1. Estimation of temperature of phase transition at different pressures is of great practical importance for modern pharmaceutical industry and can be done by applying:

a. Clapeyron-Clausius equation
b. Gibbs phase rule
c. Konovalov law
d. Mendeleev-Clapeyron equation
e. Troutons rule

2. Particles of dispersed phase of an emulsion are deformed and look as polyhedrons. What emulsion is it?

a. Oil-in water
b. Water-in-oil
c. Concentrated
d. Diluted
e. High-concentrated

3. Solution applied as isotonic solution should have the following osmotic pressure:

a. 700 - 800 kPa
b. 300 - 400 kPa
c. 900 - 1000 kPa
d. 500 - 600 kPa
e. 200 - 300 kPa

4. Rates of chemical reactions of the same order are compared by:

a. Change in the concentration of the reaction products
b. Constant of chemical reaction rate
c. Endpoint of a reaction
d. Chemical reaction rate
e. Change in the reactants concentration

5. According to Schultze-Hardy rule coagulating action of coagulant ion is affected by:

a. Polarizability
b. Ion charge
c. Adsorbability
d. Ion size
e. Hydratability

6. Solutions of some electrolytes are used as medications. What is the maximum value of the isotonic coefficient for MgSO4 solution?

a. 4
b. 5
c. 7
d. 2
e. 3

7. Heparin is the direct-acting anticoagulant that reduces blood coagulation and prevents thrombosis. Its action is based upon the following phenomenon:

a. Protective power of colloids
b. Thixotropy
c. Dialysis
d. Micelle formation
e. Syneresis

8. The labels of some medications have an inscription: Shake before use! This warning is caused by:

a. Insolubility of disperse systems
b. None of the above
c. Coagulation
d. Solubility of disperse systems

e. Sedimentation

9. Colloidal protection is used while manufacturing drug preparations. Name the preparation of colloidal silver protected by proteins:
a. Festal
b. Argentum
c. Collagen
d. Protargol
e. Enzymtal

10. In the pharmaceutical production processes of drug synthesis take place under different conditions. Entropy stays unchanged in the following process:
a. Isothermal
b. Isobaric
c. Polytropic
d. Adiabatic
e. Isochoric

11. Electrolyte solutions are medicinal preparations. What is the maximum value of isotonic coefficient for $MgSO_4$ solution?
a. 2
b. 3
c. 7
d. 5
e. 4

12. When computing quantities of adjuvant substances required to make liquid drug forms isotonic, the values of isotonic quotients are used. What is the quotient for zinc sulphate if known that it dissociates completely in an aqueous solution?
a. 3
b. 4
c. 0
d. 1
e. 2

13. Disperse systems are widely used in the pharmaceutical practice. The evidence of colloidal state is the passing of light through the system. In this case the beam of light:
a. Penetrates into the particle
b. Is diffused in form of light cone
c. Is adsorbed
d. Is reflected
e. Is refracted

14. What expression corresponds with the state of chemical equilibrium under constant pressure and temperature?
a. ?U=0
b. ?S=0
c. ?F=0
d. ?H=0
e. ?G=0

15. Labels of some drugs have the following inscription: "shake before use!". This warning is induced by:
a. Solubility of disperse systems
b. Coagulation
c. Sedimentation
d. Insolubility of disperse systems
e. -

16. Vant Hoffs rule is used for determining the shelf life of drugs. The temperature coefficient of the rate of most chemical reactions lies within the following range:

a. 1-3

b. 2-3

c. 2-4

d. 3-4

e. 1-5

17. Enzymes (biological catalysts) are used as pharmacologic preparations. What is the mechanism of enzyme action in the biochemical reactions?

a. They increase the energy of reaction activation

b. They change the constant of the reaction rate

c. They change the reaction order

d. They reduce the energy of reaction activation

e. They inhibit the reaction process

18. Pharmacological effect of enterosgel (hydrogel of methylosilicic acid) is based upon the following phenomenon that is typical for disperse systems:

a. Adsorption

b. Cohesion

c. Desorption

d. Moistening

e. Adhesion

19. Thermodynamic calculations allow us to determine the possibility and direction of spontaneous processes. In an isolated system the change of the following thermodynamic function is used for this purpose:

a. Entropy

b. Helmholtz energy

c. Enthalpy

d. Internal energy

e. Gibbs energy

20. Kinetic methods are used for determination of drug stability. What is the order of reaction if its rate constant equals to c-1?

a. Second

b. Third

c. Zero

d. Fractional

e. First

21. Yield of medical products can be enhanced by proper choice of temperature conditions during their production. What equation determines dependence of equilibrium constant from the temperature under constant pressure?

a. Gibbs-Helmholtz equation

b. Isobaric lines of chemical reaction

c. Kirchhoff equation

d. Isotherms of chemical reaction

e. Isochores of chemical reaction

22. An injured person exhibits the following signs at the site of trauma: skin redness, throbbing small arteries, elevated local temperature, increased tissue turgor. What local blood circulation disorder are these presentations typical for?

a. Embolism

b. Ischemia

c. Venous hyperemia

d. Thrombosis

e. Arterial hyperemia

23. When producing some liquid drug forms, it is necessary to take into account their osmotic pressure. The highest osmotic pressure is characteristic for the 0,1 M solution of the following substance:

a. KNO3
b. AlCl3
c. Saccharose
d. Glucose
e. CaCl2

24. Which of the following solutions of the same molality has the highest boiling temperature?

a. Saccharose solution
b. K3[Fe(CN)6] solution
c. Al2(SO4)3 solution
d. CaCl2 solution
e. NaCl solution

25. The rate of a chemical reaction does not depend on the concentration of the reactants. Specify the order of such reaction:

a. Second
b. First
c. Zeroth
d. Third
e. Fraction

26. Potentiometric method of pH determination is regarded as the most universal and enters into the National Pharmacopeia of Ukraine. Which electrode is used as a reference electrode?

a. Hydrogen
b. Zinc
c. Quinhydrone
d. Glass
e. Saturated calomel

27. Most technological processes in pharmaceutics run in heterogenous systems. How many phases has an eutectic composition at the eutectic temperature in the two-component system?

a. 1
b. 3
c. 5
d. 2
e. 4

28. In the technology of medicinal preparation temperature and pressure are sustained constant very often. What is this process called?

a. Isochoric-isothermal
b. Isochoric
c. Isothermal
d. Isobaric-isothermal
e. Isobaric

29. Technology of pharmaceutical preparations requires sometimes that some processes take place at low temperatures. In which solution will the crystallization be the first to begin provided that solutions have equal molality?

a. KBr
b. C6H12O6
c. CaCl2
d. NaCl
e. Al2(SO4)3

30. Aqueous-alcocholic mixtures are widely used in the medical and pharmaceutical practice. They

relate to the azeotropes. What is the peculiarity of azeotropic mixtures?
a. They produce a vapor of the same composition as the mixture
b. They interact with each other
c. They mix together at a critical temperature
d. They dont interact with each other
e. They dont mix together

31. Micelle solutions of surfactants are applied in pharmaceutical production as stabilizers and solubilizers. What solution of colloidal surfactants will have the greatest value of critical concentration of micelle formation?
a. $C_{16}H_{33}SO_3Na$
b. $C_{14}H_{29}SO_3Na$
c. $C_9H_{19}SO_3Na$
d. $C_{12}H_{25}SO_3Na$
e. $C_{10}H_{21}SO_3Na$

32. In the pharmaceutical industry, the micelle-forming solutions of surface-active substances are used for production of water-soluble preparations out of water-insoluble substances, for example vitamins A and E. The critical concentration of micelle formation has the lowest value in the solutions of the following substances:
a. $C_{12}H_{25}COONa$
b. $C_{15}H_{31}COONa$
c. $C_{11}H_{23}COONa$
d. $C_{17}H_{35}COONa$
e. $C_{13}H_{27}COONa$

33. Pharmaceutic preparation collargol is a colloid silver solution containing a high-molecular compound. What is the function of this compound?
a. It increases dispersion degree
b. It enhances aggregative stability
c. It facilitates sedimentation
d. It induces coagulation
e. It reduces aggregative stability

34. Drugs are commonly analyzed by means of potentiometric pH measurement. Which of the electrodes can be used for measuring the solution pH?
a. Glass
b. Zinc
c. Chlorine-silver
d. Calomel
e. Standard hydrogen

35. In terms of water-air interface, the following substance acts as a surface-active substance:
a. Urea
b. -
c. HCl
d. NaOH
e. Valeric acid

36. An electrode composed by scheme Au3+ | Au relates to the following type:
a. Oxidation-reduction electrodes
b. Ion-selective electrodes
c. II type electrodes
d. III type electrodes
e. I type electrodes

37. The particles of dispersed phase of a ready drug emulsion are sized 10-6 m. The given drug form relates to the following type of disperse systems (according to the dispersion degree classification):

a. Heterogeneous system
b. Colloidal disperse system
c. Ultramicroheterogeneous system
d. Microheterogeneous system
e. Coarse-dispersion system

38. Which of the following substances relates to colloidal surface-active substances?
a. Potassium oleate
b. Sodium chloride
c. Gelatin
d. Polyethylene
e. Iodine

39. Thresholds of coagulation of a drug sol by electrolytes $MgSO_4$, $NaCl$, $Al(NO_3)_3$ are equal to 0,81; 51,0; 0,095 millimole/l correspondingly. Which electrolyte ion has the maximal coagulating effect?
a. Cl^-
b. SO_4^{2-}
c. Mg^{2+}
d. Na^+
e. Al^{3+}

40. Refinement of glycerin that is a component of many drug formulations can be done by means of activated carbon. What phenomenon underlies this process?
a. Capillary condensation
b. Adsorption
c. Adhesion
d. Cohesion
e. Wetting

41. Under certain conditions high-molecular substances make gellies that are widely used in drug production. What process takes place during jelly ageing?
a. Syneresis
b. Swelling
c. Diffusion
d. Solvatation
e. Thixotropy

42. Iodoform when stored decomposes spontaneously into free iodine. Which thermochemical function is a criterion for this process direction when V and T are constant?
a. Intrinsic energy U
b. Helmholtz energy F
c. Enthalpy H
d. Entropy S
e. Gibbs energy G

43. Aqueous solution of $CaCl_2$ with mass concentration 10% is used for intravenous injections. What is the maximum value of isotonic coefficient of $CaCl_2$ in an aqueous solution?
a. 3
b. 2
c. 1
d. 5
e. 4

44. Cryoscopic constants of water, benzene, chloroform, acetic acid and camphor equal to 1,86; 5,12; 4,9; 3,9; 40,0 respectively. Which of these solvents should be selected for the most accurate determination of the molar mass of a drug substance (nonelectrolyte) by the cryoscopic method?
a. Water
b. Camphor

c. Acetic acid
d. Chloroform
e. Benzene

45. Employees of a physicochemical laboratory prepared water solutions of urea, glucose, sodium sulfate, aluminium sulfate and sodium benzoate all of which had the same molar concentration. What solution has the highest osmotic pressure under 298oK?
a. Sodium benzoate
b. Sodium sulfate
c. Urea
d. Glucose
e. Aluminium sulfate

46. Limited swelling of gelatine comes to unlimited one (solution formation) under the following conditions:
a. Heating
b. In presence of SO42– ions
c. If pH medium matches with isoelectric point
d. In presence of Cl– ions
e. Cooling

47. A patient with a diagnosis of drug poisoning has been admitted to the resuscitation department. The patient is in grave condition. Respiration is rapid, superficial, with periods of apnea (Biots respiration). What was the main cause of the development of periodic breathing in the patient?
a. Diminished chest mobility
b. Pulmonary dysfunction
c. Impaired function of spinal cord motoneurons
d. Impaired function of the neuromuscular system
e. Inhibition of the respiratory center function

48. A patient was found to have a tumor of the pancreatic head, which is accompanied by the impaired patency of the common bile duct. Blood test will reveal an increase in the following substance level:
a. Hemoglobin
b. Urea
c. Bilirubin
d. Insulin
e. Adrenaline

49. On the 2nd day after developing acute inflammation of the knee joint, the patient exhibits the joint enlargement, swelling of the skin. At what stage of inflammation are these signs typically observed?
a. Regeneration
b. Sclerosis
c. Alteration
d. Proliferation
e. Exudation

50. Positive sol of iron hydroxide was generated by method of hydrolysis. What coagulating ion will have the lowest coagulation threshold?
a. Phosphate
b. Chloride
c. Bromide
d. Nitrate
e. Sulfate

51. In pharmaceutical synthesis both simple and complex reactions are applied. Specify the order of the simple reaction of type 2A+B=3D:

a. 1
b. 2
c. 3
d. Zero
e. 0,5

52. Pharmaceutical practice widely applies isotonic solution of sodium chloride. How much sodium chloride is to be takenin order to prepare 100 g of the isotonic solution?

a. 4,5 g
b. 8,5 g
c. 0,85 g
d. 0,45 g
e. 5,0 g

53. Some drugs are colloid solutions. Colloidal disperse systems are the systems whose particles are sized within the range of:

a. 10-9 m
b. 10-9 - 10-4 m
c. 10-7 - 10-4 m
d. 10-4 m
e. 10-9 - 10-7 m

54. During study of pharmaceutical substances pH rate can be determined by method of potentiometry. What electrode can be used as an indicator during measuring of pH solution?

a. Silver-chloride
b. Zinc
c. Copper
d. Glass
e. Calomel

55. Drug production commonly involves the processes of adsorption and ion exchange. What ion is selectively adsorbed from the aqueous solution based on silver chloride crystal?

a. Cu2+
b. OH–
c. H+
d. NO3–
e. Ag+

56. Osmotic pressure is an important characteristic of biologic fluids. Osmotic pressure variates with time in the following solution:

a. Sodium chloride
b. Magnesium sulphate
c. Glucose
d. Calcium sulphate
e. Silver chloride sol

57. As a result of an accident (snakebite) a male patient has the following blood values: Hb - 80 g/l, RBC - 3,0*10^12/l; WBC - 5,5*10^9/l. What type of anemia is observed in this case?

a. Posthemorrhagic
b. Folic acid-deficiency
c. Hemolytic
d. Aplastic
e. Iron-deficiency

58. Pharmaceutical practice involves use of microheterogeneous systems with liquid disperse medium and solid disperse phase. Such drug form is:

a. Powder
b. Foam

c. Suspension
d. Aerosol
e. Emulsion

59. What is the number of degrees of freedom for the salol-camphor system, provided that both components crystallize from the melt simultaneously?
a. 1
b. 3
c. - 1
d. Zero
e. 2

60. The method of "accelerated drug ageing" used for determination of drug shelf life is based upon:
a. Raoult law
b. Vant Hoffs rule
c. Plancks postulate
d. Fajans rule
e. Ostwald law

61. All the undermentioned water solutions of pharmaceutical substances have molal concentration of 0,1 mole/kg. Which solution has the maximal boiling-point elevation?
a. Ascorbic acid
b. Sodium acetate
c. Nicotinic acid
d. Glucose
e. Ethanol

62. Temperature quotient of the reaction velocity is equal to 2. In how many times does the reaction velocity change, if the temperature changes by 40oC?
a. In 24 times
b. In 16 times
c. In 4 times
d. In 8 times
e. In 32 times

63. For the technology of drug production the pressure, temperature and concentration are of great importance. What process is accelerated in case of temperature decrease?
a. Adiabatic
b. Endothermic
c. Exothermic
d. Isochoric
e. Isobaric

64. Surface-active substances are widely used in the drug production. Specify a surface-active substance present at the aqueous solution-air interface:
a. Butyric acid
b. NaCl
c. HCl
d. NaOH
e. Saccharose

65. What equation can be applied for calculation of surface tension of propionic acid water solution?
a. Rayleigh equation
b. Shishkovskys
c. Gibbs equation
d. Freundlichs equation
e. Helmholtz-Smoluchowski

66. Sol Al(OH)3 was derived by processing a freshly made Al(OH)3 precipitate with a small amount of

HCl solution. Sol production bases upon the following phenomenon:

a. Chemical condensation
b. Mechanic dispersing
c. Physical condensation
d. Chemical peptization
e. Rinsing with a solvent

67. Systems relate to colloid-disperse ones if size of their particles is within the following range:

a. >< 10-9 m
b. 10-9 -- 10-4 m
c. 10-7 -- 10-4 m
d. > 10-4 m
e. 10-9 -- 10-7 m

68. In pharmaceutical technology an important part is played by pressure, temperature, concentration. The reaction yield can be increased by lowering the temperature of the following process:

a. Exothermic
b. Isochoric
c. Adiabatic
d. Isobaric
e. Endothermic

69. Sol is one of drug forms. What happens if sols are fused with oppositely charged granules?

a. Thixotropy
b. Contraction
c. Lyophilization
d. Mutual coagulation
e. Sedimentation

70. What is the osmotic pressure of medicinal solutions used as blood isotonics?

a. 740 - 780 kPa
b. 900 - 960 kPa
c. 690 - 720 kPa
d. 600 - 670 kPa
e. 420 - 448 kPa

71. Drugs in form of colloidal-and-disperse systems are widely spread in the pharmaceutical practice. What method of sol production is based upon the phenomenon of physical condensation?

a. Double exchange
b. Solvent substitution
c. Oxidation
d. Reduction
e. Hydrolysis

72. Under what conditions the limited swelling of gelatine turns into the unlimited one?

a. Heating
b. In presence of PO43- ions
c. In presence of H+ ions whose concentration is equal to their concentration in the isoelectric point
d. In presence of Cl- ions
e. Cooling

73. The best swelling of gelatine will be observed in the following solvent:

a. Benzol
b. Chloroform
c. Acetone
d. Water
e. Ethyl alcohol

74. Isoelectric point of protein equals 8,3. Electrophoretic mobility of protein macromolecule will be equal zero if pH value is:

a. 11,5
b. 7,0
c. 8,3
d. 2,3
e. 4,7

75. The second Konovalovs law is applied to azeotropic solutions that have extreme points on phase diagrams and are called:

a. Azeotropic mixtures
b. Miscible in all proportions liquids
c. Mutually insoluble liquids
d. Partially miscible liquids
e. Ideal solutions

76. A 22-year-old male was stung by bees, the affected region became hyperemic and edematous. What is the leading mechanism of edema development in this patient?

a. Reduced oncotic pressure of blood
b. Increased permeability of the capillaries
c. Increased oncotic pressure of tissue fluid
d. Decreased hydrostatic blood pressure in the capillaries
e. Impaired lymphatic efflux

77. Skin diseases can be treated with pastes. What class of disperse systems can the pastes be related to?

a. Emulsions
b. Foams
c. Aerosols
d. Suspensions
e. Powders

78. A biological system (living organism) exchanges material and energy with the environment. What system does it relate to?

a. Open, heterogenous
b. Closed, homogenous
c. Open, homogenous
d. Closed, heterogenous
e. Isolated, heterogenous

79. Glass electrode is commonly used for pH measurement in the biologic media, fluid drug forms etc. What type does the glass electrode relate to?

a. II type electrode
b. Gas electrode
c. I type electrode
d. Reduction-oxidation electrode
e. Ion selective electrode

80. Specify the number of degrees of freedom for intersection of the liquidus line with ordinate axis of the equilibrium diagram of a two-component system:

a. $C = 1$
b. $C = 2$
c. $C = 0$
d. $C = -1$
e. $C = 3$

81. What thermodynamic value is a criterion of direction of spontaneous processes under conditions of constant volume and temperature?

a. Chemical potential
b. Enthalpy
c. Entropy
d. Gibbs energy
e. Helmholtz energy

82. What data is required to determine the activation energy?

a. Reaction order
b. Constants of reaction rate at two temperatures
c. Energy change of the system
d. Thermal energy of the reaction
e. Internal energy of the system

83. According to the Paneth-Fajans rule, the ion preferably adsorbed from a solution on the surface of a solid crystalline adsorbent is the ion, which:

a. Is included in the crystal lattice of the adsorbent
b. Does not form a sparingly soluble compound with one of the lattice ions
c. Forms a sparingly soluble compound with one of the lattice ions
d. Forms an easily soluble compound with one of the lattice ions
e. Is not included in the crystal lattice of the adsorbent

84. Name the process characterized by a chemical interaction between an adsorbate and an adsorbent:

a. Chemical adsorption
b. Absorption
c. Sedimentation
d. Desorption
e. Solvation

85. Stability of concentrated emulsions can be increased by adding surface-action substances and high-molecular compounds that are:

a. Activators
b. Solvents
c. Absorbents
d. Emulsifiers
e. Catalysts

86. Which of the following solutions with the same molar concentration has the maximum osmotic pressure?

a. Sodium chloride
b. Glucose
c. Aluminum nitrate
d. Magnesium sulfate
e. Potassium iodide

87. If the amount of high-molecular substance added to the sol is very small, it may not increase but decrease its stability. This phenomenon is called:

a. Mutual coagulation
b. Solubilization
c. Sensibilization
d. Colloidal protection
e. Sol habituation

88. Which of the following adsorbents is the most effective for adsorption of a substance from the aqueous solution?

a. Activated carbon
b. Quartz
c. Gypsum

d. Bolus alba
e. Silica gel

89. Specify the indicator of the protective properties of high-molecular compounds of body that promote the keeping of calcium, phosphate and carbonate in blood plasma:
a. Hydrophilic-lipophilic balance
b. Volume of sol coagulated by 1 mol of the electrolyte substance
c. Coagulation threshold
d. Critical micelle concentration
e. Protective value

90. Emulsions are classified according to the volume concentration of dispersed phase. An emulsion with the concentration at the rate of 0,1-74,0% vol. relates to the following group of emulsions:
a. Concentrated
b. Highly concentrated
c. Reversible
d. Direct
e. Diluted

91. According to the Rayleigh equation, the intensity of scattered light is inversely proportional to the wavelength of:
a. Incident light (fourth power)
b. Incident light (fifth power)
c. Incident light
d. Incident light (third power)
e. Incident light (second power)

92. The technology of drug production widely uses the phenomena of absorption and ion exchange. Which of the ions will be selectively adsorbed on the surface of a silver chloride crystal from an aqueous solution?
a. Ag^+
b. NO_3^-
c. OH^-
d. H^+
e. Cu^{2+}

93. Half-life (half-reaction) is inversely proportional to the initial concentration for the reactions of:
a. Fraction order
b. First order
c. Second order
d. Third order
e. Zeroth order

94. Estimation of temperature of phase transition at different pressures is of great practical importance for modern pharmaceutical industry and can be done by applying:
a. Konovalov law
b. Clapeyron-Clausius equation
c. Gibbs' phase rule
d. Trouton's rule
e. Mendeleev-Clapeyron equation

95. Particles of dispersed phase of an emulsion are deformed and look as polyhedrons. What emulsion is it?
a. Diluted
b. Concentrated
c. High-concentrated
d. Oil-in water
e. Water-in-oil

96. Solution applied as isotonic solution should have the following osmotic pressure:

a. 500 - 600 kPa

b. 900 - 1000 kPa

c. 200 - 300 kPa

d. 300 - 400 kPa

e. 700 - 800 kPa

97. Rates of chemical reactions of the same order are compared by:

a. Constant of chemical reaction rate

b. Endpoint of a reaction

c. Change in the concentration of the reaction products

d. Change in the reactants concentration

e. Chemical reaction rate

98. Solutions of some electrolytes are used as medications. What is the maximum value of the isotonic coefficient for MgSO4 solution?

a. 3

b. 4

c. 2

d. 5

e. 7

99. Heparin is the direct-acting anticoagulant that reduces blood coagulation and prevents thrombosis. Its action is based upon the following phenomenon:

a. Micelle formation

b. Dialysis

c. Syneresis

d. Thixotropy

e. Protective power of colloids

100. Colloidal protection is used while manufacturing drug preparations. Name the preparation of colloidal silver protected by proteins:

a. Argentum

b. Collagen

c. Festal

d. Enzymtal

e. Protargol

101. When computing quantities of adjuvant substances required to make liquid drug forms isotonic, the values of isotonic quotients are used. What is the quotient for zinc sulphate if known that it dissociates completely in an aqueous solution?

a. 0

b. 3

c. 4

d. 2

e. 1

102. Disperse systems are widely used in the pharmaceutical practice. The evidence of colloidal state is the passing of light through the system. In this case the beam of light:

a. Is refracted

b. Penetrates into the particle

c. Is reflected

d. Is adsorbed

e. Is diffused in form of light cone

103. What expression corresponds with the state of chemical equilibrium under constant pressure and temperature?

a. ?H=0

b. ?F=0

c. ?G=0

d. ?U=0

e. ?S=0

104. Labels of some drugs have the following inscription: "shake before use!". This warning is induced by:

a. -

b. Sedimentation

c. Solubility of disperse systems

d. Coagulation

e. Insolubility of disperse systems

105. Van't Hoff's rule is used for determining the shelf life of drugs. The temperature coefficient of the rate of most chemical reactions lies within the following range:

a. 2-4

b. 1-3

c. 1-5

d. 3-4

e. 2-3

106. Pharmacological effect of enterosgel (hydrogel of methylosilicic acid) is based upon the following phenomenon that is typical for disperse systems:

a. Adhesion

b. Moistening

c. Desorption

d. Adsorption

e. Cohesion

107. Thermodynamic calculations allow us to determine the possibility and direction of spontaneous processes. In an isolated system the change of the following thermodynamic function is used for this purpose:

a. Enthalpy

b. Entropy

c. Helmholtz energy

d. Gibbs energy

e. Internal energy

108. Kinetic methods are used for determination of drug stability. What is the order of reaction if its rate constant equals to c-1?

a. Third

b. First

c. Fractional

d. Zero

e. Second

109. Yield of medical products can be enhanced by proper choice of temperature conditions during their production. What equation determines dependence of equilibrium constant from the temperature under constant pressure?

a. Isotherms of chemical reaction

b. Isochores of chemical reaction

c. Gibbs-Helmholtz equation

d. Isobaric lines of chemical reaction

e. Kirchhoff equation

110. An injured person exhibits the following signs at the site of trauma: skin redness, throbbing small arteries, elevated local temperature, increased tissue turgor. What local blood circulation disorder are these presentations typical for?

a. Ischemia
b. Arterial hyperemia
c. Thrombosis
d. Venous hyperemia
e. Embolism

111. When producing some liquid drug forms, it is necessary to take into account their osmotic pressure. The highest osmotic pressure is characteristic for the 0,1 M solution of the following substance:
a. Glucose
b. CaCl2
c. KNO3
d. AlCl3
e. Saccharose

112. Which of the following solutions of the same molality has the highest boiling temperature?
a. CaCl2 solution
b. NaCl solution
c. K3[Fe(CN)6] solution
d. Saccharose solution
e. Al2(SO4)3 solution

113. The rate of a chemical reaction does not depend on the concentration of the reactants. Specify the order of such reaction:
a. Zeroth
b. Second
c. Fraction
d. Third
e. First

114. Most technological processes in pharmaceutics run in heterogenous systems. How many phases has an eutectic composition at the eutectic temperature in the two-component system?
a. 3
b. 5
c. 1
d. 4
e. 2

115. In the technology of medicinal preparation temperature and pressure are sustained constant very often. What is this process called?
a. Isochoric
b. Isothermal
c. Isochoric-isothermal
d. Isobaric
e. Isobaric-isothermal

116. Aqueous-alcocholic mixtures are widely used in the medical and pharmaceutical practice. They relate to the azeotropes. What is the peculiarity of azeotropic mixtures?
a. They mix together at a critical temperature
b. They produce a vapor of the same composition as the mixture
c. They interact with each other
d. They don't mix together
e. They don't interact with each other

117. Micelle solutions of surfactants are applied in pharmaceutical production as stabilizers and solubilizers. What solution of colloidal surfactants will have the greatest value of critical concentration of micelle formation?
a. C14H29SO3Na

b. C12H25SO3Na
c. C10H21SO3Na
d. C9H19SO3Na
e. C16H33SO3Na

118. In the pharmaceutical industry, the micelle-forming solutions of surface-active substances are used for production of water-soluble preparations out of water-insoluble substances, for example vitamins A and E. The critical concentration of micelle formation has the lowest value in the solutions of the following substances:
a. C11H23COONa
b. C17H35COONa
c. C13H27COONa
d. C12H25COONa
e. C15H31COONa

119. Pharmaceutic preparation collargol is a colloid silver solution containing a high-molecular compound. What is the function of this compound?
a. It induces coagulation
b. It reduces aggregative stability
c. It increases dispersion degree
d. It enhances aggregative stability
e. It facilitates sedimentation

120. In terms of water-air interface, the following substance acts as a surface-active substance:
a. NaOH
b. HCl
c. Valeric acid
d. Urea
e. -

121. The particles of dispersed phase of a ready drug emulsion are sized 10-6 m. The given drug form relates to the following type of disperse systems (according to the dispersion degree classification):
a. Coarse-dispersion system
b. Heterogeneous system
c. Microheterogeneous system
d. Colloidal disperse system
e. Ultramicroheterogeneous system

122. Which of the following substances relates to colloidal surface-active substances?
a. Polyethylene
b. Gelatin
c. Iodine
d. Sodium chloride
e. Potassium oleate

123. Thresholds of coagulation of a drug sol by electrolytes MgSO4, NaCl, Al(NO3)3 are equal to 0,81; 51,0; 0,095 millimole/l correspondingly. Which electrolyte ion has the maximal coagulating effect?
a. SO42-
b. Al3+
c. Na+
d. Mg2+
e. Cl-

124. Refinement of glycerin that is a component of many drug formulations can be done by means of activated carbon. What phenomenon underlies this process?
a. Adhesion
b. Cohesion
c. Adsorption

d. Wetting

e. Capillary condensation

125. Iodoform when stored decomposes spontaneously into free iodine. Which thermochemical function is a criterion for this process direction when V and T are constant?

a. Enthalpy H

b. Entropy S

c. Helmholtz energy F

d. Gibbs energy G

e. Intrinsic energy U

126. Aqueous solution of CaCl2 with mass concentration 10% is used for intravenous injections. What is the maximum value of isotonic coefficient of CaCl2 in an aqueous solution?

a. 2

b. 4

c. 3

d. 5

e. 1

127. Cryoscopic constants of water, benzene, chloroform, acetic acid and camphor equal to 1,86; 5,12; 4,9; 3,9; 40,0 respectively. Which of these solvents should be selected for the most accurate determination of the molar mass of a drug substance (nonelectrolyte) by the cryoscopic method?

a. Acetic acid

b. Chloroform

c. Camphor

d. Benzene

e. Water

128. Employees of a physicochemical laboratory prepared water solutions of urea, glucose, sodium sulfate, aluminium sulfate and sodium benzoate all of which had the same molar concentration. What solution has the highest osmotic pressure under 298oK?

a. Glucose

b. Urea

c. Aluminium sulfate

d. Sodium benzoate

e. Sodium sulfate

129. Limited swelling of gelatine comes to unlimited one (solution formation) under the following conditions:

a. In presence of SO_4^{2-} ions

b. Cooling

c. Heating

d. In presence of Cl– ions

e. If pH medium matches with isoelectric point

130. A patient with a diagnosis of drug poisoning has been admitted to the resuscitation department. The patient is in grave condition. Respiration is rapid, superficial, with periods of apnea (Biot's respiration). What was the main cause of the development of periodic breathing in the patient?

a. Inhibition of the respiratory center function

b. Impaired function of the neuromuscular system

c. Pulmonary dysfunction

d. Diminished chest mobility

e. Impaired function of spinal cord motoneurons

131. A patient was found to have a tumor of the pancreatic head, which is accompanied by the impaired patency of the common bile duct. Blood test will reveal an increase in the following substance level:

a. Insulin

b. Adrenaline
c. Urea
d. Hemoglobin
e. Bilirubin

132. Positive sol of iron hydroxide was generated by method of hydrolysis. What coagulating ion will have the lowest coagulation threshold?
a. Sulfate
b. Nitrate
c. Bromide
d. Phosphate
e. Chloride

133. In pharmaceutical synthesis both simple and complex reactions are applied. Specify the order of the simple reaction of type 2A+B=3D:
a. 1
b. 2
c. 3
d. 0
e. 0,5

134. Pharmaceutical practice widely applies isotonic solution of sodium chloride. How much sodium chloride is to be takenin order to prepare 100 g of the isotonic solution?
a. 5,0 g
b. 0,85 g
c. 4,5 g
d. 8,5 g
e. 0,45 g

135. Some drugs are colloid solutions. Colloidal disperse systems are the systems whose particles are sized within the range of:
a. 10-9 - 10-4 m
b. 10-9 - 10-7 m
c. 10-4 m
d. 10-7 - 10-4 m
e. 10-9 m

136. During study of pharmaceutical substances pH rate can be determined by method of potentiometry. What electrode can be used as an indicator during measuring of pH solution?A Glass
a. Silver-chloride
b. Zinc
c.
d. Copper
e. Calomel

137. Osmotic pressure is an important characteristic of biologic fluids. Osmotic pressure variates with time in the following solution:
a. Magnesium sulphate
b. Silver chloride sol
c. Calcium sulphate
d. Glucose
e. Sodium chloride

138. As a result of an accident (snakebite) a male patient has the following blood values: Hb - 80 g/l, RBC - 3,0*1012/l; WBC - 5,5*109/l. What type of anemia is observed in this case?
a. Folic acid-deficiency
b. Aplastic
c. Iron-deficiency

d. Hemolytic
e. Posthemorrhagic

139. Pharmaceutical practice involves use of microheterogeneous systems with liquid disperse medium and solid disperse phase. Such drug form is:
a. Foam
b. Aerosol
c. Emulsion
d. Suspension
e. Powder

140. What is the number of degrees of freedom for the salol-camphor system, provided that both components crystallize from the melt simultaneously?
a. - 1
b. 0
c. 2
d. 1
e. 3

141. The method of "accelerated drug ageing" used for determination of drug shelf life is based upon:
a. Fajans' rule
b. Ostwald law
c. Raoult law
d. Van't Hoff's rule
e. Planck's postulate

142. All the undermentioned water solutions of pharmaceutical substances have molal concentration of 0,1 mole/kg. Which solution has the maximal boiling-point elevation?
a. Ethanol
b. Ascorbic acid
c. Glucose
d. Nicotinic acid
e. Sodium acetate

143. Temperature quotient of the reaction velocity is equal to 2. In how many times does the reaction velocity change, if the temperature changes by 40oC?
a. In 16 times
b. In 4 times
c. In 24 times
d. In 32 times
e. In 8 times

144. Surface-active substances are widely used in the drug production. Specify a surface-active substance present at the aqueous solution-air interface:
a. $NaOH$
b. HCl
c. Saccharose
d. $NaCl$
e. Butyric acid

145. What equation can be applied for calculation of surface tension of propionic acid water solution?
a. Shishkovsky's
b. Gibbs' equation
c. Rayleigh equation
d. Helmholtz-Smoluchowski
e. Freundlich's equation

146. Sol Al(OH)3 was derived by processing a freshly made Al(OH)3 precipitate with a small amount of HCl solution. Sol production bases upon the following phenomenon:

a. Chemical condensation
b. Mechanic dispersing
c. Physical condensation
d. Chemical peptization
e. Rinsing with a solvent

147. Systems relate to colloid-disperse ones if size of their particles is within the following range:
a. > 10-4 m
b. 10-7 -- 10-4 m
c. 10-9 -- 10-7 m
d. >< 10-9 m
e. 10-9 -- 10-4 m

148. In pharmaceutical technology an important part is played by pressure, temperature, concentration. The reaction yield can be increased by lowering the temperature of the following process:
a. Adiabatic
b. Exothermic
c. Isochoric
d. Endothermic
e. Isobaric

149. What is the osmotic pressure of medicinal solutions used as blood isotonics?
a. 600 - 670 kPa
b. 690 - 720 kPa
c. 420 - 448 kPa
d. 900 - 960 kPa
e. 740 - 780 kPa

150. Under what conditions the limited swelling of gelatine turns into the unlimited one?
a. In presence of H+ ions whose concentration is equal to their concentration in the isoelectric point
b. Heating
c. In presence of PO43- ions
d. Cooling
e. In presence of Cl- ions

151. The best swelling of gelatine will be observed in the following solvent:
a. Water
b. Ethyl alcohol
c. Acetone
d. Chloroform
e. Benzol

152. Isoelectric point of protein equals 8,3. Electrophoretic mobility of protein macromolecule will be equal zero if pH value is:
a. 7,0
b. 2,3
c. 4,7
d. 8,3
e. 11,5

153. The second Konovalov's law is applied to azeotropic solutions that have extreme points on phase diagrams and are called:
a. Azeotropic mixtures
b. Miscible in all proportions liquids
c. Mutually insoluble liquids
d. Partially miscible liquids
e. Ideal solutions

154. A 22-year-old male was stung by bees, the affected region became hyperemic and edematous. What is the leading mechanism of edema development in this patient?

a. Increased permeability of the capillaries
b. Increased oncotic pressure of tissue fluid
c. Reduced oncotic pressure of blood
d. Impaired lymphatic efflux
e. Decreased hydrostatic blood pressure in the capillaries

155. Skin diseases can be treated with pastes. What class of disperse systems can the pastes be related to?

a. Aerosols
b. Suspensions
c. Powders
d. Emulsions
e. Foams

156. A biological system (living organism) exchanges material and energy with the environment. What system does it relate to?

a. Closed, homogenous
b. Isolated, heterogenous
c. Open, heterogenous
d. Closed, heterogenous
e. Open, homogenous

157. Glass electrode is commonly used for pH measurement in the biologic media, fluid drug forms etc. What type does the glass electrode relate to?

a. Ion selective electrode
b. Reduction-oxidation electrode
c. Gas electrode
d. II type electrode
e. I type electrode

158. Specify the number of degrees of freedom for intersection of the liquidus line with ordinate axis of the equilibrium diagram of a two-component system:

a. ? = 0
b. ? = 1
c. ? = 3
d. ? = −1
e. ? = 2

159. Name the process characterized by a chemical interaction between an adsorbate and an adsorbent:

a. Desorption
b. Sedimentation
c. Solvation
d. Absorption
e. Chemical adsorption

160. Stability of concentrated emulsions can be increased by adding surface-action substances and high-molecular compounds that are:

a. Absorbents
b. Emulsifiers
c. Catalysts
d. Activators
e. Solvents

161. Which of the following solutions with the same molar concentration has the maximum osmotic pressure?

a. Magnesium sulfate
b. Potassium iodide
c. Glucose
d. Sodium chloride
e. Aluminum nitrate

162. If the amount of high-molecular substance added to the sol is very small, it may not increase but decrease its stability. This phenomenon is called:
a. Sol habituation
b. Sensibilization
c. Mutual coagulation
d. Solubilization
e. Colloidal protection

163. Which of the following adsorbents is the most effective for adsorption of a substance from the aqueous solution?
a. Gypsum
b. Activated carbon
c. Quartz
d. Silica gel
e. Bolus alba

164. Specify the indicator of the protective properties of high-molecular compounds of body that promote the keeping of calcium, phosphate and carbonate in blood plasma:
a. Critical micelle concentration
b. Coagulation threshold
c. Protective value
d. Hydrophilic-lipophilic balance
e. Volume of sol coagulated by 1 mol of the electrolyte substance

165. Emulsions are classified according to the volume concentration of dispersed phase. An emulsion with the concentration at the rate of 0,1-74,0% vol. relates to the following group of emulsions:
a. Diluted
b. Direct
c. Reversible
d. Concentrated
e. Highly concentrated

166. According to the Rayleigh equation, the intensity of scattered light is inversely proportional to the wavelength of:
a. Incident light (third power)
b. Incident light
c. Incident light (second power)
d. Incident light (fifth power)
e. Incident light (fourth power)

167. The technology of drug production widely uses the phenomena of absorption and ion exchange. Which of the ions will be selectively adsorbed on the surface of a silver chloride crystal from an aqueous solution?
a. NO_3^-
b. Cu^{2+}
c. Ag^+
d. H^+
e. OH^-

168. Half-life (half-reaction) is inversely proportional to the initial concentration for the reactions of:
a. Third order
b. Zeroth order

c. First order

d. Fraction order

e. Second order

169. Research of reaction rate dependance from various factors allows to intensify technological processes. What factor HAS NO effect on reaction rate constant?

a. Solvent nature

b. Solid substance dispersion degree

c. Temperature

d. Reagents nature

e. Reacting agents concentration

170. Reaction rate constant numerically equals reaction rate, if molar concentrations of:

a. Products are identical

b. Reagents differ by 1

c. Reagents equal 1

d. Products differ by 1

e. -

171. A pharmacist has been adding small portions of electrolyte to silver chloride sol, with resulting coagulation occuring under higher electrolyte concentration, if compared to single instance of adding electrolyte. This phenomenon is called:

a. Additivity

b. Desensitization

c. Antagonism

d. Synergism

e. Sol acclimatization

172. Emulsions containing less then 0,1% of dispersed phase (in volume) are classified as:

a. High-concentration

b. Concentrated

c. Diluted

d. Water-in-oil type

e. Oil-in-water type

173. What particles of the micelle described by the following formula: m(AgCl)nAg+(n-x)NO3-x+ xNO3- are situated in diffusion layer?

a. AgCl and Ag+

b. Ag+ and NO3-

c. AgCl

d. Ag+

e. NO3-

174. If the amount of high-molecular substance added to the given sol is extremely small, it is possible its stability will decrease, instead of increase. What is this phenomenon called?

a. Sedimentation

b. Synergism

c. Solubilization

d. Syneresis

e. Sensitization

175. Pharmaceutical synthesis requires studying complex reaction kinetics. If the first stage product is the second stage initial substance, then such reation is called:

a. Inverse

b. Second order

c. Parallel

d. Consecutive

e. Concerted

176. What data is necessary to calculate activation energy of drug synthesis reaction?

a. Change of Gibbs energy of system
b. Thermal effect
c. Reaction rate constant for two temperatures
d. Internal energy of system
e. Reaction order