



STATE NON-PROFIT ENTERPRISE «TESTING BOARD FOR PROFESSIONAL
COMPETENCE ASSESSMENT OF HIGHER EDUCATION TRAINEES IN
MEDICINE AND PHARMACY AT THE MINISTRY OF PUBLIC HEALTH OF
UKRAINE»

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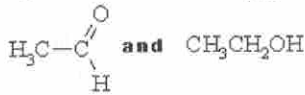
**TEST ITEMS
FOR THE UNIFIED STATE QUALIFICATION EXAM
STAGE 1**

**INTEGRATED TEST EXAM
KROK 1**

**Specialty «PHARMACY, INDUSTRIAL
PHARMACY»**

Specialization «PHARMACY»

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



- A. NaOH
- B. FeCl_3
- C. HCl
- D. $\text{NaNO}_2 + \text{HCl}$
- E. $[\text{Ag}(\text{NH}_3)_2]\text{OH}$

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

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

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

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

4. 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. These disorders have not been caused by the medicines
- B. Intensified use of blood elements
- C. Inhibition of hematopoiesis in the bone marrow
- D. Bone marrow stimulation
- E. Destruction of blood elements

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

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

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

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

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

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

10. 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. Tetraborate anions
- C. Carbonate anions
- D. Formate anions
- E. Oxalate anions

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

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

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

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

13. *Amanita phalloides* mushroom contains α -amanitin toxin and eating it causes poisoning in humans. What enzyme becomes inhibited by this toxin?

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

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

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

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

16. Some cells in a leaf have lignified membranes. Name these cells.

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

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

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

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

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

20. 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 form spores
- C. They die in oxygen-containing environments
- D. They have one flagellum
- E. They do not grow on nutrient media

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

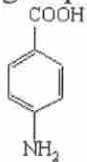
22. Because of its antiplatelet effect, acetylsalicylic acid is used in the treatment of diseases of the cardiovascular system. What mechanism is this effect based on?

- A. Reduction of synthesis of E2 prostaglandins
- B. Inhibition of thromboxane A2 biosynthesis
- C. Inhibition of COX-1 enzyme activity
- D. Stimulation of synthesis of E1 prostaglandins
- E. Inhibition of COX-2 enzyme activity

23. A doctor prescribed metoprolol to a patient, which helped to lower the patient's blood pressure. This drug belongs to the following pharmacological group:

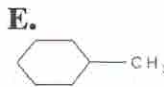
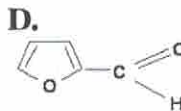
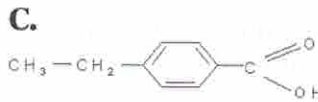
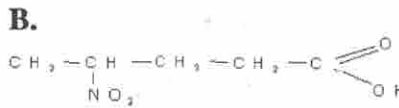
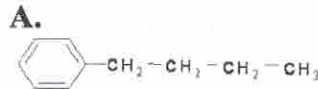
- A. Alpha-blockers
- B. Beta-blockers
- C. Muscarinic antagonists
- D. Sympatholytics
- E. Nicotinic antagonists

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

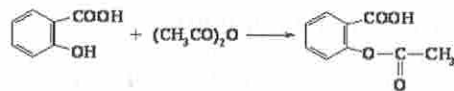


- A. NaHCO_3
- B. SOCl_2
- C. NaOH
- D. $(\text{CH}_3\text{CO})_2\text{O}$
- E. Br_2

25. What compound is an aliphatic one?



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



What type of reaction is it?

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

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

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

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

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

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

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

31. 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. Normocythemmic hypovolemia
- B. Polycythemmic hypovolemia
- C. Polycythemmic hypervolemia *
- D. Oligocythemmic hypervolemia
- E. Oligocythemmic hypovolemia

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

33. 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. Direct antispasmodic effect
- B. Stimulation of β_2 - and α_1 -adrenoceptors of the uterus
- C. Blocking β_2 -adrenoceptors of the uterus
- D. Stimulation of α_1 -adrenoceptors of the uterus
- E. Stimulation of β_2 -adrenoceptors of the uterus

34. 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. Ca^{2+}
- B. Pb^{2+} *
- C. Ba^{2+}
- D. Hg^{2+}
- E. Ag^{+} ✓

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

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

36. 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. Globoids
- B. Crystalline sand *
- C. Druses
- D. Styloids
- E. Cystoliths

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

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

38. What causes the dry cough that developed in a patient who has been taking lisinopril for a long time to treat her essential hypertension?

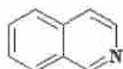
- A. Depletion of the noradrenaline reserves
- B. Increased bradykinin levels
- C. Decreased renin levels
- D. Inhibition of angiotensin receptors
- E. Accumulation of angiotensin II

39. After the total resection of the stomach, the patient developed severe B₁₂-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. Microcytes
- B. Normocytes
- C. Megalocytes
- D. Ovalocytes
- E. Annulocytes (codocytes)

40. Select the quinoline formula among the given compounds.

A.



B.



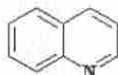
C.



D.



E.



41. What side effect is characteristic of captopril?

- A. Dry cough
- B. Red color of urine
- C. Increased blood pressure
- D. Arrhythmia
- E. Hyperglycemia

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

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

43. What is a component of attenuated vaccines?

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

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

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

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

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

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

47. 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. Acid-base catalysis
- B. Redox catalysis \emptyset
- C. Enzymatic catalysis.
- D. Autocatalysis
- E. Heterogeneous catalysis

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

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

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

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

50. 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. Dehydrogenation
- B. Decarboxylation
- C. Transamination
- D. Phosphorylation \emptyset
- E. Isomerization

51. 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. Adrenal glands \emptyset
- B. Heart muscle
- C. Liver
- D. Kidneys
- E. Skeletal muscles

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

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

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

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

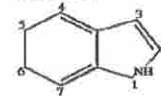
54. A laboratory has conducted a soil study to identify the causative agents of an anaerobic infection. Spore-forming is a characteristic feature of these bacteria. What staining technique can be used to detect spores?

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

55. A 71-year-old woman with cholecystitis has developed mechanical jaundice. What type of arrhythmia will develop in this case?

- A. Sinus tachycardia \bullet
- B. Ciliary arrhythmia
- C. Sinus bradycardia
- D. Atrioventricular block
- E. Extrasystole

56. At what position in the indole molecule does its nitration reaction occur?



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

57. 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. Tissue hypoxia
- B. Anemic hypoxia
- C. Circulatory hypoxia
- D. Hemic hypoxia \emptyset
- E. Hypoxic hypoxia

58. Aggression enzymes are characteristic of pathogenic microorganisms. Select one

such aggression enzyme from the list.

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

59. 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. Ampicillin
- B. Benzylpenicillin
- C. Streptomycin
- D. Ceftriaxone
- E. Pefloxacin

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

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

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

- A. Stimulation of opioid receptors
- B. Stimulation of butyrylcholinesterase activity
- C. Increasing GABA levels in the brain
- D. Stimulation of β -adrenergic receptors
- E. Stimulation of α -adrenergic receptors

62. 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^{2+}
- B. Fe^{3+}
- C. Cr^{3+}
- D. Al^{3+}
- E. Bi^{3+}

63. An iodine solution was prepared using the method of established titer. What primary standards can be used for the standardization in this case?

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

64. 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. Stimulating therapy
- E. Symptomatic therapy

65. What anticholinesterase agent is used to stimulate intestinal peristalsis in the patients during the postoperative period?

- A. Metoprolol
- B. Suxamethonium
- C. Salbutamol
- D. Neostigmine
- E. Epinephrine

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

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

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

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

69. 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. Glucocorticoids
- C. Catecholamines
- D. Estrogens
- E. Androgens

70. What type of dispersion system is a foam?

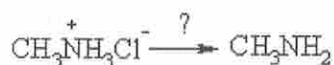
- A. Ion-molecular system
- B. Bound dispersion system
- C. Colloidal dispersion system
- D. Hydrosol
- E. Fibrillar system

71. 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_E
- E. A_N

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



- A. NaOH
- B. HCl
- C. N_2
- D. O_2
- E. Br_2

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

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

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

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

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

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

77. 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?

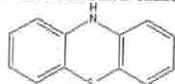
- A. Hemolytic jaundice
- B. Crigler-Najjar syndrome
- C. Gilbert's syndrome
- D. Mechanical jaundice
- E. Parenchymal jaundice

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

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

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

- A. Phenothiazine



- B. Isonicotinic acid



- C. Pyridine



- D. Pyrimidine



- E. Piperidine



80. 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 measure the sensitivity to antibiotics
- C. To study the antigenic properties
- D. To determine the tinctorial properties
- E. To determine the mobility of the bacteria

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

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

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

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

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

84. 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. Mebeverine
- B. Pirenzepine
- C. Allochol
- D. Omeprazole
- E. Famotidine

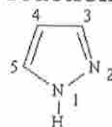
85. What is the mechanism of Br_2 attaching to propene?

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

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

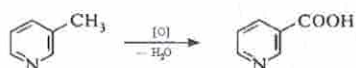
- A. Anthracene
- B. Phenanthrene
- C. Cumene
- D. Triphenylmethane
- E. Benzene

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



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

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



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

89. 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. Accumulation of the substance in the body
- C. Inhibition of biotransformation
- D. Weakening of the absorption process
- E. Increased sensitivity of receptors

90. 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 $-CH_2-$ groups?

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

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

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

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

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

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

94. Plant fatty acids have an odd number of carbon atoms. What product forms as a result of β -oxidation of fatty acids with an odd number of carbon atoms?

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

95. What drug is used in treatment of herpes infection?

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

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

97. 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. Glycogen
- C. Cholesterol
- D. Glycerine
- E. Glucose

98. What is the name of the technique of binding extraneous ions in analytical analysis?

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

99. What reagent can be used to distinguish ethanol (C_2H_5OH) from glycerine ($CH_2OH - CHOH - CH_2OH$)?

- A. $Cu(OH)_2$
- B. Ag_2O
- C. $FeCl_3$
- D. HBr
- E. $KMnO_4$

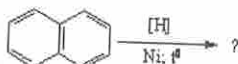
100. Examination of the sputum of a patient with suspected pneumonia detects blue-violet lanceolate cocci with a capsule, arranged in pairs. What staining method has been used to detect the capsule?

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

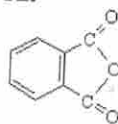
101. A patient with essential hypertension has been taking loop diuretics as prescribed by the doctor. What water-salt exchange imbalance can develop in this case?

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

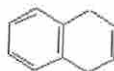
102. What compound forms during the complete hydrogenation of naphthalene?



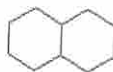
A.



B.



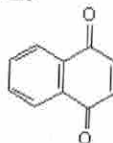
C.



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

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

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

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

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

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

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

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

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

109. What titrant is used in bromatometric titration?

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

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

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

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

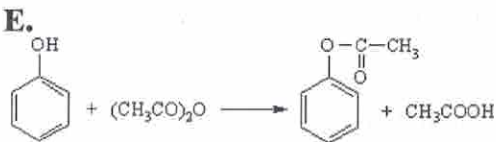
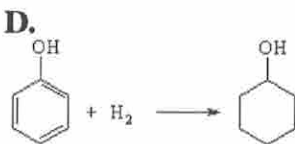
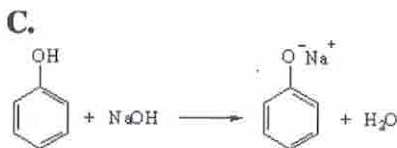
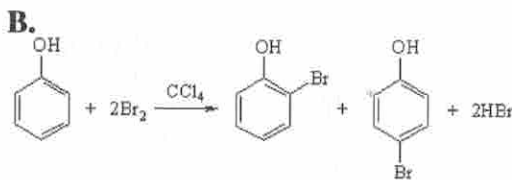
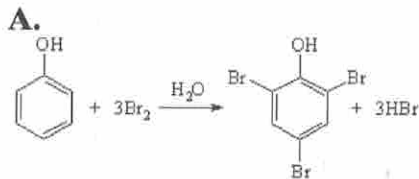
112. A 23-year-old patient has laryngeal diphtheria that manifests as classic clinical signs with the development of true croup. What type of inflammation is characteristic of this disease?

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

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

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

114. What reaction proves that phenol exhibits acidic properties?



115. 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. Autoimmune disease
- C. Allergy to the pathogen
- D. Antigen of the microorganism
- E. Antibodies to the microorganism

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

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

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

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

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

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

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

121. 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. Van't Hoff
- D. Rebinder
- E. Schulze, Hardy

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

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

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

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

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

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

125. What disaccharide is a reducing one?

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

126. Under what condition is the solubilization process possible?

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

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

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

128. 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

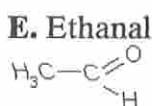
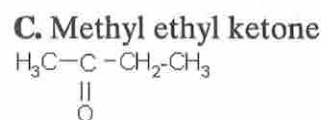
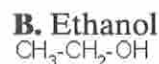
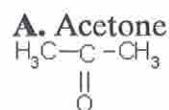
substance is it?

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

129. What reaction can be used to obtain butane $CH_3 - CH_2 - CH_2 - CH_3$ from chloroethane $CH_3 - CH_2 - Cl$?

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

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



131. 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. *Enterococcus faecalis*
- E. *Staphylococcus aureus*

132. Polarography is one of the electrochemical methods of analysis.

What parameter is used in polarographic analysis to identify the substance being analyzed?

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

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

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

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

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

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

136. 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. *Lamiaceae*
- C. *Convallariaceae*
- D. *Alliaceae*
- E. *Pinaceae*

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

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

139. Microbiological study of dried medicinal plants shows that they are contaminated with clostridia. What feature characterizes this group of microorganisms?

- A. They are obligate aerobes
- B. They are Gram-negative
- C. They are non-pathogenic for humans
- D. —
- E. They form spores

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

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

141. 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. Primary alteration
- C. Progression
- D. Exudation
- E. Secondary alteration

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

143. 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. 400
- C. 500
- D. 100
- E. 200

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

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

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

146. A 2M solution of *HCl* was added into the studied solution, resulting in formation of a white precipitate that dissolved when heated. What cations are present in the solution?

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

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

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

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

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

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

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

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