

1. What titrimetric methods of analysis uses external and internal indicators?

- A. Nitritometry
- B. Alkalimetry
- C. Complexometry
- D. Permanganometry
- E. Argentometry

2. Cell membrane transformation into cork is associated with its accumulation of the following substance:

- A. Suberin
- B. Cellulose
- C. Cutin
- D. Lignin
- E. Mineral salts

3. What has an effect on the coagulating action of a coagulant ion, according to the Schulze-Hardy rule?

- A. Ion charge
- B. Ion size
- C. Adsorbability
- D. Hydration ability
- E. Polarization

4. To prevent tetanus, a toxin is used, which was being neutralized with 0.4% formalin solution under the temperature of 39°C for four weeks. Name this preparation.

- A. Anatoxin
- B. Immunoglobulin
- C. Antitoxic serum
- D. Adjuvant
- E. Inactivated vaccine

5. After obtaining an antitoxic serum, its activity must be determined. For this purpose, one needs to use a reaction that is based on a combination of equal doses of immune serum and anatoxin. Name this reaction.

- A. Flocculation
- B. Hemagglutination
- C. Precipitation
- D. Complement fixation
- E. Hemadsorption

6. In eukaryotic cells, DNA exists in its protein-bound form. What proteins bind and stabilize the DNA molecule?

- A. Histones
- B. Albumins
- C. Globulins
- D. Interferons
- E. Glutelins

7. Quantitative determination of copper salts using the photometric method is performed according to the calibration chart. What coordinates are used to build this calibration chart?

- A. Optical density — concentration
- B. Optical density — temperature
- C. Optical density — liquid layer thickness
- D. Intensity of light absorption — wavelength
- E. Optical density — wavelength

8. The concentration of ethyl alcohol in some dosage forms and tinctures can be determined using refractometry. What parameter is measured for this purpose?

- A. The refractive index of a solution
- B. The rotation angle of a polarized light plane
- C. The angle of total internal reflection of a light beam
- D. The angle of incidence of a light beam
- E. The temperature of a solution

9. A 42-year-old man presents with pale skin, weakness, and enlarged lymph nodes. His peripheral blood analysis shows leukocytosis, absence of intermediate leukocyte forms («leukemic hiatus»), and accelerated ESR. What disease can be characterized by such clinical and laboratory signs?

- A. Acute leukemia
- B. Chronic leukemia
- C. Erythromyelosis
- D. Neutrophilic leukocytosis
- E. Leukemoid reaction

10. When barium chloride was added to an analyte solution, a white precipitate formed. The precipitate was insoluble in acids and alkalis. What ions are present in the solution, as indicated by this reaction?

- A. Sulfate ions
- B. Chloride ions
- C. Nitrate ions
- D. Permanganate ions
- E. Iron(II) ions

11. An alkaline solution releases a gas when heated. This gas changes the color of a moist litmus paper from red to blue. What ions are present in the solution, as indicated by this reaction?

- A. Ammonium ions
- B. Carbonate ions
- C. Lead ions
- D. Bismuth ions
- E. Chloride ions

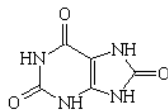
12. A man has undergone an examination of his gastric secretory function. His gastric juice analysis detected no hydrochloric acid or enzymes. Name this pathological gastric condition:

- A. Achylia
- B. Hyperchlorhydria
- C. Hypochlorhydria
- D. Achlorhydria
- E. Hypoacidity

13. What sanitary-indicative microorganisms are used for the assessment of the microbial contamination levels of potable water?

- A. *Escherichia coli*
- B. *Staphylococcus aureus*
- C. *Streptococcus viridans*
- D. *Clostridium perfringens*
- E. *Candida albicans*

14. Patients with gout present with elevated blood levels of a certain acid, the chemical formula of which is given below. Increased concentration of this acid contributes to the formation of kidney stones and leads to a number of other pathological conditions. What substance is the basis for the formation of this acid?



- A. Purine
- B. Indole
- C. Pyrazine
- D. Pyrazole
- E. Pyridine

15. Surfactants are the compounds that reduce the surface (or interfacial) tension between two liquids, between a gas and a liquid, or between a liquid and a solid. A certain substance has the properties of a surfactant at the air-water interface. Its derivatives are widely used in medicine. Name this substance.

- A. Valeric acid
- B.  $HCl$
- C.  $NaOH$
- D. Urea
- E. —

16. Pus samples obtained from a patient with osteomyelitis contain Gram-positive spherical microorganisms arranged in irregular clusters. What microorganisms cause this disease?

- A. *Staphylococcus aureus*
- B. *Serratia marcescens*
- C. *Salmonella typhimurium*
- D. *Escherichia coli*
- E. *Pseudomonas aeruginosa*

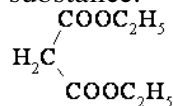
17. In the epidemiology of certain diseases, a great attention must be paid to fleas as disease carriers. Particularly, the fleas play a major role in the spread of:

- A. Plague
- B. Anthrax
- C. Typhus
- D. Relapsing fever
- E. Leptospirosis

18. Microscopy of a smear obtained from the pharyngeal mucosa of a sick child with suspected diphtheria detected yellow-brown bacilli with dark blue thickened ends. What staining method was used in this case?

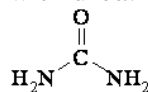
- A. Neisser stain
- B. Loeffler stain
- C. Gram stain
- D. Aujezsky stain
- E. Ziehl-Neelsen stain

19. The structural formula of a chemical substance that is used for the production of barbiturates is given below. Name this substance:



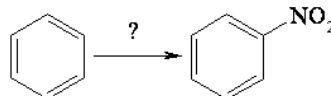
- A. Diethyl ester of malonic acid (malonic ether)
- B. Monoethyl ester of malonic acid
- C. Dimethyl ester of malonic acid
- D. Monomethyl ester of malonic acid
- E. Methylethyl ester of malonic acid

20. Urea, the structural formula of which is given below, is widely used in the pharmaceutical industry for the production of phenobarbital, veronal (barbital), bromural (bromisoval), and other substances. Among the listed names, choose the one that corresponds with urea:



- A. Carbonic acid diamide
- B. Carbonic acid monoamide
- C. Carbamic acid
- D. Formic acid diamide
- E. Formamide

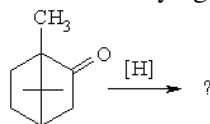
21. Benzene derivatives are used in medicine. What mixture of reagents must be used for benzene nitration?



- A. Concentrated  $HNO_3$  + concentrated  $H_2SO_4$
- B. Concentrated  $HNO_3$  +  $C_2H_5OH$
- C.  $KCl$  + concentrated  $HNO_3$
- D.  $NaNO_2$  + concentrated  $H_2SO_4$
- E. Concentrated  $HNO_3$  + concentrated  $HCl$

22. What product of camphor reduction

(the formula is given below) is widely used in medicine as an antiseptic and anti-inflammatory agent?



- A.**
- B.**
- C.**
- D.**
- E.**

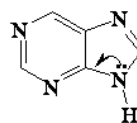
**23.** A certain hormone produced by the thyroid gland regulates the  $Ca^{2+}$  levels in the blood and promotes bone mineralization. Name this hormone.

- A.** Thyrocalcitonin  
**B.** Thyroxine  
**C.** Triiodothyronine  
**D.** Dopamine  
**E.** Adrenaline

**24.** What compound is an aromatic one, with derivatives that are used in medicine?

- A.**
- B.**
- C.**
- D.**
- E.**

**25.** How many electrons take part in the creation of a closed conjugate system of a purine molecule that is used in pharmacy?



- A.** 10  
**B.** 6  
**C.** 26  
**D.** 14  
**E.** 18

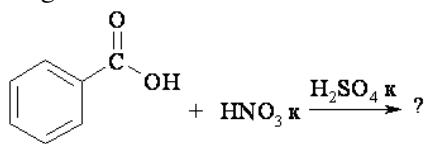
**26.** What carboxylic acid is an aromatic monocarboxylic acid and can be used in treatment of skin diseases as an external antiseptic and fungicide?

- A.** Benzoic acid  
**B.** Formic acid  
**C.** Acetic acid  
**D.** Butyric acid  
**E.** Valeric acid

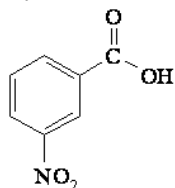
**27.** A patient with acute left ventricular failure developed pulmonary edema. What disturbance of peripheral blood circulation in the lungs was the cause of this complication?

- A.** Venous hyperemia  
**B.** Neurotonic arterial hyperemia  
**C.** Neuroparalytic arterial hyperemia  
**D.** Pulmonary artery thrombosis  
**E.** Ischemia

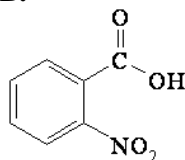
28. Name the main product of benzoic acid nitration that is widely used in medicine for manufacturing of antimicrobial agents and fungicides:



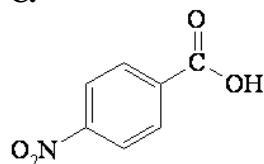
A.



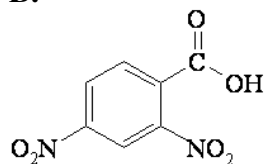
B.



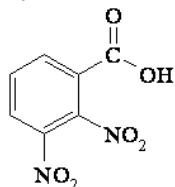
C.



D.



E.



29. What cations of the IV analytical group (acid-base classification) form no precipitate when heated with an excess solution of alkali and hydrogen peroxide, turning the solution yellow instead?

- A. Chromium(III)
- B. Tin(II)
- C. Tin(IV)
- D. Zinc
- E. Aluminum

30. What anions form a precipitate soluble in 12% ammonium carbonate solution as a result of their interaction with a silver(I) nitrate solution?

- A. Chloride ions
- B. Bromide ions
- C. Sulfide ions
- D. Iodide ions
- E. Thiocyanate ions

31. Calcium cations can be used as components of pharmaceuticals. Pharmacopoeial reaction for the detection of calcium cations is a reaction with a solution of:

- A. Ammonium oxalate
- B. Hydrochloric acid
- C. Potassium iodide
- D. Ammonium hydroxide
- E. Sodium hydroxide

32. Complexonometry is a titrimetric method of analysis based on the interaction of polydentate ligand complexes with cations of alkaline earth and heavy metals, which results in formation of strong, easily water-soluble compounds. Solution of what substance is used in complexonometry as a titrant?

- A. Trilon B (ethylenediaminetetraacetic acid tetrasodium salt)
- B. Potassium dichromate
- C. Sodium thiosulfate
- D. Sulfuric acid
- E. Silver(I) nitrate

33. In microbiology, the Gram method is the main method for bacteria differentiation by means of staining. In this method, bacteria differentiation into Gram-positive and Gram-negative ones is based on their:

- A. Cell wall structure
- B. Cell size
- C. Presence of ribosomes
- D. Cytoplasmic membrane structure
- E. Chemical composition of the capsule

34. A pathological process in the blood serum has caused increased ammonia levels. What is the main way of toxic ammonia neutralization?

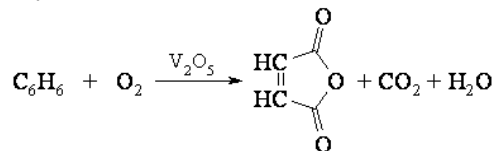
- A. Urea synthesis
- B. Glycine synthesis
- C. Ammonium salt synthesis
- D. Uric acid synthesis
- E. Alanine synthesis

35. A tumor of the adenohypophysis disturbs the synthesis of tropic hormones and causes acromegaly. What hormone would exhibit elevated levels in this case?

- A. Somatotropin
- B. Vasopressin
- C. Luteinizing
- D. Oxytocin
- E. Follicle-stimulating

36. Which of the following reactions is an electrophilic substitution reaction?

- A.  $C_6H_6 + Cl_2 \xrightarrow{FeCl_3} C_6H_5Cl + HCl$   
 B.  $C_6H_6 + Cl_2 \xrightarrow{h\nu} C_6H_6Cl_6$   
 C.  $C_6H_6 + 3H_2 \xrightarrow{t^o, Ni} C_6H_{12}$   
 D.



- E.  $C_6H_6 + O_2 \rightarrow CO_2 + H_2O$

37. A patient with croupous pneumonia has the body temperature of 40°C. What type of elevated body temperature is it?

- A. High fever  
 B. Subfebrile temperature  
 C. Moderate fever  
 D. Hyperpyretic temperature  
 E. The temperature is within the norm

38. After a surgery, the man has developed a severe pain syndrome. What change in his hormonal status is most likely in this case?

- A. Increased catecholamine production  
 B. Insulin hypersecretion  
 C. Decreased ACTH production  
 D. Decreased glucocorticoid production  
 E. Decreased mineralocorticoid production

39. Serology is the main method of congenital toxoplasmosis diagnostics. What reaction is used to diagnose this pathology?

- A. Complement fixation  
 B. Agglutination  
 C. Precipitation  
 D. Neutralization  
 E. Bacteriolysis

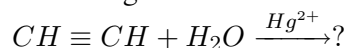
40. Detection of antibodies to a pathogen in the patient's blood serum helps to confirm the diagnosis. Name this method of testing.

- A. Serological method  
 B. Biological method  
 C. Allergy testing  
 D. Microscopy  
 E. Microbiological method

41. When sodium hydroxide solution and hydrogen peroxide solution were added to an unknown mixture, a precipitate was formed. The precipitate disappeared after these substances were added in an excess, which indicates the presence of the cations that belong to the following analytical group:

- A. IV  
 B. V  
 C. VI  
 D. II  
 E. III

42. What substance is formed during the reaction given below?



- A. Ethanal  
 B. Ethanol  
 C. Propanal  
 D. Propanon  
 E. Acetic acid

43. *Berberis vulgaris* has thorns that develop from modified:

- A. Leaves  
 B. Stipules  
 C. Petioles  
 D. Stems  
 E. Rachises

44. What plant family can be characterized by the following diagnostic features: fruit — achene, inflorescence — capitulum, essential oil glands are present?

- A. *Asteraceae*  
 B. *Scrophylariaceae*  
 C. *Solanaceae*  
 D. *Lamiaceae*  
 E. *Rosaceae*

45. What solution can be used to determine anions of the first analytical group?

- A. A solution of  $BaCl_2$  in a neutral or slightly alkaline medium  
 B. A solution of  $BaCl_2$  in an acidic medium  
 C. A solution of  $AgNO_3$  in an acidic medium  
 D. Mineral acid solution  
 E. Alkaline solution

46. The pharmacy of a tuberculosis clinic has received tuberculin. What is the purpose of this substance?

- A. Allergic diagnostics of tuberculosis  
 B. Specific prevention of tuberculosis  
 C. Specific therapy of tuberculosis  
 D. Phagotyping of mycobacteria  
 E. Serological diagnostics of tuberculosis

47. Bacterioscopy of the cerebrospinal fluid of a sick child revealed Gram-negative bean-shaped diplococci located in the leukocytes. What is the most likely causative agent of this condition?

- A. Meningococcus  
 B. Gonococcus  
 C. Staphylococcus  
 D. Rickettsia  
 E. Streptococcus

48. Name the pathological condition characterized by formation of purulent foci in various organs and tissues against the background of bacterial growth in the blood?

- A. Septicopyemia
- B. Bacteremia
- C. Septicemia
- D. Viremia
- E. Toxemia

49. What sanitary indicative microorganisms must be determined during a sanitary microbiological study of soil?

- A. *Streptococcus faecalis*, *E.coli*, *Clostridium perfringens*
- B. *Streptococcus haemolyticus*, *Streptococcus faecalis*
- C. *Candida fungi*, *Streptococcus faecalis*
- D. *Streptococcus faecalis*, *Clostridium perfringens*
- E. *Staphylococcus aureus*, *Clostridium perfringens*

50. Cocarboxylase is used in medicine as a pharmaceutical agent for treatment of myocardial dystrophies and disorders of muscles, peripheral and central nervous system. What vitamin is a component of this drug?

- A. B<sub>1</sub>
- B. B<sub>2</sub>
- C. B<sub>6</sub>
- D. C
- E. B<sub>12</sub>

51. Based on their structure, disperse systems can be divided into the following classes:

- A. Free and bound
- B. Lyophilic and lyophobic
- C. Hydrosols and aerosols
- D. Coarse and microheterogeneous
- E. Hydrosols and organosols

52. What optical method of analysis can be used to quantify iron(III) ions?

- A. Photocolorimetry
- B. Polarimetry
- C. Conductometry
- D. Potentiometry
- E. Coulometry

53. What analytical method can be used to quantify hydrogen peroxide without any special indicators?

- A. Permanganatometry
- B. Nitritometry
- C. Iodometry
- D. Argentometry
- E. Complexonometry

54. Name the process of liquid droplets or gas (air) bubbles fusion that occurs when they collide inside a moving medium (liquid, gas), or on the surface of a body:

- A. Coalescence
- B. Aggregation
- C. Sedimentation
- D. Electrophoresis
- E. Coagulation

55. What pair of electrodes is used for potentiometric titration of acids and bases in non-aqueous solutions?

- A. Glass, silver chloride
- B. Hydrogen, platinum
- C. Quinhydrone, platinum
- D. Antimony, glass
- E. Two platinum electrodes

56. A colloidal solution emits a matte glow, when light passes through it, due to the light scattering on the colloidal particles as a result of diffraction. Name this physical phenomenon:

- A. Opalescence
- B. Coagulation
- C. Intramolecular diffraction
- D. Syneresis
- E. Sedimentation

57. Heparin is a potent natural anticoagulant, synthesized in mast cells. What is the chemical nature of this compound?

- A. Heteropolysaccharide
- B. Simple protein
- C. Steroid
- D. Homopolysaccharide
- E. Phospholipid

58. What phenomenon is characteristic of a benign tumor?

- A. Expansive growth
- B. Metastases
- C. Cancer cachexia
- D. Invasion into the surrounding tissues
- E. Infiltrative growth

59. One of the antidotes to methanol poisoning is ethanol taken orally or received intravenously in large doses. What process ensures the positive effect of such treatment?

- A. Ethanol competes with methanol for the active site of alcohol dehydrogenase
- B. Ethanol inactivates alcohol dehydrogenase
- C. Ethanol blocks alcohol dehydrogenase coenzyme
- D. Ethanol breaks down faster than methanol
- E. Ethanol inhibits methanol diffusion

60. The chemical and biological processes that occur with the drug in the human body follow certain patterns. The reduction of tetracycline absorption, when it is co-administered with antacids, is an example of the following process:

- A. Pharmacokinetic incompatibility
- B. Pharmaceutical incompatibility
- C. Pharmacodynamic incompatibility
- D. Synergism
- E. Functional antagonism

61. What drug has its hypoglycemic effect due to the stimulation of pancreatic beta cells?

- A. Glibenclamide
- B. Metformin
- C. Pepsin
- D. Loperamide
- E. Heparin

62. A 56-year-old man with ischemic heart disease was prescribed metoprolol. What is the mechanism of action of beta-blockers in ischemic heart disease?

- A. Reduction of the myocardial oxygen demand
- B. Increase of the myocardial oxygen demand
- C. Dilation of the coronary vessels
- D. Reduction of the peripheral vessel tone
- E. Constriction of the coronary vessels

63. A person with essential hypertension was prescribed lisinopril. What is the typical side effect of this medicine?

- A. Dry cough
- B. Constipation
- C. Increased appetite
- D. Insomnia
- E. Vomiting

64. Name the ability of drugs to accumulate in the human body as a result of their long-term use.

- A. Cumulation
- B. Antagonism
- C. Synergism
- D. Tolerance
- E. Allergy

65. Fenofibrate belongs to the following pharmacological group:

- A. Hypolipidemic drugs
- B. Fibrinolysis inhibitors
- C. Hypnotics
- D. Antihypertensive drugs
- E. Indirect-acting anticoagulants

66. A doctor has prescribed an adrenocortical hormone drug for a patient with bronchial asthma. Specify this drug.

- A. Prednisolone
- B. Loratadine
- C. Diclofenac sodium
- D. Salbutamol
- E. Atropine sulfate

67. What antidote must be used in case of narcotic analgesics overdose?

- A. Naloxone
- B. Caffeine and sodium benzoate
- C. Diazepam
- D. Unithiol (Dimercaptopropansulfonate sodium)
- E. Calcium chloride

68. A patient was prescribed L-thyroxine after a thyroidectomy. What type of pharmacotherapy is provided by L-thyroxine?

- A. Replacement therapy
- B. Pathogenetic therapy
- C. Etiotropic therapy
- D. Stimulation therapy
- E. Preventive therapy

69. Name the process when a dissolved macromolecular compound is sedimented by adding electrolytes into the solution:

- A. Salting out
- B. Denaturation
- C. Coacervation
- D. Jelly formation
- E. Flocculation

70. Complex biological systems contain components such as electrolytes, non-electrolytes, and proteins that together create osmotic pressure. What part of osmotic pressure is formed primarily by proteins?

- A. Oncotic pressure
- B. Biological pressure
- C. Cellular pressure
- D. Internal pressure
- E. —

71. In medicine, various dosage forms are used: emulsions, foams, powders, etc. that can be classified as disperse systems. What determines the dispersion in such systems?

- A. The degree of the dispersed material comminution
- B. The shape of the particles
- C. The nature of the dispersed material
- D. The mass of the comminuted substance
- E. The volume of the continuous medium

72. An «artificial kidney» device has membranes that purify the blood of harmful substances. What method is used to remove low molecular weight impurities from the patient's blood?

- A. Dialysis
- B. Salting out
- C. Electrophoresis
- D. Isoelectric focusing
- E. X-ray diffraction analysis

73. Which of the following processes describes sedimentation?

- A.** The process of dispersed phase particles settling in a liquid or gaseous medium under the effect of gravity  
**B.** The process of dispersed phase particles adhesion to each other in a liquid medium with formation of aggregates  
**C.** The process of dispersed phase particles adhesion to each other under the effect of electrolyte solutions  
**D.** The process of dispersed phase particles aggregation in a liquid medium  
**E.** The arbitrary process of dispersed phase particles fragmentation in a liquid or gaseous medium under the effect of an electric current

**74.** Activation of lipid peroxidation is one of the mechanisms that cause damage to biostructures and development of cellular pathology. What compound takes part in neutralization of organic peroxides?

- A.** Glutathione  
**B.** Taurine  
**C.** Glycine  
**D.** Alanine  
**E.** Methionine

**75.** What type of colloidal systems are foams?

- A.** Gas–liquid  
**B.** Gas–gas  
**C.** Solid–liquid  
**D.** Liquid–liquid  
**E.** Liquid–solid

**76.** What physical phenomenon is measured using stalagmometry?

- A.** Surface tension  
**B.** Concentration  
**C.** Molecular mass  
**D.** Osmotic pressure  
**E.** Isoelectric point

**77.** What methods of obtaining disperse systems can be classified as physical condensation methods?

- A.** Condensation from vapor and solvent replacement  
**B.** Chemical condensation and peptization  
**C.** Dispersion and peptization  
**D.** Ultrafiltration and peptization  
**E.** Ultrafiltration and condensation from vapor

**78.** To determine a certain second group cation, the «golden rain» reaction is used with slow cooling of the preheated reagents. What reaction product is formed during the slow precipitation?

- A.**  $PbI_2$   
**B.**  $PbCl_2$   
**C.**  $AgI$   
**D.**  $HgI_2$   
**E.**  $Hg_2I_2$

**79.** Gypsum water is added to a test solution

for analytical determination of barium ions. What visual effect is observed in this case?

- A.** Formation of a white precipitate  
**B.** Yellow coloring of the solution  
**C.** A characteristic odor appearing  
**D.** Production of a brown gas  
**E.** Formation of a blue precipitate

**80.** Mercurimetry is used for quantification of halide ions in their interaction with solutions of mercury salts ( $Hg_2^{2+}$ ). What indicator allows analytical visualization of complete precipitation of halide ions?

- A.** Diphenylcarbazone  
**B.** Eosin  
**C.** Fluorescein  
**D.** Methyl orange  
**E.** Potassium dichromate

**81.** Name the difference in potentials that occurs due to uneven distribution of electrolytes between the outer and inner surfaces of the cell membrane:

- A.** Membrane potential  
**B.** Diffuse biopotential  
**C.** Contact biopotential  
**D.** Surface biopotential  
**E.** Chemical biopotential

**82.** Name the method of sorption detoxification of the body, in which the adsorption of toxic substances occurs when the sorbent passes through the digestive system?

- A.** Enterosorption  
**B.** Hemosorption  
**C.** Liquorosorption  
**D.** Contact therapy  
**E.** Lymphosorption

**83.** Ammonium ions ( $NH_4^+$ ) must be removed from a mixture during the detection of sodium ( $Na^+$ ) and potassium ( $K^+$ ) cations of the first analytical group. Why is it necessary?

- A.** They interfere with the determination of potassium and sodium ions  
**B.** The solution pH becomes  $<7$ , because of hydrolysis of these ions  
**C.** The solution pH becomes  $>7$ , because of hydrolysis of these ions  
**D.** Ammonium salts decompose at high temperatures  
**E.** Compounds with  $K^+$  and  $Na^+$  ions form supersaturated solutions

**84.** Sodium hexanitrocobaltate(III) is used to determine the presence of potassium cations in a solution. What visual analytical effect is observed in this case?



- A. Formation of a yellow precipitate
- B. Formation of a white precipitate
- C. Formation of a black precipitate
- D. Formation of a violet precipitate
- E. Formation of a blue precipitate

85. Crystalline lead(IV) dioxide in the presence of concentrated nitric acid is used to detect the presence of manganese(II) cations in a solution. What visual analytical effect is observed in the process?

- A. The solution colors pink
- B. The solution colors yellow
- C. A white precipitate is formed
- D. A blue precipitate is formed
- E. The solution colors green

86. What medicine increases the risk of toxic effects when taken along with gentamicin?

- A. Furosemide
- B. Penicillin
- C. Caffeine
- D. Erythromycin
- E. Methylprednisolone

87. A 35-year-old woman came to a pharmacy to buy a medicine for relief of dry hacking cough. Which of the listed medicines is indicated for her in this case?

- A. Libexin (Prenoxdiazine)
- B. Ambroxol
- C. Amoxicillin
- D. Mucaltin (*Althaeae officinalis herbae* extract)
- E. Captopres (Captopril)

88. A person with a past history of acute myocardial infarction was recommended to take an antiaggregant that blocks platelet cyclooxygenase. What medicine can be classified as an antiaggregant?

- A. Acetylsalicylic acid
- B. Clopidogrel
- C. Dipyridamole
- D. Ticlopidine
- E. Abciximab

89. IgM to rubella virus were detected in the blood serum of a sick child. What stage of the disease progression is indicated by this sign?

- A. Acute
- B. Chronic
- C. Persistent
- D. Incubation
- E. Post-vaccination

90. A sample obtained from the wound of a patient with suspected gas anaerobic infection was inoculated on the Kitt-Tarozzi medium. Why must this medium be heated before the inoculation?

- A. To remove oxygen
- B. To sterilize the medium
- C. To dissolve salts
- D. To destroy microorganisms
- E. To enrich the medium with carbon dioxide

91. Sputum analysis by means of flotation and Ziehl-Neelsen staining technique revealed red long thin bacilli, both isolated and arranged in clusters. What disease is caused by this pathogen?

- A. Tuberculosis
- B. Diphtheria
- C. Actinomycosis
- D. Tularemia
- E. Pertussis

92. A person was hospitalized into the infectious department with the body temperature of 39°C, headache, and chills. Spiral-shaped microorganisms stained violet according to the Romanowsky-Giemsa technique were detected in the thick blood smear. What microorganisms were detected in the patient?

- A. Borrelia
- B. Treponema
- C. Leptospira
- D. Actinomycetes
- E. Clostridia

93. Against the background of cardiac glycoside treatment, a person developed an arrhythmia. The doctor prescribed the patient a potassium medicine that successfully normalized the heart rate. Name this potassium medicine.

- A. Asparcam
- B. Verapamil
- C. Metoprolol
- D. Novocainamide
- E. Amiodarone

94. What is the shape of a simple leaf blade, if the dissection of the leaf blade reaches the central vein or the base of the leaf?

- A. Pinnatisect or palmatisect
- B. Partite
- C. Lobate
- D. Digitate
- E. Trifoliolate

95. What medicine must be prescribed to a patient diagnosed with rheumatoid arthritis, if this patient's medical history indicates gastritis as a concomitant diagnosis?

- A. Celecoxib
- B. Aspirin (acetylsalicylic acid)
- C. Diclofenac
- D. Ibuprofen
- E. Indomethacin

96. When a mixture of electrolytes is added into a sol, one of them reduces the effect of

another. Name this phenomenon:

- A. Antagonism
- B. Synergism
- C. Additivity
- D. Rheopexy
- E. Phoresis

97. Electrolytic dissociation is one of the quantitative characteristics of electrolytes. What is used to determine the degree of electrolytic dissociation?

- A. The ratio of the number of dissociated molecules to the total number of solute molecules
- B. The product of the number of dissociated and non-dissociated solute molecules
- C. The ratio of the number of non-dissociated molecules to the number of dissociated solute molecules
- D. The ratio of the solution concentration to the total number of dissociated solute molecules
- E. The ratio of the number of non-dissociated solute molecules to the total number of ions

98. In iodometry, titrimetric quantitative analysis is used to measure the amount of iodine utilized for the oxidation of a reducing agent or released as a result of iodide oxidation. What salt is used to make an iodide solution for iodometry?

- A. Potassium iodide
- B. Sodium iodide
- C. Calcium iodide
- D. Magnesium iodide
- E. Lithium iodide

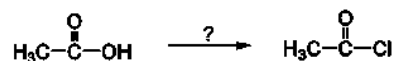
99. During a sanitary-microbiological study of tap water, certain microorganisms were detected, the presence of which indicates fresh fecal contamination of the water. What microorganisms were detected in the water?

- A. *Escherichia coli*
- B. *Streptococcus agalactiae*
- C. *Haemophilus influenzae*
- D. *Neisseria sicca*
- E. *Staphylococcus aureus*

100. The process of putrefaction is a component of physicochemical changes that occur with food proteins in the human gastrointestinal tract. What product is excreted with the urine and is an indicator of the intensity of the protein putrefaction in the large intestine?

- A. Indican
- B. Bilirubin
- C. Cholesterol
- D. Benzene
- E. Ammonia

101. Name the formula of the reagent that is used for the production of acetyl chloride in pharmaceutical manufacturing:

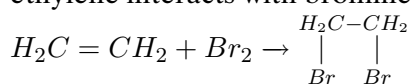


- A.  $\text{PCl}_3$
- B.  $\text{HNO}_3$
- C.  $\text{NaCl}$
- D.  $\text{LiCl}$
- E.  $\text{Br}_2$

102. A starch molecule contains residues of a certain monosaccharide. Name this monosaccharide.

- A. D-glucose
- B. D-fructose
- C. D-ribose
- D. D-galactose
- E. D-mannose

103. What is the mechanism of reaction where ethylene interacts with bromine water?

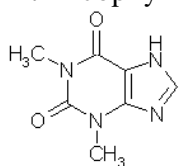
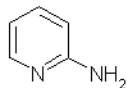
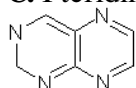


- A. AE (electrophilic addition)
- B. SE (electrophilic substitution)
- C. SN (nucleophilic substitution)
- D. E (elimination)
- E. Polymerization

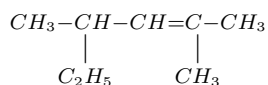
104. Salicylic acid and its derivatives are widely used in medicine. This compound belongs to the following class of chemicals:

- A. Hydroxycarboxylic acids
- B. Heterocyclic compounds
- C. Alcohols
- D. Aldehydes
- E. Alkanes

105. What compound contains pyrrole and pyridine nitrogen atoms and is widely used in treatment of bronchial asthma?

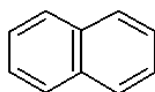
**A. Theophylline****B. 2-aminopyridine****C. Pteridine****D. Pyrimidine****E. Pyridazine**

**106.** What is the name of the alkene given below according to the IUPAC substitutive nomenclature?



- A.** 2,4-dimethylhexene-2
- B.** 4-ethyl-2-methylpentene-2
- C.** 2-ethyl-4-methylpentene-3
- D.** 3,5-dimethylhexene-4
- E.** 4-ethyl-2-methylpentene-3

**107.** What numerical value of  $n$  is necessary for the Huckel's rule ( $4n+2$ ) to be observed for naphthalene?



- A.**  $n=2$
- B.**  $n=1$
- C.**  $n=0$
- D.**  $n=4$
- E.**  $n=8$

**108.** A 10-year-old boy ate 0.5 kg of sweets, which exceeds his daily energy needs. As a result, the synthesis of a certain substance will activate in this child. Name this substance.

- A.** Glycogen
- B.** Starch
- C.** Lactose
- D.** Sucrose
- E.** Raffinose

**109.** Some vegetables and fruits (carrots, tomatoes, apricots) are rich in a substance that in the human body acts as an antioxidant and is a provitamin of vitamin A. Name this substance:

- A.** Beta-carotene
- B.** Cholesterol
- C.** Methionine
- D.** Choline
- E.** Inositol

**110.** Neutralization of drugs, particularly sulfonamides, in the liver occurs by means of acetylation. Name the compound that causes acetylation reaction:

- A.** Acetyl-CoA
- B.** Glycine
- C.** Glutathione
- D.** S-adenosylmethionine
- E.** Succinyl-CoA

**111.** What hormone can provoke an increase in blood pressure and elevated blood levels of glucose and lipids in a patient with hypotension, who has taken it as a component of a drug?

- A.** Adrenaline
- B.** Testosterone
- C.** Insulin
- D.** Progesterone
- E.** Folliculin

**112.** Examination of a child revealed enlarged abdomen, curved legs, increased excitability of the nervous system, and increased excretion of phosphates with the urine. Deficiency of what food component can cause such clinical changes?

- A.** Vitamin D
- B.** Vitamin K
- C.** Vitamin C
- D.** Vitamin A
- E.** Vitamin F

**113.** Name the type of an inflorescence that has an elongated and thickened main axis with sessile flowers:

- A.** Spadix
- B.** Spike
- C.** Umbel
- D.** Round capitulum
- E.** Flat capitulum

**114.** A person diagnosed with ischemic heart disease presents with stable angina pectoris, atherosclerosis, and elevated plasma lipids. What class of lipids plays the main role in the pathogenesis of atherosclerosis?

- A. Low density lipoproteins
- B. High density lipoproteins
- C. Chylomicrons
- D. Fatty acid–albumin complexes
- E. Triglycerides

**115.** Aldehyde dehydrogenase inhibitors are widely used in the treatment of alcohol dependence. What metabolite causes the feeling of disgust towards alcohol, if its blood level is elevated?

- A. Acetaldehyde
- B. Methanol
- C. Glucose
- D. Fructose
- E. Cholesterol

**116.** Trypsin is a proteolytic enzyme used to clean purulent wounds. Combined with water, it causes the breakdown of complex organic compounds (proteins, peptides) into simpler ones. According to the modern international Nomenclature and Classification of Enzymes, trypsin belongs to:

- A. Hydrolases
- B. Transferases
- C. Oxidoreductases
- D. Isomerases
- E. Ligases

**117.** Pterin derivatives are used as antitumor agents, because they are the equivalents of the coenzyme required for the synthesis of thiamine monophosphate. This coenzyme is the active form of the following vitamin:

- A. Folic acid
- B. Ascorbic acid
- C. Thiamine
- D. Riboflavin
- E. Lipoic acid

**118.** A perennial herbaceous plant has the following characteristic features: calyx with an epicalyx, double perianth, fused stamens with purple anthers, its fruit is a disc-like schizocarp. Name this plant.

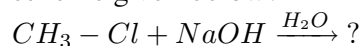
- A. *Althaea officinalis*
- B. *Polygonum persicaria*
- C. *Amygdalus communis*
- D. *Hyoscyamus niger*
- E. *Melissa officinalis*

**119.** What compound can be classified as a condensed arene?

- A. Naphthalene
- B. Biphenyl
- C. Diphenylmethane
- D. Benzene
- E. Triphenylmethane

**120.** Chloromethane is used in medicine as a local anesthetic. In the manufacturing of certain medicines, it is an intermedi-

ate product of the technological chain. What compound is formed as a result of alkaline hydrolysis of chloromethane according to the scheme given below?



- A. Methanol
- B. Methane
- C. Methanal
- D. Sodium formate
- E. Ethane

**121.** As a result of a car accident, a man (driver) has suffered an extensive blood loss. He presents with rapid breathing, tachycardia, and low blood pressure. What pathological condition is likely to be observed in him one hour after the blood loss?

- A. Hypovolemia
- B. Dyslipidemia
- C. Erythrocyte hypochromia
- D. Erythrocyte hyperchromia
- E. Hyperglycemia

**122.** At an altitude of 20000 meters, a depressurization of a cargo plane occurred, followed by its crashing to the ground. A forensic examination determined that the people onboard had died before the impact with the ground. Embolism was stated as one of the causes of death of the entire crew. What type of embolism is most likely in this case?

- A. Gas embolism
- B. Air embolism
- C. Fat embolism
- D. Thromboembolism
- E. Foreign body embolism

**123.** During a practical skill-building session, in the Konheim experiment, a student observes the dynamics of vascular reactions and changes in the blood circulation in an inflammatory focus. Name the correct sequence of the stages, characteristic of acute inflammation development:

- A. Spasm of arterioles, arterial hyperemia, venous hyperemia, prestasis, stasis
- B. Arterial hyperemia, venous hyperemia, prestasis, stasis, spasm of arterioles
- C. Venous hyperemia, arterial hyperemia, prestasis, stasis, spasm of arterioles
- D. Prestasis, stasis, spasm of arterioles, arterial hyperemia, venous hyperemia
- E. Venous hyperemia, stasis, spasm of arterioles, arterial hyperemia, prestasis

**124.** The leaves of a *Lamiaceae* family plant are ovate, with a pointed tip, crenate leaf edge, and a lemon scent, which is characteristic of the following plant:

- A. *Melissa officinalis*
- B. *Salvia officinalis*
- C. *Leonurus cardiaca*
- D. *Mentha piperita*
- E. *Lamium album*

125. What type of parenchyma usually has aleurone or starch grains and droplets of a fatty oil in its cells?

- A. Storage parenchyma
- B. Columnar parenchyma
- C. Folded parenchyma
- D. Spongy parenchyma
- E. Water-storing parenchyma

126. Calcium carbonate crystals are deposited as clusters on the inner protrusions of a cell wall. What are these formations called?

- A. Cystoliths
- B. Druses
- C. Raphides
- D. Styloids
- E. Druses attached to cell membrane

127. A certain perennial alkaloid-containing plant is widely used in medicine. It has the following features: pinnately dissected leaves with light green upper surface and bluish lower surface; regular bisexual flowers with double perianth, attached to long peduncles, located in the axils of narrow sharp bracts, and clustered together in umbel inflorescences; the fruit is a siliquiform capsule; the plant produces an orange milky sap. These biological features are characteristic of:

- A. *Chelidonium majus*
- B. *Papaver somniferum*
- C. *Datura stramonium*
- D. *Atropa belladonna*
- E. *Vinca minor*

128. A plant has roots with bacteriorhiza, complex leaves with stipules, flowers with a papilionaceous corolla, and a silique fruit. These features are characteristic of the following family:

- A. *Fabaceae*
- B. *Apiaceae*
- C. *Asteraceae*
- D. *Lamiaceae*
- E. *Solanaceae*

129. A poisonous weed of the *Solanaceae* family has branching downy stems. Its leaves are soft, dull, and dark green; on their lower surface they are light gray, with thicker and longer down along their veins and edges. The flowers are sessile, with a deciduous five-lobed funnelform corolla that is colored dirty yellow (rarely whitish) and has a network of purple-violet veins. The fruit is an urceolate capsule with an operculum. These features are characteristic of:

- A. *Hyoscyamus niger*
- B. *Datura innoxia*
- C. *Datura stramonium*
- D. *Nicotiana tabacum*
- E. *Atropa belladonna*

130. Jelly is one of the promising dosage forms. Name the process, when the initial structure of a mechanically destroyed jelly spontaneously restores:

- A. Thixotropy
- B. Syneresis
- C. Diffusion
- D. Stratification
- E. Gelation

131. After a subtotal gastric resection, the patient developed B<sub>12</sub>-deficiency anemia. What cells in a blood smear are typical in this pathology?

- A. Megaloblasts
- B. Microcytes
- C. Anulocytes
- D. Normoblasts
- E. Erythroblasts

132. A sailor, who had been at sea for 10 months, developed bleeding gums and mobility and loss of healthy teeth. After an examination he was diagnosed with scurvy. What vitamin is deficient in this case, causing this disease?

- A. Vitamin C
- B. Nicotinic acid
- C. Folic acid
- D. Vitamin E
- E. Vitamin D

133. In the dentist's office, a patient developed asphyxia caused by aspiration of a small instrument. What type of respiratory failure is observed in this case?

- A. Obstructive
- B. Restrictive
- C. Dysregulatory
- D. Perfusion
- E. Diffusion

134. A man with signs of glomerulonephritis came to a hospital. What pathological components in his urine indicate the increased permeability of the glomerular membrane?

- A. Protein
- B. Glucose
- C. Bilirubin
- D. Acetone
- E. Pus

135. A 30-year-old woman complains of increased sweating, tachycardia, weight loss, tremor, irritability, and exophthalmos. What endocrine pathology can cause this condition?

- A. Hyperthyroidism
- B. Hypothyroidism
- C. Hypogonadism
- D. Hypergonadism
- E. Hyperaldosteronism

136. Examination of children with kwashiorkor revealed facial edema, ascites, weight loss, and stunted growth. What is the most likely cause of this disease?

- A. Alimentary protein deficiency
- B. Excess protein in the diet
- C. Deficiency of unsaturated fatty acids
- D. Carbohydrate deficiency
- E. Excess fats and carbohydrates

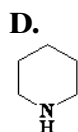
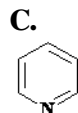
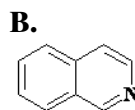
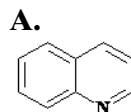
137. Pleural tap performed by a doctor has yielded a significant amount of yellow exudate. Microscopy detected neutrophils in the exudate. What type of exudate is it characteristic of?

- A. Purulent
- B. Serous
- C. Fibrinous
- D. Hemorrhagic
- E. Bloody

138. The patient's 24-hour urine output is 6 liters, its specific gravity varies from 1003 to 1008 g/L. What pathological process can be characterized by these signs?

- A. Diabetes insipidus
- B. Diabetes mellitus
- C. Hypothyroidism
- D. Chronic renal failure
- E. Acute renal failure

139. Quinoline derivatives are the basis for numerous antimicrobial drugs. Select the quinoline formula among the compounds listed below:



140. In hot weather on the leaf tips of *Tilia cordata* and on the crenations along its leaf edges, drops of liquid are released through the water stomata. Name the structures located on the plant leaves, through which liquid water can be passively released:

- A. Hydatodes
- B. Osmophores
- C. Nectaries
- D. Glandules
- E. Hydropotes

141. While on a tour, the students have been collecting summer shoots of *Equiseti arvensis* that were hard to the touch. What type of the outer shell is characteristic of the epidermal cells of this plant?

- A. Mineralized
- B. Cutinized
- C. Suberized
- D. Slimified
- E. Lignified

142. A *Polygonaceae* family plant has elongated lanceolate leaves with ochreae and brown spots on the upper surface of the leaf blade. These features are characteristic of:

- A. *Polygonum persicaria*
- B. *Polygonum aviculare*
- C. *Polygonum hydropiper*
- D. *Leonurus quinquelobatus*
- E. *Hypericum perforatum*

143. A man with allergic dermatitis and disturbed sleep came to a doctor. What antihistamine would be optimal in this case?

- A. Dimedrol (Diphenhydramine)
- B. Dexamethasone
- C. Ampicillin
- D. Loratadine
- E. Enterogel (Polymethylsiloxane polyhydrate)

**144.** On day 7 of dimedrol (diphenhydramine) treatment, the patient noted a decrease in the effectiveness of the drug. What pharmacological concept describes the decreased response of the body to a drug?

- A. Tolerance
- B. Mutagenicity
- C. Idiosyncrasy
- D. Embryotoxicity
- E. Carcinogenicity

**145.** A doctor has prescribed metoprolol to a person with essential hypertension. As a result of abrupt cessation of treatment, the patient's blood pressure increased. What pathological condition did the patient develop?

- A. Withdrawal syndrome
- B. Drug allergy
- C. Pharmacotoxic response
- D. Allergic reaction
- E. Idiosyncrasy

**146.** Which medicine of those listed below is the least active among the local anesthetics, poorly dissolves in water, and can be used for topical anesthesia in the form of ointments, pastes, and powders?

- A. Anesthesin (Benzocaine)
- B. Lidocaine
- C. Novocaine (Procaine)
- D. Ropivacaine
- E. Ultracaine (Articaine)

**147.** A patient with bronchitis was taking

doxycycline hydrochloride. What side effects can develop in the patient after the patient has been taking this drug for some time?

- A. Diarrhea, hepatitis
- B. Euphoria, tolerance
- C. Withdrawal, dependence
- D. Hypotension, vertigo
- E. Hypertension, arrhythmia

**148.** The presence of storage proteins in a microslide prepared from *Phaseolus vulgaris* endosperm can be confirmed, if the microslide colors golden-yellow when stained with Lugol solution. In plant seeds, such protein deposits are called:

- A. Aleurone grains
- B. Inulin
- C. Glycogen
- D. Starch grains
- E. Chlorophyll grains

**149.** Interaction of narcotic analgesics with certain receptors can cause constipation. Name these receptors:

- A. Opiate receptors
- B. Dopamine receptors
- C. Glutamate receptors
- D. Mechanoreceptors
- E. Chemoreceptors

**150.** To disinfect a burn surface, an antiseptic was used. When interacting with tissues, this antiseptic releases atomic oxygen and manganese dioxide. What antiseptic was used in this case?

- A. Potassium permanganate
- B. Hydrogen peroxide
- C. Iodine alcohol solution
- D. Ethyl alcohol
- E. Brilliant green