FoM - Chemistry

1. Chemistry as a natural science

A. studies the properties of matter and its transformations

B. studies the chemical reactions

C. studies only the behavior of substances in chemical reactions

D. studies only the constitution of atoms and molecules

2. The chemical substance:

A. is one of the matter form

B. consists of particles with velocity lower than velocity of light (speed of light)

C. consists of particles bigger than 10^{-7} m

D. can be the set of macroscopic bodies, e. g. planets, galaxies

3. The fundamental property of the matter is:

A. inertia

B. movement

C. colour

D. stiffness

4. Atom:

A. is the basic indivisible micro-unit of the substance

B. is the basic unit of the chemical substance, that consists of central nucleus and electron cloud

C. consists of protons, electrons and ions

D. is the smallest irreducible unit of chemical substance

5. Nuclides:

A. are substances consisting of atoms with the same proton (atom) number

B. are substances consisting of atoms with different proton (atom) number

C. are particles of the substance with the same proton (atom) number

D. are particles of the substance with the same numbers of protons and neutrons in the atom nucleus

6. Isotopes

A. are atoms with the same number of protons but different number of nucleons

B. are for example deuterium, tritium, and nitrogen

C. do not occur in nature

D. have the same number of protons and neutrons but different number of electrons

7. An element

A. is a particle of a chemical substance that consists of atoms with the same proton number

B. is a particle made of identical nuclides

C. is a substance made of atoms with the same proton number

D. is for example sodium, oxygen, and distilled water

8. A molecule

A. is a group of two or more atoms

B. is a group of two or more chemically bonded atoms

C. is a substance that consists of bonded atoms of several elements

D. is for example N_2, F_2, or HCl

9. Chemically pure substance:

A. consists only of particles of the same type

B. can be a chemical element or a compound

C. is a substance, that remains unchanged (its properties) after purification

D. can only be a chemical element

10. Ethanol is liquid and ethane is gas due to:

A. the lower molecular weight of ethane

B. the stronger acidity of ethanol

C. hydrogen bonds formed between ethanol molecules

D. strong covalent bonds formed between ethane molecules

11. The difference between mineral water and distilled water

A. is in the concentration of dissolved ions

B. is in their ability to form hydrogen bonds between molecules

C. is none; they are the same

D. is in their electrical conductivity

12. Distilled water:

A. when compared with drink water is a homogeneous solution

B. is a chemically pure substance

C. does not contain dissolved salts

D. is colloidal (heterogeneous) mixture

13. Mixture:

A. can be homogeneous or heterogeneous (colloidal)

B. is homogeneous, if it consists of two or more substances with the same weight

C. is, for instance, filtered seawater

D. can be heterogeneous, if it consists of particles smaller than 10^{-9} m

14. Solution:

A. is a heterogeneous mixture consisting of two or more liquid substances

B. of proteins dispersed in water is colloid

C. always consists of the water and only one dissolved substance

D. of NaCl in the water is the chemical individuum

15. Composition of solution can be expressed by:

A. mass fraction

B. volume fraction

C. the osmotic pressure

D. degree of ionization

16. Mass fraction:

A. is the fraction of the dissolved substance mass to the mass of the solvent

B. is the fraction of the dissolved substance mass to the mass of total mixture

C. is the fraction of the dissolved substance mass in 1000 g of water

D. can be expressed as a percentage

17. 25% solution of calcium sulphate consists of:

A. 25 g of $CaSO_4$ in 100 g of the solution

B. 25 g Ca_2SO_4 in 100 g of the solution

C. 25 g of $CaSO_4$ in 100 g of water

D. 25 g of $CaSO_4$ and 75 g of water

18. What mixture must not be marked as suspension?

A. of water and oil

B. of sand and oil

C. of gas and liquid

D. of crushed chalk and water

19. Emulsion is

A. colloidal solution of egg white in water

B. a mixture of two liquid immiscible substances

C. a mixture of benzene and iodine

D. for example a mixture of nonpolar liquid with water

20. Suspension is

A. homogeneous mixture of liquid and solid substances

B. heterogeneous mixture of liquid and solid substances

C. for example unfiltered sea water

D. mixture of two or more liquids with different molecular mass

21. Which of the following options is considered to be foam?

A. a whipped cream

B. a beaten egg-white

C. a fog

D. a yolk

22. The atomic mass unit

A. is the mass of a hydrogen atom

B. has a value of $6.023 \cdot 10^{23}$

C. has a value of $1.66057 \cdot 10^{-27}$ kg

D. is 1/12 of the mass of an ^{12}C atom

23. Relative atomic weight:

A. says, how many times is the atom of some element heavier than atomic mass (weight) constant

B. is the total weight of all elementary particles in an atom

C. allows us to calculate a weight of concrete atom

D. is marked as Ar and it is a non-dimensional number

25. Amount of substance (chemical amount):

A. is the amount of the substance, containing the same number of particles as 12 g of nuclide ^{12}C

B. is the amount of the substance, containing $6.022 . 10^{23}$ particles

C. contains $1.66 . 10^{27}$ particles

D. is $6.022 . 10^{23}$ g

27. Calculate the molecular weight of NaOH:

A. $24.09 . 10^{-23}$ g

B. $0.0415 . 10^{-23}$ g

C. $6.64. 10^{-23}$ g

D. 40 g

28. How many oxygen atoms are there in the molecule of potassium disulfide?

A. 3

B. 5

C. 6

D. 4

29. According to the quantum-mechanical model of the atom:

A. the electrons are moving around the atomic nucleus, with the spatial probability defined by an orbital

B. quantum numbers characterize energy and size of the orbitals

C. the electrons are orbiting around the atomic nucleus on circular trajectories

D. the electrons are orbiting around the atomic nucleus on circular trajectories, with the probability of occurrence defined by an orbital

30. Quantum numbers

A. can be calculated from the Schrödinger wave functions

B. include *n*, *l*, *m*, and *s*

C. characterize the energy of an electron

D. determine the number of electrons in a shell

31. The principal quantum number

A. describes the energy and size of an orbital

B. has integer values from 0 to 7

C. is labeled with the letters K, L, M, N, O, P, Q

D. can theoretically take up integer values from 1 to ∞

32. Select a correct statement(s):

A. higher orbitals will be populated by electrons with lower energy

B. higher orbitals will be populated by electrons with lower electronegativity

C. higher orbitals will be populated by electrons with higher energy

D. higher orbitals will be populated by electrons with higher ionization energy

33. The Hund's rule

A. gives the maximum number of electrons in a shell

B. is the rule of maximum multiplicity

C. allows to calculate the energy of an electron

D. describes bonding between atoms

34. Electrons in one orbital

A. have the same energy

B. have the same value of the spin quantum number

C. have the same values *n*, *l*, *m*, but different values of *s*

D. occur in the number dictated by the Hund's rule

35. Ionization energy

A. increases with the increasing proton number within a group in the periodic system

B. decreases with the increasing proton number within a group in the periodic system

C. has maximal values for the elements from the I. A group

D. is largest for the transition metals

36. Electron affinity

A. decreases in a downward direction in a group in the periodic system

B. is highest for fluorine

C. is highest for cesium

D. is the energy liberated when an atom in the gaseous phase takes up an electron

38. Number of a group

A. is identical with the principal quantum number of a given element

B. is identical with the number of valence electrons of a given element

C. is identical with the number of protons of a given element

D. is identical with the maximal oxidation state of a given element

39. Number of a period

A. is identical with the principal quantum number of a given number

B. determines the highest electron shell found in a given element

C. determines the number of proton in a given element

D. determines the number of neutrons in a given element

40. The strongest reduction agents are

A. the elements placed furthest left in a period of the periodic system

B. the halogen elements

C. the alkali metals

D. the *d*-elements

41. Basic or base-forming oxides

A. are only compounds of oxygen and the s^1 a s^2 elements

B. are water-insoluble and react with acids and bases to produce salts

C. react according to the equation $O^{2-} + H_2O \rightarrow 2\ OH^-$

D. are oxides of metals with the oxidation state less than IV

42. For hydrides, it is true that

A. the oxidation state of hydrogen is -1

B. they are ternary compounds of hydrogen and more electronegative elements

C. the non-polar hydrides do not react with water

D. ionic hydrides are those which contain the s^1 a s^2 elements

43. A sodium cation is more stable than a sodium atom

A. because the cation has the electron configuration of the inert gas Ne

B. the statement is incorrect, the atom is more stable than the cation

C. because the cation has the electron configuration of the heavier inert gas Ar

D. because the cation is smaller

44. Alkali metals

A. occur naturally only combined with other elements due to their reactivity

B. stabilize their valence shell by accepting an electron to complete the *s* orbital

C. are found in a human body only in the cationic form M^+

D. are hygroscopic and cause burns on skin and membranes

45. Halogens

A. are, in contrast to the their anions (halides), toxic for humans

B. stabilize their valence shell by accepting one electrons to achieve the electron configuration of the nearest lighter inert gas

C. stabilize their valence shell by accepting one electrons to achieve the electron configuration of the nearest heavier inert gas

D. comprise the most electronegative elements

46. Halides

A. are salts of simple inorganic acids HF, HCl, HI, and HBr

B. are products of the reactions of a metal with HF, HCl, HI, or HBr

C. cannot be produced by a direct reaction between a metal and a halogen

D. may be produced, for example, by a reaction between $CaCO_3$ and HCl

47. Upon sublimation of elemental iodine,

A. intermolecular bonds are broken

B. the structure of the atoms is degraded

C. van der Waals interactions are broken

D. covalent bonds are broken

48. Oxygen

A. belongs among the most electronegative elements

B. is more reactive in the form of isolated atoms than diatomic molecules

C. forms cations H_3O^+ upon reaction with water

D. forms a single bond in a hydrogen peroxide molecule

49. Oxides

A. include basic oxides, acidic oxides, and amphoteric oxides

B. are divided into ionic, covalent, and molecular compounds according to their structure

C. are produced exclusively by a direct reaction with oxygen

D. are all water-soluble because they are polar compounds

50. A water molecule

A. has polar covalent bonds and a bond angle of approximately 104°

B. may represent the central atom in coordination substances

C. has its oxygen and hydrogen atoms bonded by hydrogen bonds, and therefore has water relatively high boiling temperature

D. may form hydrates

51. Hydrogen sulphide:

A. is smelly poisonous gas

B. is a product of protein decomposition

C. has only reducing effects

D. is liquid, because there are hydrogen bonds between hydrogen sulphide molecules

53. Select the correct statement(s) about carbon:

A. carbon atoms in graphite undergo the sp^2 hybridization

B. carbon atoms in diamond undergo the sp^2 hybridization

C. carbon atoms in graphite are bound together by four covalent, non-polar bonds

D. carbon black and animal charcoal are amorphous carbon modification

54. Select the correct statement(s) about carbon dioxide:

A. it is more soluble in a cold water than in a warm water

B. it is not soluble in the water, because there is no molecular dipole moment in the molecule

C. it is produced by a complete combustion of coal and hydrocarbons

D. it has a reducing effect

56. The chemical compound of $COCl_2$:

A. is used as narcotic in medicine

B. is product of combination of carbon dioxide with chlorine

C. is good solvent, especially of organic chemical compounds

D. is phosgene gas, very poisonous, used as chemical weapon

57. Carbon

A. is a reducing agent
B. reacts with elements of lower electronegativity to form carbides
C. reacts with sulfur to form carbon disulfide, CS_2
D. is not found in its elemental form in nature because of its reactivity

58. p-block elements:

A. are elements, that have 1-8 electrons of p-orbital in their valence layer
B. are elements of all the A groups
C. are elements of III. A and IV. A group
D. are, for instance, hydrogen, nitrogen, sulphur, fluorine

59. What colour do vapours of volatile s-block elements give to the flame?

A. Li - dark red
B. Na - green
C. potassium and rubidium - bluish violet
D. sodium - yellow

60. Sulphur dioxide:

A. is a product of incomplete combusting of sulphur or fossil fuels
B. has only oxidizing effects
C. has oxidizing as well as reducing effects
D. if present in the air, causes acid rains

61. The nitrogen molecule is more stable than the nitrogen atom because:

A. in the nitrogen molecule, there is a triple bond between nitrogen atoms
B. the nitrogen molecule have a greater total weight than nitrogen atom
C. the nitrogen molecule is non-polar
D. a formation of N_2 is an exothermic reaction

62. We can say about ammonia:

A. it is the end product of protein decomposition (in human body)
B. its reactions with acids produce ammonium salts
C. according to Brönstedt it is an acid
D. according to Brönstedt it is a base

63. Nitric acid:

A. has strong oxidizing and reducing effects
B. reacts almost with all metals, besides gold and platinum
C. is product of the reaction of nitrous oxide and the water
D. gives salts - nitrates and nitrites

64. H_3PO_4 acid:

A. is a part of AMP and NAD molecules
B. gives salts - only phosphates and hydrogen phosphates

C. is component of membrane lipids

D. causes a passivation of some metals

65. Phosphoric acid:

A. is a product of dissolving of phosphorus pentoxide in the water

B. gives salts - dihydrogen phosphates, hydrogen phosphates and phosphates

C. belongs to the strongest acids

D. has strong oxidizing effects already at room temperature

67. We can say about III. A group elements:

A. they stabilize their valence layer by taking three electrons in

B. all of them are metals

C. they form only covalent bonds

D. all of them are metals, besides boron

68. We can say about metals:

A. their atoms are arranged to form a crystal lattice, where they are bound together by metallic bond

B. all of metals react with acids, producing salts and water

C. physical properties of metals depend on number of valence electrons forming a metallic bond

D. they have high ionisation energy

69. Metals can be obtained:

A. by the reduction of their oxides

B. only by the reduction with carbon

C. by the reduction with carbon, aluminium, or by electrolysis

D. by oxidation

70. The atom of carbon is:

A. primary, if it is bound to only one carbon atom

B. secondary, if it is bound to other three carbon atoms

C. tertiary, if there are three different substituents bound to the carbon atom

D. niladic, if it stands alone

72. Isomerism:

A. is a phenomenon where two molecules have the same molecular formula but differ in chemical and physical properties

B. may only be spatial

C. may only be optical

D. may be spatial and constitutional (structural)

73. Structural (constitutional) isomerism:

A. is determined by an arrangement and properties of atoms, groups of atoms, bond types and the way the atoms are bound

B. belongs to the stereoisomerism

C. may be cis-trans

D. is given by the presence of a double bond between carbon atoms

74. Two organic compounds are isomers if:

A. they have completely different physical and chemical properties

B. they have exactly the same physical and chemical properties but different molecular formulas

C. they have at least one different physical or chemical property but the same molecular formulas

D. only if they have a different spatial arrangement

75. Alkanes:

A. are hydrocarbons having only linear chains with simple non-polar covalent bonds

B. may be linear, branched or cyclic

C. have homologous formula CnH2n +2

D. with a lower carbon atom number are water-soluble

76. Carbon atom in alkanes:

A. undergoes sp^3, sp^2, or sp hybridization

B. is always bound by single covalent bonds

C. is replaced by a sulfur, nitrogen or oxygen atom in molecules

D. is always tetravalent

77. We can say about alkanes:

A. their physical properties depend on the number of carbon atoms in their molecules

B. there are polar and non-polar covalent bonds in the alkane molecules

C. alkanes having a carbon number C1 - C2 are water-soluble

D. they are flammable

78. What are the characteristic reactions of alkanes?

A. radical substitutions

B. redox reactions

C. radical additions

D. eliminations

79. We can say about alkanes:

A. they are very reactive, since the single bond between the carbon atoms is weaker than the multiple

B. they are less reactive, non-polar hydrocarbons

C. in nature they are only found in oil (petroleum) as their derivatives

D. their characteristic reactions are radical substitutions

80. The addition is the reaction:

A. in which there is no by-product

B. in which an atom or group of atoms is bound to a multiple bond

C. at which the bond multiplicity is decreased (reduced.

D. that can not be nucleophilic

81. Addition reactions:

A. are typical for all the hydrocarbons

B. are characteristic for unsaturated hydrocarbons

C. on the benzene ring run as electrophilic additions

D. of alkenes and alkynes are electrophilic additions

82. Substitution reactions:

A. are reactions, where atoms or group of atoms are bound to a multiple bond

B. may be radical, electrophilic or nucleophilic

C. are reactions that involve the replacement of an atom or group of atoms with another atom or group of atoms

D. are only homolytic

83. Substitution reactions:

A. are characteristic reactions of alkanes

B. are characteristic reactions of aromatic hydrocarbons

C. always run as addition-elimination mechanisms

D. of alkanes are radical reactions

84. Which of following reactions can be considered to be the elimination reaction?

A. formation of ethylene from ethanol

B. formation of vinyl alcohol from acetylene

C. reduction of propylene to propane

D. formation of propylene from propane

85. We can say about alkanes:

A. their complete combustion always gives the carbon dioxide and water

B. their reaction with oxidizing agents produces alcohols (further oxidation produces carboxylic acids)

C. they are less reactive

D. their reaction with oxidizing agents produces esters

86. Alkenes:

A. are less reactive than alkanes, because the C = C bond is stronger than a single bond

B. are more reactive than alkanes

C. are less reactive than alkynes, because the double bond is stronger than triple

D. can form polymers

87. Select the correct statement(s):

A. alkenes are found with alkanes in nature

B. characteristic reaction of alkenes is radical substitution

C. C = C bond in alkenes can be cleaved by homolytic and heterolytic agent according to the reaction conditions

D. alkenes can form cis-trans isomers

88. How do we distinguish alkanes and alkenes?

A. by the reaction with bromine water

B. by the biuret reaction

C. by Selivanov´s reaction

D. by the reaction with $KMnO_4$ solution

89. We can say about alkynes:

A. there are two carbon atoms (*sp* hybridized. in their molecules

B. they are less reactive than alkenes

C. characteristic reactions of alkynes are electrophilic substitutions

D. unlike alkenes they react with alcohols

90. Characteristic reactions of alkynes are:

A. nucleophilic substitutions

B. electrophilic substitutions

C. hydrogenations

D. for example – the additions of hydrogen halide

91. Alkynes can react with:

A. alkaline hydroxides

B. halogens in the presence of a catalyst (type AlX3)

C. water

D. hydrogen halides

92. Select the correct statement(s):

A. products of the halogenation of alkynes are derivatives of alkenes or alkanes

B. products of the alkynes hydration are dihydroxyderivatives of alkanes

C. the product of the ethene hydration is acetaldehyde

D. the product of the alkyne hydrogenation is alkyne

93. We can say about alkynes:

A. they can react with water

B. they form acetylides

C. they have mild alkaline properties

D. hydrogen atoms in ethyne are slightly acidic

95. What can be ethene used for?

A. production of vinyl chloride

B. production of ethylene oxide

C. production of allyl chloride

D. production of acetaldehyde

97. We can say about propene:

A. it is used for production of plastics, acetone and cumene

B. products of its reaction with halogens are alkenyl halides

C. the product of its oxidation may be formic and acetic acid

D. the product of its oxidation is cumene

98. Ethylene oxide:

A. is produced by the dehydrogenation of ethylene

B. its acidic or basic hydrolysis gives rise to ethylene glycol

C. is stable cyclic ether

D. is product of the ethylene oxidation

99. Benzene:

A. is 1,3,5-cyclic hexatriene

B. is the unsaturated hydrocarbon

C. all of its the carbon atoms have sp hybridization, so the length of all the bonds in the aromatic ring is 0.139 nm

D. is a regular hexagon, where all carbon atoms have sp^2 hybridization

100. Characteristic reactions of benzene are:

A. nucleophilic and radical reactions

B. only electrophilic substitutions

C. oxidations

D. reductions

101. Characteristic reactions of arenes (aromatic hydrocarbons) are:

A. radical substitutions

B. radical additions

C. electrophilic additions

D. electrophilic substitutions

102. Benzyl chloride is:

A. chlorine derivative of phenol

B. functional derivative of benzoic acid

C. monovalent group derived from benzoic acid

D. chlorine derivative derived from toluene

103. Aniline:

A. is the product of the nitrobenzene oxidation

B. is as basic as a secondary amine

C. is the product of the nitrobenzene reduction

D. is the product of the aniline oxidation

104. The product of the styrene hydrogenation is:

A. methylbenzene

B. ethylbenzene

C. ethylcyclohexane

D. acetophenone

105. Derivatives of hydrocarbons:

A. are hydrocarbons that have carbon atom replaced by another atom, such as chlorine, in a molecule

B. are hydrocarbons that have only one hydrogen atom replaced by another atom or group of atoms, in the molecule

C. are hydrocarbons that have one or more hydrogen atoms replaced by another atom or group of atoms, in the molecule

D. may have, for example, nitrogen or oxygen atoms in the molecule

106. Halide derivatives:

A. are colorless substances that are very water-soluble

B. are very good solvents of non-polar substances, especially lipids

C. with an increasing number of halogen atoms in the molecule decreases their flammability

D. carbon tetrachloride is used to extinguish fire

107. Chloroform:

A. . is a crystalline substance of sweet odour

B. is decomposed by light to form phosgene

C. its inhalation causes a temporary dysfunction of the cerebral cortex

D. is used to extinguish fire

108. Freons:

A. are derivatives of hydrocarbons, which molecule comprises at least two different halogens

B. are derivatives of hydrocarbons, which molecule comprises at least two different halogens, of which one must be fluorine

C. are dibromodifluoromethane and chlorofluoromethane, for instance

D. are dichlorodibromomethane and dichlorodiiodomethane, for instance

109. We can say about C-halogen bond:

A. its cleavage is hemolytic

B. its cleavage is heterolytic

C. may be cleaved by the action of electrophilic reagent

D. is cleaved by the action of a nucleophilic agent

110. The product of the reaction of chloroethane with potassium ethoxide is:

A. ethyl ester

B. dietylether

C. chloptan

D. acetic acid chloride

111. Halogen derivatives can be prepared:

A. by radical substitution from alkanes

B. by electrophilic substitution from alkenes

C. by electrophilic addition from unsaturated hydrocarbons

D. by electrophilic substitution from aromatic hydrocarbons

112. The reaction of benzylchloride and sodium methoxide gives:

A. ester
B. propylbenzene
C. methylbenzene
D. ether

113. Diethylether can be prepared by the reaction of:

A. sodium methoxide and 1-chloropropane
B. potassium methoxide and chloroethane
C. CH_3CH_2OK and C_2H_5Cl
D. C_2H_5OH and C_2H_5Cl

114. The reaction of alkylhalide and alkoxide is:

A. an electrophilic addition
B. a nucleophilic addition
C. a nucleophilic substitution
D. an ether forming reaction

115. Two ammine groups are present in the molecule of:

A. guanidine
B. urea
C. glycine
D. lysine

116. Nitro compounds are hydrocarbon derivatives, that:

A. have one of the hydrogen atoms substituted by $–NO_2$ group
B. are prepared by a nucleophilic substitution from halide derivatives and nitrites
C. are products of the reaction of alcohol and nitrous acid
D. have the nitroso group in their molecules

117. Nitro compounds are products of:

A. electrophilic substitution occurring on the aromatic ring
B. the reaction of glycerol and nitric acid, for instance
C. the reduction of primary ammines
D. the reaction of primary ammines with nitrous acid

118. We can say about aniline:

A. it is product of the nitrobenzene oxidation
B. it is product of the nitrobenzene reduction by hydrogen
C. according to the positive mesomeric effect it is weak acidic
D. it has basic properties

119. Nitro compounds are reactive, because

A. $–NO_2$ group is very good nucleophile

B. they induce a negative inductive effect or a negative mesomeric effect

C. nitroso group is a substituent, that accepts electrons willingly

D. $–NO_2$ group can be easily oxidized

120. We can say about nitro derivatives:

A. nitrobenzene is reduced to aniline by hydrogen

B. nitro derivates that contains more nitro groups in their molecules, are explosive

C. nitro derivates are used for polymer production

D. nitro derivates are used for production of explosives, paints and drugs

121. Products of the reduction of nitroarenes are:

A. amines with characteristic $–NH_2$ group, in the acidic medium

B. hydroxylammines with characteristic –NH-OH group, in neutral medium

C. hydrazo compounds with characteristic –NH-NH-group, in alkaline medium

D. always ammines, medium does not matter

122. Nitro compounds are produced:

A. from halogen derivatives of hydrocarbons and alkaline nitrites

B. by aniline reduction

C. by the direct reaction of hydrocarbons with nitric acid

D. by the substitution of the carbon atom with nitrogen atom and following oxidation

123. Amine derivatives:

A. according to the type of carbon atom, to which the $–NH_2$ group is bound, we can divide amine derivatives into 3 groups – primary, secondary and tertiary

B. according to the number of hydrogen atoms of ammonia, that are theoretically substitute with hydrocarbon residue, we can divide amine derivatives into 3 groups - primary, secondary and tertiary

C. are of amphoteric character

D. in the reaction with acids give ammonium salts

124. We cannot say about amines:

A. amines with a small number of carbon atoms in their molecules are very water-soluble

B. molecules of soluble amines form hydrogen bonds with water molecules

C. all amines smell as ammonia

D. all amines are white crystalline substances

125. Basic properties of amine derivatives:

A. are caused by free electron pair of nitrogen atom

B. depend on functional group type, bound to the nitrogen atom of ammonia group

C. increase in the order phenylamine<methylamine<dimethylamine

D. decrease in the order triethylamine>diethylamine>ethylamine

126. Which of the following amines is the most basic?

A. methylamine

B. dimethylamine

C. trimethylamine, due to three inductive effects

D. aniline

127. Which chemical compound does not have properties of amines?

A. choline

B. aniline

C. urea

D. guanidine

128. Which of the following chemical compound is the most basic?

A. aniline

B. ethandiamine

C. hexandiamine

D. dimethylamine

129. We can say about aniline:

A. it is a weak acid

B. it is a secondary amine

C. it is a weak base

D. the reaction with hydrochloric acid gives anilinium chloride

130. What type of reaction is the preparation of nitrobenzene from aniline?

A. oxidation

B. reduction

C. diazotization

D. coupling reaction

131. We can say about primary amines:

A. they react with alkaline nitrites to produce azo compounds

B. the product of the reaction of primary amines with sodium nitrite in the presence of hydrochlorid acid (for example) is diazonium salt

C. they react with nitrous acid to produce nitrosamines

D. they are weaker bases than secondary amines

132. Secondary amines:

A. are more basic than primary amines

B. react with nitrous acid to form N-nitrosamines

C. react with nitrites in acid medium to form the diazonium salts

D. react only with concentrated mineral acids to form ammonium salts

133. Aniline is produced:

A. by the nitrobenzene reduction

B. by the reaction of bromobenezne with ammonia

C. by the reaction of benzene with alkaline nitrites

D. by the nitrobenzene oxidation

134. We can say about azo compounds:

A. they are produced by the reaction of amines with phenols

B. they are produced by the reaction of diazonium salts with aromatic phenols only

C. they are used for the production of azo dyes

D. they contain -N=N- group, so called chromophoric group

135. Select the correct statement(s):

A. secondary amines act as electrophilic reagents

B. amines act as nucleophilic reagents

C. diazotization can be realized only at high temperatures

D. primary amines react with halogen derivatives to produce secondary amines

136. Diazonium salts are produced:

A. by the reaction of primary aromatic amines with nitrous acid

B. by coupling

C. by primary amines oxidation

D. by the reaction of aromatic amines with alkaline nitrite in the presence of hydrochloric acid

137. Which of the following chemical compounds is not the naturally occurring amine?

A. adrenaline

B. niacin

C. quinine

D. nicotine

138. Naturally occurring amines:

A. are components of living organisms

B. are products of protein metabolism (in an organism)

C. are, inter alia, adrenaline and acetylcholine

D. are, inter alia, carotenes

139. The molecule of alkaloid includes:

A. phosphor

B. nitrogen

C. sulphur

D. halogen element

140. Methyl orange is:

A. an indicator of redox reactions

B. an indicator of acid-base reactions

C. an azo dye

D. a primary amine

141. Coupling is:

A. for example, the reaction of diazonium salt with phenol

B. for example, the reaction of diazonium salt with ammonia

C. the reaction producing azo compounds that are used as dyes

D. redox reaction

142. The product of the reaction of diazonium chloride with benzene is:

A. azobenzene

B. aniline black

C. azo compound

D. diazonium salt

143. The product of the dehydration of 2-pentanol is:

A. 3-pentene

B. pentane

C. 2-pentanone

D. alkene

144. Hydroxy derivatives:

A. with the lowest number of carbon atoms (in their molecules) are colourless liquids with nice (pleasant) smell

B. are very water-soluble

C. are not soluble in water, because the dissociation does not occur

D. their solubility increases with increasing number of carbon atoms in their molecules

145. We can say about hydroxy derivatives:

A. with an increasing number of –OH groups in their molecules, their solubility in water increases

B. phenols are white crystalline compounds, that change their colour into pink to brownish red due to the presence of the air

C. hydrogen bonds are formed between molecules of hydroxy derivatives of hydrocarbons and water molecules

D. all of them are non-polar substances

146. Hydroxy derivatives of hydrocarbons are divided into:

A. monobasic, dibasic and polybasic, according to the number of –OH groups

B. primary, secondary and tertiary, according to the number of –OH groups bound to the single carbon atom

C. alcohols and phenols, according to carbon atom (where –OH group is bond. hybridization

D. animal and plant groups, according to their origin

147. We cannot say about hydroxy derivatives:

A. simple alcohols are very water-soluble, because between water molecules and alcohol molecules hydrogen bonds are formed

B. comparing to corresponding hydrocarbons, hydroxy derivatives have higher boiling point due to hydrogen bonds between molecules of simple alcohol

C. there are oxygen bonds between molecules of simple hydroxy derivatives

D. complex alcohols are liquids of nice (pleasant) smell and narcotic effects

149. Methanol:

A. is used for the production of formaldehyde

B. its preparation runs according to the equation: $CO + H_2 \rightarrow CH_3–OH$ at elevated temperature and in the presence of a catalyst

C. is toxic for human, lethal dose is 20-50 ml

D. differs from ethanol primarily by odour

150. Ethanol:

A. is industrially made by ethylene hydration

B. is a product a fermentation of natural saccharides

C. is colourless crystalline substance, very water-soluble

D. is used as solvent

151. Glycerol:

A. is the component of lipids

B. is the raw material for the production of explosives

C. is used as a drug in medicine

D. is the component of lyddite

152. Ethanediol:

A. is a liquid of sweet taste and is used as sweetener in food industry

B. is used for antifreeze production

C. is produced by acid or base hydrolysis of ethyleneoxide

D. is toxic

153. Ethanediol is produced:

A. by ethane oxidation

B. by ethene oxidation

C. by ethyleneoxide hydrolysis in the presence of an acid or a base

D. by glycerol reduction

154. Hydroxy derivatives of hydrocarbons:

A. are amphoteric

B. their –OH bond is more polar than –OH bond in the water molecule

C. that have the hydroxyl group bound to tertiary carbon atom, are the most acidic

D. that have the hydroxyl group bound to primary carbon, are the most acidic

155. The presence of –OH group in molecule:

A. underlies the amphoteric character of hydroxy derivatives of hydrocarbons

B. underlies the solubility of simple alcohols in water

C. causes the middle strong acidity of alcohols

D. causes the basic character of alcohols

156. The acidity of alcohols decrease in the order:

A. primary alcohol>phenol>secondary alcohol
B. water>primary alcohol>secondary alcohol>tertiary alcohol
C. phenol>primary alcohol
D. water>phenol

158. Phenol:

A. is a white crystalline substance insoluble in water
B. its hydrogen cation is cleaved more easily than from primary alcohol
C. has a disinfecting effect
D. is used in medicine to disinfect wounds

159. We can say about secondary alcohol:

A. the product of its dehydration is alkene
B. the product of its oxidation is carboxylic acid
C. the product of its reduction is ketone
D. the product of its oxidation is ketone

160. The product of an oxidation of propane-2-ol is:

A. acetone
B. glycerol
C. aldehyde
D. ketone

161. The product of an oxidation of ethanediol can be:

A. glyoxal
B. ethylene glycol
C. glyoxylic acid
D. oxalic acid

162. We can say about tertiary alcohol:

A. it is a product of the reaction of secondary alcohol with water in acidic medium
B. is more acidic than secondary alcohol
C. is, for example, pyrogallol
D. it cannot be oxidized to produce aldehyde

163. The product of the reaction of an acid with an alcohol is

A. alkoxide
B. alkyloxonium salt
C. carboxylic acid
D. the reaction of an acid with an alcohol cannot happen, because the alcohol has mild acidic character

164. According to Brönsted, hydroxy derivatives of hydrocarbons:

A. are acids

B. are bases

C. are ampholytes

D. cannot be acceptor nor donor of hydrogen cation

165. Glycerol is:

A. tribasic alcohol

B. tertiary alcohol

C. optically active

D. the component of cosmetic skin-care creams

167. We can say about glycerol:

A. it is present in the human body as coenzyme

B. it is produced by living organisms during the proteosynthesis

C. it is produced by living organisms during the enzymatic hydrolysis of lipids

D. it is the component of lipids and nucleic acids

168. Glycerine:

A. is a water solution of glycerol, and is used in cosmetic industry

B. moisturizes skin

C. is the product of the reduction of glyceraldehyde

D. is the alcohol solution of glycerol

169. The product of the reaction of alcohol with alkaline hydroxide is:

A. alkoxide

B. for example, sodium alcoholate

C. phenoxide

D. salt of the alcohol

170. The chemical compound CH_3CH_2OK is:

A. potassium ethoxide

B. potassium ethanoate

C. potassium ethanolate

D. produced by the reaction of sodium with ethanol

171. Potassium phenoxide:

A. is produced by the reaction of benzoic acid with potassium

B. is produced by the reaction of phenol with potassium hydroxide

C. has ionic bond in its molecule

D. is produced by the reaction of toluene with potassium

172. Hydroxy derivatives have amphoteric character because:

A. there is δ^- on the oxygen atom of -OH group, so it can accept hydrogen atom

B. the O-H bond is polar and in the presence of stronger acid the H^+ is cleaved off

C. they cleave off the hydroxide anion in an acidic medium

D. they cleave off the hydrogen in the presence of alkaline hydroxide

173. Alkyloxonium salts are produced:

A. by the oxidation of an alcohol

B. by the reaction of alcohol with fatty acid

C. by the reaction of acid with phenol

D. by the reduction of carboxylic acid

174. Phenols are more acidic than alcohols due to:

A. the conjugation of free electron pair of oxygen atom and delocalized π electron cloud of the aromatic ring

B. +M effect of -OH group

C. -M effect of -OH group

D. they are not more acidic, because the oxygen atom is strongly electronegative, so it pulls the aromatic ring electrons

175. How can we distinguish methanol and ethanol?

A. they have different smell

B. by the reaction with $KMnO_4$

C. by the reaction with I_2 in the presence of alkaline hydroxide

D. by the iodoform reaction

176. What can be considered to be a phenol?

A. salicylic acid

B. cresol

C. *o*-xylene

D. hydroquinone

177. The product of the oxidation of hydroquinone is:

A. *p*-benzoquinone

B. *m*-benzoquinone

C. terephtalic acid

D. aromatic diketone

178. *p*-benzoquinone is produced:

A. by the reduction of pyrogallol

B. by the dehydrogenation of hydroquinone

C. by the dehydration of hydroquinone

D. by the oxidation of hydroquinone

181. The product of the reaction of ethanol with H_2SO_4 is:

A. ethene, at higher temperature

B. ester, in cool environment

C. CH_3-CH_2-O-SO_3H, at low temperature

D. CH_3-CH_2-O-O-SO_3H, at higher temperature

184. Which of following options may be considered to be the metamer of dibutylether?

A. CH_3-CH_2-CH_2-O-CH_2-CH_2-CH_2-CH_2-CH_3

B. CH_3-CH_2-CH_2-CH_2-CH_2-CH_2-CH_2-O-CH_3

C. CH_3-CH_2-CH_2-O-CH_2-CH_2-CH_3

D. CH_3-CH_2-CH_2-CH_2-CH_2-CH_2-CH_2-CHO

185. According to the conditions of a reaction, the product of an oxidation of primary alcohol is:

A. carboxylic acid

B. ketone

C. acetal

D. aldehyde

186. The product of the reaction of hydroxy derivatives of hydrocarbons with:

A. ketones are aldols

B. hydrohalic acids are alkyloxonium salts

C. mineral acids that contain oxygen are esters

D. aldehydes are acetals

187. Vinyl alcohol:

A. is produced by the addition of water to acetylene

B. is produced by the addition of water to ethylene

C. is produced by the dehydration of ethanol

D. is unstable and is converted to the acetaldehyde

188. Acetone and vinyl alcohol are:

A. optical isomers

B. tautomers

C. metamers

D. not the isomers

189. We can say about carbonyl compounds:

A. they have lower boiling point than hydroxy derivatives of hydrocarbons because there are no hydrogen bonds formed between their molecules

B. simple aldehydes and ketones are very water-soluble because there are hydrogen bonds formed between their molecules and water molecules

C. besides carbonyle group there cannot be any other substituent in their molecule

D. all of them are products of an oxidation of primary hydroxy derivatives

190. We can say about aldehyde and ketone reactivity:

A. it depends on functional groups bound to the carbonyle carbon atom

B. it is almost identical, because aldehydes as well as ketones contain the same carbonyle group

C. aldehydes are more reactive during the nucleophilic additions than ketones

D. the reactivity of carbonyle compounds depends simply on δ^+ of carbonyl carbon

191. Formaldehyde is more reactive than acetaldehyde because:

A. its carbonyle carbon atom is not affected by +I effect coming from hydrogen atoms
B. its molecular weight is lower
C. it is gas
D. the intensity of δ^+ of carbonyl carbon decreases the +I effect of alkyl group

192. Characteristic reaction of aldehydes and ketones is:

A. electrophilic addition
B. nucleophilic addition
C. elimination reaction
D. electrophilic substitution

194. Acetal reaction:

A. is important in the industry
B. is used for the protection of aldehyde group before oxidation
C. runs only in the presence of the catalyst H^+, that eliminates the dissociation of aldehyde hydrogen cation
D. runs only in the presence of the catalyst H^+, that supports the reactivity of carbonyl carbon

195. We can say about aldehydes and ketones:

A. aldehydes and ketones are included in naturally occurred taste and smell substances
B. benzaldehyde is a liquid with bitter almond smell and is present, for example, in bitter almond boneless
C. acetone is produced by the glycolysis in an organism
D. formaldehyde is used, for example, for laquer and plastic production

196. Formaldehyde:

A. can be released from new furniture and can cause the headaches and dizziness
B. is present in the cigarette smoke
C. is toxic for human
D. is white crystalline substance

197. Formalin:

A. is a 3% solution of formaldehyde in water
B. has antimicrobial properties
C. is used for preservation of biological material
D. is a 37% formaldehyde solution in water

198. The aldol condensation:

A. is the reaction between molecules of carbonyl compounds in alkaline medium
B. the reaction begins on such an aldehyde or ketone, that is more reactive and has at least one hydrogen atom bound to α-carbon atom
C. the reaction begins by the bonding of electrophile to the carbonyl carbon
D. is, for example, the reaction between two molecules of formaldehyde

199. The reaction between formaldehyde and benzaldehyde:

A. always begins on formaldehyde, because it is more reactive

B. always begins on benzaldehyde, because it has higher electron density in an aromatic ring

C. does not occur because formaldehyde does not have the α-carbon atom, and benzaldehyde does not have hydrogen atom bonded to its α-carbon atom

D. does not occur because α-carbon atom of formaldehyde and benzaldehyde does not have the hydrogen atom bonded to it

200. We can say about acetaldehyde:

A. it is colourless liquid with characteristic smell

B. its features are similar to formaldehyde, but they are milder

C. it is produced by the oxidation of ethanol

D. comparing to formaldehyde it is not toxic for human

201. Acetone:

A. is colourless gas with characteristic smell

B. is used for laquers, paints (colours) and solvents production

C. is produced by an organism during severe dehydration and during diabetic metabolic processes

D. is a volatile, non-flammable substance

202. We cannot say about aldehydes and ketones:

A. when compared with ketones, aldehydes are easily oxidized in the presence of weak oxidizer

B. during the oxidation of aldehydes the carboxylic acids are produced

C. C-C bond in ketones is stronger, therefore they are oxidized already by moderate warming up

D. C-C bond in ketones is stronger, that is why they are hardly oxidized

203. How can we prove the presence of aldehydes?

A. by Tollens reagent

B. by Fehling's reagent

C. by biuret reaction

D. by bromine water

204. Carboxylic acids:

A. occur as mono-, di-, tri-,...., polycarboxylic acids

B. with a lower number of carbon atoms are of pungent odor

C. are very water-soluble, because there is a polar group in their molecules

D. with a lower number of carbon atoms have a higher boiling temperature than the corresponding hydrocarbons, because there are hydrogen bonds in their molecules

205. The acidity of carboxylic acids:

A. only depends on the number of carboxyl groups in the molecule

B. only depends on the hydrocarbon chain length

C. depends on the concentration and on the number of -COOH groups in the molecule

D. depends on the carbon chain length and on the carbon chain properties

206. We can say about properties of carboxyl group -COOH:

A. the polarity of O-H bond determines the cleavage of H +
B. in the anion -COO^- the negative charge is evenly distributed on both oxygens
C. the length of all C-O bonds in the group -COOH is the same and it is 0.127 mm
D. all three bonds on the carboxyl atoms are arranged in space and enclose an angle of 107 °

208. Formic acid:

A. is a colorless liquid with pungent odor and corrosive effect
B. can be found in the bodies of ants, mosquitoes, bees and in nettle, but it has no practical application
C. is used for metallization of metals, leather processing and in the synthesis of complex compounds
D. is industrially produced from methanol and carbon monoxide

209. Oxalic acid:

A. is a colorless liquid
B. can be found in plants, such as sorrel, spinach
C. is toxic to humans, because sodium oxalate is a component of kidney stones
D. calcium oxalate is a component of kidney stones

210. Citric acid:

A. is propantricarboxylic acid
B. is tribasic hydroxy acid
C. has an antimicrobial properties and is useful in the food industry for food preservation (conservation)
D. reduces ability of the blood to clott, because it binds calcium cations in the blood

211. Characteristic reactions of carboxylic acids are:

A. neutralizations
B. electrophilic substitutions
C. nucleophilic substitutions
D. dehydrogenations

212. We can say about the esterification:

A. it is the reaction of carboxylic acid and alkaline hydroxide
B. it is the reaction of alcohols and carboxylic acids in an acidic medium
C. it runs as addition-elimination mechanism
D. it is the reaction, in which the organic acid reacts with alcohol only

213. The neutralization is the reaction:

A. of carboxylic acid and an organic base
B. of carboxylic acid and hydroxide
C. in which a salt of an acid and water are formed
D. that gives rise to anhydride of an acid

214. We can say about esterification:

A. the reaction mixture should be cooled, because the reaction is highly exothermic

B. hydrogen cation as a catalyst increases the reactivity of the carboxyl carbon and decreases the acid dissociation

C. acid can react only with a monohydric alcohol

D. equilibrium of the reaction is shifted to the side of the reactants, so it is necessary to remove products

215. How is aspirin prepared?

A. by the reaction of phthalic acid and ethanol

B. by the reaction of benzoic acid and acetic acid

C. by the reaction of salicylic acid and acetic acid

D. by the reaction of salicylic acid anhydride and ethanoic acid

216. The acidity of polybasic carboxylic acids:

A. depends only on the number of carboxyl groups in the molecule

B. is characterized by pK_a value

C. Adipic and glutaric acids are more acidic than acetic acid

D. depends on the distance of carboxyl groups to each other in the carbon chain

217. We can say about carboxylic acids:

A. the product of the propanedioic acid decarboxylation is acetic acid

B. the product of the malic acid dehydration is maleic acid

C. the product of the tartaric acid dehydration is acrylic acid

D. the product of the linoleic acid hydration is oleic acid

218. Amino acids:

A. are functional derivatives of carboxylic acids

B. All of them have basic properties, because they contain a basic group-NH2

C. contain functional groups that are able to accept and also to donate proton

D. are ampholytes

219. Amino acids are ampholytes because:

A. they do not dissociate in water

B. they contain acidic as well as alkaline characteristic group in their molecules

C. are capable to form the zwitterion

D. they can be acidic, basic or neutral

220. Isoelectric point pI:

A. is the pK_a value at which the amino acid does not move in an electric field

B. is the equilibrium constant of the amino acid

C. is the pH of the medium in which the amino acid (in solution) turns into amfion (zwitterion)

D. is used for electrophoretic separation of amino acids

221. We can say about amino acids:

A. nonessential amino acids need not to be included in the diet because the human body can form them from nitrogen, hydrogen and carbon

B. amino acids having aromatic ring, heterocycle or branched chain in the molecule are essential

C. nonessential amino acids can be prepared by transamination in human body

D. essential amino acids can be prepared from non-essential amino acids by transamination in human body

222. We can say about hydroxy acids:

A. they are products of the pyruvic acid oxidation

B. lactic acid and salicylic acid are hydroxy acids

C. hyaluronic acid is used in cosmetics as a component of anti-wrinkle creams

D. they can be prepared by the glucose oxidation

223. Salicylic acid:

A. is *o*-hydroxybenzoic acid

B. is a functional derivative of benzoic acid

C. in the reaction with acetic acid gives aspirin

D. is a functional derivative of acetic acid

224. Pyrrole derivatives do not include:

A. bilirubin

B. chlorophyle

C. myoglobin

D. cholic acid

225. We can say about lactic acid:

A. it is a colorless liquid

B. there is the chiral carbon in its molecule

C. it is produced by the cabbage fermentation (making saurkraut)

D. it may crystallize in muscles and causes "muscle soreness“ during the excessive muscle activity

226. CH_3-COO^- is:

A. acyl

B. acetyl

C. acetate

D. pyruvate

227. Which of followings can be considered to be the carbonic acid derivative?

A. guanidine

B. phosgene

C. urea

D. uric acid

228. We can say about esters:

A. they are very water-soluble because there are hydrogen bonds between their molecules
B. esters include also lipids
C. they are used in food industry as essences (e. g. rum, pear or pineapple)
D. the ester of methacrylate acid and methanol is used to make Plexiglas

229. Which of following options is usually used as medicine (drug)?

A. hydroxy derivative of salicylic acid, which has antipyretic effects
B. salicylamide, which acts as an analgesic for central nervous system
C. salicylic acid chloride, which acts as an analgesic
D. aminosalicylic acid that is used in the treatment of tuberculosis

230. p-aminobenzoic acid:

A. is a component of the folic acid (vitamin B_9)
B. affects the regeneration of red blood cells
C. is a growth factor of some micro-organisms
D. supports the production and storage of lipids in adipose tissue

231. We can say about calcium oxalate:

A. its chemical formula is $(COOH)_2Ca$
B. it is a component of kidney stones
C. its chemical formula is CaOOC-COOC
D. it supports blood clotting

232. We can not say about the oxalic acid:

A. it is produced by the oxidation of ethanethiol
B. its reduction gives 1,2-ethanediol
C. it is a white crystalline solid
D. it does not contain a chiral carbon

233. How can we distinguish formic acid and acetic acid:

A. by the reaction with Fehling's reagent
B. by the iodoform reaction
C. by the reaction with an oxidizing agent, because only formic acid has reducing effects
D. by the reaction with an oxidizing agent, because only acetic acid has reducing effects

234. Chemical formula R-CO-O-CO-R corresponds to:

A. ester
B. diketone
C. anhydride
D. organic peroxide

235. Which acid is formed by the addition of water to the acrylic acid?

A. malic acid
B. lactic acid

C. pyruvic acid

D. 2-hydroxypropanoic acid

236. How do we prepare the carboxylic acid?

A. by the acidic hydrolysis of esters

B. by the oxidation of the primary alcohol

C. by the triglyceride hydrolysis in an acid medium

D. by the oxidation of ketones

237. Heterocyclic compounds:

A. are cyclic compounds having at least one hydrogen atom replaced by nitrogen, oxygen or sulfur atom in the molecule

B. there is one or more carbon atoms replaced by other heteroatom, most often by nitrogen, oxygen or sulfur in the cycle

C. are used as herbicides and insecticides

D. may contain also silicon atoms in the molecule, because silicon is also able to form chains

238. Why are heterocycles important?

A. they represent structural units (building blocks) of nucleic acids

B. they occure in proteins, vitamins and alkaloids as an important component

C. they form phospholipids

D. they are used in pharmaceutical industry

239. We can say about heterocycles:

A. heterocycles having the nitrogen atom in the molecule have such properties as amines have

B. heterocycles having the oxygen atom (heteroatom) in the molecule are cyclic ethers

C. all of them have basic properties

D. they can not be divided into saturated and unsaturated heterocycles

240. Which of followings do belong to five-membered heterocycles with one heteroatom?

A. thiazole

B. pyrrole

C. imidazole

D. thiophene

241. Aromatic character of heterocyclic compounds:

A. is formed only if the number of delocalized unpaired electrons corresponds to the Hückel rule (4n + 2)

B. is always formed by involving the lone electron pair of the heteroatom into the conjugation

C. of furan, thiophene and pyrrole is the same

D. decreases in the order thiophene> pyrrole> furan

242. Pyrrole:

A. is a component of hemoglobin and chlorophyll

B. is a component of bilirubin and bile acids

C. is a component of bile pigments

D. is a component of vitamin B_{12}

243. We can say about bile pigments:

A. they are products of the degradation of hemoglobin

B. they play the most important role in the formation of bile acids

C. there are four furan rings in their molecules

D. they contain porphyrin structure

244. What molecule does contain two identical heteroatoms?

A. thiophene

B. imidazole

C. thiazole

D. oxirane

245. Pyrrole does not occur in the molecule of:

A. indol

B. purine

C. tryptophan

D. porphin

246. Pyrrole rings occur in the molecule of:

A. hemoglobin

B. B_{12} vitamin

C. bile acids

D. uric acid

247. Pyrrolidine:

A. is product of the hydrogenation of pyrrol

B. is product of the oxidation of pyrrole

C. has two heteroatoms in its molecule

D. has aromatic character

248. We can say about pyrrole and pyridine:

A. they have basic properties

B. they differ in the formation of aromatic character

C. they have different acid-base properties

D. pyridine is a base

249. Select the correct statement(s):

A. pyrazole and thiazole are used for the production of drugs that ease pain and reduce fever

B. thiazole is used for the production of penicilline, sulphonamides and thiamine

C. pyrazole is a component of H vitamin and histidine

D. there is one oxygen atom and one nitrogen atom in the molecule of pyrazole

250. We can say about six-membered heterocyclic compounds with one heteroatom:

A. there is a nitrogen atom (heteroatom) in their molecules

B. they are for example, 2*H*--pyran, 4*H*--pyran and pyridine

C. there are carbon atoms having *sp* and sp^2 hybridization in their molecules

D. all carbon atoms in their molecules have sp^2 hybridization

251. We can say about pyridine:

A. free electron pair of nitrogen is not involved in conjugation

B. it has aromatic character due to the delocalized electron cloud formed by five unpaired electrons of carbon atoms and by one unpaired electron of nitrogen atom

C. the electron density increases and the basic character occurs due to involving a free electron pair in the delocalization of π-electrons of nitrogen atom

D. substitution reactions on pyridine run easier than on benzene

252. Pyridine:

A. comparing to pyrrole, it has basic character

B. the product of its dehydrogenation is piperidine

C. is easily oxidized

D. the product of its hydrogenation is piperidine

253. Nicotinic acid:

A. is derivative of pyrimidine

B. is converted into nicotinamid in the organism

C. is a component of niacin

D. can be produced from tryptophane, if there is enough B_1, B_2 and B_6 vitamin in the organism

254. Pyridine:

A. reacts with acids to produce salts

B. the product of its reduction is piperidine

C. is not a component of isoquinoline

D. contains two oxygen atoms in its molecule

255. What chemical compound does have isomeric forms?

A. pyrrole

B. pyridine

C. pyran

D. porphin

256. Barbituric acid is produced:

A. by the reaction of maleic acid with urea

B. by the reaction of malonic acid with urea

C. by the oxidation of pyrimidine

D. by the reduction of thymine

257. Catalytic hydrogenation runs the most easily on:

A. thiophene
B. furan
C. pyrrole
D. pyrolidine

258. By the hydrogenation:

A. of furan the tetrahydrogenfuran is produced
B. of thiophene the tetrathiophene is produced
C. of pyrrole the piperidine is produced
D. the aromatic character of heterocycle vanishes

259. We can say about heterocycles:

A. pyridine is six-membered heterocycle, that contains two nitrogen atoms in its molecule
B. uracil, cytosine and thymine are pyrimidine derivatives
C. nicotinic acid and nicotinamide are pyrrole derivatives
D. barbituric acid is produced by the condensation of malonic acid and urea

260. There are two condensed heterocycles in the molecule of:

A. uric acid and caffeine
B. adenine and guanidine
C. adenine and guanine
D. cytosine and barbituric acid

261. What chemical compound does form the tautomeric forms?

A. thymine
B. uracil
C. pyridine
D. uric acid

262. Uric acid:

A. is produced by the degradation of pyrimidine compounds in human body
B. is very water-soluble
C. is a major component of urine
D. is the end product of purine metabolism in human body

263. We can say about uric acid and urea:

A. they differ in their solubility in water
B. uric acid crystallizes in joints
C. urea is the main component of urine
D. both of them are produced by the decomposition of purine substances

264. Alkaloids:

A. are naturally occurring substances with basic character
B. all of them cause hallucinations

C. are analeptics, that affect the central nervous system

D. are, for example, caffeine, theine, theobromine

265. We can say about alkaloids use:

A. codeine that belongs to the opium alkaloids is antitussive

B. analeptics stimulate the central nervous system

C. caffeine and morphine ease the pain

D. nicotine eases the headache

266. What alkaloid does contain the tropane cycle in its molecule?

A. caffeine

B. atropine

C. codeine

D. cocaine

267. What alkaloid does not contain the quinoline or isoquinoline cycle?

A. codeine

B. morphine

C. nicotine

D. theobromine

268. What chemical compound is lysergic acid derived from?

A. pyridine

B. indole

C. quinoline

D. pyrrole

269. What chemical compound are caffeine and theobromine derived from?

A. indole

B. piperidine

C. pyridine

D. purine

270. What chemical compound is codeine derived from?

A. indole

B. purine

C. isoquinoline

D. tropane

271. The basic unit of the macromolecular substances:

A. is the periodically repeated part of macromolecule that has the same chemical structure

B. is the simplest group of atoms periodically repeated

C. of polyethylene type is identical to the structural unit

D. is the molecule that contains two double bonds or two reactive functional groups

272. The basic unit:

A. of polypropylene is –[CH_2-CH(CH_3)]-
B. of polyterpene is –[CH_2-C(CH_3)=CH-CH_2]-
C. is always identical to the structural unit
D. of polyethylene is –[CH_3-CH_3]-

273. Structural unit:

A. is a part of the macromolecule with the same chemical composition
B. represents the simplest arrangement of building blocks (units) that are regularly repeated
C. is for example - [A-B-C] -
D. is only such molecule that have multiple bond

274. Polymerization:

A. is the reaction of two identical monomers containing multiple bonds
B. can be radical or ionic
C. has addition-elimination mechanism
D. is, for example, polystyrene production

275. Polycondensation:

A. is stepwise reaction
B. has addition-elimination mechanism
C. is, for example, polyamides production
D. is also the chain reaction

276. Synthetic rubber (caoutchouc. is produced:

A. by the polymerization of but-1,3-diene or its derivatives
B. by the polycondensation of isoprene and chloroprene
C. by the copolymerization of butadiene and styrene
D. by the copolymerization but-1,3-diene and adipic acid

277. Polyaddition:

A. is the reaction of two monomers with reactive functional group, one of which is donor and one is the acceptor of the hydrogen cation
B. is only radical reaction
C. is the reaction of polystyrene production
D. is the reaction of polyurethane production

278. Phenolic plastics, bakelites are made from:

A. phenol and urea
B. phenol and methanal
C. formaldehyde and thiourea
D. formaldehyde and phenol

279. Amino plastics are produced by:

A. the polycondenzation of diamide of carbonic acid and formaldehyde

B. the polyaddition of uric acid and formaldehyde

C. the polymerization of urea and methanal

D. the copolymerization of formaldehyde and buthadiene

280. Saccharides :

A. consist only of carbon, hydrogen and oxygen atoms

B. contain carbon, hydrogen, oxygen and nitrogen atoms in their molecules

C. are hydroxy aldehydes or hydroxy ketones

D. there are heteroatoms (sulphur or phosphor) in their molecules

281. We cannot say about saccharides:

A. they are involved in animal and plant bodies

B. they are energy storages in organisms

C. they cannot be converted to other important substances in organisms

D. they are a neutral component of nucleic acids

282. We can say about saccharides:

A. they are produced by photosynthesis in nature

B. they are considered to be heterocycles

C. according to the number of monosaccharide units we can divide them into 3 groups – monosaccharides, oligosaccharides and polysaccharides

D. all of oligosaccharides and polysaccharides have sweet taste

283. Monosaccharides:

A. can have 3 to 9 carbon atoms in their molecules

B. they are cleaved into simpler saccharides during the hydrolysis

C. cannot be cleaved into simpler saccharides during the hydrolysis

D. almost all of them have sweet taste

284. We can say about monosaccharides:

A. they are white crystalline substances, very water-soluble

B. they dissociate in water

C. they are very soluble, because they form hydrogen bonds with water molecules

D. they hydrolyze to CO_2 and H_2O at higher temperature in the mineral acid medium

285. There is more than one chiral carbon atom in the molecule of:

A. aldotriose

B. ketotriose

C. ketohexose

D. galactose

286. D-glucose and L-glucose differ:

A. in the number of chiral carbon atoms in their molecules

B. only in the position of the hydroxyl group of the second carbon atom

C. in the position of the hydroxyl group of the last chiral carbon atom

D. in the way they rotate polarized light

287. We can say about aldose that has two –OH groups in its molecule:

A. it gives glyceric acid by its own oxidation

B. it gives glycerol by its own reduction

C. it is called ethylene glycol

D. it is called aldodiose

288. The product of the reduction of monosaccharide is:

A. polybasic alcohol

B. hemiacetal

C. a substance that does not react with Schiff's reagent

D. for example, ribitol, glucitol, galactitol

289. Cyclic forms of monosaccharides arise:

A. from linear forms that are affected by ultraviolet radiation

B. from intramolecular hemiacetal reactions

C. from intramolecular esterification

D. from the reaction of -OH groups of last chiral carbon atom and oxygen atom of aldehyde group

290. Anomers:

A. are optical isomers

B. are substances that rotate the plane of polarized light in the same angle to the left or right

C. are substances that rotate the plane of polarized light in the same angle only to the left

D. are substances, that do not rotate the plane of polarized light in the same angle to the left or right

291. The products of the oxidation of monosaccharide aldehyde group:

A. are uronic acids in the presence of enzymes

B. are aldaric acids in the presence of strong oxidizing agent (oxidizer)

C. are aldonic acids

D. are split carbon chains, but also simple aldehydes and ketones are formed

292. Glucaric acid:

A. has two aldehyde groups in its molecule

B. has one aldehyde and one carboxyl group in its molecule

C. is dicarboxylic acid

D. is produced by the reaction of glucose with strong oxidizing agent (oxidizer)

293. Aldaric acids:

A. are formed by the action of very strong oxidizing agents on aldohexose

B. are formed only by the action of reducing agents in the presence of enzymes

C. are formed only by the action of oxidizing agents in the presence of enzymes

D. are never formed from glucose

294. Gluconic acid:

A. is the product of the reaction of glucose with strong oxidizing agent (oxidizer)
B. is produced by mild oxidation of glucose
C. is produced only in the presence of an enzyme
D. does not have a chiral carbon atom

295. Cyclic form of monosaccharides is:

A. glycoside
B. ester
C. acetal
D. hemiacetal

296. Glucitol:

A. is polyalcohol
B. is produced by the reduction of glucose or fructose
C. has only one carbonyl group in its molecule
D. does not have reducing effects

297. Ribitol and galactitol:

A. belong to the hydroxy derivatives
B. are products of the monosaccharides oxidation in the presence of common oxidizing agents
C. are products of the reduction of ribose and galactose
D. their oxidation to the second stage forms corresponding acids

298. Manitol is produced:

A. by the reduction of maltose
B. by the hydrolysis of maltose
C. by the reduction of mannose
D. by the oxidation of mannose

299. Fructose gives a positive response to:

A. the Molisch´s reagent
B. the nitrochrome
C. the Fehling's reagent
D. the bromine water

300. How can we prove the presence of a monosaccharide?

A. by the iodine solution
B. by the mixture of HNO_3 and K_2CrO_4
C. by Fehling's or Tollens reagent
D. by the iodoform reaction

302. How is the presence of reducing saccharide proven?

A. by Fehling's reagent
B. by Tollens' reagent

C. by the nitro-chromic reaction

D. by the reaction with iodine solution

306. How is the presence of cyclic form of glucose expressed?

A. by a change of monosaccharide solubility

B. it reacts with Fehling's reagent only at higher temperature

C. by a change of optical activity

D. it does not form O-glycosidic bonds

307. The product of the esterification of glucose is:

A. only glucose-1-phosphate

B. only glucose-6-phosphate

C. according to reaction conditions glucose-1,6-biphosphate

D. phosphoester bond on any of glucose carbon atoms

308. L-glucose:

A. has –OH group bound to the last chiral carbon atom on the left side

B. is physiologically important for human body

C. it occurs in urine of diabetic patients

D. is the left-handed (according to the polarized light) glucose form

309. α-D-fructose-6-phosphate:

A. is product of the esterification of fructose by phosphane

B. is product of the reaction of the hydroxyl group of sixth fructose carbon atom with phosphoric acid

C. cannot be produced, because there is hemiacetal hydroxyl bound to the sixth carbon atom

D. is product of the esterification of primary –OH group of sixth carbon atom by H_3PO_4

312. Glycosidic bond:

A. is bond between hemiacetal hydroxyl and –OH group of alcohol

B. can be formed between hemiacetal hydroxide of one monosaccharide and hemiacetal or primary hydroxyl of other monosaccharide

C. is a covalent bond. When it is formed the water molecule is released.

D. is coordination bond, so called donor-acceptor bond

313. Propyl-β-D-glucopyranoside:

A. is product of the reaction of propanol with β-D-glucopyranose

B. is the product of the reaction of glucose's hemiacetal hydroxyl in β position and –OH group of propanol

C. is product of the neutralization of propanol with gluconic acid

D. propanol cannot react with glucose because there is no hemiacetal hydroxyl in its molecule

314. We can say about saccharose:

A. it is so called beet sugar, and it is the sweetest sugar

B. there is a glycosidic bond formed in its molecule, that is the product of glucose hemiacetal hydroxyl bonding to primary hydroxyl of the fructose's second carbon atom

C. there is a glycoside bond formed in its molecule, that is the product of glucose's hemiacetal hydroxyl bonding to hemiacetal hydroxyl of the fructose's second carbon atom

D. the formule of saccharose's glycosidic bond is α1→ β2

315. Saccharose:

A. contains α-D-glucopyranose and β- L-fructofuranose

B. is a non-reducing disaccharide, because there is no hemiacetal hydroxyl group in its molecules

C. is reducing disaccharide, because glycosidic bond is formed between the hemiacetal hydroxyl of glucose and the hemiacetal hydroxyl of fructose

D. even after its hydrolysis does not give a positive reaction with Fehling's reagent

316. We can say about ribose:

A. it is part of the DNA

B. it is ketopentose

C. it is found in ATP

D. it is an intermediate product of glycolysis

317. Milk sugar:

A. is reducing saccharide

B. is galactose

C. is aldohexose

D. is lactose

318. Which of these substances does have reducing properties?

A. starch hydrolysate

B. lactose

C. maltose

D. saccharose

319. Saccharose is non-reducing disaccharide because:

A. glycosidic bond is formed between two hemiacetal hydroxyls

B. there is no free hemiacetal hydroxyl in the molecule

C. it does not react with Fehling's reagent

D. it can not form esters

320. In the reaction of glucose with Fehling's reagent:

A. the glucose is reduced

B. the cupric cation (II) is reduced to cuprous cation (I)

C. the red precipitate of Cu_2O is formed

D. the copper oxidizes

321. What is the proof of the presence of glucose by Fehling's reagent based on?

A. the oxidation of glucose

B. the oxidation of cupric cation (II)

C. the reduction of cupric cation (II)

D. the reduction of hemiacetal hydroxyl

322. Dihydroxyacetone:

A. is the simplest ketotrioze

B. oxidizes to glyceric acid

C. is formed by glycolysis in the human body

D. is formed by the oxidation of the secondary carbon atom of glycerol

323. Maltose:

A. is glucopyranosyl-glucopyranose

B. consists of two molecules of α-D-glucopyranose bound by α (1 → 4) bond

C. is a malt sugar and is formed by starch degradation by maltase

D. consists of galactopyranose and glucopyranose

324. We can say about lactose:

A. there is free hemiacetal hydroxyl in its molecule, therefore it is reducing disaccharide

B. it can be of plant or animal origin

C. the glycosidic bond β (1 → 4) causes its non-reducing effects

D. it is split into glucose and galactose by the action of maltase

325. Starch:

A. is a polysaccharide of plant origin

B. consists of amylose and amylopectin

C. contains glycoside bonds α (1 → 4) and β (1 → 4)

D. contains glycoside bonds α (1 → 4) and α (1 → 6)

326. Starch, cellulose and glycogen:

A. differ only in their occurence in nature

B. do not differ in the composition

C. differ in the type of glycosidic bond

D. contain glycosidic bonds α (1 → 4) and α (1 → 6)

327. Starch and glycogen:

A. are composed of α-D-glucofuranose

B. contain a glycoside bonds α (1 → 4) and α (1 → 6)

C. differ in occurrence in nature, starch is the plant polysaccharide and glycogen is of animal origin

D. differ in water solubility

329. Maltose:

A. arises from starch by the action of amylase in human body

B. is formed by the oxidation of mannitol

C. is split into carbon dioxide, water and energy by maltase

D. is a reducing disaccharide

330. Cellulose unlike starch:

A. is water-soluble

B. contains glycoside bonds β (1 → 4)

C. is indigestible to humans, because amylase cleaves only α-glycoside bond

D. may be proven by iodine solution

331. We can say about polysaccharides:

A. glycogen unlike starch and cellulose may be proven by Fehling's reagent

B. polysaccharides do not have a reducing effects

C. polysaccharides do not have a sweet taste

D. glycogen is the storage material in animal body (including human)

332. How is glucose formed from disaccharides and polysaccharides?

A. by the reduction

B. by the hydrolysis in an acidic medium

C. by the hydrolysis in the presence of amylase or disaccharidases

D. it takes place in the stomach by the action of trypsin

333. We can say about cellulose:

A. it is a linear polysaccharide

B. it forms a colloidal solution in water

C. it is the most common polysaccharide in the biosphere

D. it is used in the manufacture of viscose rayon

334. Lipids are:

A. esters of long chained fatty acids and tertiary alcohol

B. esters of long chained fatty acids and tribasic alcohol

C. ethers of long chained fatty acids

D. ethers of long chained fatty acids and monohydric alcohols with long carbon chain

335. Lipids are divided into several groups:

A. according to the origin (plant, animal and synthetic.

B. according to the alcohol content (acylglycerols and waxes)

C. according to the composition (simple and phospholipids)

D. according to the carboxylic acid content (fats and oils)

336. What is the importance of lipids in the human body?

A. they form cell membranes

B. they create an environment in which non-polar substances, such as vitamins or drugs are dissolved

C. they are involved in protein synthesis

D. they are broken down by the action of lipase to form glycerol and fatty acids

337. Which of following options can be considered to be the unsaturated fatty acid?

A. linoleic acid

B. arachic acid

C. butyric acid

D. oleic acid

338. Which of following options can be considered to be the non-essential fatty acids?

A. arachidonic acid

B. aspartic acid

C. stearic acid

D. palmitic acid

339. Which of following options does contain two or more double bonds in the molecule?

A. oleic acid

B. linolenic acid

C. arachidonic acid

D. elaidic acid

340. We can say about lipids:

A. they are hydrophobic

B. they are insoluble in cold water but they dissolve in warm water

C. they need not to be supplied in the diet, because our body can produce them

D. they are insoluble in water, they can form only colloids or micelles

341. Which of following options can be considered to be fat?

A. all lipids of plant origin

B. lipids that contain a higher percentage of saturated fatty acids

C. all acylglycerols

D. mostly lipids of animal origin

342. Melting point of lipids:

A. depends only on the esterified carboxylic acid chain length

B. depends only on the number of unsaturated bonds in the molecule

C. depends on the esterified carboxylic acid chain length and the number of unsaturated bonds in the molecule

D. decreases with shortening of carboxylic acid chain, and with increasing number of unsaturated bonds in the molecule of lipid

343. Fatty acids are:

A. water-insoluble carboxylic acids

B. carboxylic acids, that contain at least sixteen carbon atoms and that have an even number of carbon atoms

C. unbranched-chain carboxylic acids with minimum of sixteen carbon atoms in their molecules

D. aromatic carboxylic acids

344. Essential fatty acids:

A. are produced by the saturated carboxylic acids dehydrogenation in the human body, so their intake in the diet is not needed

B. have the aromatic ring or heterocycle in the molecules

C. have two or more double bonds in their molecules

D. are important in the metabolism of saturated fatty acids and cholesterol

345. The product of the complete hydrogenation of $C_{19}H_{31}COOH$ is:

A. oleic acid

B. linoleic acid

C. arachidic acid

D. saturated hydrocarbon

346. The product of the reaction of $C_{17}H_{29}COOH + 2H_2$ is:

A. linoleic acid

B. oleic acid

C. octadecenoic acid

D. saturated fatty acid

347. We can say about lipids:

A. unsaturated fatty acids in lipid molecules are cis-isomers

B. trans-isomers of fatty acids are produced by partial hardening of lipids

C. cool-pressed oils are not suitable for fritting

D. lipids with high percentage of unsaturated fatty acids are thermostable

348. Acylglycerols:

A. can be divided into mono-, di- and tri-acylglycerols

B. are simple, if there are only saturated fatty acids in their molecules

C. are combined, if the glycerol is esterified by various fatty acids

D. contain long-chain monobasic alcohol and long-chain carboxylic acid in the molecule

349. What chemical bond is present in the molecule of simple lipid?

A. carboxy phosphoesteric bond

B. esteric bond

C. O-glycosidic bond

D. peptide bond

350. Triacylglycerol:

A. contains three carboxylic acids bound to the tertiary alcohol, in its molecules

B. contains carboxylic acids bound together by carboxyl-ester bonds

C. contains also the phosphoesteric bond

D. is 1,2,3-propanetriol

351. . 2-stearylglycerol:

A. is monoglycerol

B. is composed of stearyl alcohol and glycerol

C. is glycerol with two esterified carbon atoms

D. is glycerol with esterified –OH group on the secondary carbon atom

352. We can say about acylglycerol molecule:

A. there is one, two or three esterified hydroxyl groups there
B. there are only primary hydroxyl groups esterified
C. it may contain identical or different long-chained acyls of carboxylic acids
D. it contains only saturated acyls of fatty acid

353. Simple lipids:

A. there is glycerol and the alcohol component in their molecules
B. there is only alcohol component together with long-chained carboxylic acids in their molecules
C. are, for example, waxes
D. are, for example, acylcholesterols

355. Lipids rancidification (ageing):

A. is the oxidation of unsaturated bonds
B. is the oxidation of double bonds of carbon chains resulting in the formation of simple aldehydes and ketones
C. due to the yellow colour and the smell of new-formed aldehydes and ketones is called yellowing
D. is not caused by microorganisms in warm and moist environment

356. Lipids hardening:

A. is catalytic dehydrogenation of oils
B. is radical substitution
C. is stepwise reaction
D. destroys the biological value of plant oils

359. Effects of soap as a laundry detergent are based:

A. on the presence of polar and non-polar molecule parts of sodium palmitate
B. on the orientation of hydrophobic part of the molecule of the soap into the non-polar impurity structure
C. on the presence of hydrophilic part of the soap molecule in the surface of micelle
D. on the fact that the soap precipitates in the hard water

360. Complete hydrogenation of linoleic acid forms:

A. palmitic acid
B. oleic acid
C. stearic acid
D. linolenic acid

361. The product of the hydrolysis of phospholipids is not:

A. the phosphoric acid
B. choline
C. glycerol
D. cetyl alcohol

362. What reaction is the soap product of?

A. triglyceride hydrolysis in the presence of NaCl
B. lipid hydrolysis in the presence of NaOH
C. lipid hydrolysis in the presence of alkaline hydroxide and hydrolase (enzyme)
D. the reaction of palmitic acid and sodium hydroxide

363. Waxes:

A. are simple lipids
B. are esters of monohydric alcohols and long chained fatty acids
C. may contain cetyl alcohol or ceryl alcohol
D. are only of animal origin

364. Complex lipids:

A. contain only glycerol esterified with phosphoric acid in the molecule
B. are for example, phospholipids, that may include choline, serine or ethanolamine in their molecules
C. are for example, esters of glycerol and phosphoric acid
D. contain for example galactose or the protein part in their molecules

366. We can say about phospholipids:

A. they contain glycerol esterified by phosphoric acid and choline
B. they contain only ethanolamine or serine besides glycerol and fatty acids
C. they consist of glycerol, fatty acids, phosphoric acid
D. they also contain ethanolamine, choline and serine besides glycerol and the fatty acid

367. Polar part of the phospholipid contains:

A. H_3PO_4
B. ethanolamine, choline and serine
C. glycerol
D. anion of an acid

368. The non-polar part of the phospholipid contains:

A. the carbon chain of fatty acid
B. choline
C. ethanediol
D. ethanolamine

369. Lipoproteins:

A. also contain the protein residue besides the alcohol and acid component in the molecule
B. in the blood plasma are for example involved in cholesterol transport
C. are found in cell membranes
D. also contain glucose or galactose in the molecule

370. Which of following chemical compounds is/are important for the lipids metabolism?

A. lipase, which breaks down the lipid ester bonds

B. gastric acid and pepsin, which breaks down fatty acids

C. bile acids that emulsify lipids

D. β-carotene and vitamin C

371. We can say about cholesterol:

A. it is derived from cyclopentanoperhydrophenanthrene

B. it can be esterified by long chained carboxylic acid

C. it does not occur in the human body, it must be supplied in the diet

D. it occurs as free and esterified (form) in the organism

372. We can say about cholesterol:

A. it is a part of cell membranes

B. it is the precursor for insulin and glucagon

C. it gives rise to bile acids

D. it is a component of bilirubin and biliverdine

373. The cholesterol in the body is precursor for:

A. sex hormones

B. bile pigments

C. vitamin A

D. bile acids

374. Bile acids:

A. have shorter side chain than cholesterol

B. act as enzyme in digestion of fats

C. are products of cholesterol reduction

D. contain porphin in the molecule

375. Phytol belongs to:

A. monoterpenes

B. diterpenes

C. triterpenes

D. tetraterpenes

376. What can be esterified in the molecule of cholesterol:

A. only hemiacetal hydroxyl

B. carboxyl group (by glycerol)

C. hydroxyl group on the third carbon atom

D. nothing can be esterified there

378. We can say about sterols:

A. phytosterol is of animal origin

B. ergosterol is found in the yeast

C. by UV irradiation of ergosterol vitamin B_{12} is produced

D. by UV irradiation of ergosterol ergocalciferol, vitamin D_2 is produced

379. Bile acids:

A. are formed in the liver from cholesterol
B. are products of the degradation of hemoglobin
C. are found in adipose tissues, where they are formed from cholesterol
D. are formed in the small intestine

380. What processes are bile acids important for?

A. the formation of steroid hormones
B. the absorption of lipids
C. the emulsification and breakdown of triglycerides
D. the hydrolysis of water-insoluble proteins

381. Steroid hormones do not include:

A. adrenal cortical hormones
B. corticosteroids
C. insulin and glucagon
D. cholecalciferol

382. Proteins in the human body:

A. have structural and kinetic function, for example - hemoglobin
B. may be replaced by lipids or polysaccharides
C. have transport, regulatory and defensive function
D. are an important component of nucleic acids, as neutral components of nucleotides

383. Proteins consist of:

A. α-amino acids only
B. neutral amino acids such as serine, valine or glycine only
C. the neutral saccharide component, alkaline base and amino acid
D. amino acids having only one-COOH group and one-NH2 group in the molecule

384. Essential amino acids:

A. must be supplied in the diet
B. have one-NH_2 group bound to the β-carbon
C. are for example phenylalanine, tryptophan and lysine
D. contain the heterocycle in their molecules

386. Heterocycle is contained in the molecule of:

A. tyrosine
B. tryptophan
C. histidine
D. asparagine

389. We can say about amino acids:

A. they occur only in the food of animal origin
B. the organism can produce glucose from them

C. non-essential amino acids are formed by transamination of oxo acids in the human body

D. the product of matabolism of amino acids is urea in human body

390. We can say about tyrosine:

A. it is a hormone that is produced in the thyroid gland

B. its precursor may be phenylalanine in the organism

C. it is a hydroxy derivative of phenylalanine

D. it does not have an aromatic character

391. Which of following amino acids can be considered to be acidic?

A. glutaric acid

B. glutamic acid

C. aspartic acid

D. ascorbic acid

392. Which of amino acids can be considered to be basic?

A. lysine, proline, histidine

B. histamine, arginine, asparagine

C. lysine, histidine, arginine

D. amino acid that has more -NH_2 groups than –COOH groups in the molecule

393. Characteristic reactions of amino acids are:

A. dehydrating reactions

B. decarboxylation and deamination reactions

C. redox reactions

D. condensation and transamination reactions

394. Transamination:

A. is the reaction of preparing non-essential amino acids

B. takes place in the presence of a derivative of vitamin B_6 - transaminase (coenzyme)

C. is the reduction of oxogroup

D. is for example, the production of tryptophan

396. We can say about peptide bond:

A. it is a stable covalent bond

B. it has a planar structure

C. we can prove it by biuret reaction

D. it is very stable and only cleaves during denaturation

397. pI value:

A. is dissociation constant of the amino acid

B. for essential acids is equal to 7

C. is pH of the medium in which the amino acid is in the form of amfion (zwitterion)

D. is characteristic for each amino acid

398. The primary structure of proteins:

A. indicates the biological value of protein and determines higher protein structures (secondary, tertiary. . .)

B. is determined by amino acid sequence in the polynucleotide chain

C. is stabilized by hydrogen bonds between molecules of amino acids

D. is determined by the order of amino acids bound by peptide bonds

399. We can say about the geometric arrangement of polypeptides:

A. it is called α-helix, if hydrogen bonds are formed between the oxygen and hydrogen atoms of peptide bonds in a single polypeptide chain

B. amino acid residues are bound together by van der Waals forces within the helix

C. amino acid residues do not participate in the secondary structure, they are arranged into the outer space of helix

D. it is not destroyed by denaturation

400. We can say about proteins:

A. they are found in the blood of a healthy person

B. they are found in the urine of healthy person

C. important ones are only of plant origin

D. they play an important role as a part of nucleic acids

401. Histones:

A. are found in the nucleus of cells

B. are proteins that contain a higher ratio of basic amino acids

C. in the cell nucleus are bound to nucleic acids

D. have acidic character

402. Proteins are irreversibly denatured by:

A. strong acids

B. the solutions of alkali metals

C. the solution of lead chloride

D. transferases

403. Enzyme:

A. is the biocatalyst, which not only accelerates the reaction but also regulates it

B. likewise catalyst decreases the activation energy value

C. unlike catalyst must be supplied during the reaction

D. operates only by its active center, not by the entire surface as the catalyst

404. Effect-specificity of enzyme:

A. is related to the structure of the enzyme allosteric center

B. is related to coenzyme

C. is the ability of the enzyme to catalyze only one thermodynamically possible transformation of the substrate

D. does not allow cleavage of cellulose by α-amylase

405. The enzyme can be activated by:

A. the separation (removing) of low-molecular part of a peptide chain
B. the chemical modification such as phosphorylation
C. bonding of the alosteric activator to its active site
D. the activity of metallic cations such as Zn^{2+}, Mg^{2+} or Cd^{2+}

406. The enzyme can be activated by:

A. the presence of cations such as Zn^{2+} or Mg^{2+}
B. the separation of the part of enzyme active site
C. the bonding of alosteric activator to the enzyme active site
D. the formation of covalent bonds between an activator and an enzyme

407. Pepsin:

A. is synthesized as pepsinogen in an organism
B. its molecular weight decreases with its activation
C. is the catalyst of aminoacides cleavage
D. is the catalyst of polysaccharides cleavage

408. Inhibition:

A. can be reversible and irreversible
B. is competitive or uncompetitive
C. cannot be allosteric
D. can be only irreversible

409. Competitive inhibition:

A. can be reversible
B. can be removed by increasing of substrate concentration
C. can be removed by increasing of enzyme concentration
D. can be removed by increasing of enzyme or substrate concentration

410. Non-competitive inhibition:

A. can be reversible and irreversible
B. can be eliminated by increasing the substrate concentration
C. is for example the poisoning by some toxins
D. is the type of inhibition, in which the inhibitor may be bound to any reactive functional group of the enzyme, what interferes with the affinity of enzyme to the substrate

411. We can say about uncompetitive inhibition:

A. inhibitor is irreversibly bound to the enzyme active site
B. uncompetitive inhibition by heavy metals causes enzyme denaturation
C. inhibitor is bound only to the enzyme alosteric site
D. uncompetitive inhibition by light metals causes enzyme denaturation

412. We can say about enzyme inhibition:

A. the heavy metal poisoning results in the enzyme denaturation, but the metal cation is not bound to the enzyme active site

B. alosteric inhibitor is always bound to the enzyme active site

C. competitive inhibition always causes the denaturation of an enzyme

D. during the biochemical processes the product of one chemical reaction can act as inhibitor of the previous one

414. We can say about hydrolase:

A. it catalyses the dehydration of substrate

B. a coenzyme of hydrolase is FAD

C. it is, for example, lipase

D. it catalyses the cleaving of peptide bonds

415. Oxidoreductases:

A. they catalyse only the oxidation of substrate

B. they catalyse all redox processes

C. coenzymes of oxidoreductases are FAD, NAD^+

D. they enable the oxidation of aldehyde to ethanol

416. Isomerases catalyse:

A. isomers rearrangement

B. for example, the conversion of glucose-6-phosphate to fructose-6-phosphate

C. for example, the conversion of ribose to deoxyribose

D. besides isomerization reactions they also catalyse polymerization reactions

417. We can say about lyases and ligases:

A. ligases catalyse a synthesis of two substrates in the presence of ATP

B. ligases catalyse a synthesis of two substrates in the presence of NAD^+

C. lyases catalyse the nonhydrolytic cleavage of C-C bond

D. lyases and ligases can catalyse the same reaction types

418. Which of followings can be contained in the molecule of oxidoreductase coenzymes NAD, FAD?

A. pyridine

B. purine

C. vitamin PP

D. ribose

419. Nucleic acids:

A. are responsible for the organization and reproduction of living matter

B. are polypeptides

C. contain acidic, neutral and basic component

D. are biomacromolecule substances having peptides as their structural units

420. DNA and RNA differ in:

A. pentose; DNA contains deoxyribose and RNA contains ribose
B. their presence in cell nucleus
C. the content of nitrogenous bases
D. a structure

421. We can say about nucleotide structure:

A. it consists of H_3PO_4 bound to the purine or pyrimidine base by phosphoester bond
B. nitrogenous base is bound to the first carbon atom of pentose by N-gycosidic bond
C. pentose is bound to the phosphoric acid by phosphoester bond
D. acidic and basic part of nucleotide are bound together by an amide bond

422. Polynucleotide is produced:

A. by the condensation of nucleotides
B. by the polymerization of nucleotides
C. by the formation of 3', 5'-diphosphoester bonds between nucleotides
D. by the polyaddition of nucleosides

423. Nucleotides and nucleosides:

A. differ in the acidic component of their molecule
B. free nucleotides and nucleosides occur in cells and they have various functions
C. free nucleotides and nucleosides do not occur in cells
D. there are alkaline bases bound together by high-energy bond in their molecules, therefore they are energy transferring agents

424. We can say about high-energy chemical compounds:

A. they are, for example, ATP, GTP, NAD, FAD
B. there is high-energy bond formed in their molecules
C. during the hydrolytic cleavage of phosphoester bond, the energy is released
D. they are, for example, ATP, GTP, acetyl-CoA

425. We can say about the structure of DNA:

A. primary structure of DNA depends on the sequence of nucleotides (bound together by 3', 5'-diphosphoester bonds)
B. the disorder of the sequence of nucleotides causes genetic mutation
C. DNA contains 4 nucleotide types – adnenine, cytosine, guanine and uracil
D. DNA has primary, secondary, tertiary and quadruple structure like proteins do

426. Complementarity of nitrogenous bases:

A. depends on the presence of characteristic groups, where hydrogen bonds are formed between bases
B. means that there are always two hydrogen bonds formed between adenine and cytosine
C. means that there are three hydrogen bonds formed between gunanine and cytosine
D. means that we can replace a part of DNA sequence with part of mRNA sequence

427. Select the incorrect statement(s):

A. the complementarity of bases takes part in protein biosynthesis between codon and anticodon
B. codon and anticodon are bound together by an ester bond
C. in the DNA macromolecule, the ratio A:U is always 1:1
D. transcription is based on the complementarity of bases

428. The secondary structure of DNA:

A. is double α-helix
B. is based on the complementarity of purine and pyridine bases
C. is the result of hydrogen bonds formed between purine and pyrimidine bases of two polynucleotide chains
D. is the result of hydrogen bonds, van der Waals forces and disulfide bonds

429. We cannot find in DNA:

A. guanidine
B. guanine
C. ribose
D. phosphoric acid

430. Transfer RNA (tRNa. :

A. its secondary structure reminds "clover leaf "
B. during the transcription it transfers nucleotides to the place where messenger RNA is formed
C. at the longer end there is always the triplet CCA, where the amino acid is bound to
D. it contains the codon

431. Select the correct statement(s) about RNA:

A. there are codons in the molecules of mRNA
B. secondary structure of rRNA is double α-helix, and in the places where the complementarity of bases is broken, oval projections also known as "loops"are formed
C. rRNA is formed in ribosomes
D. rRNA molecule has double-strand form

433. Transcription:

A. is the translation of the nucleotide sequence into amino acid sequence
B. is the transcription of the genetic information from DNA to mRNA based on complementarity of bases
C. takes place in cell nucleus
D. takes place in cell cytoplasm

434. Ammino acyl-tRNA:

A. is formed by bonding of activated amino acid (at the longer end. to the last adenine nucleotide (on its third ribose carbon atom) by ester bond
B. is formed by bonding of the activated amino acid to anticodon
C. is formed by bonding of the amino acid to the phosphoric acid of the last nucleotide by amide bond

D. is formed by bonding the amino acid to the last nucleotide adenine of longer end by N-glycosidic bond

435. Translation:

A. is the translation of nucleotide sequence to the sequence of amino acids of the peptide chain
B. always starts on the “start codon” AUG
C. at the beginning of the translation, the methionyl-tRNA occurs on the ribosomal peptidyl transferase centre
D. there is the peptide bond formed between the initiator and “start codone”

436. “Start codon”:

A. is the initiation codon
B. defines the bonding of methionyl-tRNA to the mRNA
C. defines the bonding of methionyl-tRNA to the rRNA
D. is not complementary to any codon, it just provides the energy to the translation process

437. Genetical information of human cell is coded in:

A. histones
B. chromosomes
C. tRNA
D. DNA

438. Osmosis:

A. procures the water transfer in organism
B. does not depend on dissociation of substances dissolved
C. depends on the concentration of substances dissolved
D. it is not important for an organism

439. Osmosis:

A. is process in which the solvent particles pass trough semi-permeable membrane
B. is the opposite of diffusion
C. requires the presence of semi-permeable membrane
D. is process in which the specific particle dissolved in the solution pass through semi-permeable membrane

440. Which solution does have the highest osmotic efficiency by the identical concentration of chemical amount?

A. solution of ammonium sulphate
B. solution of potassium chloride
C. solution of glucose
D. solution of saccharose

441. Physiological solution:

A. is isotonic comparing to inner environment of cell
B. isolated hepatic cells do not change their volume in it
C. is isotonic comparing to saccharose solution with concentration 0.15 mol/l

D. is glucose solution

442. We can say about water solution of saccharose (c=0.2 mol/l); NaCl (c=0.1 mol/l); $AlCl_3$ (c=0.2 mol/l) at identical temperature:

A. saccharose and aluminium chloride solutions are isotonic

B. saccharose solution is hypertonic comparing to sodium chloride solution

C. saccharose solution is isotonic comparing to sodium chloride solution

D. aluminium chloride solution is hypertonic comparing to saccharose solution

443. Metabolic pathway:

A. is a set of biochemical reactions, that follow each other

B. is a set of reactions, where the product of one reaction is the starting material for the following reaction

C. is for example the neutralization reaction or complex reactions

D. is always reversible

444. Which of following reactions can be considered to be amphibolic reaction?

A. formation of glycogen

B. glycolysis

C. β-oxidation of fatty acids

D. transamination

445. The mechanism of redox processes is based on transfer of:

A. hydrogen atoms to the NAD^+ pyridine ring

B. hydrogen atoms to the NAD^+ purine ring

C. hydrogen atoms to the NAD^+ pyrimidine ring

D. hydrogen atoms to the NADP

446. Endergonic reactions:

A. take place only under anaerobic conditions

B. take place only at lower temperature

C. are anabolic metabolic pathways

D. obtain the energy from a cleavage of high-energy bonds

447. Krebs cycle:

A. takes place in mitochondria, where enzymes and transmitters of oxidoreductases occur

B. takes place in ribosomes

C. despite its catabolic effect, it belongs to amphibolic pathways

D. is used in the body as the main source of energy

449. What types of reactions do take place in the citric acid cycle?

A. phosphorylations

B. deaminations

C. dehydrogenations

D. decarboxylations

450. We can say about citric acid cycle:

A. it begins by the condensation of acetyl-CoA and oxaloacetic acid

B. the product of the condensation of acetyl-CoA and oxaloacetic acid is citric acid

C. the product of the hydrolysis of citric acid is 2-oxoglutaric acid

D. the product of the dehydrogenation and decarboxylation of 2-oxoglutaric acid is oxaloacetic acid

451. Citric acid cycle:

A. occurs in the cytoplasm

B. occurs in the mitochondria

C. is localized in ribosomes

D. occurs in the cell nucleus

453. Glycolysis:

A. occurs in the mitochondria

B. is localized in the cytoplasm

C. is localized in ribosomes

D. occurs also in cell nucleus

454. We can say about pyruvic acid:

A. the product of the pyruvic acid reduction under anaerobic conditions is lactic acid

B. the product of the decarboxylation of pyruvic acid under aerobic condition in living organism is acetaldehyde

C. the product of the decarboxylation and oxidation of pyruvic acid under aerobic conditions is acetyl-CoA, that enters citric acid cycle and other respiration processes

D. is produced by lactic acid reduction

455. What reactions of glycolysis process are irreversible?

A. the reaction of glucose with ATP, where glucose-6-phosphate is formed

B. the reaction of fructose with ATP, where fructose-1, 6-biphosphate is formed

C. the oxidation of lactic acid, where pyruvic acid is formed

D. the reaction of dihydroxyacetone phosphate, where glyceraldehyde 3-phosphate is formed

456. Lipids:

A. are produced also by saccharides conversion, when there is a excessive saccharide intake into the organism

B. the product of their cleavage by a lipase (enzyme) is glycerol and long chained fatty acids

C. they are cleaved into acetyl-CoA in the stomach

D. cannot be synthesized by the organism, and therefore they must be supplied in the diet

457. Lipids:

A. can be substituted by saccharides in the organism

B. they provide the environment suitable for water insoluble substances, that are dissolved here (in lipids), for example B vitamin group

C. are the important components of cell membranes

D. they protect vital organs of human body

458. What does occur in the molecule of lipid?

A. a carboxyl acid with 15 carbon atoms in a chain

B. a carboxyl acid with an even number of carbon atoms in a chain

C. branched carboxyl acid

D. for example, linoleic acid, stearic acid, arachidonic acid

459. Acylglycerol:

A. there is only fatty acid bound to tribasic alcohol by the peptide bond in its molecule

B. there is only fatty acid bound to tribasic alcohol by the ester bond in its molecule

C. there is also choline in its molecule

D. it does have the phosphoester bond formed in its molecule

460. Lipids rancidity (ageing):

A. is the oxidation of multiple bonds by air oxygen, at which the long chains of fatty acids are broken

B. is caused also by microorganisms in warm, moist environment

C. we can avoid the lipids rancidity by lipids dehydrogenation in the presence of catalyst

D. we can slow down the lipids rancidity by addition of A vitamin or β-carotene

461. We can say about triacylgycerols:

A. the product of the acidic hydrolysis of triacylglycerols is a soap

B. according to the alcohol content, they can be simple or mixed

C. according to the fatty acid content, they can be simple or mixed

D. the product of the alkaline hydrolysis of triacylglycerols is a soap

462. Acetyl-CoA cannot be used for synthesis of:

A. oleic acid

B. estradiol

C. heme

D. cholic acid

463. The end product of protein metabolism in human body is:

A. urea

B. uric acid

C. ammonia

D. diamide of carbonic acid

464. The end product of purine bases is:

A. iminourea

B. carbamic acid

C. uric acid

D. urea

465. We can say about vitamins:

A. essential vitamins for humans are not always essential for animals and microorganisms
B. they are an energy source for organism
C. according to the origin, they can be divided into 2 groups – phyto- and zoo-
D. according to the solubility, they can be divided into water-soluble and fat-soluble

466. Hypervitaminosis:

A. it does not cause the side effect, because vitamins are not cumulated in the organism
B. can have a toxic effect, if concerned fat-soluble vitamins
C. causes side effect, if concerned water-soluble vitamins
D. never have the side effect (adverse effect), because vitamins are just coenzymes and are almost not involved in biochemical processes

467. Hypovitaminosis:

A. is an actual vitamin deficiency
B. is an ineffective vitamin form
C. is an actual excess of a vitamin
D. is a long-term vitamin deficiency

468. Avitaminosis:

A. is chronic vitamin deficiency
B. can cause serious disease, sometimes death
C. occurs, when vitamin mass descend under 0.15% of total body mass
D. is just temporal vitamin deficiency

469. A vitamin:

A. is produced by symmetric cleavage of the β-carotene molecule in the organism
B. vitamin A deficiency causes rhachitis
C. hypovitaminosis causes night blindness
D. the overdose is toxic

470. What chemicals are antioxidants?

A. vitamin A, E, C and selenium
B. Zn, Mg and C vitamin
C. Na, K and C vitamin
D. only C vitamin

471. We can say about vitamins D and E:

A. they have a steroid structure
B. tocopherol acts as an antioxidant
C. vitamin D supports the absorption of calcium and phosphorus from food
D. vitamin D supports the release of calcium and phosphorus from the bones and teeth

472. B_1 vitamin:

A. regulates an oxidation of nutrients, and energy procurement

B. is a part of FAD

C. provides an energy for central nervous system

D. is thermostable

473. B_2 vitamin:

A. is pyridine derivative

B. is a part of coenzyme of aminotransferases

C. occurs only in the plant material

D. is converted into nicotinamide in the organism

474. Anemia can be caused by the:

A. vitamin F deficiency

B. niacin deficiency

C. cobalamin deficiency

D. folic acid deficiency

475. What chemical gives a positive biuret reaction?

A. vasopressin

B. insulin

C. calcitonin

D. thyroxine

476. How many molecules of sodium hydroxide are there in 25g?

A. $6.022 . 10^{26}$

B. $3.76 . 10^{23}$

C. $1.03 . 10^{-23}$

D. $376 . 10^{21}$

477. Calculate the weight of $5 . 10^9$ iron atoms:

A. $46.49 . 10^{-14}$ g

B. $67.44 . 10^{-14}$ g

C. $148 . 10^{-10}$ g

D. $4.649 . 10^{-13}$ g

478. Lysine has Mr = 220. How much nitrogen is there in 220 mg of lysine?

A. 14 mg

B. 28 mg

C. 0. 028 g

D. there is no nitrogen in the lysine molecule

479. Purine has Mr = 120. How much nitrogen is there in 240 μg of purine?

A. 112 micrograms

B. 56 . micrograms

C. 28 micrograms

D. 224 micrograms

481. What is the weight of 22.4 ml of nitrogen (Ar = 14) under normal conditions?

A. 14 mg

B. 140 mg

C. 28 mg

D. 280 mg

482. What is the weight of 11.2 ml of fluorine?

A. 9 g

B. 9 mg

C. 19 mg

D. 18 g

484. How much heat is required to produce 100 g of burnt lime (ΔH=178 kJ/mol)?

A. 317.86 kJ/mol

B. 17.8 MJ/mol

C. 317.86 MJ/mol

D. 17.8 kJ/mol

485. 50 l of ethanol burning releases 3. 092 MJ. Calculate the heat of the reaction:

A. 2862. 96 kJ

B. 1386. 54 kJ

C. 1386. 54 kJ/mol

D. 2862. 96 kJ/mol

486. The reaction of 3 mol of sulphuric acid and 10 mol of sodium hydroxide gives rise to:

A. 3 mol of sodium sulphate

B. 6 mol of sodium sulphate

C. 10 mol of sodium sulphate

D. 6 mol of $NaSO_4$

487. If 44. 8 ml of methane reacts with oxygen, the volume of carbon dioxide (product) is:

A. 1 mmol

B. 2 mmol

C. 3 mmol

D. 4 mmol

488. If 5 mmol of propane reacts with oxygen, the volume of carbon dioxide (product) is:

A. 5 mmol

B. 10 mmol

C. 15 mmol

D. 30 mmol

489. How many grams of glucose do you need to make 350 ml of solution with c=0.25 mol/l. ? M(glucose)=180.16 g/mol:

A. 15.77 g

B. 128.70 g

C. 0.128 g

D. 157.64 g

490. How many grams or millilitres of nitric acid (w=68%; ρ=1.4 g/cm^3) do you need to make 500 ml of solution with c=0.2 mol/l. ? Mr(HNO_3)=63:

A. 6.3 g

B. 9.26 g

C. 6.61 ml

D. 4.5 ml

491. How much water do you need to add to the 150 g of 35% sodium hydroxide solution to prepare 12% solution?

A. 106.25 g

B. 587.5 g

C. 287.5 g

D. 300 g

492. If 160 g of water vaporizes from 800 g of 8% solution of KCl, what will be the final concentration of the solution?

A. 10%

B. 16%

C. 8%

D. 0.1

493. How much of NaOH do you need to make 25 ml of 0.001 mol/dm^3 solution?

A. 25 μmol

B. 1 mg

C. 0. 1 g

D. 100 mg

494. If 320 g of water vaporizes from 850 g of calcium chloride solution (w=20%), and simultaneously 50 g of CaCl2 precipitates, what will be the final concentration of the solution?

A. 30%

B. 25%

C. 35.4%

D. 22.6%

495. How much oxygen and air do you need to burn 7 l of acethylene?

A. 25 g; 17.5 l of oxygen

B. 10 g; 7 l of oxygen

C. 47.62 g; 33.33 l of air

D. 119 g; 83.33 l of air

496. Iron is produced by the reduction of iron oxide by carbon. How much iron oxide and iron ore do you need to make 5t of iron, if there is 23% Fe_2O_3 in the iron ore?

A. 7.136 t of Fe_2O_3

B. 31 t of iron ore

C. 14.3 t of Fe_2O_3

D. 62 t of iron ore

497. In the equilibrium state of the reaction of $2N_2 + 3O_2 \leftrightarrow 2N_2O_3$ the concentrations 2.3 mol/dm^3 of nitrogen, 1.05 mol/dm^3 of oxygen and 3.42 mol/dm^3 of dinitrogen trioxide were detected. Calculate the equilibrium constant? What were the initial concentrations of oxygen and nitrogen?

A. $[N_2]$=5.73 mol/dm^3; $[O_2]$=6.18 mol/dm^3

B. $[N_2]$=4.01 mol/dm^3; $[O_2]$=2.29 mol/dm^3

C. K=0.524

D. K=1.909

498. What will be the osmotic pressure of aluminium acetate at the temperature 25° C, if in 500 ml of its solution there is 5 g of the substance? (R=8. 32 J/K.mol):

A. 0.479 kPa

B. 479.02 kPa

C. 239.51 kPa

D. 40.16 kPa