МИНИСТЕРСТВО НАУКИ, ВЫСШЕГО ОБРАЗОВАНИЯ И ИННОВАЦИЙ КЫРГЫЗСКОЙ РЕСПУБЛИКИ
ОШСКИЙ МЕЖДУНАРОДНЫЙ МЕДИЦИНСКИЙ УНИВЕРСИТЕТ

Кафедра «Естественно-гуманитарных дисциплин»

РАССМОТРЕНО
на заседании кафедры протокол № 2
от «25» 09 **2025 года**

Зав. кафедрой, _____ **Р.О.Юсупова**

УТВЕРЖДАЮ_____

Председатель УМС ОММУ,
к.б.н., доцент _____**Орунбаева Б.М.**
“28” 08 **2025 г.**

ФОНД ТЕСТОВЫХ ЗАДАНИЙ
для итогового контроля по дисциплине
«Биоорганическая химия»
на 2025-2026 учебный год
Направление: 560001 – Лечебное дело (GM)
курс – I, семестр – I

Наименование дисциплины	Всего	Кредит	Аудиторные занятия (60 ч)		СРСП	СРС
			Лекции	Лабораторные		
Биоорганическая химия	**120 ч**	**4 кр**	**20**	**28 ч**	**12**	**60 ч**
Количество тестовых вопросов	**320**					

Составитель:. _____ Иматали кызы К.

Составитель:. _____Эргешев Н.Т.

Эксперт-тестолог: _____ Тешебаева У.Т.

г. Ош – 2025 г.

ЭКСПЕРТНОЕ ЗАКЛЮЧЕНИЕ БАНКА ТЕСТОВЫХ ЗАДАНИЙ

кафедры « Естественно-гуманитарных дисциплин»

от «___» _____________20__г.

на разработанные тестовые задания по дисциплине

“ Биоорганическая химия ”

наименование дисциплины

Исматова К.К., Эргешев Н.Т.

/указать должность, ученую степень, Ф.И.О. автора (авторов)/

Тестовые задания проверены членом экспертной группы тестологов

Тешебаева У.Т.

/указать должность, ученую степень, Ф.И.О./

Направления проведения оценки структуры и содержания тестового задания

№	Направление экспертизы	Оценка экспертов	
1.	Соответствие задания программам и стандартам обучения	Соответствует	Не соответствует
2.	Включение в тесты только наиболее важных, базовых знаний	Соответствует	Не соответствует
3.	Ясность смысла тестовой ситуации и представления ТЗ	Ясно	Не ясно
4.	Правильность ответа на вопрос ТЗ	Соответствует	Не соответствует
5.	Значимость содежания тестового задания (0-сомнительный, 1-допустимый, 2-важный, 3-существенный)	2 балл(ов)	
6.	Соответствие необходимое число заданий по каждому разделу дисциплины исходя из его важности и числа часов, отведенных на его изучение в программе.	Соответствует	Не соответствует

Членом экспертной группы выявлены следующие недостатки в тестовом задании 10 тестовых вопросов несоответствует по тематике

Членом экспертной группы внесены следующие исправления (корректировки) в тестовое задание 10 тестовых вопросов обсуждении заменены.

На основании представления тестовых заданий автором (авторами) и проведенной проверки сделала следующее заключение:

1) Содержание тестовых заданий **соответствует (не соответствует)** содержанию УМКД (*нужное подчеркнуть*)

2) Представленные тестовые задания в следующем объеме 320 вопросов:

соответствуют (не соответствуют) требованиям, предъявляемым к количеству, уровням сложности и формам заданий для составления тестов. (*нужное подчеркнуть*)

Тестолог: Тешебаева У.Т. ____________

Ознакомлен зав. кафедрой Юсупова Р.О. ____________

1. Which compounds enter addition reactions?
   a) Unsaturated hydrocarbons;
   b) Saturated hydrocarbons;
   c) Aromatic hydrocarbons;
   d) Alcohols;
2. Which of the following are homologues?

   a) Pentanoic acid and pentanedioic acid;

   b) Butenedioic acid and butynedioic acid;

   c) Butanoic acid and butanedioic acid;

   d) Butanedioic acid and pentanedioic acid.

3. What are the electronic effects of functional groups in the molecule of 4-hydroxybutanoic acid?
   a) –I; b) +M; c) +M, + I; d) -M, - I;
4. What is the pH in lysine water solution
   a) Basic; b) Acidic;
   c) Neutral; d) Depends on conditions;
5. Which reaction provides biological function of ATP?
   a) Esterification; b) Hydrolysis;
   c) Dehydration; d) Transamination;
6. Which molecule contains pyrrole ring?
   a) Nicotinic acid; b) Uric acid;
   c) Adenine; d) Hemoglobine;
7. π-π – conjugation has the structure:
   a) pentadiene - 1.3 b) pentadiene - 1.4
   c) butanoic acid; d) propanoic acid.
8. Aromatic compounds are:
   a) cyclohexane; b) cyclooctatetraene;
   c) naphthalene; d) butadiene
9. Energy of 2-chlorobutane in the eclipsed conformation more than gauche because in the eclipsed conformation:
   a) the other configuration of the molecule; b) the greater torsional stress;
   c) increased Van der Waals repulsion.
   d) the molecule another electronic structure;
10. The product of hydration reaction of aconitoic (3-carboxypentyl-2-dioic) acid, flowing through Markovnikov rule (in vivo) is:
   a) isocitric acid;
   b) 3-hydroxy-3-carboxypentanedioic acid;
   c) acetoacetic acid;
   d) 2-hydroxy-3-carboxypentanedioic acid.
11. Characteristic reaction for Benzene proceeds by following mechanisms:

a) A_N; b) A_E;
c) S_N; d) S_E ;

12. In initiation step:
a) generation of radicals.
b) the step where the products of the reaction are formed.
c) radicals are removed from the reaction mixture.
d) generation of ions

13. By the alkaloid pyridine group include:
a) quinine; b) nicotine;
c) morphine; d) cocaine;

14. Tautomeric transformations are possible for the following heterocyclic compounds:
a) furan; b) pyridine;
c) pyrrole; d) imidazole (1,3-diazole);

15. Structure of D-glucose configuration corresponds to the number of stereoisomers:
a) four; b) eight;
c) sixteen d) thirtytwo;

16. How many functional groups have D-glucose?
a) 1; b) 2;
c) 3; d) 4.

17. Phenol is a compound:
a) acyclic; b) carbocyclic;
c) heterocyclic; d) saturated;

18. 2-Isopropyl-5-methylcyclohexanol on carbon skeletal structure of the compound is:
a) carbocyclic; b) heterocyclic;
c) unsaturated and acyclic.; d) aromatic;

19.Give the systematic IUPAC name to the following compound

$NH_2 – CH_2 – CH_2 - CH_2 – CH_2-CH(NH_2)– COOH$

a) 2,6-diaminohexanoic acid
b) 2,6-aminohexanoic acid
c) 1,5-diaminohexanoic acid
d) 3,6-diaminohexanoic acid

20. There is sp^2 - hybrid atoms in molecule of:
a) butane b) propane;
c) pentane ; d) ethene

21. p-π - conjugate has the structure:
a) acetic acid; b) 2-propenal
c) ethylene glycol; d) pyridine;

22. The following compounds are not aromatic:
a) pyridine; b) cyclohexene-1;
c) anthracene; d) furan.

23.The conformations of 1-chloropropane with a torsion angle of 60˚ and 300˚ are degenerate, because in these conformations

the molecule have:
a) same configuration;
b) same chemical structure;
c) different conformational structure;
d) same torsion, Van der Waals and angular stresses;

24.The weakest acid is:
a) ethanamine; b) ethanol;
c) phenol; d) ethanoic acid;

25.Heterolytic cleavage of chemical bonds is possible for the following compounds:
a) 2-chlorpropane; b) ethane;
c) Br_2; d) benzene;

26. The product of the hydration of fumaric (butenedioic acid) in vivo is:
a) citric acid;
b) malic acid;
c) 2-hydroxybutanoic acid;
d) 2,3-dihydroxybutanedioic acid;

27.To conduct methylation reaction of benzene are needed the following conditions:
a) acid catalyst;
b) concentrated alkali (NaOH, KOH);
c) catalyst $FeCl_3$.
d) ultraviolet radiation;

28. In propagation step:
a) generation of radicals.
b) the step where the products of the reaction are formed.
c) radicals are removed from the reaction mixture.
d) generation of ions

29. Iimidazole corresponds to the systematic name:
a) 1,3-diazole; b) azine;
c) 1,3-diazine; d) azole;

30. Tautomerism possible for the heterocyclic compounds whose molecules arepresent at the same time the reaction centers:
a) two acidic;
b) acidic and basic;
c) two major
d) basic and electrophilic;

31. Ability flow nucleophilic substitution (S_N) in a series of reactions of compounds decreases from left to right:
a) pyridine, pyrimidine, pyridazine;
b) pyrrole, oxazole, benzene;
c) pyridine, benzene, pyrimidine;
d) pyridazine, pyridine, benzene.

32. Carbon in organic compounds has a valence equal to ...
a) IV b) II

c) III d) V.

33. Benzoic acid is a compound:
a) acyclic; b) carbocyclic;
c) aromatic; d) heterocyclic;

34. 1,2,3-propanetriol is the compound of:
a) heterofunctional; b) aromatic;
c) unsaturated; d) polyfunctional;

35.Give the systematic IUPAC name to the following compound

$HOOC - CH_2 - CH(OH) - CH_2 - COOH$

a) 3-hydroxypentanoic acid
b) hydroxypentanedioic acid
c) 3-hydroxypentanedioic acid
d) 2-hydroxypentanedioic acid

36. There is sp - hybrid atoms in molecule of:
a) butyne b) propane;
c) pentane ; d) ethane

37. π-π – conjugation has the structure:
a) $CH_2 = CH - CH = CH_2$
b) $CH_2 = CH_2$
c) $CH_2 = CH - Cl$
d) $CH_2=CH - O - CH=CH_2$

38. In the functional group has a negative mesomeric effect in the compound of:
a) ethanol; b) glycerol;
c) acetone; d) butyen 2-al-1;

39. The molecule 1,2 - dimethylcyclohexane has the maximum amount of energy, if:
a) both methyl substituents in the equatorial bonds;
b) both methyl substituents in the axial connections;
c) one of the two substituents on the axial connection
d) the one of the two substituents on the equatorial bond;

40. The most strong acidic properties of the compound shown in:
a) acetic acid;
b) propanoic acid;
c) 2-methylpropanoic acid;
d) 2,2,2-trichloroethanoic acid;

41.The nucleophilic reagents include:
a) Na+ b) $C_3H_7NH_2$, OH;
c) ammonium ion; d) CH_4;

42. The product of the reaction of hydration of 2-propenal is:
a) 2-hydroxypropanal; b) propanoic acid;
c) acetal; d) 3-hydroxypropanal;

43.The product of bromination of phenol is:
a) 2-bromophenol;
b) 3-bromophenol;
c) 2,4,6 tribromphenol;
d) 3,3-dibromophenol;

44. In termination step:
a) generation of radicals;
b) the step where the products of the reaction are formed;
c) radicals are removed from the reaction мixture;
d) generation of ions;
45. Pyrimidine corresponds to the systematic name:
a) diazole 1.3;
b) 1,3-diazine;
c) 1,4-diazepine;
d) azine;
46. The basic properties of heterocyclic compounds are shown in their reactions:
a) with bases;
b) with acids;
c) with bicarbonates;
d) halogenated hydrocarbons;
47. The ability of the reactions of nucleophilic substitution (SN) is maximal among aromatic compounds, characterized by:
a) the electronic structure of benzene;
b) π-electron structure insufficient;
c) the electronic structure of furan;
d) π-electron structure of the excess;
48. D-glucose and L-glucose relate to each other as:
a) enantiomers; b) diastereomers;
c) epimers; d) anomers
49. Hexane is a compound:
a) cyclic; b) carbocyclic;
c) heterocyclic; d) saturated;
50. According to functional groups 4 – hydroxy - 3 - ethoxybenzaldehyde is:
a) phenol, aldehyde, ether,
b) acid, Na+;
c) ester;
d) alcohol.
51. By the IUPAC nomenclature the following compound is;
$HC\equiv C - CH_2 - CH_3$
a) butyne-1 b) butyne–2
c) butane d) butene
52. There is no sp - hybrid atoms in molecule of:
a) butyne b) propyne;
c) pentyne ; d) ethane
53. p-π - conjugate has the structure:
a) $CH_2 = CH - CH = CH_2$
b) $CH_2 = CH_2$
c) $CH_2 = CH - Cl$

d) $CH_2 = CH – CH = CH- CH_3$

54. In the functional group has a negative inductive effect only in compound of:
a) phenol;
b) acetic acid;
c) methylphenylketone;
d) ethanedioic acid;

55. The chiral molecule is:
a) glycine (2-aminoetanoic acid);
b) serine, (2-amino-3-hydroxypropanoic acid);
c) aminoethanol;
d) 1-butanol;

56. Electrophilic particles are:
a)cations: H+, NO_2^+, SO_3H^+, Me^{n+};
2) molecules with lone electron pairs (Lewis bases)
c) compounds with multiply bonds >C=C<, -C≡C-.;
d) anions: OH^-, Hal^-, HSO_3^-, RS^-;

57. Electrophilic reagents are:
a) NH_3; b) Br+, cation nitro;
c) C_2H_5OH; d) ethanal.

58 .For propene hydration reaction is necessary to establish the following conditions:
a) anhydrous conditions;
b) the ultraviolet radiation;
c) acid catalyst;
d) catalyst;

59. Product of mononitration of benzaldehyde is:
a) 2-nitrobenzaldehyde;
b) 3-nitrobenzaldehyde;
c) 4-nitrobenzaldehyde;
d) 3, 3-dinitrobenzaldegid;

60. Characteristic reaction for unsaturated compounds:
a). radical substitution
b) electrophilic addition
c) electrophilic substitution
d) nucleophilic substitution

61. Reactions of acetoacetic ester with bromine water and iron (III) chloride ($FeCl_{c)}$ allow us to prove:
a) p-π-conjugation;
b) The keto-enol tautomerism of acetoacetic ester;
c) π-π-conjugation in the molecule;
d) ester group;

62. In reactions with bases under normal conditions of uric acid (2,6,8-

trihydroxypurine) forms a salt:
a) ammonium salts;
b) barbiturates;
c) the salts of nitrogenous bases;
d) acid and urate average;

63. The rate of electrophilic substit nution reactions (S_E) is reduced to a series of compounds from left to right:
a) pyridine, pyrrol, benzene;
b) benzene, pyrrole, pyridine;
c) benzene, pyridine, pyrrole;
d) pyrrole, benzene, pyridine.

64. D-glucose and D-galactose relate to each other as:
a) enantiomers; b) diastereomers;
c) structural isomers; d) anomers

65. Ethylene is a compound:
a) acyclic; b) carbocyclic;
c) heterocyclic; d) unsaturated;

66. How many functional groups have 2 – hydroxy - 4 – methyl benzoic acid?
a) 1; b) 2;
c) 3; d) 4;

67. By the IUPAC nomenclature the following compound is; $H_3C – C \equiv C – CH_3$
a) butyne-1 b) butyne–2
c) butane d) butene

68. π-π – conjugation has the structure:
a) propanoic acid.
b) pentadiene - 1.4
c) butanoic acid;
d) pentadiene - 1.3

69. All are electron withdrawing functional groups in the compounds:
a) 2-aminoethanol-1;
b) 2-hydroxybenzoic acid;
c) 4-aminobenzoyl sulfonic acid.
d) 4-hydroxy-3-methoxybenzaldehyde;

70. The chiral molecule is:
a) D - glucose ;
b) Glycerol
c) 2 - aminoethanol;
d) 2-hydroxypronane;

71. Nucleophiles are:
a)cations: H+, NO_2^+, SO_3H^+, Me^{n+};
b) molecules with vacant orbitals (Lewis acids)
c) Molecules which contain atoms with low electron density;
d) anions: OH^-, Hal^-, HSO_3^-, RS^-;

72. As a electrophilic substrate can serve the

following compounds:
a) ethanoic acid; b) propene;
c) methanamine; d) hydrochloric acid;

73. The product of the reaction of 1-butene and HBr is:
a) 1 brombutan; b) 2 brombutan;
c) butane; d) 1,3-butadiene;

74. Product of monomethylation of benzoic acid is:

a) 2- metilbenzoic acid;

b) 3- metilbenzoic acid;

c) 4-metilbenzoic acid;

d) 2,4,6-trimetilbenzoic acid;

75. Characteristic reaction for saturated compounds:
a) radical substitution
b) electrophilic addition
c) electrophilic substitution
d) nucleophilic addition

76. Upon heating of lactic acid (2-hydroxypropanoic) are formed:
a) anhydride and H_2O;
b) H_2O and lactide;
c) lactam and H_2O;
d) diketopiperazine and H_2O;

77. The reaction of formation of salts with bases uric acid (2,6,8-trihydroxypurine) behaves like:
a) monobasic acid;
b) dibasic acid;
c) tribasic acid;
d) can not form salts with bases;

78. Electrophilic substitution reactions (S_E) with a minimum flow rate from:
a) toluene (methylbenzene);
b) pyrimidine (1,3-diazine
c) pyridine;
4. furan;

79. D-glucose and D-fructose are related to each other as:
a) enantiomers;
b) diastereomers;
c) epimers;
d) structural isomers

80. By the IUPAC nomenclature the following compound is;

$H_3C - CH = CH - CH_3$

a) butyne-2 b) butene–1
c) butane d) butene - 2

81. Butane is a compound:
a) acyclic; b) carbocyclic;
c) heterocyclic; d) saturated

82. There is sp^3 - hybrid atoms in molecule of:
a) butyne b) propane;
c) pentyne ; d) ethene

83. What is the kind of conjugation in the molecule of aniline (aminobenzene) between functional group and aromatic ring?
a) p,π b) π,π c) p,p
d) there is no conjugated system

84. In the functional group has a negative inductive effect only in compound of:
a) phenol;
b) ethanedioic acid;
c) methylphenylketone;
d) acetic acid;

85. 2-aminopropanoic acid has the following stereoisomers:
a) 1; b) 2;
c) 3; d) 4;

86. Nucleophiles are:
a) H^+ b) NH_4^+,
c) OH^-, d) Na^+

87. The characteristic reaction of alkenes is proceeding following mechanisms:
a) A_E; b) A_N
c) S_E ; d) S_N;

88. Carbocations are……..
a) particles, which contain positively, charged carbon atoms.
b) particles, which contain negatively, charged carbon atoms.
c) particles, which contain unpaired electrons.
d) particles, which contain positively and negatively, charged carbon atoms.

89. Characteristic reaction for aromatic compounds:
a) radical substitution
b) electrophilic addition
c) electrophilic substitution
d) nucleophilic substitution

90. The acidic properties of imidazole (1,3-diazole) expressed more than:
a) barbituric acid;

b) 2,4-dihydroxypyrimidine;
c) sulfuric acid;
d) pyrrole;

91. Electrophilic substitution reactions (S_E) with a maximum flow rate in most soft conditions the compounds:
a) benzene and its homologues;
b) π-excessive aromatic heterocyclic rings;
c) alkanes and cycloalkanes;
d) π-deficient aromatic heterocycles;

92. The reaction of hydrogen removal is called ...
a) dehydrogenation b) hydrogenation
c) dehydration d) hydration

93. Pyridine is a compound:
a) acyclic; b) carbocyclic;
c) heterocyclic; d) saturated;

94. 2-aminobutanoic acid is the compound of:
a) heterofunctional; b) aromatic;
c) unsaturated; d) polyfunctional;

95. There is sp^2 - hybrid atoms in molecule of:
a) butene; b) propane;
c) pentyne ; d) acetylene

96. p-π - conjugate has the structure:
a) ethylene glycol; b) 2-propenal;
c) acetic acid; d) pyridine;

97. Newman projection formula is written to show the differences of:
a) chemical structure of the compounds;
b) conformations and configuration of the molecule;
c) structural isomers;
d) geometric structure;

98. 2, 3, 4-trihydroxybutanoic acid corresponds to the following stereoisomers:
a) 6; b) 2;
c) 9; d) 4;

99. Electrophilic particles are:

a) H b) H^- c) H^+ d) Br^-

100. Alkane characterized by the following reaction:
a) A_E; b) A_N;
c) S_N; d) S_R;

101. The chlorination reaction of following compounds proceeds by a mechanism of radical substitution when exposed ultraviolet radiation:

a) cyclohexane; b) benzene;
c) acetylene; d) 1,3-butadiene

102. Conjugated systems are :
a) Thermodynamically stable
b) Very reactive
c) Thermodynamically unstable
d) Very unreactive

103. Characteristic reaction for unsaturated compounds:
a) radical substitution
b) electrophilic addition
c) electrophilic substitution
d) nucleophilic substitution

104. The reaction, which releazed water, is
a) dehydrogenation b) hydrogenation
c) dehydration d) hydration

105. Cyclohexane is a compound:
a) acyclic;
b) carbocyclic;
c) heterocyclic;
d) saturated;

106. Furan is the compound of:
a) heterofunctional; b) heterocyclic;
c) unsaturated; d) polyfunctional;

107. There is sp - hybrid atoms in molecule of:
a) butene b) propane;
c) pentane ; d) acetylene

108. π-π – conjugation has the structure:
a) propanoic acid.
b) pentadiene - 1.4
c) butanoic acid;
d) butadiene - 1.3

109. Energy of propanol-1 in the anti-conformation is less than gauche conformation, because in the anti-conformation:
a) less angular tension;
b) configuration has changed;
c) decreased Van der Waals repulsion;
d) was less torsional stress;

110. The following conditions for the reaction of chlorination of butane are needed:
a) room temperature;
b) exposure to ultraviolet radiation (hn);
c) cooling
d) catalyst $FeCl_3$;

111. A major product of reaction (equimolecular ratio of mixture) of 2-methylpentane with bromine (when exposed to ultraviolet radiation) is:
a) 1-bromo-2-methylpentane;

b) 2-bromo-2-methylpentane;
c) 1,2-dibromo-2-methylpentane;
d) 3-bromo-2-methylpentane;

112. Radicals are……..
a) particles, which contain positively, charged carbon atoms.
b) particles, which contain negatively, charged carbon atoms.
c) particles, which contain unpaired electrons.
d) particles, which contain positively and negatively, charged carbon atoms.

113. Characteristic reaction for saturated compounds:
a) radical substitution
b) electrophilic addition
c) electrophilic substitution
d) nucleophilic addition

114. The structure of 2-amino-3-methylbutanoic acid is a natural α-amino acid:
a) leucine; b) isoleucine;
c) valine; d) tyrosine;

115. Macromolecules peptides and proteins are constructed from residues:
a) α-amino acids;
b) oxocarboxylic acids;
c) β-amino acids;
d) γ-amino acids;

116. Pyrimidine nucleotide nitrogenous bases mentioned in the examples:
a) birbiturovaya acid; b) guanine;
c) thymine; d) adenine;

117. The lipids are:
a) low molecular weight well water-soluble substances;
b) high molecular weight (polymer) water-soluble substances;
c) bio polymers, low solubility in water;
d) low molecular weight insoluble substances;

118. Which compound enters addition reactions?
a) CH_3-CH_2-NH_2;
b) CH_3-CH_2- CH_2 -CH_3;
c) CH_3-CH_2-OH;
d) CH_3-CH=CH-CH_2 – CH_3;

119. D-glucose and D-fructose are related to each other as:
a) enantiomers; b) diastereomers;
c) epimers; d) structural isomers

120. Under the action of strong oxidants in acid medium (dilute nitric acid) monosaccharides form:
a) gluconic acid;
b) glucaric acid;
c) glucuronic acid;
d) glycolic acid;

121. The non-reducing disaccharide is:
a) D-glucose; b) amylopectin;
c) maltose; d) sucrose.

122. In the present structure of the cellulose glycosidic bonds:
a) Only β-(1 → 4);
b) α- (1 → 4) and α-(1 → 6);
c) β- (1 → 4) and α- (1 → 4);
d) β- (1 → 4), β- (1 → 3);

123. The primary structure of DNA is represented by:
a) linear polypeptide chain;
b) helical polysaccharide chain;
c) double-stranded polynucleotide of the structure;
d) structure of single-stranded polynucleotide;

124. The structure of 2-amino-3-hydroxybutanoic acid is a natural α-amino acid:
a) threonine; b) valine;
c) phenylalanine; d) tryptophan;

125. The isoelectric point of the tripeptide Ser-His-Asn is in the medium:
a) acidic; b) basic;
c) neutral; d) can not be determined.

126. Pyrimidine nucleotide nitrogenous bases mentioned in the examples:
a) uracil; b) uric acid;
c) adenine; d) guanine;

127. The reaction of adenine with nitrous acid is formed:
a) 2-amino-6-hydroxypurin;
b) 2,6-dihydroxypurin;
c) 2 hydroxypurin;
d) 6 hydroxypurin;

128. The lipids are classified according to their molecules to hydrolytic degradation:
a) α-amino acids, peptides and proteins;
b) saponifiable and unsaponifiable;
c) mono-, oligo- and polysaccharides;
d) nucleosides and nucleotides;

129. The products of fat hydrolysis in alkaline medium by heating are:

a) glycerol and salts, usually higher carboxylic acids (soap);
b) salt of a higher carboxylic acids and higher monohydric alcohol;
c) glycerol, higher carboxylic acid salts and phosphoric acid salts;
d) salts of higher carboxylic acids and higher alcohol;

130. Parental steroids hydrocarbon group of female sex hormones are:
a) cardenolides; b) estrane;
c) cholestane; d) pregnan;

131. D-glucose and D-galactose relate to each other as:
a) enantiomers; b) diastereomers;
c) structural isomers; d) anomers;

132. The open form of D-glucose is a chemical nature:
a) Only an aldehyde;
b) Only polyhydric alcohol;
c) The aldehyde and polyhydric alcohol;
d) hemiacetal and polyhydric alcohol;

133. The structure of maltose is reflected in the title:
a) β-D-glyucopyranozil- (1 → 4)-D-glucopyranose;
b) α-D-glucopyranosyl-(1→4)-D-glucopyranose;
c) β-D-galactopyranosyl- (1 → 4) -D-glucopyranose;
d) δ-D-glucopyranosyl- (1 → 6) -β-D-glucopyranose;

134. In the present structure of glycogen glycoside bonds:
a) Only β- (1 → 4);
b) α- (1 → 4) and α- (1 → 6);
c) β- (1 → 4) and α- (1 → 4);
d) β- (1 → 4), β- (1 → 3);

135. In the dipeptide Ser-Arg in aqueous medium:
a) neutral; b) sour;
c) alkaline; d) weak

136. The structure of 2-amino-4-methylpentanoic acid is a natural α-amino acid:
a) isoleucine; b) glutamine;
c) cysteine; d) leucine;

137. According to the chemical nature of proteins and peptides are:
a) polyesters; b) polyamides;
c) polyglycosides; d) polynucleotides;

138. Qualitative reaction on the peptide bond:

a) ninhydrin; b) xantoprotein;
c) biuret; d) with formaldehyde;

139. The purine nucleotide nitrogenous bases mentioned in the examples:
a) guanine; adenine; b) uracil;
c) thymine; d) cytosine.

140. As part of the DNA complementary to thymine:
a) adenine; b) cytosine;
c) 1-N-methylguanine; d) guanine;

141. By the chemical nature saponified lipids are:
a) isoprenoids;
b) sterane derivatives (rutting);
c) esters;
d) polyamides;

142. Saponifiable lipids as esters can be hydrolyzed by heating:
a) Only under acidic conditions;
b) Only in alkaline medium;
c) both in acidic and in alkaline medium;
d) incorrect, hydrolysis is generally impossible,

143. In the context of the body saponifiable lipid oxidation in unsaturated acyl residues occurs by the mechanism:
a) hydroxylation;
b) peroxidation;
c) β-enzymatic oxidation;
d) oxidation under these conditions is absent;

144. Cyclohexane – is a parent structure for many natural compounds. What kind of substance is it?
a) carbocyclic b) heterocyclic
c) aromatic d) alkene

145. D-glucose and L-glucose relate to each other as:
a) enantiomers; b) diastereomers;
c) epimers; d) anomers;

146. Pyranose and / or furanose form D-glucose on the chemical nature, are:
a) Only an aldehyde;
b) Only ketone;
c) Only a polyhydric alcohol;
d) a polyhydric alcohol and a cyclic hemiacetal;

147. Which of the following are homologues?
a) Propanal and butanal
b) Propanal and propanol
c) Propanal and propanoic acid

d) Propanal and propanone

148. The structure of the lactose is reflected in the title:
a) β-D-glucopyranosyl- (1 → 4) -D-glucopyranose;
b) α-D-glucopyranosyl- (1 → 5) -D-glucopyranose;
c) β-D-galactopyranosyl-(1 → 4)-D-glucopyranose;
d) α-D-glucopyranosyl-(1 → 6)-D-glucopyranose;

149. In the present structure of heparin glycoside bonds:
a) Only β- (1 → 4);
b) α- (1 → 4) and α- (1 → 6);
c) β- (1 → 4) and α- (1 → 4)
d) β- (1 → 4), β- (1 → 3);

150. α-amino acids in reactions with aldehydes to form:
a) substituted imines (reaction products of the amino group);
b) carboxylic acid salt;
c) esters (the reaction products of the carboxylic group);
d) amine

151. The structure of 2-amino-3- (1H-3-indolyl) propionic acid is a natural α-amino acid:
a) histidine; b) proline;
c) tryptophan; d) aspartic acid;

152. The primary structure of the tetrapeptide prolylargenylserylglycine recorded in this example:
a) Pro-Gly-Ser-Arg;
b) Pro-Arg-Ser-Gly;
c) Pro-Asp-Ser-Gly;
d) Pro-Asp-Ser-Gln;

153. The types of bonds that establish α-helix peptides and proteins:
a) ion; b) hydrogen;
c) glycoside; d) peptide;

154. Lactim form uracil corresponds to the systematic name:
a) 2,4-dihydroxy-5-methylpyrimidine;
b) 4-amino-2-hydroxypyrimidine;
c) 2,4-dihydroxypyrimidine;
d) 6-aminopurine;

155. As part of the DNA guanine is complementary to:
a) adenine; b) cytosine;
c) thymine; d) 6-N-methyladenine;

156. By the chemical structure the following molecule unsaponifiable lipids are:
a) esters; b) polyesters;
c) polyamides; d) isoprenoids;
157. The mandatory components of the bilayer cell membranes due to their amphiphilic structure are:
a) solid fats; b) glycerophospholipids.;
c) waxes; d) terpenoids
158. Which bond undergoes homolytic fission preferentially?
a) covalent nonpolar b) covalent polar
c) ionic d) hydrogen
159. Structure of D-glucose configuration corresponds to the number of stereoisomers:
a) four; b) eight;
c) sixteen d) thirtytwo;
160. The configuration of the anomeric carbon atom at the a-anomer same configuration:
a) The second carbon atom in the molecule of a monosaccharide;
b) The last chiral center, defining a monosaccharide belonging to D- or L-series.
c) The penultimate chiral center in the molecule of a monosaccharide;
d) any chiral center;
161. Non stereoisomers (achiral molecule) the natural α-amino acid:
a) glutamine; b) isoleucine;
c) proline; d) glycine;
162. Amino-lactim form cytosine corresponds to the systematic name:
a) 2,4-dihydroxy-5-methylpyrimidine;
b) 4-amino-2-hydroxypyrimidine;
c) 2,4-dihydroxypyrimidine;
d) 6-aminopurine;
163. Hydrolysis of nucleoside occurs:
a) in water;
b) in an aqueous acid medium;
c) in an aqueous basic medium;
d) in concentrated solutions of bases;
164. Saponified lipids are classified into:
a) esters and isoprenoids
b) monomers and polymer compounds;
c) terpenes (terpenoids) and steroids;
d) simple and complex;
165. By the chemical nature glycerophospholipid are:

a) higher carboxylic acids;
b) polyhydric alcohols;
c) glycerol ethers, and higher monohydric alcohols;
d) esters of L-phosphatidic acid;

166. Most of the known terpenes and terpenoids:
a) compounds are not natural and synthetically obtained;
b) is a natural compound of animal origin;
c) This natural compound of vegetable origin;
d) prepared by modification of natural compounds;

167. What is the characteristic of aromatic system?
a) It is a closed conjugated system which carries (4n +2) electrons
b) It has flat cycle
c) It contains heteroatom
d) It is a heterocyclic compound

168. D-fructose may be classified as:
a) monosaccharide; b) polysaccharide;
c) aldohexoses; d) aldopentoza;

169. Only glycoside formed by the reaction of a monosaccharide from:
a) C_2H_5-Cl / NaOH;
b) C_2H_5-OH / HCl (dry);
c) S_2N_5SOCl;
d) $C_3H_8NH_2$ / HCl (dry);

170. D-glucose reaction gives "silver mirror" in the conditions:
a) Br_2 / H_2O;
b) HNO_3 (dil.);
c) Cu $(OH)_2$ / NaOH, to;
d) $Ag(NH_{c)2}OH$, to;

171. The structure of sucrose is reflected in the title:
a) β-D-glucopyranosyl- (1 → 4) -D-glucopyranose;
b) β-D-galactopyranosyl- (1 → 4) -D-glucopyranose;
c) a-D-glucopyranosyl- (1 → 6) -D-glucopyranose;
d) a-D-glucopyranosyl- (1 → 2) -D-fructofuranoside.

172. The secondary structure of amylose is:
a) sequence of residues α-D-glucopyranose linked α- (1 → 4) bond -glycoside;
b) helical conformation;
c) linear conformation;

d) β-structure (conformation of the folded sheet);

173. Phenylalanine- 2-amino-3-phenylpropanoic acid forms an ester by reaction with:
a) sulfuric acid;
b) ethanol in the presence of an acid catalyst;
c) sodium hydroxide;
d) formaldehyde;

174. The isoelectric point of the tripeptide Glu-Thr-Cys is in the medium:
a) basic; b) neutral;
c) acid; d) weakly basic;

175. β-sheet structure of macromolecular peptides and proteins in fixed space relation:
a) peptide; b) disulfide;
c) ion; d) hydrogen;

176. A more stable tautomeric form of guanine in a body is:
a) lactim; b) imino-lactim;
c) lactam; d) amino-lactam;

177. Unsaponifiable lipids are classified into:
a) simple and complex lipids;
b) fats, waxes, phospholipids;
c) proteins and peptides;
d) terpenes (terpenoids) and steroids.

178. For complex saponified lipids are:
a) fats; b) glycerophospholipids;
c) oil; d) steroids

179. The number of carbon atoms in the molecules of monoterpenes is:
a) 5 b) 10;
c) 15; d) 20;

180. D-ribose can be classified as:
a) oligosaccharide; b) monosaccharide;
c) polysaccharide; d) aldohexoses;

181. The product was D-glucose with acetic anhydride should be classified as:
a) ether; b) ester;
c) acetal; d) hemiacetal and ether;

182. Maltose can be classified as:
a) monosaccharide;
b) reducing disaccharide;
c) non-reducing disaccharide;
d) oligopeptide;

183. The secondary structure of cellulose is:
a) sequence of residues 1 a-D-glucopyranose linked a- (1 → 4) bond -glycoside;
b) helical conformation;

c) linear conformation;
d) β-structure (conformation of the folded sheet);

184. The types of bonds that establish α-helix peptides and proteins:
a) ion; b) hydrogen;
c) glycoside; d) peptide;

185. The reaction employed for protection of carboxyl groups in the artificial peptide synthesis:
a) esterification;
b) salt formation;
c) acylation carbobenzoxy chloride (benzyl chloroformate ester);
d) acid hydrolysis;

186. To protect the α-amino group of the artificial peptide synthesis reaction is used:
a) acid hydrolysis;
b) salt formation
c) acylation carbobenzoxy chloride;
d) esterification with ethanol;

187. Adenine corresponds to the systematic name:
a) 2,4-dihydroxy-5-methylpyrimidine;
b) 4-amino-2-hydroxypyrimidine;
c) 2,4-dihydroxypyrimidine;
d) 6-aminopurine;

188. For complex saponified lipids include:
a) terpenes and terpenoids;
b) steroids;
c) phospholipids;
d) fats (solid fats and oils);

189. As part of the molecules of liquid fats (oils) are dominated by the remains:
a) unsaturated fatty acids;
b) stearic acid;
c) palmitic acid;
d) saturated fatty acids;

190. The number of carbon atoms in the molecules diterpenes is:
a) 5; b) 10;
c) 15; d) 20;

191. The repeating units of proteins are
a) Glucose units b)Amino acids c) Fatty acids d)*Peptides

192. D-glucose can be classified as:
a) monosaccharide;
b) oligosaccharide;
c) aldopentoza;
d) polysaccharide;

193. When recovering D-xylose is produced:

a) sorbitol; b) xylitol;
c) acid; d) xylonic acid;

194. The lactose may be classified as:
a) monosaccharide;
b) reducing disaccharide;
c) The non-reducing disaccharide;
d) oligopeptide;

195. In response α-maltose with acetic anhydride is formed:
a) mixture of α- and β-O-ethyl-maltoside;
b) mixture of α and β-O-ethyl-D-glucopyranoside;
c) octa ethyl-maltose;
d) α-octa acethyl-maltose;

196. Blue complex with iodine forms:
a) D-mannose; b) maltose;
c) cellulose; d) starch;

197. As a result, α-amino acid reaction with nitrous acid ($NaNO_2$ + HCl), typically:
a) amine salt is formed;
b) diazonium salt is formed;
c) nitrogen gas and alcohol is formed;
d) N-nitro derivative is formed;

198. Upon heating β-amino acids commonly occurs:
a) decarboxylation;
b) The formation of lactones;
c) formation conjugated unsaturated acid;
d) The formation of deketopiperazine;

199. The isoelectric point of the tripeptide Met-Arg-Tyr is in the environment:
a) acidic; b) basic
c) weakly acidic; d) neutral;

200. Amino-lactim form guanine corresponds to the systematic name:
a) 2,4-dihydroxy-5-methylpyrimidine;
b) 4-amino-2-hydroxypyrimidine;
c) 2,4-dihydroxypyrimidine;
d) 2-amino-6-hydroxypurin

201. A more stable tautomeric form uracil in terms of the body is:
a) lactim; b) imino-lactim;
c) lactam; d) amino-lactam;

202. As part of the fat molecules of solid residues prevail:
a) unsaturated fatty acids;
b) oleic acid;
c) linoleic acid;
d) saturated fatty acids;

203. For the structure of saturated fatty acid

molecules are characterized by the following features:

a) sistema conjugated double bonds;

b) double not conjugate relation, they are separated by sp^3-hybrid carbon atom;

c) zigzag conformation of the carbon chain;

d) cis- configuration of each double bond;

204. The number of carbon atoms in the molecules tetraterpenes is:

a) 20; b) 40;

c) 60; d) 80;

205. β-carotene should be classified as:

a) monoterpenes acyclic;

b) bicyclic monoterpenes;

c) diterpenes;

d) tetraterpenes;

206. What is the heaviest of the twenty amino acids?

a) Phenylalanine b) Tryptophan

c)Tyrosine d) Histidine

207. Carbohydrates are classified into:

a) monosaccharides, oligosaccharides, polysaccharide;

b) pyrimidenes, purines, glucose;

c) fatty acids, oils, triacylglycerols;

d) nucleosides, nucleotides, polynucleotides;

208. Sucrose can be classified as:

a) monosaccharide;

b) oligopeptide;

c) polysaccharide;

d) non-reducing disaccharide.

209. The reaction product α-lactose with methyl iodide in an alkaline medium is:

a) octa acethyl lactose;

b) octa methyl lactose;

c) lactobionic acid;

d) mixture of α and β-O-methylmaltose;

210. D-Alanine and L-Alanine are technically known as

a) anomers

b) enantiomers

c) epimers

d) polymer

211. Which particle is carbocation?

a) $(CH_3\text{-}CH_2)^+$;

b) $(CH_3\text{-}NH_3)^+$;

c) CH_3COO^-;

d) C_6H_6;

212. Which compound enters addition reactions?

a) CH_3-CH=CH_2;
b) CH_3-CH -CH_3;
c) CH_3-CH_2-OH;
d) CH_3-CH_2-NH_2;

213. Which reaction occurs with the breaking of π-bond:
a) Exothermic; b) Substitution;
c) Decomposition; d) Addition;

215. What are the intermediates in lipids peroxide oxidation?
a) Free radicals; b) Cations;
c) Anions; d) Atoms;

216. Which reaction is typical for aromatic hydrocarbons?
a) Substitution; b) Addition;
c) Decomposition; d)Neutralization

217. Electrophilic reagents are:
a) Positively charged particles;
b) Particles having a pair of electrons on the external level;
c) Atoms or groups of atoms having unpaired electron;
d) Negatively charged particles.

218. In order for a reagent to behave as a nucleophile it must possess.
1. an overall positive charge
2. an overall negative charge
3. an unpaired electron
4. an unshared pair of electrons
5. π-bond
a) 13 b) 245 c) 24 d) 45 .

219.Which of the following series contains only nucleophiles:
a) $AlCl_3$, BF_3, NO_2^+, NH_3
b) $AlCl_3$, NH_3, H_2O, I
c) $AlCl_3$, BF_3, H_2O, NH_3
d) NH_3, H_2O, CN^- , I^-

220. Pyrrole is a compound:
a) acyclic;
b) carbocyclic;
c) heterocyclic, and aromatic;
d) saturated;

221. Ethylene glycol is the compound of:
a) heterofunctional; b) aromatic;
c) unsaturated; d) polyfunctional;

222. Give the systematic names to the following organic compounds:
$NH_2 – CH_2 – CH_2 – OH$
a) acetic acid b) 1-aminoethanol-1
c) 2-aminoethanol-1 d) ethylene glycol

223. There is no sp^2 - hybrid atoms in molecule of:

a) acetic acid b) propanoic acid;
c) butane; d) ethene

224. What are the products of primary alcohols oxidation?
a) Aldehydes;
b) Saturated hydrocarbones;
c) Unaturated hydrocarbones;
d) Halogen derivatives;

225. Which compound participates in polymerization reaction?
a) $H_2C=CH-CH=CH_2$;
b) $CH_3-CH_2-CH_2-CH_3$;
c) $CH_3-CH_2-CH_2-CH_2-OH$;
d) $CH_3-CH_2-CH_2-CH_2-NH_2$

226. Which α-amino acid gives biogenic amine histamine on decarboxylation?
a) Glycine; b) Histidine;
c) Thyrosine; d) Serine;

226. Xanthoprotein reaction is a qualitative reaction for:
a) Peptide bond;
b) Sulfur containing amino acids;
c) Aromatic amino acids;
d) Dibasic amino acids.

227. Which reagent is needed to convert liquid lipid into solid fat?
a); Sodium hydroxide solution;
b) Potassium permanganate solution;
c) Water with concentrated sulfuric acid;
d) Hydrogen

228. What are the products of basic hydrolysis of fats?
a) Glycerine and soap;
b) Glycerine and carboxylic acid;
c) Water and carboxylic acid;
d) Glycerine and water;

229. What is the mechanism of imine formation from pyruvic acid and amine?
a) Aldol condensation;
b) Nucleophilic substitution;
c) Nucleophilic addition;
d) Electrophilic substitution.

230. Amides are products of interaction of:
a) Aldehydes with amines;
b) Acid chlorides with amines;
c) Carboxylic acids with amines;
d) Water with ammonia;

231. Which molecule contains pyridine ring?
a) nicotinic acid; b) hemoglobine;
c) adenine; d) histidine;

232. Vitamin B1 (thiamin) – is a derivative of:
a) pyridine; b) pyrrole;
c) imidazole; d) thiazole;

233. Vitamin B6 (pyridoxal phosphate) – is a derivative of:
a) pyrrole; b) pyridine;
c) pyrimidine; d) purine;

234. Uric acid is the final product of nucleic acids catabolism. Uric acid - is a derivative of:
a) purine; b) pyrimidine
c) pyrrole; d) pyridine;

235. Histidine and histamine are derivatives of imidazole;
a) pyrrole; b) quinoline;
c) indole; d) pyridine

236. Which acid forms ester bond with hydroxyl group of monosaccharide in the composition of mononucleotide?
a) Nitrous; b) Nitric;
c) Phosphoric; d) Sulphurous.

237. Which is the most favorable conformation for kolamine (2-aminoethan-1-ol)?
a) Staggered; b) Eclipsed;
c) Gauche 60^0; d) Gauche $20^{0.}$

238. The strongest base is:
a) 2-aminoethanol; b) ethanamine;
c) methylamine; d) dimethylamine;

239.Homolytic cleavage of chemical bonds characteristic of the following compounds:
a) HCl; b) Cl_2, CH_4;
c) Na+; d) NaOH;