Evaluation tools for certification
in the discipline " Toxicological chemistry "
for students of the educational program
specialist degree
in the specialty of training 33.05.01 Pharmacy
direction (profile) Pharmacy,
form of study full-time (face to face)
for the 2023-2024 academic year

Intermediate certification in the discipline of Toxicological Chemistry is carried out following the results of mastering the discipline "exam" in the VIII semester.

Assessment tools for current certification of the discipline.

Current certification includes the following types of tasks: testing, solving situational tasks, interviewing on control questions.

Examples of multiple-choice tests:

Verifiable indicators of competence achievement: UK-1.1.3. UK-8.1.1, UK-8.1.2.OPK-1.1.1.PK-5.1.1. PC-11.1.1. PC-12.1.1.

1. Asphyxiating poisons include all of the following compounds, with the exception of:

a) carbon monoxide;

b) nitrogen oxides;

c) phosgene;

d) diphosgene.

2. Psychotic poisons include all of the following substances, except:

a) chloropicrin;

b) cocaine;

c) opium;

d) atropine.

3. Adsorption is determined by the following chemical bonds:

a) covalent;

b) ionic;

c) hydrogen;

d) van der Waals;

e) the sum of all chemical bonds.

4. Of the listed, the most common ways of introducing poison into the body in domestic conditions are:

a) oral;

b) sublingual;

c) rectal and vaginal;

d) intravenous and intra-arterial;

d) intramuscular and subcutaneous.

5. Of the above, the most common ways of introducing poison into the body under industrial conditions are:

a) cutaneous;

b) inhalation;

c) ocular and nasal;

d) by bite.

6. According to the occupation theory, the maximum toxic effect is observed when:

a) incomplete filling of receptors with a toxicant;

b) complete filling of receptors with a toxicant.

7. According to the kinetic theory, the maximum response to a toxic effect is determined by:

a) the number of receptors associated with the toxicant;

b) the rate and mechanism of binding of the toxicant to the receptor.

8. Lethal synthesis is typical for the following substances except:

a) methyl alcohol;

b) fluoroacetic acid;

c) thiophos;

d) hexenal.

9. The gas chromatographic method for determining ethanol in biological fluids is based on the formation reaction:

a) ethyl acetate;

b) ethyl benzoate;

c) ethyl nitrite.

10. Reactions for identifying hydrocyanic acid include all except:

a) the formation of Prussian blue;

b) Mark's reaction;

c) Koenig reaction.

Examples of situational tasks:

Verifiable indicators of competence achievement: UK-1.2.1, UK-1.2.2, UK-1.2.3. UK-1.3.1, UK-1.3.2. UK-8.2.1.UK-8.3.1. OPK-1.2.1, OPK-1.2.2.OPK-1.3.1. PC -5.2.1, PC-5.3.1, PC-5.3.2. PK-11.2.1, PK-11.2.2.PK-11.3.1, PK-11.3.2. PK-12.2.1.PK-12.3.1.

1. Patient I, 28 years old, an agricultural worker, took an active part in pollinating fruit trees and grain crops with pesticides. He felt unwell and was taken to the emergency hospital. Conduct a blood and urine test for the presence of COS.

2. After an accident at a chemical plant, the victim is unconscious, periodically experiencing tonic-clonic convulsions, the face is clearly hyperemic, the pupils are dilated, and breathing is rare. The clothes have a strong smell of bitter almonds. Conduct a chemical-toxicological study for hydrocyanic acid.

Examples of control questions for the interview.

Verifiable indicators of competence achievement: UK-1.1.3.UK-1.2.1, UK-1.2.2, UK-1.2.3.UK-1.3.1, UK-1.3.2.UK-8.1.1, UK-8.1.2.UK- 8.2.1.UK-8.3.1.OPK-1.1.1.OPK-1.2.1, OPK-1.2.2.OPK-1.3.1.PK-5.1.1.PK -5.2.1, PC-5.3. 1, PK-5.3.2.PK-11.1.1.PK-11.2.1, PK-11.2.2.PK-11.3.1, PK-11.3.2.PK-12.1.1.PK-12.2.1. PC-12.3.1.

1 Toxicological chemistry as a special pharmaceutical discipline. Subject and tasks of toxicological chemistry

2 The place of toxicological chemistry among pharmaceutical and medical disciplines. The importance of toxicological chemistry in the system of training pharmacists.

3 Main sections of toxicological chemistry (biochemical toxicology).

4 Main sections of toxicological chemistry (analytical toxicology).

5 Main directions of use of chemical-toxicological analysis. Forensic chemical examination.

6 Main directions of use of chemical-toxicological analysis. Analytical diagnosis of acute poisoning.

7 Main directions of use of chemical-toxicological analysis. Analytical diagnosis of drug addiction.

8 The concept of “poison”. Classification of poisons. Factors determining the toxicity of a substance.

9 The concept of “poisoning”. Classification of poisonings. General characteristics of toxic effects.

10 Organization of forensic medical examination in Russia. Bureau of Forensic Medicine of Health Authorities.

11 Legal and methodological foundations of forensic chemical examination.

12 Basic documents regulating work in the field of forensic chemical examination.

13 Rights and responsibilities of a forensic expert.

14 Objects of forensic chemical analysis.

15 Features of forensic chemical analysis.

16 Organization of diagnostic services for intoxication and chemical dependence conditions, chemical and toxicological laboratories. Their tasks and functions.

17 Basic patterns in the behavior of toxic substances in the human and animal body

18 Physico-chemical characteristics of xenobiotics.

19 Routes of entry of xenobiotics into the human body.

20 Toxicokinetic features of oral poisoning.

21 Toxicokinetic features of inhalation poisoning.

22 Toxicokinetic features of percutaneous poisoning.

23 Toxicodynamics. Types of receptors. Receptor theory of toxic action.

24 Toxicodynamics. Factors influencing the distribution of xenobiotics in the human body.

25 Basic toxicokinetic distribution parameters. Clearance, Bioavailability.

26 System parameters for creating physiological models.

27 Xenobiotic poisoning: acute, chronic

28 General principles of accumulation of xenobiotics in the human body.

29 Suction. Distribution of poisons, transport mechanisms.

30 Concept of Biotransformation. Biotransformation phases

31 Toxicokinetics. Mathematical relationship between response and toxicant dose. Langmuir adsorption equation, finding toxicometric parameters by graphical method.

32 Theory of selective toxicity: “occupational”, kinetic. Theory of nonionic diffusion. Henderson's equation for organic electrolytes in the body.

33 Distribution of xenobiotic biotransformation enzymes.

34 Reactions of the 1st phase of biotransformation of xenobiotics (hydrolysis, reduction)

35 Reactions of the 1st phase of biotransformation (oxidation).

36 Reactions of the 2nd phase of biotransformation of xenobiotics (glucuronidation, sulfation).

37 Reactions of the 2nd phase of biotransformation (methylation, acetylation).

38 Conjugation with amino acids and glutathione.

39 Secondary metabolism.

40 Metabolism and factors influencing it.

41 Metabolism and toxicity of xenobiotics.

42 The concept of “lethal synthesis”.

43 Posthumous changes in poisons in a corpse. The influence of decomposition processes (autolysis, putrefaction, decay, mummification, fat wax) on the content and transformation of poisons.

44 Basic reactions of secondary metabolism.

45 Pathways and mechanisms for removing toxic substances from the body.

46 Objects of chemical-toxicological analysis and their characteristics. Selection of research objects depending on the type and cause of poisoning.

47 The concept of “physical evidence”. Rules for the selection, referral and acceptance of objects for forensic chemical examination.

48 Methods of preserving biological objects. Sample preparation issues.

49 Rules for forensic chemical research.

50 General characteristics of the group. Physico-chemical properties and reactivity of toxic and potent substances of organic nature. Basic physicochemical constants (pH, pKa, distribution coefficient - Kp).

51 General and specific isolation methods. Theoretical foundations of isolation. Thermodynamics of the process. Factors influencing the efficiency of extraction at different stages of isolation (pH of the medium, degree of ionization of the substance, nature of the extractant, time and frequency of extraction, influence of the electrolyte, etc.).

52 General methods for isolating toxic substances with polar solvents. Provide a schematic diagram of insulation using the Stas-Otto method. Advantages and disadvantages of the method.

53 General methods for isolating toxic substances with polar solvents. Provide a schematic diagram of insulation using the Shvaikova-Vasilieva method. Advantages and disadvantages of the method.

54 General methods for isolating toxic substances with polar solvents. Provide a schematic diagram of insulation using the Kartashov method.

55 Particular methods for isolating toxic substances with polar solvents. Provide a schematic diagram of isolation using the Kramarenko method.

56 Particular methods for isolating toxic substances with polar solvents. Provide schematic diagrams of insulation using the methods of Valov and Popova.

57 Particular methods for isolating toxic substances with polar solvents. Provide a schematic diagram of isolation using the Salomatin method.

58 Schematic diagram of the isolation of medicines and narcotic drugs from biological fluids.

59 Methods of purification and separation of xenobiotics from associated endogenous substances, their rationale.

60 Methods for detecting "medicinal poisons". Chemical research methods. Chromogenic and sedimentary reactions. Microcrystalloscopy. sensitivity and specificity of reactions.

61 Physico-chemical methods of analysis. Thin layer chromatography, TLC as a method of separation and preliminary identification. Prospects for the use of HPLC.

62 Methods of absorption spectroscopy. Electronic spectra. Chromatography-mass spectrometry, use in chemical-toxicological analysis.

63 Enzyme immunoassay. Pharmacological tests for the identification of certain alkaloids (atropine, nicotine, strychnine).

64 Methods for quantitative determination of "medicinal poisons". Differential spectrophotometry (using the example of barbituric acid derivatives). Sensitivity and specificity of methods. The significance of data on the quantitative content of a substance in the organs of a corpse and biological fluids when assessing the results of the study.

65 Photometric and extraction-photometric methods of analysis (using the example of nitrogen-containing bases). Sensitivity and specificity of methods. The significance of data on the quantitative content of a substance in the organs of a corpse and biological fluids when assessing the results of the study.

66 Features of chemical-toxicological analysis of individual groups of compounds isolated by extraction with polar solvents:

67 Derivatives of barbituric acid (barbital, phenobarbital, barbamyl, sodium etaminal). Chemical and toxicological characteristics, physical and chemical properties, metabolism. Features of isolation and chemical-toxicological analysis.

68 Alkaloids - derivatives of pyridine and piperidine (pachycarpine, nicotine, anabasine). Chemical and toxicological characteristics, physical and chemical properties, metabolism. Features of isolation and chemical-toxicological analysis.

69 Alkaloids derivatives of tropane and ecgonine (atropine, scopolamine, cocaine) Chemical and toxicological characteristics, physico-chemical properties, metabolism. Features of isolation and chemical-toxicological analysis.

70 Alkaloids derived from quinoline (quinine). Chemical and toxicological characteristics, physical and chemical properties, metabolism. Features of isolation and chemical-toxicological analysis.

71 Alkaloids derived from phenanthrene isoquinoline (morphine, codeine, ethylmorphine, heroin). Chemical and toxicological characteristics, physical and chemical properties, metabolism. Features of isolation and chemical-toxicological analysis.

72 Synthetic derivatives of phenanthrene isoquinoline (ethylmorphine, heroin). Chemical and toxicological characteristics, physical and chemical properties, metabolism. Features of isolation and chemical-toxicological analysis.

73 Alkaloids derived from benzylisoquinoline (papaverine). Chemical and toxicological characteristics, physical and chemical properties, metabolism. Features of isolation and chemical-toxicological analysis.

74 Alkaloids; indole derivatives (strychnine, brucine). Chemical and toxicological characteristics, physical and chemical properties, metabolism. Features of isolation and chemical-toxicological analysis.

75 Purine derivatives (caffeine). Chemical and toxicological characteristics, physical and chemical properties, metabolism. Features of isolation and chemical-toxicological analysis.

76 A synthetic analogue of morphine - promedol. Chemical and toxicological characteristics, physical and chemical properties, metabolism. Features of isolation and chemical-toxicological analysis.

77 Synthetic derivatives of pyrazolone (antipyrine, amidopyrine, analgin) Chemical and toxicological characteristics, physico-chemical properties, metabolism. Features of isolation and chemical-toxicological analysis.

78 Synthetic derivatives of para-aminobenzoic acid (novocaine, novocainamide) Chemical and toxicological characteristics, physico-chemical properties, metabolism. Features of isolation and chemical-toxicological analysis.

79 Synthetic phenothiazine derivatives (aminazine, diprazine, thioridazine, levomepromazine). Chemical and toxicological characteristics, physical and chemical properties, metabolism. Features of isolation and chemical-toxicological analysis

80 1,4-benzodiazepines (chlordiazepoxide, oxazepam, diazepam, nitrazepam). Chemical and toxicological characteristics, physical and chemical properties, metabolism. Features of isolation and chemical-toxicological analysis

81 Natural and synthetic phenylalkylamines. Chemical and toxicological characteristics, physical and chemical properties, metabolism. Features of isolation and chemical-toxicological analysis.

82 Cannabinoids. Chemical and toxicological characteristics, physical and chemical properties, metabolism. Features of isolation and chemical-toxicological analysis

83 Basics of general (non-directional) analysis of xenobiotics.

84 TLC screening of xenobiotics.

85 Immune methods for diagnosing acute poisoning and drug addiction.

86 Analytical diagnosis of drug addiction and substance abuse.

87 Organization of an analytical diagnostic service for drug addiction and substance abuse.

88 Basic documents regulating the activities of chemical and toxicological laboratories.

89 Tasks of the chemical-toxicological service in providing drug treatment.

90 Subjects of drug testing. Sample preparation

91 Directed analysis of individual groups of narcotic substances. Selection of analysis methods. An integrated approach when choosing methods.

92 Methods of preliminary and confirmatory research. Rational combination of methods.

93 The problem of screening analysis of narcotic substances. Interpretation of the results of chemical-toxicological analysis. Drawing up a conclusion.

94 Analytical diagnosis of acute poisoning.

95 Clinical toxicology. Subject, tasks and main sections.

95 Prevalence of acute poisoning, nature, causes. Features of poisoning in childhood.

97 Organization of specialized care for acute poisoning of chemical etiology.

98 Poisoning clinic. Clinical diagnosis

99 Methods of detoxification therapy.

101. General characteristics of methods of detoxification of the body in acute poisoning.

102. Methods of enhancing the body's natural detoxification pathways. Cleansing the gastrointestinal tract. Forced diuresis. Hyperventilation method. The feasibility of their use.

103. Basic methods of artificial detoxification of the body. Dialysis. Sorption. Blood transfusion (replacement).

104. Detoxification of the body with the help of antidotes (antidotes). Give examples of the main antidotes. For what poisonings are they used? The effectiveness of antidote therapy.

105. Requirements for chemical and toxicological analysis of acute poisoning. Sample preparation Selection of methods. Methodology of analysis.

106. Direction of analysis depending on clinical data. The principle of a rational combination of methods.

107. Features of conducting directed analysis. Screening analysis. Reproducibility of methods applied to the analysis of biofluids. Quantitative analysis. Documentation and conclusion.

108. Chemical and toxicological characteristics of "metal poisons". Features of toxicodynamics and toxicokinetics.

109. General characteristics of the group. Theoretical justification for the need for mineralization. Characteristics of modern general and private methods of mineralization. The choice of method depends on the nature of the object and the "poison" being analyzed.

110. Theory of mineralization. Isolation stages, chemical processes underlying them. Denitration of mineralizate, preparing it for research.

111. Fractional research method. Theoretical provisions. Scheme of the fractional method of analysis (according to A.N. Krylova). Characteristics of reagents used in the fractional method to mask interfering ions, isolate and analyze "metallic" poisons. Tananaev series theory.

112. Quantitative analysis of "metallic" poisons, justification for its necessity. General characteristics of the methods. Forensic medical assessment of the results of chemical-toxicological analysis taking into account the natural content of metals in the body.

113. General scheme of CTA of mineralizate for an unknown "metallic" poison.

114. CTA of barium compounds in mineralizate. Chemical-toxicological characteristics, isolation features, qualitative and quantitative analysis.

115. CTA of lead compounds in mineralizate. Chemical-toxicological characteristics, isolation features, qualitative and quantitative analysis.

116. ChTA of tetraethyl lead. Chemical-toxicological characteristics, isolation features, qualitative and quantitative analysis.

117. CTA of manganese compounds in mineralizate. Chemical-toxicological characteristics, isolation features, qualitative and quantitative analysis.

118. CTA of chromium compounds in mineralizate. Chemical-toxicological characteristics, isolation features, qualitative and quantitative analysis.

119. CTA of silver compounds in mineralizate. Chemical-toxicological characteristics, isolation features, qualitative and quantitative analysis.

120. CTA of zinc compounds in mineralizate. Chemical-toxicological characteristics, isolation features, qualitative and quantitative analysis.

121. CTA of cadmium compounds in mineralizate. Chemical-toxicological characteristics, isolation features, qualitative and quantitative analysis.

122. CTA of copper compounds in mineralizate. Chemical-toxicological characteristics, isolation features, qualitative and quantitative analysis.

123. CTA of antimony compounds in mineralizate. Chemical-toxicological characteristics, isolation features, qualitative and quantitative analysis.

124. CTA of thallium compounds in mineralizate. Chemical-toxicological characteristics, isolation features, qualitative and quantitative analysis.

125. CTA of bismuth compounds in mineralizate. Chemical-toxicological characteristics, isolation features, qualitative and quantitative analysis.

126. CTA of arsenic compounds in mineralizate. Chemical-toxicological characteristics, isolation features, qualitative and quantitative analysis.

127. CTA of mercury compounds in mineralizate. Chemical-toxicological characteristics, isolation features, qualitative and quantitative analysis.

128. CTA of organic mercury compounds. Chemical-toxicological characteristics, isolation features, qualitative and quantitative analysis.

129. General characteristics of the group. A method of isolating toxic substances by steam distillation. Theoretical justification of the method. Features of steam distillation for individual compounds. Azeotropic and non-azeotropic distillation. Features of isolation of ethylene glycol, cyanide, acetic acid, tetraethyl lead Other types of isolation (microdiffusion, microdistillation). Objects of chemical-toxicological research.

130. Chemical method for detecting "volatile" poisons in distillate. General scheme of analysis of the first and second distillates. Types of reactions used, their sensitivity and specificity.

131. Gas-liquid chromatography as a modern method of separation, identification and quantitative determination of "volatile" poisons.

132. . Hydrocyanic acid and its salts. Physical and chemical properties. Isolation conditions, methods of detection and quantitative determination of hydrocyanic acid in objects of biological origin. Toxicological significance.

133. Alkyl halides (chloroform, chloral hydrate, carbon tetrachloride, dichloroethane). Physical and chemical properties. Toxicity. Features of behavior in the body. Methods of chemical-toxicological analysis.

134. Aliphatic alcohols (alkanols C1 – C5): methyl, ethyl, isoamyl, ethylene glycol. Properties and pharmacological effects on the human body. Toxicity. Features of isolation, detection and determination of alcohols in various research

objects (exhaled air, blood, urine, internal organs of a corpse). The significance of the quantitative determination of ethyl alcohol in a chemical-toxicological study. Current state and tasks of forensic and forensic chemical examination of alcohol intoxication.

135. CTA of methyl alcohol. Chemical-toxicological characteristics, isolation features, qualitative and quantitative analysis.
136. CTA of ethyl alcohol. Chemical-toxicological characteristics, isolation features, qualitative and quantitative analysis.
137. ChTA of amyl and isoamyl alcohol. Chemical-toxicological characteristics, isolation features, qualitative and quantitative analysis.
138. Aldehydes (formaldehyde). Toxicological significance. Chemical-toxicological analysis of various research objects.
139. . Monohydric phenols and their derivatives (phenol, cresols). Properties and application in various sectors of the national economy. Toxicity. Toxicokinetics, metabolism. Methods for detection and quantification of phenol and its derivatives.
140. Ketones (acetone). Toxicity. Toxicokinetics. Chemical-toxicological analysis.
141. Carboxylic acids (acetic acid). Properties and toxicity, objects of chemical-toxicological analysis for poisoning with acetic acid. Features of insulation. Methods of proof.
142. General characteristics of the group. Importance for the national economy. The problem of pesticide residues. Causes and prevalence of poisoning. Classification of pesticides: production, by ability to penetrate the pest's body, by nature and mechanism of action, by toxicity. Chemical classification.
143. Objects of chemical-toxicological analysis for pesticides. Selection rules, referral for analysis. Methods of extraction from biological and other research objects.
144. Organophosphorus compounds (OPS): derivatives of phosphonic (chlorophos, dichlorvos), thiophosphoric (metaphos, thiophos), dithiophosphoric (carbaphos) acids. Structure and physicochemical properties. Toxicity, features of toxicokinetics. Objects of research at FOS. Main stages of forensic chemical analysis. Enzymatic method, its significance. Coloring reactions, chromatography in a thin layer of sorbent. Specificity of methods. Use of GLC with selective detectors. Quantitative determination of FOS for phosphorus. Evaluation of the results of forensic chemical research.
145. Pesticides from the group of organochlorine derivatives (OCDs): DDT, hexachlorocyclohexane, heptachlor. General characteristics and physicochemical properties. Toxicity, ability to cumulate. Objects of chemical and toxicological analysis. Methods of chemical and toxicological research.
146. Pesticides from the group of carbamic acid derivatives (Sevin). General characteristics, Toxicity, toxicokinetics, metabolism. Physico-chemical properties and methods of chemical-toxicological analysis.

147. Synthetic pyrethroids. General characteristics. Toxicity, toxicokinetics, metabolism. Physico-chemical properties and methods of chemical-toxicological analysis.
148. Gaseous toxic substances: carbon monoxide. Toxicological significance. Mechanism of toxic action. Toxicokinetics. Poisoning clinic and clinical diagnostics.
149. The method of hyperbaric oxygenation in a complex of methods of detoxification therapy.
150. Objects of research. Sampling rules. Qualitative analysis.
151. Chemical express methods for detecting carboxyhemoglobin in the blood. Quantitative determination of carboxyhemoglobin in blood.
152. Spectroscopic research method. GLC method in the analysis of carbon monoxide. Evaluation of quantification results.
153. Fluorine compounds: fluorides, silicofluorides. Application in the national economy. Toxicological significance.
154. Methods of isolation, detection, determination in food products and internal organs of a corpse
155. General characteristics of the group. Acids (sulfuric, nitric, hydrochloric). Toxicity. Justification for choosing the research object. The role and methods of determining the pH of an object's environment.
156. Alkalis (potassium, sodium, ammonium hydroxides). Toxicity. Justification for choosing the research object. The role and methods of determining the pH of an object's environment.
157. Nitrates, nitrites. Toxicity. Justification for choosing the research object. The role and methods of determining the pH of an object's environment.
158. Membrane filtration and dialysis. Nitrocellulose filters and membrane filters. Techniques and methods of membrane filtration and dialysis.
159. Preservation of toxicologically important substances isolated by extraction with water (mineral acids, alkalis and salts) in cadaveric material.
160. Chemical-toxicological analysis of substances isolated by extraction with water
161. Doping agents. Concept, history of use, main classes. Features of sampling and research. Methods and interpretation of the results obtained.
162. Ecotoxicants. Concept, classification. Ecotoxicants and features of their determination in biosystems.
163. Biological hazard and biological terrorism. Basic concepts. Natural toxins: sources, classification, toxic effects, methods of determination.

Examples of situational tasks

Verifiable indicators of competence achievement: UK-1.1.3.UK-1.2.1, UK-1.2.2, UK-1.2.3.UK-1.3.1, UK-1.3.2.UK-8.1.1, UK-8.1.2.UK- 8.2.1.UK-8.3.1.OPK-1.1.1.OPK-1.2.1, OPK-1.2.2.OPK-1.3.1.PK-5.1.1.PK -5.2.1, PC-5.3. 1, PK-

5.3.2.PK-11.1.1.PK-11.2.1, PK-11.2.2.PK-11.3.1, PK-11.3.2.PK-12.1.1.PK-12.2.1. PC-12.3.1.

1. The corpse of citizen R. was found. Citizen R. had epilepsy and had been taking phenobarbital for a long time. Conduct an examination of the internal organs of the corpse for the presence of phenobarbital.
2. For the purpose of criminal abortion, patient N. took quinine and pachycarpine (fatal). Conduct an examination of the internal organs of the corpse for the presence of these substances.
3. A 2-year-old child was admitted to the hospital with severely dilated pupils. The child died 6 minutes after admission. Conduct a study of the child's internal organs for the presence of atropine.
4. Citizen O., 60 years old, who recently suffered a myocardial infarction, drank caffeine powder to cheer himself up and died. Conduct a blood test of the deceased for the presence of caffeine.
5. A child in a deep coma was brought to the poison control center with suspected bellataminal poisoning (atropine, ergotamine, phenobarbital). Conduct a chemical and toxicological study of the child's blood and urine.
6. The following items were delivered for analysis: blood, urine, gastric lavage. Conduct a test for the presence of opium (morphine, codeine, narcotine, meconic acid).
7. The internal organs of the gastrointestinal tract tissues, liver and kidneys from the corpse of citizen K., 53 years old, were delivered for forensic chemical examination. According to preliminary data, death occurred as a result of taking a large dose of Elenium. Conduct isolation and chemical-toxicological research to determine the content of this compound in the biomaterial.
8. Citizen A., 45 years old, was found dead in his apartment. Verodone tablets were found at the scene of the incident. (amidopyrine, barbital). Conduct isolation and chemical-toxicological testing for content in organ tissuesconnection data.
9. The corpse of citizen N. was found in the apartment. According to preliminary information, death was caused by poisoning tropane alkaloids. Conduct isolation and chemical-toxicological examination of organ tissues for this group of connections.
10. The internal organs of the corpse of gr. K., 47 years old. According to preliminary information, he previously suffered from schizophrenia. I took about 20 thioridazine tablets. He was taken to the clinic, where he remained for 19 hours before his death. Conduct isolation and XT study for a group of phenothiazine derivatives.
11. Internal organs from the corpse of gr. TO . , 30 years, to detect sleeping poisons. Conduct isolation and XT examination of the internal organs of the corpse gr. K. for the content of barbiturates.

12. Tinder was found in the forest. G., 32 years old. Next to the corpse were: 4 standard packages of Sibazon tablets, bottles of mineral water and vodka. The packages were missing 54 tablets of Sibazon (diazepam). Since Mr. G. left home 13 days passed before his body was discovered. Carry out isolation and CTA of organ tissues for sibazon content.
13. Mr. X., 45 years old, underwent surgery - removal of the upper lobe of the right lung due to cancer. A few weeks after the operation, the patient died after taking 10 seduxen tablets simultaneously with intramuscular administration promedol. Conduct isolation and analysis of corpse organs for these compounds.
14. Patient Zh, 30 years old, who was undergoing examination in the psychiatric department of the hospital, was administered 4 ml intramuscularly daily. 2.5% chlorpromazine solution. Three days later the patient died of cardiac arrest. The department's orderlies found chlozepid tablets in the deceased's bedside table. Conduct isolation and XT examination of internal organs for the content of aminazine and chlozepid.
15. The body of Mr. A. was found in a field near the road. No ethanol was found in the blood or urine of the corpse. It was assumed that Mr. A. could be in a helpless state under the influence of a potent substance, since packages of chlozepid and phenobarbital tablets were found in the pocket of his padded jacket. Conduct isolation and XT examination of internal organs for the indicated compounds.
16. The corpse of a girl aged 14 was brought for forensic medical examination. The accompanying document states that she died suddenly at a boarding school. It was also established that the deceased previously had incomplete packaging drug - bellaspon. After the girl's death, the bottle of the drug turned out to be empty. The number of tablets that the girl could have taken could not be determined. Conduct isolation and XT examination of cadaveric organ tissues for the content of phenobarbital and atropine.
17. Citizen M., 40 years old, ingested a mixture of caffeine and morphine powders. Death occurred 1 - 1.5 hours after administration the specified mixture of powders. Conduct isolation and XT examination of corpse organs for the content of these compounds.
18. Citizen M., 40 years old, ingested a mixture of caffeine and morphine powders. Death occurred 1 - 1.5 hours after administration the specified mixture of powders. Conduct isolation and XT examination of corpse organs for the content of these compounds.
19. Citizen U. invited two girls to his hotel room. In order to put them in a helpless state, he poured a narcotic into their glasses of lemonade. One of the girls drank the entire contents of the glass, and the second only sipped its contents. After some time, both girls felt unwell. Realizing that the worst could happen, Mr. U. called an ambulance and disappeared from the room. Upon arrival, the ambulance crew confirmed the death of one of the girls,

and the second was hospitalized in the emergency hospital. Carry out CTA of blood to detect the presence of drugs (heroin, cocaine, amphetamines).

20. Gr. T, 76 years old, was found dead in the kitchen of her apartment. During the inspection of the crime scene, it was discovered on the nightstand empty package of phenobarbital. Conduct isolation and chemical-toxicological research to determine the content of this compound in organ tissues.
21. Patient K., 29 years old, undergoing examination in the psychiatric department of the hospital, was daily administered intramuscularly with 4 ml of a 2% solution of chlorpromazine. Three days later the patient died. The department's orderlies found an empty package of the drug "Elenium" in the deceased's bedside table. Conduct a forensic chemical study for the content of chlordiazepoxide and chlordiazepoxide.
22. The blood and urine of citizen K., who was involved in a car accident, was delivered to the Bureau of Emergency Medical Examinations. Estimal tablets were found in the victim's jacket pocket. Conduct a targeted chemical toxicological study for barbamyl.
23. A 14-year-old boy was found dead in the attic. In the trouser pocket there were empty packages of the drugs Sonapax and Oxazepam. Conduct a forensic chemical test for thioridazine and oxazepam.
24. The corpse of A., 26 years old was found at home. According to relatives, he took Codeine and Luminal tablets. Conduct a forensic chemical test for the presence of codeine and luminal
25. A teenager, 14 years old, was detained by the Ministry of Internal Affairs with a bag of marijuana. Establish the fact of smoking marijuana.
26. Citizen A. was admitted to the toxicology center after taking, as follows from the note she left, pills for suicidal purposes phenobarbital. Conduct a blood and urine test to check for the presence of this drug.
27. K. was detained by traffic police officers and is suspected of smoking hashish. Conduct a chemical and toxicological study of saliva, hair and urine. K. for the presence of cannabinoids.
28. Citizen Z., born in 1992 detained by police officers. Suspected of drug use. Conduct a chemical-toxicological study of the blood, urine, hair and nails of group Z. for heroin and ephedrone content.
29. Citizen V. was admitted to the emergency department of a city hospital with signs of poisoning with tropane alkaloids. Conduct a chemical and toxicological study of wash water, blood and urine for the presence of atropine and cocaine.
30. The woman dyed her hair with a dye containing silver. The next day, severe poisoning developed with lethal outcome. The hair and internal organs of the corpse were delivered for forensic chemical examination. Conduct isolation, qualitative and quantitative analysis for silver compounds.
31. 7 children aged 4 to 12 years old ate eggs soaked in thallium sulfate, scattered across a field for the purpose of extermination crow. Two children died. Conduct a forensic chemical study (isolation, qualitative and

quantitative analysis) of the liver and kidneys of corpses for thallium compounds.

32. While trying to suck leaded gasoline containing tetraethyl lead as an anti-knock agent from the tank, the driver accidentally swallowed a large amount of liquid. The result was poisoning, which ended in death. Conduct isolation, qualitative and quantitative analysis of the internal organs of the corpse for tetraethyl lead.
33. An auxiliary worker, in a state of severe alcoholic intoxication, drank vinegar essence. He was taken to the hospital, where he died without regaining consciousness. The following items were delivered for forensic chemical examination: blood, urine, and gastric lavage. Conduct isolation, qualitative and quantitative analysis for ethanol and acetic acid.
34. Citizen X., while removing paint from doors and windows with organic solvents, felt dizzy and nauseated, consulted a doctor, was hospitalized and died on the second day. Conduct isolation, qualitative and quantitative analysis of internal organs for acetone, dichloroethane, carbon tetrachloride.
35. Before the operation, the patient was given an overdose of chloral hydrate, the patient died without regaining consciousness. Conduct isolation, qualitative and quantitative analysis of blood, urine and internal organs for chloral hydrate and chloroform.
36. The participant in the accident was taken for a medical examination. Conduct a blood and urine test for the presence of ethyl alcohol and drugs.
37. A workshop worker drank ethyl alcohol from a container contaminated with phenol. He was taken to the hospital, where he died on the 3rd day. Conduct a forensic chemical study (isolation, qualitative and quantitative analysis) for the presence of ethanol and phenol.
38. 10 people were taken to the hospital in serious condition with suspected poisoning. From the anamnesis it is known that everyone drank cherry tincture. Urine (10 ml), blood (10 ml), and vomit were taken from each victim. Conduct a chemical toxicological study (isolation, qualitative and quantitative analysis) for hydrocyanic acid and ethyl alcohol.
39. Citizen A. A dry cleaning worker was taken to the center for the treatment of acute poisoning in serious condition with a diagnosis of acute inhalation poisoning with alkyl halides (work was carried out in the workshop with uncorrected ventilation); the patient died a day later. Conduct a forensic chemical study for the content of alkyl halides.
40. A teenager was found in the basement of the house without signs of life. Next to the corpse was a bottle with an unknown liquid and a plastic bag. SCE concluded that the liquid was a solvent containing acetone and isoamyl alcohol. Present the progress of the research
41. After an accident at a chemical plant, the victim was unconscious, periodically having clonic-tonic convulsions, his face was brightly hyperemic, his pupils were dilated, and his breathing was rare. The clothes

have a strong smell of bitter almonds. Conduct a chemical-toxicological study for hydrocyanic acid.

42. After an accident at a chemical production facility, the victim is unconscious, the skin and mucous membranes are bright red, periodically the whole body experiences severe convulsions, the pupils are dilated, exophthalmos, breathing is rare and convulsive. Conduct a chemical-toxicological study for hydrocyanic acid.
43. A nurse was poisoned while working with formaldehyde. Conduct a chemical-toxicological study for formaldehyde.
44. With suicidal intent gr. S. took 20 ml of liquid, presumably karbofos. Conduct a blood and urine test for the presence of FOS.
45. Patient K., 40 years old. field farmer of the state farm, was taken to the central regional hospital with complaints of severe weakness, dizziness, headache, nausea, vomiting, and abdominal pain. During the interview, it was established that 2 hours before the onset of the described symptoms, he was weeding a field that had been treated with methyl mercaptophos the day before. Conduct a blood and urine test for the presence of FOS.
46. Patient M., 39 years old. brought to the clinic in a state of psychomotor agitation, does not make contact. According to the victim's relatives, it turned out that the patient mistakenly drank a chlorophos solution. On examination: the patient is in a soporous state, excited, with severe miosis with absent pupillary reaction to light. Conduct a blood and urine test for the presence of FOS.
47. Patient I, 28 years old, an agricultural worker, took an active part in pollinating fruit trees and grain crops with pesticides. He felt unwell and was taken to the emergency hospital. Conduct a blood and urine test for the presence of COS.
48. Patient B., 42 years old, auto technician, has been involved in work to combat agricultural pests for a number of years. While filling a cylinder with toxic chemicals, I accidentally doused my face, hands, and chest with a hot mixture of polychloropylene and DDT from a hose. I partially inhaled them. I washed my face and hands with water. The next day, rapid heartbeat, chills, twitching in certain muscle groups appeared, body temperature increased to 38.4 "C. The patient could not continue work and was hospitalized. Conduct a blood and urine test for the presence of COS.
49. The storekeeper of the pesticide warehouse came to work healthy. During the working day he weighed chemical reagents. He worked in enclosed spaces without ventilation and did not use a respirator. By the end of the shift I felt general malaise, weakness in the limbs, headache, dizziness, abdominal pain, nausea and vomiting. Delivered to emergency hospital. Conduct a blood and urine test for the presence of FOS.
50. An unconscious 59-year-old woman, a storekeeper at the state farm's pesticide warehouse, was brought to the clinic by ambulance. From a survey of eyewitnesses who accompanied the patient to the hospital, it was revealed

that on the day of the incident, granosan and chlorophos were packaged and distributed to the foremen, and the patient had to lift and carry bags of pesticides to the scales. Conduct a blood and urine test for the presence of granosan and chlorophos.

Example of an exam card

Federal State Budgetary Educational Institution of Higher Education
"Volgograd State Medical University"
Ministry of Health of the Russian Federation
Department of Pharmaceutical and Toxicological Chemistry

EXAMINATION CARD № 1
in the discipline " Toxicological chemistry "
for students of the educational program
specialist degree
in the specialty of training 33.05.01 Pharmacy
direction (profile) Pharmacy,
form of study full-time (face to face)
for the 2023-2024 academic year

1. Organization of a diagnostic service for intoxication and chemical dependence conditions, chemical and toxicological laboratories. Their tasks and functions.

2. CTA of lead compounds in mineralizate. Chemical-toxicological characteristics, isolation features, qualitative and quantitative analysis.

3. Situational task: The corpse organs (gastrointestinal tract, liver, kidneys) of a woman who died under unknown circumstances were delivered for forensic chemical examination. Packages of nitrozepam tablets were seized from the jacket pockets. Conduct isolation and chemical-toxicological research to determine the content of this compound in organ tissues.

Seal place Head of department

The full fund of assessment tools for discipline / practice is available in the EIES of VolgSMU at the link:

https://elearning.volgmed.ru/course/view.php?id=8013#section-11

Considered at the meeting of the department of Pharmaceutical and Toxicological Chemistry "27" may 2023, protocol No9

Head of the Department  Ozerov A.