

1. What is the mechanism of action of beta-lactam antibiotics?

- a. Inhibition of DNA gyrase
- b. Disruption of DNA synthesis
- c. Inhibition of cytoplasmic \ membrane synthesis
- d. Inhibition of protein synthesis \ in ribosomes
- e. Inhibition of cell wall synthesis**

2. To obtain exotoxins of some microorganisms, these microorganisms are inoculated into liquid nutrient medium, where microbial cultivation occurs and toxins are produced. At a certain stage it is necessary to remove the microbial cells from the medium, that is, to separate the toxins from microbes. What method should be applied in this case?

- a. Bacteria-excluding filters**
- b. Disinfectants (chloramine)
- c. Boiling
- d. Autoclaving
- e. Ultraviolet irradiation

3. A doctor has prescribed a nonsteroidal anti-inflammatory drug to relieve inflammation and pain syndrome. Name this drug:

- a. Diclofenac sodium**
- b. Fentanyl
- c. Glibenclamide
- d. Loratadine
- e. Paracetamol

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

- a. Ionic size
- b. Adsorbability
- c. Hydration ability
- d. Polarization
- e. Ionic charge**

5. What family of viruses has a unique reverse transcriptase enzyme?

- a. Retroviruses**
- b. Flaviviruses
- c. Togaviruses
- d. Picornaviruses
- e. Reoviruses

6. A man has undergone a course of radiotherapy and chemotherapy. The drug complex included 5-fluorodeoxyuridine that is an inhibitor of thymidylate synthase. This drug blocks the synthesis of a certain substance. What substance is it?

- a. mRNA
- b. DNA**
- c. tRNA
- d. rRNA
- e. Protein

7. Первинні та вторинні нітроалкани є таутомерними сполуками. Яка таутомерія характерна для них?

- a. Кето-енольна
- b. Аци-нітротаутомерія**
- c. Лактам-лактимна
- d. Аміно-імінна
- e. Азольна

8. Name the ability of high-molecular compounds to prevent precipitation of lyophobic sols and deposition of cholesterol plaques on the vessel walls:

a. Colloid protection

- b. Coacervation
- c. Thixotropy
- d. Sedimentation
- e. Coagulation

9. The third analytical group of cations (acid-base classification) includes  $\text{Ca}^{2+}$ ,  $\text{Sr}^{2+}$ ,  $\text{Ba}^{2+}$ . What acid can function as a precipitator agent (group reagent) for these cations?

a.  $\text{H}_2\text{SO}_4$

- b.  $\text{HNO}_3$
- c.  $\text{CH}_3\text{COOH}$
- d.  $\text{HCl}$
- e.  $\text{HClO}_4$

10. During bacteriology of the feces of a patient with diarrhea, a pure culture of rod-shaped, slightly bent microorganisms was isolated. In the microslide, these microorganisms resemble schools of fish. Their inoculation on alkaline media (alkaline peptone water) results in formation of a blue-tinted film after 6 hours. What pathogen has such properties?

- a. Spirochetes
- b. Escherichia coli
- c. Salmonellae

d. Vibrio cholerae

- e. Mycobacteria

11. Rhizome of a species belonging to the Asteraceae family is polycephalous, succulent, has lysigenous cavities, accumulates inulin. Such underground organ is characteristic of:

- a. Helianthus annuus
- b. Digitalis grandiflora

c. Inula helenium

- d. Sorbus aucuparia
- e. Hyoscyamus niger

12. До якого виду хроматографії відносять метод газорідинної хроматографії?

a. Розподільної

- b. Гель-хроматографії
- c. Іоннообмінної
- d. Адсорбційної
- e. Афинної

13. The presence of antibodies to HIV has been established in the analyzed serum by means of enzyme-linked immunosorbent assay. What method or reaction must be used to confirm the diagnosis of AIDS?

- a. Biological method
- b. Virological method

c. Immunoblotting

- d. Immunofluorescence
- e. Bacteriological method

14. The second stage of detoxification involves joining certain chemical compounds with functional groups of toxins. Select one such compound:

- a. Cholesterol
- b. Pyruvate
- c. Glucose

d. Glucuronic acid

- e. Higher fatty acids

15. For the symptomatic treatment of diarrhea, the doctor prescribed the patient a drug that inhibits intestinal peristalsis after making sure that the patient's diarrhea was of non-infectious origin. What drug was prescribed in this case?

- a. Dexamethasone
- b. Mannitol
- c. Loperamide**
- d. Augmentin (Co-amoxiclav)
- e. Thiamine

16. The therapeutic properties of activated charcoal are due to its large specific surface area. Name the phenomenon, when gas absorption occurs only at the surface of a solid object:

- a. Cohesion
- b. Adhesion
- c. Recuperation
- d. Adsorption**
- e. Desorption

17. The bacterial culture obtained from a patient does not grow when exposed to oxygen. Conditions suitable for bacterial culture growth can be created in:

- a. Krotov apparatus
- b. Oxidative medium
- c. Pasteur oven
- d. Serum-supplemented medium
- e. Anaerobic culture jar**

18. A patient demonstrates symmetrical dermatitis on the palms. A doctor made a diagnosis of pellagra. What vitamin deficiency can result in such symptoms?

- a. Nicotinic acid**
- b. Folic acid
- c. Cobalamin
- d. Ascorbic acid
- e. Cholecalciferol

19. Which of the listed plants is a bush with imparipinnate leaves, decussate leaf arrangement, and juicy black fruits?

- a. Sambucus nigra**
- b. Arctostaphylos uva-ursi
- c. Ledum palustre
- d. Urtica dioica
- e. Chelidonium majus

20. What drug should be prescribed to a patient with bronchospasm?

- a. Bisacodyl
- b. Salbutamol**
- c. Insulin
- d. Vicasol (Menadione)
- e. Oxytocin

21. What indicator is used, when sodium carbonate is being quantified in the preparation by means of acid-base titration?

- a. Ferroin
- b. Murexide
- c. Methyl orange**
- d. Methylene blue
- e. Diphenylamine

22. A woman, who works at a factory that produces phenylhydrazine, came to a hospital with complaints of general weakness, dizziness, and drowsiness. Her blood has signs of anemia with high levels of reticulocytosis, anisocytosis, and poikilocytosis; isolated normocytes are present in the woman's blood. What type of anemia is it?

- a. Iron-deficiency anemia
- b. Aplastic anemia

- c. Metaplastic anemia
- d. Protein-deficiency anemia
- e. Hemolytic anemia**

23. An analytical chemist performs a qualitative analysis of cations that belong to the sixth analytical group. If nickel ions are processed with Chugaiev's reagent (dimethylglyoxime), a colored compound is produced. What is the color of the resulting compound?

- a. Violet
- b. Yellow

- c. Red**
- d. Blue
- e. Green

24. What parameter takes into account the deviation of the properties of a real solution from an ideal one?

- a. Degree of dissociation
- b. Concentration
- c. Fugacity

**d. Activity**

- e. Isotonic coefficient

25. In the roots of primary structure, the nutrient reserves are stored in the:

**a. Mesodermis**

- b. Central axial cylinder
- c. Exodermis
- d. Pericycle
- e. Endodermis

26. In order to carry out the silver cations identification, HCl was added to the solution. Later, the formed solution was followed by adding the solution of ammonia. Specify which of the below-mentioned compounds are formed in such case?

- a.  $\text{AgCl}$
- b.  $[\text{Ag}(\text{NH}_3)_3]\text{Cl}$
- c.  $[\text{Ag}(\text{NH}_3)_2]\text{Cl}$**
- d.  $\text{AgOH}$
- e.  $[\text{Ag}(\text{NH}_3)_3]\text{Cl}$

27. A human is immune to the plague of cattle and dogs. What type of immunity is it?

- a. Artificial passive
- b. Natural active
- c. Natural passive

**d. Innate**

- e. Artificial active

28. A man came to a doctor complaining of a headache, pain in the throat during swallowing, and an increase in the body temperature. He was diagnosed with tonsillitis. What changes in the patient's blood can be expected in this case?

- a. Lymphocytosis
- b. Monocytosis
- c. Neutrophilic leukocytosis**
- d. Basophilic leukocytosis
- e. Eosinophilic leukocytosis

29. Vitamins can enhance each other's effects, when taken simultaneously. What vitamin potentiates the activity of vitamin P?

- a. C**
- b. B<sub>1</sub>
- c. B<sub>2</sub>
- d. D

e.  $\text{A}^{\cdot}$

30. What reaction occurs according to the free-radical (SR) mechanism?

a.  $\text{C}_6\text{H}_6 + \text{Cl}_2$

b.  $\text{C}_2\text{H}_6 + \text{Cl}_2$

c.  $\text{CH}_3\text{-CH}_3 + \text{O}_2$

d.  $\text{CH}_2=\text{CH}_2 + \text{Cl}_2$

e.  $\text{CH}_3\text{CH}_2\text{OH} + \text{HCl}$

31. During harvesting of a herbal raw material (belladonna), the plants had burns and patches of withering and rot. What microorganisms cause this kind of damage in plants?

a. Viroids

b. Mycoplasma

c. Viruses

d. Protozoa

e. Microfungi

32. During the assessment of air purity in an aseptic unit of a pharmacy, sedimentation analysis resulted in growth of small colonies with areas of hemolysis. What medium was used for inoculation in this case?

a. Blood agar

b. Egg-yolk salt agar

c. Ploskirev agar

d. Levine formulation (eosin methylene blue agar)

e. Endo agar

33. To preserve valuable varietal qualities of peppermint, the optimal method of its propagation was chosen. What method is it?

a. Plantlets

b. Parts of the tuber

c. Germinated seeds

d. Leaf cuttings

e. Parts of the rhizome

34. People, who were indoors during a fire, suffer from a carbon monoxide poisoning. What type of hypoxia is observed in such cases?

a. Hemic hypoxia

b. Circulatory hypoxia

c. Hypoxic hypoxia

d. Tissue hypoxia

e. Respiratory hypoxia

35. What type of fruit is characteristic of *Atropa belladonna*?

a. Hesperidium

b. Capsule

c. Berry

d. Silique

e. Legume

36. Salts and esters of oxalic acid are called:

a. Oxalates

b. Adipinates

c. Malonates

d. Urates

e. Succinates

37. What cation of the third analytical group can be precipitated using the group reagent  $\text{H}_2\text{SO}_4$  only in the presence of ethanol (binds water and concentrates the solution)?

a.  $\text{Ca}^{2+}$

- b.  $K^{+}$
- c.  $Sr^{2+}$
- d.  $Na^{+}$
- e.  $Ba^{2+}$

38. Який із патогенетичних факторів відіграє провідну роль у розвитку набряків у пацієнтів після тривалого голодування?

- a. Зниження осмотичного тиску крові
- b. Зниження онкотичного тиску крові**
- c. Підвищення осмотичного тиску інтерстиціальної рідини
- d. Зниження гідростатичного тиску крові
- e. Підвищення онкотичного тиску в тканинах

39. A patient with an acute myocardial infarction had been receiving heparin as a component of complex therapy. After a time, the patient developed hematuria. What drug is indicated as an antidote to heparin?

- a. Aminocaproic acid
- b. Neodicoumarin (ethyl biscoumacetate)
- c. Protamine sulfate**
- d. Fibrinogen
- e. Vicasol (Menadione)

40. What can be used to distinguish formic acid from acetic acid?

- a.  $Br_2 (H_2O)$
- b.  $NaOH$
- c.  $H_2SO_4$
- d.  $[Ag(NH_3)_2]OH$**
- e.  $NaHCO_3$

41. A patient has been hospitalized with signs of carbon monoxide poisoning. What type of hypoxia is characteristic of this condition?

- a. Hypoxic hypoxia
- b. Circulatory hypoxia
- c. Hemic hypoxia
- d. Tissue hypoxia
- e. Respiratory hypoxia

42. A drug solution sterilized by means of boiling was tested for sterility. Inoculation on Kitt-Tarozzi medium revealed clostridia. Clostridia survived the boiling because they are:

- a. Prototrophic
- b. Acid-fast
- c. Thermophilic
- d. Spore-formers
- e. Anaerobic

43. A person has been stung by a bee. The stung area developed redness and edema. What is the main mechanism of edema development?

- a. Disturbed lymphatic efflux
- b. Decreased oncotic blood pressure
- c. Increased permeability of the capillaries
- d. Increased hydrostatic blood pressure
- e. Decreased osmotic blood pressure

44. In snake venom there is a substance that causes erythrocyte hemolysis when it is introduced into a human organism. Blood test revealed a large amount of lysolecithin (lysophosphatidylcholine). What enzyme leads to accumulating lysolecithin in blood?

- a. Neuraminidase
- b. Phospholipase A<sub>2</sub>
- c. Phospholipase D

- d. Phospholipase A1
- e. Phospholipase C

45. What reference electrode can be used in the potentiometric analysis of a medicinal substance?

- a. Silver chloride electrode
- b. Glass electrode
- c. Antimony electrode
- d. Zinc electrode
- e. Quinhydrone electrode

46. What substances can be determined by means of substitution titration using the iodometric method?

- a. Weak reducing agents
- b. Saturated hydrocarbons
- c. Strong oxidizing agents
- d. Unsaturated hydrocarbons
- e. Strong reducing agents

47. A patient has been warned that the medicine prescribed to him can cause a cough. Name this medicine:

- a. Lisinopril
- b. Phenyhydine (Nifedipine)
- c. Dichlothiazide (Hydrochlorothiazide)
- d. Clonidine (Clonidine)
- e. Metoprolol

48. What transformation is accompanied by an increase in entropy?

- a.  $\text{N}_2(\text{gas}) + \text{O}_2(\text{gas}) = 2\text{NO}(\text{gas})$
- b.  $\text{NH}_4\text{-NO}_2(\text{solid}) = \text{N}_2(\text{gas}) + 2\text{H}_2\text{O}(\text{gas})$
- c.  $2\text{H}_2\text{S}(\text{gas}) + 3\text{O}_2(\text{gas}) = 2\text{SO}_2(\text{gas}) + 2\text{H}_2\text{O}(\text{gas})$
- d.  $\text{C}_2\text{H}_2(\text{gas}) + \text{H}_2(\text{gas}) = \text{C}_2\text{H}_4(\text{gas})$
- e.  $\text{CaO}(\text{solid}) + \text{CO}_2(\text{gas}) = \text{CaCO}_3(\text{solid})$

49. Який препарат із групи психотропних засобів блокує дофамінові рецептори?

- a. Аміназин (хлорпромазин)
- b. Анальгін (метамізол натрію)
- c. Діазепам
- d. Кофеїн-бензоат натрію
- e. Амітриптилін

50. During photosynthesis within plant cell chloroplasts there is short-term retained starch being produced, which rapidly hydrolyzes into glucose. This starch is called:

- a. Primary
- b. Transitory
- c. Secondary
- d. Resistant
- e. Reserve

51. A 55-year-old man came to a doctor with complaints of acute pain in his big toes. Meat and wine remain permanently in his diet. The doctor suspects gout. What substance must be measured in the patient's blood to confirm this diagnosis?

- a. Bilirubin
- b. Urea
- c. Lactate
- d. Uric acid
- e. Ketone bodies

52. Cultivated annual plant with glands and indumentum has alternate obovate leaves and flat capitulum inflorescences with orange pseudoligulate ray florets and yellow tubular disc florets.

Specify this plant.

- a. *Artemisia absinthium*
- b. *Centaurea cyanus*
- c. *Arctium lappa*
- d. *Calendula officinalis*
- e. *Echinacea purpurea*

53. В яких структурах рослинних клітин накопичується вторинний крохмаль?

- a. Амілопластах
- b. Вакуолях
- c. Протеопластах
- d. Олеопластах
- e. Мітохондріях

54. A solution contains calcium, barium, aluminium, potassium, and sodium cations. Into this solution a small amount of ammonium hydroxide and alizarin solution was added, which resulted in production of red precipitate. What ion was detected as the result of this reaction?

- a. Potassium
- b. Barium
- c. Calcium
- d. Aluminium
- e. Sodium

55. To what electrode will the protein particle move during electrophoresis, if its isoelectric point is 4.0 and the pH of the solution is 5.0?

- a. To the anode
- b. There will be no movement
- c. To the cathode
- d. First to the cathode, and then to the anode
- e. First to the anode, and then to the cathode

56. Hyperlipemia can be observed in 2--3 hours after eating fatty food. 9 hours later lipid content normalizes again. How can this condition be characterized?

- a. Retention hyperlipemia
- b. Alimentary hyperlipemia
- c. Hypertrophic obesity
- d. Hyperplastic obesity
- e. Transport hyperlipemia

57. What reaction can be classified as a pseudo-first-order reaction?

- a. Neutralization
- b. Combustion
- c. Hydrolysis of sucrose
- d. Saponification
- e. Etherification

58. What cations belong to the IV analytical group according to the acid-base classification?

- a. Calcium, strontium, barium, potassium, bismuth
- b. Silver, lead, nickel, potassium, barium, bismuth
- c. Aluminum, zinc, chromium(II), tin(II), tin(IV), arsenic(III), arsenic(V)
- d. Magnesium, calcium, strontium, barium
- e. Sodium, potassium, ammonium, silver, lead

59. What drug is a non-selective beta-blocker?

- a. Atropine
- b. Metoprolol
- c. Anaprilin (Propranolol)
- d. Prozerin (Neostigmine)
- e. Adrenaline hydrochloride



60. What reagents produce a reaction that follows the free radical (SR) mechanism?

- a. Ethane and chlorine in the light
- b. Ethane and oxygen
- c. Ethylene and chlorine
- d. Ethanol and hydrogen chloride
- e. Benzene and chlorine in the presence of  $\text{AlCl}_3$

61. When a galvanic cell operates under standard conditions, the chemical energy of the redox process transforms into the following type of energy:

- a. Electromagnetic energy
- b. Nuclear energy
- c. Thermal energy
- d. Mechanical energy
- e. Electrical energy

62. Proteins are the catalysts of biochemical processes. What type of homogeneous catalysis includes the processes with their participation?

- a. Acid-base catalysis
- b. Redox catalysis
- c. Enzyme catalysis
- d. Coordination catalysis
- e. Gas-phase homogeneous catalysis

63. What cation can be detected with Chugaiev's agent (Dimethylglyoxime)?

- a.  $\text{Co}^{2+}$
- b.  $\text{K}^+$
- c.  $\text{Mn}^{2+}$
- d.  $\text{Ni}^{2+}$
- e.  $\text{Ca}^{2+}$

64. In the process of asexual reproduction, higher spore-forming plants have the ability to form spores, which is an adaptation to life on dry land. What set of chromosomes do their spores have?

- a. Diploid
- b. Polyploid
- c. Haploid
- d. Triploid
- e. Tetraploid

65. What enzyme allows for synthesis of various genes from template RNA to DNA in genetic engineering (this enzyme catalyzes the process observed in RNA-viruses)?

- a. DNA-ligase
- b. Helicase
- c. Endonuclease
- d. Exonuclease
- e. Reverse transcriptase

66. A patient, who has been suffering from chronic glomerulonephritis for the last 4 years, presents with a large amount of protein (4g/L) that appeared in the urinalysis. The levels of triglycerides and cholesterol increased in the patient's blood. What syndrome has complicated the course of the main disease in this case?

- a. Toxic
- b. Asthenic
- c. Hypertensive
- d. Nephrotic
- e. Inflammatory

67.  $\text{CH}_3\text{-CH}_2\text{-OH}$  and  $\text{CH}_3\text{-O-CH}_3$  are a pair of compounds that can be classified as isomers of the following type:

- a. Mirror (optical) isomers

- b. Geometric (cis-trans) isomers
- c. Tautomers
- d. Functional group isomers
- e. Carbon chain isomers

68. Select the halogenated antiseptic that would be preferable for a child to pack in the first aid kit, when going to a summer camp:

- a. Formaldehyde solution
- b. Iodine alcoholic solution
- c. Copper sulfate
- d. Methylene blue
- e. Brilliant green

69. An analytical chemist conducts a qualitative analysis of cations of the second group. What reagent can be used to separate lead chloride from chlorides of other cations of the second group?

- a. Ammonia
- b. Hydrochloric acid
- c. Sodium hydroxide
- d. Sodium chloride
- e. Hot water

70. Osmotic pressure is an important characteristic of biological fluids. Semipermeable membranes are necessary for penetration of solvent molecules. What substance cannot be used as a semipermeable membrane?

- a. Parchment
- b. Collodion film
- c. Gelatine
- d. Glass
- e. Biological membrane

71. Який патогенез розвитку цукрового діабету 1-го типу?

- a. Гіперпродукція соматотропіну
- b. Інсулінорезистентність жирової тканини
- c. Гіперпродукція глюкагону
- d. Аутоімунне ушкодження В-клітин
- e. Гіперпродукція кортизолу

72. Gastric herbal tea contains oval brown lignified "cones" up to 1.5 cm long, which are:

- a. Larix cones
- b. Juniperus galbuli
- c. Cupressus cones
- d. Alnus infructescences
- e. Platycladus orientalis cones

73. To determine the qualitative content of a drug, a sample of the analyte solution was processed with 2M solution of HCl. A white precipitate, soluble in aqueous ammonia solution, was formed. This analytical effect indicates the presence of the following cations:

- a. Tin(II) cations
- b. Silver(I) cations
- c. Lead(II) cations
- d. Mercury(I) cations
- e. Mercury(II) cations

74. Which compound of those listed below is an alicyclic hydrocarbon?

- a. Anthracene
- b. Naphthalene
- c. Benzene
- d. Phenanthrene
- e. Cyclohexene

75. What common property of cation compounds  $\text{Al}^{3+}$ ,  $\text{Zn}^{2+}$ ,  $\text{Cr}^{3+}$ ,  $\text{Sn}^{2+}$  unites them within the IV analytical group (acid-base classification)?

- a. Solubility of hydroxides in an excess ammonia solution
- b. Good solubility of some salts
- c. Insolubility of salts in water
- d. Solubility of hydroxides in acids
- e. Amphotericity of hydroxides

76. What drug has a hypoglycemic effect due to stimulation of pancreatic beta cells?

- a. Prednisolone
- b. Heparin
- c. Adrenaline hydrochloride (epinephrine)
- d. Retabolil (nandrolone)
- e. Glibenclamide

77. Helmholtz energy is the direction criterion of an arbitrary process at a constant:

- a. Entropy and pressure
- b. Temperature and volume
- c. Temperature and pressure
- d. Entropy and volume
- e. Internal energy and volume

78. Preventive examination revealed an enlargement of the patient's thyroid gland, exophthalmos, high body temperature, and an elevated heart rate of 110/min. What hormone levels should be measured in the patient's blood in this case?

- a. Glucagon
- b. Thyroxine
- c. Testosterone
- d. Cortisol
- e. Insulin

79. What cardiac glycoside is obtained from lily of the valley?

- a. Celanid (Lanatoside C)
- b. Adoniside
- c. Digitoxin
- d. Corglycon
- e. Strophanthin K

80. Pathogenic bacteria in the human body can form structures that protect them from phagocytosis. Name these structures.

- a. Inclusions
- b. Mesosomes
- c. Spores
- d. Flagella
- e. Capsule