2</sup> .	1.5
16	5-nitrofurans derivatives as chemotherapeutic agents (nitrofurazone, nitrofurantoin, furazolidone) <sup>1</sup> . Pyrazole derivatives. Antipyrine, amidopyrine <sup>1</sup> .	1.6
	Five-membered nitrogen-containing heterocycles pyrazolones <sup>1</sup> :	1.5

	metamizole sodium, butadione, propyphenazone. Color reactions of drugs <sup>2</sup> .	
17	Concluding lesson based on materials from lessons 10 – 16.	1.6
	Test work on the analysis of organic medicinal products.	1.8
	Total for the term	53
	Total	169

Considered at the meeting of the department  
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Head of the Department



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