

1. Calculation of the phase transformation temperature under varying pressure is of extreme practical importance to the modern pharmaceutical industry. This temperature can be calculated using the:

- A. Clausius-Clapeyron equation
- B. Trouton rule
- C. Gibbs phase rule
- D. Mendeleev-Clapeyron equation
- E. Konovalov rules

2. Microscopy of a specimen prepared from the patient's enlarged inguinal lymph node and stained using the Loeffler technique (methylene blue) detects chaotically arranged ovoid bacteria, stained more at their poles. What microorganisms have such properties?

- A. *Y. pestis*
- B. *N. gonorrhoeae*
- C. *T. pallidum*
- D. *L. interrogans*
- E. *M. tuberculosis*

3. A man, who had been in a car accident, was hospitalized into the intensive care unit. Objectively, he is unconscious, blood pressure — 90/60 mm Hg, 24-hour diuresis — 20 mL, high levels of creatinine and urea are observed in the blood. Characterize the patient's 24-hour diuresis.

- A. Anuria
- B. Oliguria
- C. Polyuria
- D. Pollakiuria
- E. Nocturia

4. In the formation of lateral roots, the main role belongs to:

- A. Pericycle
- B. Procambium
- C. Cambium
- D. Apical meristem
- E. Intercalary meristem

5. In cases of carbon monoxide poisoning, tissue respiration becomes inhibited in a person. Under such conditions, activity of a certain enzyme of the respiratory chain becomes sharply reduced. Name this enzyme.

- A. Cytochrome oxidase
- B. Succinate dehydrogenase
- C. NADH dehydrogenase
- D. ATP synthetase
- E. Coenzyme Q

6. What indicator is necessary for titration of a potassium iodide solution using a silver nitrate solution (direct titration)?

- A. Fluorescein
- B. Methyl orange
- C. Ammonium iron(III) sulfate
- D. Starch solution
- E. Tropaeolin 00

7. Name the process, where the chemical interaction occurs between the adsorbate molecules and the active sites of the adsorbent?

- A. Chemosorption
- B. Adsorption
- C. Solvation
- D. Desorption
- E. Sublimation

8. What indicator is used in titrimetric determination of substances using the mercurimetric titration?

- A. Diphenylcarbazide
- B. Potassium chromate
- C. Eriochrome black T
- D. Starch
- E. Tropaeolin 00

9. A 50-year-old patient has been hospitalized in a severe condition. Objectively, the skin and visible mucosa are cyanotic, arterial oxygen saturation — 88%, blood pressure — 90/60 mm Hg, pulse — 117/min, respiratory rate — 22/min. The patient has a history of chronic heart failure. What type of hypoxia is most likely to develop in this case?

- A. Circulatory hypoxia
- B. Anemic hypoxia
- C. Hemic hypoxia
- D. Tissue hypoxia
- E. Hypoxic hypoxia

10. What medium is necessary for determining the halide ions argentometrically using the Volhard method?

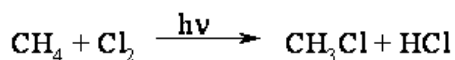
- A. Nitric acid medium
- B. Acetic acid medium
- C. Neutral medium
- D. Weak alkaline medium
- E. Strong alkaline medium

11. What is the name of the technique

of binding extraneous ions in analytical analysis?

- A. Masking
- B. Separation
- C. Removal
- D. Concentration
- E. Coprecipitation

12. What is the mechanism of the methane chlorination reaction that occurs according to the following equation:



?

- A.  $S_R$
- B.  $S_N$
- C.  $S_E$
- D.  $A_N$
- E.  $A_E$

13. After the total resection of the stomach, the patient developed severe B<sub>12</sub>-deficiency anemia with impaired hematopoiesis and altered erythrocytes appearing in the blood. What forms of erythrocytes indicate this disease in the patient, if they are present in the blood?

- A. Megalocytes
- B. Microcytes
- C. Ovalocytes
- D. Normocytes
- E. Annulocytes (codocytes)

14. What cations have the highest mobility among those listed below?

- A. Hydroxonium cations
- B. Sodium cations
- C. Potassium cations
- D. Lithium cations
- E. Ammonium cations

15. A person has been hospitalized with the diagnosis of malaria. What route of infection transmission is characteristic of this disease?

- A. Vector-borne transmission
- B. Fecal-oral transmission
- C. Airborne and droplet transmission
- D. Direct contact transmission
- E. Indirect contact transmission

16. What solution has the highest osmotic pressure at the temperature of 298 K?

- A. Aluminum sulfate solution
- B. Urea solution
- C. Glucose solution
- D. Sodium benzoate solution
- E. Sodium sulfate solution

17. What type of dispersion system is a foam?

- A. Bound dispersion system
- B. Colloidal dispersion system
- C. Ion-molecular system
- D. Hydrosol
- E. Fibrillar system

18. Staphylococci grow well on common nutrient media. However, when isolating pure cultures from patients, blood agar and yolk-salt agar are used for inoculation. What is the purpose of using these nutrient media?

- A. To determine the pathogenicity factors
- B. To determine the tinctorial properties
- C. To study the antigenic properties
- D. To determine the mobility of the bacteria
- E. To measure the sensitivity to antibiotics

19. Chromatographic methods can be classified by the mechanism of the separation process. What type of chromatography is gas-liquid chromatography?

- A. Distribution chromatography
- B. Adsorption chromatography
- C. Ion-exchange chromatography
- D. Gel-filtration chromatography
- E. Affinity chromatography

20. What solution is used to standardize the silver(I) nitrate titrant solution in Mohr's method?

- A. Sodium chloride solution
- B. Sodium carbonate solution
- C. Potassium dichromate solution
- D. Sodium tetraborate solution
- E. Sodium oxalate solution

21. What enzyme is used to synthesize various genes from matrix RNA on DNA in genetic engineering (this enzyme catalyzes the process discovered in RNA viruses)?

- A. Revertase
- B. Exonuclease
- C. DNA ligase
- D. Helicase
- E. Endonuclease

22. Polarography is one of the

electrochemical methods of analysis. What parameter is used in polarographic analysis to identify the substance being analyzed?

- A. Half-wave potential
- B. Magnitude of the electromotive force
- C. Height of the polarographic wave
- D. Position of the polarographic wave
- E. Width of the polarographic wave

23. What method is used for the quantification of bismuth in a preparation?

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

24. What method is used for the quantification of ammonia?

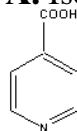
- A. Alkalimetry, back titration
- B. Acidimetry, back titration
- C. Alkalimetry, direct titration
- D. Acidimetry, direct titration
- E. Complexonometry

25. In cases of long-term intoxication, a significant decrease in the activity of aminoacyl-tRNA synthetases can be observed. What metabolic process becomes disturbed in such cases?

- A. Biosynthesis of proteins
- B. DNA replication
- C. DNA repair
- D. Genetic recombination
- E. RNA processing

26. Which one of the listed compounds is an amphoteric one?

A. Isonicotinic acid



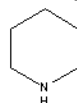
B. Pyridine



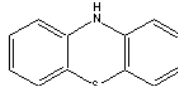
C. Pyrimidine



D. Piperidine



E. Phenothiazine



27. *Amanita phalloides* mushroom contains  $\alpha$ -amanitin toxin and eating it causes poisoning in humans. What enzyme becomes inhibited by this toxin?

- A. RNA polymerase II
- B. DNA polymerase
- C. DNA synthetase
- D. Peptidyl transferase
- E. Translocase

28. What titrant is used in bromatometric titration?

- A.  $KBrO_3$
- B.  $KBr$
- C.  $Br_2$
- D.  $KBrO_4 + KCl$
- E.  $KBrO_4$

29. In what taxonomic division is the gametophyte predominant over the sporophyte during the plant's life cycle?

- A. *Bryophyta*
- B. *Magnoliophyta*
- C. *Pynophyta*
- D. *Lycopodiophyta*
- E. *Polypodiophyta*

30. Gluconeogenesis activates during starvation. What vitamin takes an active part in the process of pyruvic acid carboxylation?

- A. Biotin
- B. Retinol
- C. Calciferol
- D. Nicotinamide
- E. Folacin

31. In March, the kindergarten kitchen made a salad from fresh cabbage that was stored in a cold room. A few hours after a meal, many children developed signs of food poisoning. What microorganisms have likely caused the poisoning, based on the conditions, in which they reproduce?

- A. Psychrophiles
- B. Thermophiles
- C. Mesophiles
- D. Resident
- E. Facultative

32. What is a component of attenuated vaccines?

- A. Live microbes
- B. Killed microbes
- C. Anatoxin
- D. Killed microbes and anatoxin
- E. Immunoglobulins

33. A pharmacy has decided to use the biological method to test the quality of instrument sterilization in an autoclave. What microorganisms should be used for this purpose?

- A. *Bacillus subtilis*
- B. *Streptococcus pyogenes*
- C. *Salmonella typhi*
- D. *Yersinia pestis*
- E. *Borrelia recurrentis*

34. What plant family has plants with storage roots, ribbed hollow stems, compound umbel inflorescences, and fruits that are schizocarpous cremocarps with essential oil channels?

- A. *Apiaceae*
- B. *Rosaceae*
- C. *Musaceae*
- D. *Fabaceae*
- E. *Cucurbitaceae*

35. Alanine is an important substrate of gluconeogenesis in the liver. What is the name of the reaction, in which alanine forms in skeletal muscles from pyruvate?

- A. Transamination
- B. Decarboxylation
- C. Dehydrogenation
- D. Isomerization
- E. Phosphorylation

36. What rule describes the coagulation of sols under the effect of electrolytes?

- A. Schulze-Hardy rule
- B. Gibbs rule
- C. Duclos–Traube rule
- D. Van 't Hoff rule
- E. Arrhenius equation

37. What is the name of the process of spontaneous merging of dispersed phase droplets in emulsions, which causes the separation of the system?

- A. Coalescence
- B. Deformation
- C. Wetting
- D. Contraction
- E. Solubilization

38. Allopurinol is used to treat gout. What is the mechanism of action of this drug?

- A. Competitive inhibitor of xanthine oxidase
- B. Xanthine oxidase activator
- C. Xanthine oxidase coenzyme
- D. Inhibitor of purine nucleotide synthesis
- E. Activator of purine nucleotide catabolism

39. One of the biological functions performed by glycoproteins in the body is a regulatory (hormone) function. What hormone is a glycoprotein based on its chemical nature?

- A. Thyrotropin
- B. Cortisol
- C. Aldosterone
- D. Insulin
- E. Glucagon

40. During active muscle work, anaerobic glycolysis is the main source of energy, causing the accumulation of lactate in the muscles, the level of which gradually decreases. During what interorgan cycle does the utilization of lactate take place afterwards?

- A. Cori cycle
- B. Krebs cycle
- C. Pentose phosphate cycle
- D. Urea cycle
- E. Knoop-Lynen cycle

41. Long-term taking of phenobarbital has resulted in the epilepsy patient developing tolerance to this drug. What is the basis of the development of tolerance?

- A.** Acceleration of biotransformation  
**B.** Weakening of the absorption process  
**C.** Increased sensitivity of receptors  
**D.** Inhibition of biotransformation  
**E.** Accumulation of the substance in the body
- 42.** What side effect is characteristic of captopril?
- A.** Dry cough  
**B.** Increased blood pressure  
**C.** Hyperglycemia  
**D.** Arrhythmia  
**E.** Red color of urine
- 43.** What anticholinesterase agent is used to stimulate intestinal peristalsis in the patients during the postoperative period?
- A.** Neostigmine  
**B.** Epinephrine  
**C.** Metoprolol  
**D.** Salbutamol  
**E.** Suxamethonium
- 44.** A doctor prescribed metoprolol to a patient, which helped to lower the patient's blood pressure. This drug belongs to the following pharmacological group:
- A.** Beta-blockers  
**B.** Alpha-blockers  
**C.** Muscarinic antagonists  
**D.** Nicotinic antagonists  
**E.** Sympatholytics
- 45.** What causes the dry cough that developed in a patient who has been taking lisinopril for a long time to treat her essential hypertension?
- A.** Increased bradykinin levels  
**B.** Depletion of the noradrenaline reserves  
**C.** Accumulation of angiotensin II  
**D.** Inhibition of angiotensin receptors  
**E.** Decreased renin levels
- 46.** A patient with peptic ulcer disease of the duodenum was taking a histamine  $H_2$  receptor blocker. Which one of the listed drugs belongs to this group?
- A.** Famotidine  
**B.** Pirenzepine  
**C.** Omeprazole  
**D.** Mebeverine  
**E.** Allochol
- 47.** Long-term taking of sulfonamides has resulted in the patient developing anemia, leukopenia, and thrombocytopenia. What is the mechanism of development of these disorders?
- A.** Inhibition of hematopoiesis in the bone marrow  
**B.** Destruction of blood elements  
**C.** Intensified use of blood elements  
**D.** Bone marrow stimulation  
**E.** These disorders have not been caused by the medicines
- 48.** An infection caused by phytopathogenic mycoplasmas has spread at a plantation of medicinal plants. What feature characterizes this group of microorganisms?
- A.** They have no cell wall  
**B.** They die in oxygen-containing environments  
**C.** They form spores  
**D.** They do not grow on nutrient media  
**E.** They have one flagellum
- 49.** Microbiological study of dried medicinal plants shows that they are contaminated with clostridia. What feature characterizes this group of microorganisms?
- A.** They form spores  
**B.** They are obligate aerobes  
**C.** They are non-pathogenic for humans  
**D.** They are Gram-negative  
**E.** —
- 50.** What is the name of the single elongated crystals with pointed ends that can be detected during the microscopy of the herbal raw material harvested from a monocotyledonous plant?
- A.** Styloids  
**B.** Globoids  
**C.** Druses  
**D.** Crystalline sand  
**E.** Cystoliths
- 51.** A 71-year-old woman with cholecystitis has developed mechanical jaundice. What type of arrhythmia will develop in this case?
- A.** Sinus bradycardia  
**B.** Sinus tachycardia  
**C.** Extrasystole  
**D.** Atrioventricular block  
**E.** Ciliary arrhythmia
- 52.** A unilocular, single-seeded fruit has a pericarp with an exocarp, a juicy mesocarp, and a lignified endocarp. What plant is it characteristic of?

- A. *Armeniaca vulgaris*
- B. *Quercus robur*
- C. *Leonurus quinquelobatus*
- D. *Coriandrum sativum*
- E. *Potentilla erecta*

53. Plant fatty acids have an odd number of carbon atoms. What product forms as a result of  $\beta$ -oxidation of fatty acids with an odd number of carbon atoms?

- A. Propionyl-CoA
- B. Palmitoyl-CoA
- C. Stearoyl-CoA
- D. Acetoacetyl-CoA
- E. Oxymethylglutaryl-CoA

54. Metal ions in the blood are transported in a complex with proteins. What blood protein contains copper?

- A. Ceruloplasmin
- B. Fibrinogen
- C. Thrombin
- D. Albumin
- E. Fibrinolysin

55. A laboratory has conducted a soil study to identify the causative agents of an anaerobic infection. Spore-forming is a characteristic feature of these bacteria. What staining technique can be used to detect spores?

- A. Ozheshko stain
- B. Burri-Gins stain
- C. Neisser stain
- D. Romanowsky-Giemsa stain
- E. Morozov stain

56. Name the pharmacopoeial method for determining the molecular mass of a high-molecular substance.

- A. Viscometry
- B. Potentiometry
- C. Nephelometry
- D. Osmometry
- E. Cryometry

57. A patient with essential hypertension has been taking loop diuretics as prescribed by the doctor. What water-salt exchange imbalance can develop in this case?

- A. Hypokalemia
- B. Hyperkalemia
- C. Hyponatremia
- D. Hypoglycemia
- E. Hypercalcemia

58. A 2M solution of *HCl* was added into the studied solution, resulting in formati-

on of a white precipitate that dissolved when heated. What cations are present in the solution?

- A.  $Pb^{2+}$
- B.  $Hg^{22+}$
- C.  $Ag^+$
- D.  $Ba^{2+}$
- E.  $Mg^{2+}$

59. Microscopy of a leaf of a heliophyte plant detects several dense layers of elongated chlorophyll-containing cells that are located under the epidermis. These cells are oriented perpendicular to the surface of the leaf. What type of parenchyma is it?

- A. Palisade parenchyma
- B. Spongy parenchyma
- C. Folded parenchyma
- D. Water-storage parenchyma
- E. Storage parenchyma

60. A child with mental retardation has been diagnosed with cretinism. Deficiency of certain hormones is the main factor in the development of the nervous system dysfunction in this case. Name these hormones.

- A. Thyroid hormones
- B. Catecholamines
- C. Estrogens
- D. Androgens
- E. Glucocorticoids

61. People with albinism tend to be very sensitive to sunlight: tan does not develop and they burn very easily. This phenomenon is caused by problems with synthesis of a certain substance. What substance is it?

- A. Melanin
- B. Phenylalanine
- C. Tyrosine
- D. Adrenaline
- E. Thyroxine

62. Nut shells, cherry pits, and wood are hard because of deposition of a certain substance in the cell membrane. What substance is it?

- A. Lignin
- B. Silica
- C. Chitin
- D. Suberin
- E. Calcium carbonate

63. What parameter determines the coagulating power of an electrolyte?

- A. Charge of the coagulator ion
- B. Electrolyte concentration
- C. Sol dispersion degree
- D. Sol volume
- E. Sol density

64. To study the sanitary and microbiological quality of water at a laboratory, the minimum volume of water, in which bacteria of the *Escherichia coli* group can be detected, was determined. According to the State Standard of Ukraine, this value must be no less than:

- A. 300
- B. 100
- C. 200
- D. 400
- E. 500

65. A pregnant woman was administered fenoterol to reduce the uterine tone for the correction of her labor activity. What is the mechanism of the uterolytic effect of this drug?

- A. Stimulation of  $\beta_2$ -adrenoceptors of the uterus
- B. Stimulation of  $\alpha_1$ -adrenoceptors of the uterus
- C. Blocking  $\beta_2$ -adrenoceptors of the uterus
- D. Stimulation of  $\beta_2$ - and  $\alpha_1$ -adrenoceptors of the uterus
- E. Direct antispasmodic effect

66. A 65-year-old man developed third-degree atrioventricular block with unstable hemodynamics. What medicine should be prescribed for this patient?

- A. Atropine
- B. Clonidine
- C. Metoprolol
- D. Pirenzepine
- E. Propranolol

67. For the treatment of burns, the patient was prescribed a 2% antiseptic solution that forms manganese dioxide, when interacting with tissues, and has an astringent and anti-inflammatory effect. Name this drug.

- A. Potassium permanganate
- B. Hydrogen peroxide
- C. Lugol's solution
- D. Phenol
- E. Brilliant green

68. A 65-year-old patient has been diagnosed with prostate adenoma. What adrenoblocker should he be prescribed?

- A. Doxazosin
- B. Atenolol
- C. Propranolol
- D. Metoprolol
- E. Nifedipine

69. A patient with epilepsy was prescribed sodium valproate. What is the mechanism of action of this drug?

- A. Increasing GABA levels in the brain
- B. Stimulation of  $\alpha$ -adrenergic receptors
- C. Stimulation of opioid receptors
- D. Stimulation of butyrylcholinesterase activity
- E. Stimulation of  $\beta$ -adrenergic receptors

70. Hydrochloric acid (HCl) was added to the analyte solution. The resulting precipitate was filtered and treated with hot water on the filter. After cooling, KI solution was added to the filtrate. What cation is present in the solution if the obtained precipitate is yellow?

- A.  $Pb^{2+}$
- B.  $Ag^+$
- C.  $Hg^{2+}$
- D.  $Ca^{2+}$
- E.  $Ba^{2+}$

71. In a plant being studied, epidermis of some of the leaves has a thick cuticle and a layer of wax on the surface, while epidermis of the other leaves has scales or numerous trichomes and only a few stomata. What group does this plant belong to?

- A. Xerophytes
- B. Mesophytes
- C. Hydrophytes
- D. Hygrophytes
- E. Ephemerals

72. Stone cells shaped like dumbbells or tubular bones were detected in begonia leaves. What type of cells do they belong to?

- A. Osteosclereids
- B. Macrosclereids
- C. Astrosclereids
- D. Trichosclereids
- E. Fibrosclereids

73. A 30-year-old woman complains of frequent nosebleeds. Objectively, she presents with pale skin, dystrophic changes in her nails, dry and brittle hair. Complete blood count: erythrocytes —  $2.9 \cdot 10^{12}/L$ , Hb — 70 g/L, color index —

0.5, serum iron — 5  $\mu\text{m/L}$ , leukocytes —  $6.0 \cdot 10^9/\text{L}$ , annulocytes (codocytes), poikilocytosis, microcytosis. What type of anemia is observed in the patient?

- A. Iron deficiency anemia
- B. Sickle cell anemia
- C.  $B_{12}$  and folate deficiency anemia
- D. Hemolytic anemia
- E. Minkowski-Chauffard syndrome

74. A patient with a hypertensive crisis was administered magnesium sulfate, which resulted in a sharp drop of the patient's blood pressure. What drug can be used in this case to eliminate the side effects of magnesium sulfate?

- A. Calcium chloride
- B. Potassium chloride
- C. Trilon B (EDTA disodium salt)
- D. Sodium bromide
- E. Sodium sulfate

75. Who is the author(s) of the following rule: "On the surface of a crystalline substance, ions that are a part of the crystal lattice or are isomorphic to them are preferentially adsorbed, forming a sparingly soluble compound with the ions of the crystal"?

- A. Fajans, Paneth
- B. Duclos, Traube
- C. Rebinder
- D. Van 't Hoff
- E. Schulze, Hardy

76. What titrimetric method of analysis is used for the quantification of calcium chloride?

- A. Permanganatometry, back titration
- B. Cerimetry, direct titration
- C. Permanganatometry, direct titration
- D. Nitritometry, direct titration
- E. Acidimetry, back titration

77. What is the taxonomic division of a plant with periphloematic fibrovascular bundles that were detected during the study of the anatomical structure of its rhizome?

- A. Polypodiophyta
- B. Bryobionta
- C. Angiosperms
- D. Gymnosperms
- E. Green algae

78. What coordinates are used to build monomolecular adsorption isotherms?

- A. Adsorption — concentration
- B. Surface tension — concentration
- C. Inverse adsorption — inverse concentration
- D. Logarithm of adsorption — concentration
- E. Inverse adsorption — concentration

79. A fibrinolysis inhibitor was used to stop the postpartum bleeding. Name this drug.

- A. Aminocaproic acid
- B. Hemostatic sponge
- C. Calcium chloride
- D. Nettle leaves
- E. Thrombin

80. The breakdown of hemoglobin is accompanied by the formation of bile pigments. What pigment forms as a result of the heme oxidation reaction?

- A. Biliverdin
- B. Chlorophyll
- C. Stercobilinogen
- D. Urobilinogen
- E. Carotene

81. An analytical chemist conducts a qualitative analysis of phosphate ions using a pharmacopoeial reaction that resulted in the formation of a yellow precipitate. What reagent did the chemist use?

- A. Silver nitrate
- B. Sodium nitrate
- C. Potassium chloride
- D. Potassium nitrate
- E. Hydrochloric acid

82. A leaf has 5-7 identical veins that branch many times. What type of leaf venation is it?

- A. Palmate reticulate
- B. Palmate marginal
- C. Parallel
- D. Arcuate
- E. Pinnate reticulate

83. Select lyophilic systems among the dispersion systems listed below.

- A. Surfactant solutions
- B. Emulsions
- C. Suspensions
- D. Sols
- E. Solid foams

84. An iodine solution was prepared using the method of established titer. What primary standards can be used for the



standardization in this case?

- A.** Hydrazine sulfate and arsenic(III) oxide
- B.** Ammonium oxalate and oxalic acid
- C.** Metallic iron and iron(II) sulfate
- D.** Potassium dichromate and potassium bromate
- E.** Sodium tetraborate and sodium carbonate

**85.** Nitritometry is used to determine primary aromatic amines. What indicator is used in the process?

- A.** Tropaeolin 00
- B.** Methyl orange
- C.** Phenolphthalein
- D.** Potassium chromate
- E.** Eosin

**86.** Some cells in a leaf have lignified membranes. Name these cells.

- A.** Sclereids
- B.** Collenchyma
- C.** Sieve tubes
- D.** Trichomes
- E.** Companion cells

**87.** A patient with tuberculosis has developed impaired hearing after a long-term antibiotic treatment. What drug has caused such an ototoxic effect in this case?

- A.** Streptomycin
- B.** Ampicillin
- C.** Ceftriaxone
- D.** Benzylpenicillin
- E.** Pefloxacin

**88.** What type of pharmacotherapy is it, when antibiotics are used in treatment of infectious diseases?

- A.** Etiotropic therapy
- B.** Pathogenetic therapy
- C.** Substitution therapy
- D.** Symptomatic therapy
- E.** Stimulating therapy

**89.** What factor will cause an increase in glomerular filtration in the kidneys?

- A.** Reduced oncotic blood pressure
- B.** Reduced hydrostatic pressure in the glomerular capillaries
- C.** Reduced number of functioning glomeruli
- D.** Increased oncotic blood pressure
- E.** Increased intra-renal pressure

**90.** Megaloblasts and a high color index were detected in the patient's blood. The

diagnosis of megaloblastic anemia was established. What drug should be prescribed in this case?

- A.** Cyanocobalamin
- B.** Pyridoxine
- C.** Ascorbic acid
- D.** Rutin
- E.** Tocopherol acetate

**91.** In a patient with jaundice, increased levels of direct bilirubin and cholemia were detected in the blood. No stercobilinogen was detected in urine. What disorder is observed in this case?

- A.** Mechanical jaundice
- B.** Hemolytic jaundice
- C.** Parenchymal jaundice
- D.** Gilbert's syndrome
- E.** Crigler-Najjar syndrome

**92.** Cytochrome oxidase enzyme blockade has occurred in the patient as a result of cyanide poisoning. What type of hypoxia develops in this case?

- A.** Tissue hypoxia
- B.** Hemic hypoxia
- C.** Circulatory hypoxia
- D.** Respiratory hypoxia
- E.** Stagnant hypoxia

**93.** Under what condition is the solubilization process possible?

- A.** Surfactant is in the form of micelles
- B.** Surfactant is in the form of molecules
- C.** Surfactant was comminuted before the dissolution
- D.** Solute has high solubility in a certain solvent
- E.** Surfactant concentration in the solution is arbitrary

**94.** During what process does the entropy of a system decrease?

- A.** Polymerization
- B.** Evaporation
- C.** Dissociation
- D.** Dissolution
- E.** Sublimation

**95.** A 23-year-old patient has laryngeal diphtheria that manifests as classic clinical signs with the development of true croup. What type of inflammation is characteristic of this disease?

- A. Fibrinous
- B. Serous
- C. Purulent
- D. Putrid
- E. Croupous

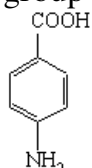
96. A stool sample obtained from a patient with suspected shigellosis was inoculated on the Ploskirev nutrient medium. What will be the color of the colonies of the dysentery pathogen in this medium?

- A. Colorless
- B. Blue-violet
- C. Red with a metallic sheen
- D. Yellow
- E. Dark brown

97. A patient developed neuritis of the facial nerve after 5 months of anti-tuberculosis treatment. What drug has caused this side effect?

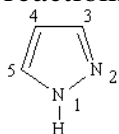
- A. Isoniazid
- B. Benzylpenicillin sodium
- C. Ceftriaxone
- D. Rifampicin
- E. Sodium para-aminosalicylate

98. What reagent reacts with the amino group of p-aminobenzoic acid?



- A.  $(CH_3CO)_2O$
- B.  $NaOH$
- C.  $NaHCO_3$
- D.  $SOCl_2$
- E.  $Br_2$

99. At what position in the pyrazole molecule do electrophilic substitution reactions occur?

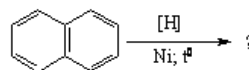


- A. 4
- B. 5
- C. 3
- D. 2
- E. 1

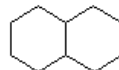
100. What compound is the base for organic dyes and belongs to isolated polynuclear arenes?

- A. Triphenylmethane
- B. Benzene
- C. Anthracene
- D. Phenanthrene
- E. Cumene

101. What compound forms during the complete hydrogenation of naphthalene?



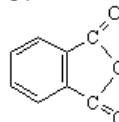
A.



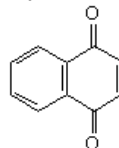
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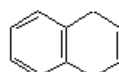
C.



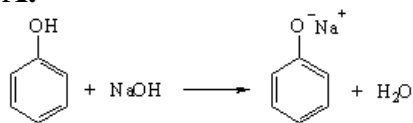
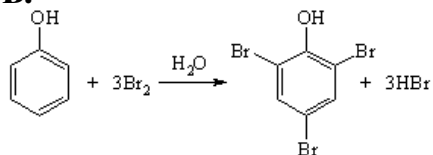
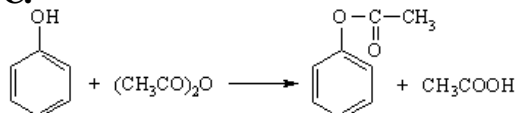
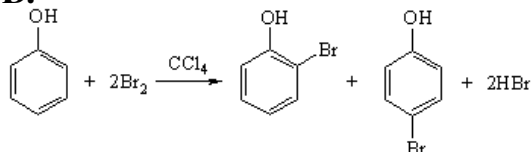
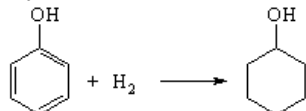
D.



E.



102. What reaction proves that phenol exhibits acidic properties?

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

**103.** Amino acids take part in methylation reactions during the synthesis of a number of bioactive substances — adrenaline, melatonin, phosphatidylcholine, creatine. For the synthesis of these compounds, the active form of a certain amino acid is used. Name this amino acid.

- A. Methionine
- B. Phenylalanine
- C. Threonine
- D. Alanine
- E. Valine

**104.** At the beginning of the bacteriological study, microscopy of the studied material was carried out and Gram-positive cocci were detected in it. The cocci were arranged in the clusters that resembled a bunch of grapes. Next, the material was inoculated on a dense nutrient medium. Why was it done?

- A. To obtain isolated colonies
- B. To obtain the pure culture
- C. To study the cultural properties
- D. To study the biochemical properties
- E. To study the antigenic properties

**105.** What is the mechanism of  $\text{Br}_2$

attaching to propene?

- A.  $\text{A}_\text{E}$
- B.  $\text{S}_\text{E}$
- C.  $\text{S}_\text{R}$
- D.  $\text{A}_\text{N}$
- E.  $\text{S}_\text{N}$

**106.** After parenteral administration of iron preparations, the patient presents with pain behind the sternum and redness of the face and neck. What drug should be administered in this case?

- A. Deferoxamine
- B. Cyanocobalamin
- C. Ascorbic acid
- D. Vitamin A
- E. Folic acid

**107.** During the morphological analysis of a flower, the presence of a reduced perianth in the form of two membranes — lodicules — was established. Its stamens have long staminal filaments. Its pistil has a feathery stigma. This description is characteristic of the plants that belong to the following family:

- A. *Poaceae*
- B. *Alliaceae*
- C. *Convallariaceae*
- D. *Lamiaceae*
- E. *Pinaceae*

**108.** The surface activity of diphilic molecules can be described using the Traube-Duclos rule. How will the surface activity of fatty acids change in the area of low concentrations, if the length of the hydrocarbon radical increases by three  $-\text{CH}_2-$  groups?

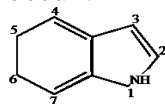
- A. It will become 27 times higher
- B. It will become 3 times lower
- C. It will become 27 times lower
- D. It will become 9 times higher
- E. It will remain unchanged

**109.** A solution contains anions of organic acids. When a solution of iron(III) chloride was added, a pink-yellow precipitate formed. What anions are present in the solution?

- A. Benzoate anions
- B. Oxalate anions
- C. Tetraborate anions
- D. Carbonate anions
- E. Formate anions

**110.** At what position in the indole molecule does its nitration reaction

occur?



- A. 3
- B. 1
- C. 2
- D. 4
- E. 5

**111.** The antitumor agent 5-fluorouracil blocks the enzyme that attaches the methyl group to deoxyuridine monophosphate (dUMP). What reaction becomes inhibited, when this medicine is used?

- A. Synthesis of thymidine monophosphate
- B. Synthesis of glucose monophosphate
- C. Synthesis of adenosine monophosphate
- D. Synthesis of guanosine monophosphate
- E. Synthesis of glycerol monophosphate

**112.** What drug is used in treatment of herpes infection?

- A. Acyclovir
- B. Rimantadine
- C. Sabin's vaccine
- D. Gamma globulin
- E. Ozeltamivir

**113.** The products of condensation of aldehydes with hydroxylamine belong to the following class:

- A. Aldoximes
- B. Ketoximes
- C. Hydrazones
- D. Hemiacetals
- E. Hydrazides

**114.** Examination of the sputum of a patient with suspected pneumonia detects blue-violet lanceolate cocci with a capsule, arranged in pairs. What staining method has been used to detect the capsule?

- A. Burri-Gins stain
- B. Ozheshko stain
- C. Neisser stain
- D. Gram stain
- E. Ziehl-Neelsen stain

**115.** Aggression enzymes are characteristic of pathogenic microorganisms. Select one such aggression enzyme from the list.

- A. Lecithinase
- B. Transferase
- C. Catalase
- D. Lyase
- E. Lactamase

**116.** Primary and secondary nitroalkanes are tautomeric compounds. What tautomerism is characteristic of these compounds?

- A. Aci-nitro tautomerism
- B. Amino-imino tautomerism
- C. Tautomerism of azoles
- D. Keto-enol tautomerism
- E. Lactam-lactim tautomerism

**117.** A patient developed a keloid scar at the site of skin inflammation. This condition is associated with an abnormal course of a certain stage of inflammation. Name this stage.

- A. Proliferation
- B. Exudation
- C. Primary alteration
- D. Secondary alteration
- E. Progression

**118.** The breakdown of starch in the body is a catalytic process that occurs with the help of amylase. What type of catalysis is it?

- A. Enzymatic catalysis
- B. Heterogeneous catalysis
- C. Autocatalysis
- D. Acid-base catalysis
- E. Redox catalysis

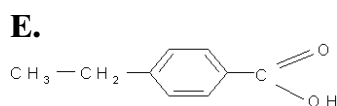
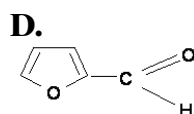
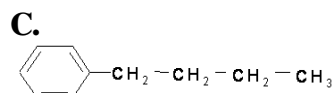
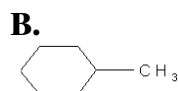
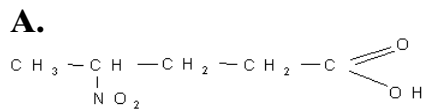
**119.** In pharmacy, extraction is used to extract bioactive substances from herbal raw materials. What law underlies this process?

- A. Distribution law
- B. Law of mass action
- C. Ostwald's law
- D. Konovalov's law
- E. Poiseulle's law

**120.** What substance is a mediator of delayed-type hypersensitivity?

- A. Lymphokines
- B. Histamine
- C. Bradykinin
- D. Serotonin
- E. Prostaglandins

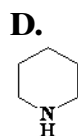
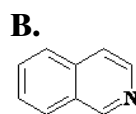
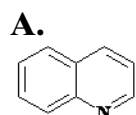
**121.** What compound is an aliphatic one?



**122.** A potassium chromate solution was added to the analyte solution, resulting in a yellow precipitate that can be dissolved in acetic acid. What cations are present in the solution, as indicated by this qualitative reaction?

- A.** Strontium cations
- B.** Potassium cations
- C.** Ammonium cations
- D.** Magnesium cations
- E.** Sodium cations

**123.** Select the quinoline formula among the given compounds.



**124.** A pharmaceutical factory has received a batch of a herbal raw material that, based on the external signs, was affected by a viral disease. What modern method of diagnostics should be used for the specific detection of viral nucleic acids in plants?

- A.** Molecular hybridization
- B.** Hemagglutination reaction
- C.** Hemagglutination inhibition reaction
- D.** Indirect hemagglutination reaction
- E.** Enzyme-linked immunosorbent assay

**125.** What pair of electrodes is used in potentiometric redox titration?

- A.** Platinum electrode and silver chloride electrode
- B.** Silver electrode and platinum electrode
- C.** Copper electrode and zinc electrode
- D.** Glass electrode and silver chloride electrode
- E.** Silver sulfide electrode and silver chloride electrode

**126.** Polymerase chain reaction (PCR) is widely used in modern laboratory diagnostics. What can be detected using this reaction?

- A.** Nucleic acid of the microorganism
- B.** Antigen of the microorganism
- C.** Antibodies to the microorganism
- D.** Autoimmune disease
- E.** Allergy to the pathogen

**127.** What reagent can be used to distinguish ethanol ( $\text{C}_2\text{H}_5\text{OH}$ ) from glycerine ( $\text{CH}_2\text{OH} - \text{CHOH} - \text{CH}_2\text{OH}$ )?

- A.**  $\text{Cu}(\text{OH})_2$
- B.**  $\text{HBr}$
- C.**  $\text{FeCl}_3$
- D.**  $\text{KMnO}_4$
- E.**  $\text{Ag}_2\text{O}$

**128.** What is the color of the solution formed as a result of the reaction between salicylate ions and  $\text{Fe}^{3+}$  ions in an acidic environment?

- A.** Violet
- B.** Green
- C.** Blue
- D.** Black
- E.** Brown

**129.** In the patient's blood, increased activity of AST, LDH1, LDH2, and CPK was detected. In what organ is a pathological process possible in this case?

- A. Heart muscle
- B. Skeletal muscles
- C. Kidneys
- D. Liver
- E. Adrenal glands

130. What disaccharide is a reducing one?

- A. Maltose
- B. Ribose
- C. Sucrose
- D. Cellulose
- E. Starch

131. A patient has been hospitalized with signs of ascites. The doctor prescribed the patient spironolactone to enhance the diuretic effect of hydrochlorothiazide. What effect does this drug have apart from the diuretic effect?

- A. Potassium-sparing
- B. Antispasmodic
- C. Analgesic
- D. Sedative
- E. Irritant

132. Because of its antiplatelet effect, acetylsalicylic acid is used in the treatment of diseases of the cardiovascular system. What mechanism is this effect based on?

- A. Inhibition of thromboxane A<sub>2</sub> biosynthesis
- B. Inhibition of COX-1 enzyme activity
- C. Inhibition of COX-2 enzyme activity
- D. Stimulation of synthesis of E<sub>1</sub> prostaglandins
- E. Reduction of synthesis of E<sub>2</sub> prostaglandins

133. A dithizone solution was added into the studied alkaline solution of cations that belong to the IV analytical group. As a result, a compound formed that was coloring not only the organic but also the aqueous phase in red. What cations are present in the solution, as indicated by this analytical effect?

- A. Zn<sup>2+</sup>
- B. Fe<sup>3+</sup>
- C. Cr<sup>3+</sup>
- D. Bi<sup>3+</sup>
- E. Al<sup>3+</sup>

134. A child presents with increased nervous excitability, spontaneous tetany attacks, dry skin, brittle nails and hair, and subcutaneous calcifications in the area of the auricles. What hormone is deficient in this case, causing the described changes?

- A. Parathyroid hormone
- B. Thyroid hormones
- C. Vasopressin
- D. Progesterone
- E. Oxytocin

135. Phosphorylation reactions are catalyzed in the cell by enzymes that have the trivial name of "kinases". What class of enzymes do they belong to?

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

136. Interleukin-1 is one of the secondary pyrogens in a fever. What cells are the main producers of this pyrogen?

- A. Macrophages
- B. Tissue basophils
- C. Platelets
- D. Lymphocytes
- E. Eosinophils

137. To isolate a pure culture of the disease's pathogen, its specific biological properties were used: growth at low temperatures, type of respiration, pathogenicity for laboratory animals, growth on selective nutrient media, and the ability for "creeping growth" on the surface of the medium. What microbial culture is expected to be isolated in this case?

- A. *Proteus vulgaris*
- B. *Yersinia pestis*
- C. *Pseudomonas aeruginosa*
- D. *Staphylococcus aureus*
- E. *Enterococcus faecalis*

138. A patient at the gastroenterological department presents with disturbed digestion of proteins, which is why the activation of the decay of proteins can be observed in the patient's large intestine. What compound forms in a large amount under these conditions?

- A. Putrescine
- B. Cholesterol
- C. Glucose
- D. Glycerine
- E. Glycogen

139. Analysis of a sedative herbal tea detects yellow-green infructescences (microstrobiles) formed by bract scales with a tile-like arrangement and small nut-like fruits. What plant can be characterized by

such features?

- A. *Humulus lupulus*
- B. *Alnus glutinosa*
- C. *Schizandra chinensis*
- D. *Juniperus communis*
- E. *Ephedra distachya*

140. What plant is a component of the pectoral herbal tea and has characteristic basal long-petiolate, broadly ovate leaves that are white and downy from below and dark green, bare, and glossy from above?

- A. *Tussilago farfara*
- B. *Sambucus nigra*
- C. *Verbascum phlomoides*
- D. *Origanum vulgare*
- E. *Thymus serpyllum*

141. A herbaceous plant has erect stems, branching in their upper part. Dark receptacles run through its leaves and flowers. Its inflorescence is an apical corymb with yellow flowers. Its fruit is a trihedral capsule. What plant has such characteristic features?

- A. *Hypericum perforatum*
- B. *Ledum palustre*
- C. *Thea sinensis*
- D. *Capsella bursa-pastoris*
- E. *Althaea officinalis*

142. A modern drug that inhibits the HMG-CoA reductase enzyme and reduces cholesterol synthesis was received by a pharmacy chain. Name this drug.

- A. Atorvastatin
- B. Lisinopril
- C. Furosemide
- D. Hydrochlorothiazide
- E. Enalapril

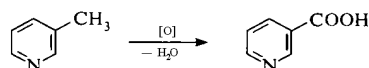
143. A patient with essential hypertension has been prescribed a drug with an anti-anginal, hypotensive, and antiarrhythmic effect. Name this drug.

- A. Metoprolol
- B. Epinephrine
- C. Clonidine
- D. Dopamine hydrochloride
- E. Fenoterol

144. A patient with food poisoning, accompanied by diarrhea and multiple episodes of vomiting, developed dehydration. What type of total blood volume disorder can be observed in this case?

- A. Polycythemic hypovolemia
- B. Oligocythemic hypovolemia
- C. Normocythemic hypovolemia
- D. Polycythemic hypervolemia
- E. Oligocythemic hypervolemia

145. What compound will form as a result of 3-methylpyridine oxidation according to the scheme given below?

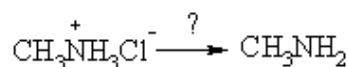


- A. Nicotinic acid
- B. Picolinic acid
- C. Isonicotinic acid
- D. 2-Hydroxypyridine
- E. 3-Hydroxypyridine

146. What reaction can be used to obtain butane  $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{CH}_3$  from chloroethane  $\text{CH}_3 - \text{CH}_2 - \text{Cl}$ ?

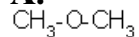
- A. Wurtz reaction
- B. Kucherov reaction
- C. Kononov reaction
- D. Zinin reaction
- E. Finkelstein reaction

147. What reagent is used to transform methylammonium chloride into methylamine?

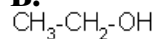


- A.  $\text{NaOH}$
- B.  $\text{HCl}$
- C.  $\text{O}_2$
- D.  $\text{N}_2$
- E.  $\text{Br}_2$

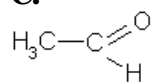
148. What compound among the listed substances does not result in a positive iodoform test?

**A.**

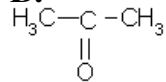
Dimethyl ether

**B.**

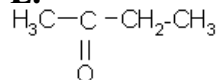
Ethanol

**C.**

Ethanal

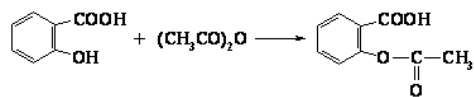
**D.**

Acetone

**E.**

Methyl ethyl ketone

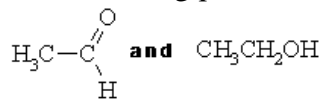
**149.** Acetylsalicylic acid forms as a result of the following reaction:



What type of reaction is it?

**A.** Acylation**B.** Reduction**C.** Addition**D.** Electrophilic substitution**E.** Abstraction

**150.** What reagent can be used to tell apart the following pair of compounds?

**A.**  $[\text{Ag}(\text{NH}_3)_2]\text{OH}$ **B.**  $\text{NaOH}$ **C.**  $\text{HCl}$ **D.**  $\text{FeCl}_3$ **E.**  $\text{NaNO}_2 + \text{HCl}$