1. What of the given reagents is applied for determination of aldehyde group?
a. Ca(OH) 2
b. Br2 (H2O)
c. [Ag(NH3)2]OH
d. Solution of KMnO4
e. 25% solution of H2SO4

2. What compounds entered into a reaction if its products were nitrobenzene and water:
a.
b.
c.
d.
e.

3. What carbon atoms in the given compound are in the second valence state of (sp2 -hybridization)?
a. 3 and 4
b. 5 and 6
c. 1 and 3
d. 2 and 3
e. 1 and 2

4. What reagent enables detection of phenolic hydroxyl?
a. Cu(OH) 2
b. -
c. Ag(NH3)2 OH
d. NaNO2 (HCl)
e. FeCl3

5. Salicylic acid relates to the phenol acids. Presence of phenolic hydroxyl can be proved by means of reaction with:
a. FeCl3
b. H2SO4 (concentrated)
c. CH3OH (H+)
d. CH3COOH (ice)
e. NaOH

6. Choose a reagent for synthesis of acetic acid hydrazide from ethyl acetate:
a. H2N-NH2
b. H2N-CH3
c. C6 H5NHNH2
d. C6 H5NH2
e. NH3

7. A product of complete acetylation of glycerine relates to the following class of organic compounds:
a. Ether
b. Acetal
c. Phenol
d. Ester
e. Ketone

8. Name a product of ester condensation of acetaldehyde (Tishchenko reaction):
a. Acetone
b. Malonic acid
c. Acetoacetic aldehyde
d. Ethyl acetate
e. Crotonic aldehyde

9. What reagent helps to distinguish glycerine from ethanol?
a. PCl3

b. PCl_5
c. $SOCl_2$
d. HNO_3(concentrated), in presence of H_2SO_4 (concentrated)
e. $Cu(OH)_2$

10. Which of the following cyclic compounds relates to the carbocyclic ones:
a. Hexane
b. Benzol
c. Tetrahydrofuran
d. Furan
e. Pyridine

11. Ring-opening addition reactions are typical for the following cycloalkane:
a. Methylcyclopentane
b. Cyclodecane
c. Cyclohexane
d. Cyclopentane
e. Cyclopropane

12. Bromination proceeds with generation of tribromoderivative in presence of the following substituent X:
a. X = NO_2
b. X = COOH
c. X = OH
d. X = CHO
e. X = SO_3H

13. What is the product of ethyl alcohol-acetic aldehyde reaction?
a.
b.
c.
d.
e.

14. Pyridine can be characterized by reactions of (SE) electrophylic and (SN) nucleophylic substitution. Low reactivity of pyridine in SE reactions is caused by:
a. Cycle size
b. Electron-acceptor properties of nitrogen atom
c. Alkaline properties
d. Aromatic nature of pyridine nucleus
e. Hybridization of carbon atoms

15. Choose the carbocation among the given intermediate reactive particles:
a.
b.
c.
d.
e.

16. What is the final product of methane chlorination?
a. Ethane
b. Chloromethane
c. Chloroform
d. Chloroethanol
e. Tetrachloromethane

17. What compound will be produced as a result of interaction of aniline with nitrite acid?
a.
b.

c.
d.
e.

18. Choose a reagent that can be used for production of propanol-2 out of acetone:
a. H2 (Ni)
b. CH3I
c. HCOH
d. HCN
e. CH3OH

19. Choose the reagent that can be used for acetone cyanohydrin production:
a. HCN
b. H2N–NH2
c. H2N-CH3
d. H2N-NH-C6 H5
e. H2N–OH

20. Which reagent allows to distinguish propine (CH3-C ? CH) from propene (CH3-CH=CH2)?
a. Cl2
b. [Ag(NH3)2]OH
c. HCl
d. Br2
e. Cu(OH) 2

21. What compound is produced as a result of reaction:
a.
b.
c. CH3-CH2-NH-OH
d. CH3-NH-CH2-OH
e.

22. Galactose belongs to the aldehyde alcohols and similarly to aldehydes interacts with hydrocyanic acid (HCN) according to the following mechanism:
a. SR
b. AN
c. SN2
d. SN1
e. AE

23. Identify the succinimide (succinic acid imide) among the given compounds:
a.
b.
c. H2NOC-CH2-CH2-CONH2
d.
e. H2NOC-CH2-CH2-CH2-CONH2

24. What reagent enables differentiation of the following pair of compounds?
a. HCN
b. H2N-OH
c. NaHSO3
d. NH2-NHC6 H5
e. Foellings reagent

25. For production of phenol ether it is necessary to cause reaction of sodium phenoxide with:
a. CH3Cl
b. CH4
c. CH3C? N
d. CH3NH2

e. CH3OH

26. Three enumerated test tubes contain solutions of glucose, fructose and starch. What reagent can help to detect fructose?

a. Tollens

b. Selivanovs

c. Fehlings

d. Lugols

e. Chempure

27. Polysaccharide cellulose consists of the remains of the following monosaccharide:

a. α-D-glucopyranose

b. α-D-fructofuranose

c. β-D-glucofuranose

d. β-D-glucopyranose

e. β-D-fructopyranose

28. What class is represented by nitroglycerine medication used for stenocardia treatment?

a. Polyatomic alcohols

b. Ester

c. Ethers

d. Nitrogen-containing alcohols

e. Nitroalkanes

29. What of the given compounds makes the reactions of electrophylic substitution (SE) the easiest?

a. Phenol

b. Chlorobenzene

c. Benzene sulfacid

d. Benzaldehyde

e. Toluol

30. By heating aniline with concentrated sulphuric acid the following compound can be obtained:

a.

b.

c.

d.

e.

31. What compound can be synthesized from bromobenzene and bromoethane by Wurtz-Fittigs reaction?

a. P-Diethylbenzene

b. Ethylbenzene

c. Bromoethyl benzene

d. Methylbenzene

e. O-Bromoethyl benzene

32. Which of the following reactions is addition reaction?

a.

b.

c.

d.

e.

33. The given reaction is called: C6 H12 O6→enzymes→ 2C2 H5 OH + 2CO2?

a. Alcohol fermentation of glucose

b. Glucose oxidation

c. Glucose reduction

d. Lactic-acid fermentation of glucose

e. Glucose hydrolysis

34. In order to identify phenol and salicylic acid we use a solution of:
a. Sodium hydroxide
b. Ferrum chloride (III)
c. Sodium hydrogen carbonate
d. Sodium chloride
e. Bromine

35. Choose a diazonium salt among the given compounds:
a.
b.
c.
d.
e.

36. This substance can be produced from the calcium carbide. It discolours bromine water and makes metal derivatives. What compound is it?
a. Acetylene
b. Ethane
c. Aniline
d. Orenol
e. Ethylene

37. The compound C7H8O relates to the derivatives of aromatic hydrocarbons, doesn't stain with FeCl3, the product of its oxidation is benzoic acid. What compound is it?
a. o-cresol
b. Methylphenyl alcohol
c. Benzyl alcohol
d. m-cresol
e. p-cresol

38. One of the causes of optical activity is that molecule structure contains an organic compound:
a. Functional group
b. Asymmetry plane
c. Double bond
d. Triple bond
e. Asymmetric carbon atom

39. Alkadiene is a name for aliphatic carbohydrates with double bonds. Choose a general formula for homologous series of alkadienes:
a. Cn H2n+1
b. Cn H2n-1
c. Cn H2n+2
d. Cn H2n
e. Cn H2n-2

40. Urea is a derivative of carbonic acid. Choose a denomination of urea:
a. Diethylic ether of carbonic acid
b. Dimethylic ether of carbonic acid
c. Monoamide of carbonic acid
d. Ethylic ether of carbamic acid
e. Diamide of carbonic acid

41. Glycosidic (hemiacetal) hydroxyl in a molecule of α-D-glucose pyranose is bonded to the following carbon atom:
a. C2
b. C4
c. C6
d. C1

e. C3

42. What product is obtained in Wagner reaction during oxidation of alkenes with potassium permanganate in the aqueous medium?

a. Epoxide

b. Glycol

c. Carboxylic acid

d. Ketone

e. Aldehyde

43. What compound will be produced during reduction of methyl ethyl ketone?

a. Butanol-1

b. tertiary-butyl alcohol

c. Propanol-2

d. secondary-butyl alcohol

e. Isobutyl alcohol

44. The most active component in the aniline acylation reaction is:

a.

b.

c.

d.

e.

45. What medication is formed as a result of interaction of acid with acetic anhydride?

a. Benzyl salicylate

b. Sodium salicylate

c. Salicyl amide

d. Phenyl salicylate

e. Aspirin

46. Interaction of aniline with excess of bromine water resulted in formation of white precipitate. What substance was produced?

a. 2-bromaniline

b. 4-bromaniline

c. 2,4-dibromaniline

d. 2,6-dibromaniline

e. 2,4,6-tribromaniline

47. Dark-violet colour appears, when FeCl3 solution is added to the following substance:

a.

b.

c.

d.

e.

48. Benzoic acid enters into benzene ring reaction with the following reagent:

a. HNO3 (k) + H2SO4 (k)

b. PCl3

c. P2 O5

d. NH3: t

e. NaOH

49. Choose the initial compound for one-stage synthesis of phthalic acid:

a. o-xylol

b. 1,2-dichlorobenzene

c. m-xylol

d. 2-chlorobenzoic acid

e. Salicylic acid

50. Interaction of lactic acid with SOCl2 excess will result in production of the following compound:

a.

b.

c.

d.

e.

51. Toluol is converted to the benzoic acid under the following conditions:

a. Sodium hydroxide action at a room temperature

b. Boiling in the open air

c. Heating with sulphuric acid

d. Hydrogen peroxide action at a room temperature

e. Oxidation with potassium permanganate

52. Which of the following compounds forms a propionic aldehyde as a result of alkaline hydrolysis (H2O, OH-)?

a.

b.

c.

d.

e.

53. 3-aminopropane acid is included in pantothenic acid which is a component of coenzyme A. What reaction takes place in course of heating of this acid?

a. Addition

b. Substitution

c. Elimination (detachment)

d. Rearrangement

e. Reduction

54. General formula of alkynes is CnH2n-2. Isomerous alkynes fall into the following compound class:

a. Alkadienes

b. Cycloalkanes

c. Multinuclear arenes

d. Mononuclear arenes

e. Alkenes

55. Diphenylmethane can be derived from benzol by means of the following reagent:

a. C2 H5Cl

b. CH3COOH

c. NaNH2

d. CH2Cl2

e. CH2O

56. The given reaction is called:

a. Removal

b. Regrouping

c. Esterification

d. Addition

e. Acylation

57. Before nitration of aniline it is usually acidified in order to protect amino groups from oxidation. Which of the following reagents is used for this purpose?

a. (CH3CO)2O

b. C2H5Cl

c. CHCl3 + NaOH

d. HNO2

e. CH3CHO

58. Choose a generalized reaction that will help to reveal an amino group in the following compounds:
a. Alkylation
b. Acylation
c. Diazotization
d. Azo dye generation
e. Isonitrile assay

59. What type of tautomerism is typical for the given compound?
a. Carbonyl-enol tautomerism
b. Amine-imine tautomerism
c. Keto-enol tautomerism
d. Nitro-aci-nitro tautomerism
e. Cyclo-oxo tautomerism

60. Amides are weak NH-acids. They make salts as a result of interaction with one of the given reagents:
a. LiAlH4
b. NaNH2(Na met.)
c. P2 O5 (to)
d. NaOH (H2O)
e. NaOBr (Br2 + NaOH)

61. Six-membered nitrogen-containing heterocyclic compounds exhibit basic properties. Which compound has the strongest basic properties?
a. Pyrimidine
b. Pyridine
c. Piperazine
d. Pyrazine
e. Pyridazine

62. What denomination corresponds with the given formula?
a. Pyrazinopyrimidine
b. Benzothiazole
c. Benzo [b] pyrone-4
d. Imidoazopyrimidine
e. Benzo [b] pyridine

63. What of the folowing compounds belongs to ketose representatives?
a. Talose
b. Fructose
c. Iodose
d. Mannose
e. Galactose

64. According to the IUPAC nomenclature the given compound has the following denomination:
a. 1,2-propanediol
b. 1,2,3-propanetriol
c. 2-propanol
d. 1-propanol
e. 1-propanethiol

65. Choose benzo-1,4-diazepine from the given heterocyclic compounds:
a.
b.
c.
d.
e.

66. Reaction of pyruvic acid in which the ketone functional group takes place proceeds with the

following reagent:
a. NaOH
b. FeCl3
c. CH3OH (H+)
d. HCN
e. SOCl2

67. Oxidation of menthol by potassium dichromate in sulfuric acid (chrome mixture) results in production of:
a.
b.
c.
d.
e.

68. Which of the following compounds has acidophobic properties?
a. Pyrimidine
b. Imidazole
c. Pyrazole
d. Pyridine
e. Pyrrole

69. What reagent can demonstrate presence of an aldehyde group in a furfural molecule?
a. [Ag(NH3)2]OH
b. NaNO2
c. NaOH
d. NH3
e. (CH3CO) 2 O

70. Which atoms of carbon in the given compound are in the second valence state (sp2 -hybridization)?
a. 3 and 4
b. 5 and 6
c. 1 and 3
d. 2 and 3
e. 1 and 2

71. What substances can be derived by alkaline hydrolysis of tripalmitine?
a. Glycerin and palmitic acid
b. Glycerin and sodium stearate
c. Sodium palmitate and water
d. Sodium palmitate and glycerin
e. Palmitic acid and sodium hydroxide

72. What is the mechanism of addition reaction of ethanol to acetaldehyde?
a. SE electrophylic addition
b. AE electrophylic addition
c. AN nucleophylic addition
d. SN nucleophylic substitution
e. SR radical substitution

73. As a result of sulfonation of naphthalene with concentrated sulfuric acid at a temperature over 160oC the following substance is produced:
a. 2-naphthalensulfonic acid
b. 3-naphthalensulfonic acid
c. 5-naphthalensulfonic acid
d. 4-naphthalensulfonic acid
e. 1-naphthalensulfonic acid

74. The highest bromination rate will be observed for the following compound:

a.

b.

c.

d.

e.

75. Name type of bond between complementary bases:

a. Semipolar bond

b. Hydrogen bond

c. Ionic bond

d. Covalent pi-bond

e. Covalent sigma-bond

76. Natural fats have liquid or solid consistence. What is the main cause of their existence in this or that aggregate state:

a. Ratio of saturated and unsaturated acids

b. Molecule sizes

c. Way of production

d. Molecule solvation

e. Presence of hydrogen bonds

77. What kind of isomerism is typical for the oleic acid?

a. Lactim-lactam tautomerism

b. Cis-trans-stereoisomerism

c. Keto-enol tautomerisn

d. Optic

e. Enantiomerism

78. Tritane relates to:

a. Alkenes

b. Multinuclear arenes with isolated benzene cycles

c. Mononuclear arenes

d. Multinuclear arenes with condensated benzene cycles

e. Alkanes

79. Specify the reagent that allows to produce liquid soap as a result of alkaline fat hydrolysis (saponification):

a. CaO

b. NaOH

c. K_2CO_3

d. PbO

e. $NaHCO_3$

80. Optical isometry can be applied to the following compounds:

a. Iodine fluorochloromethane (CHIFCl)

b. Chloroform ($CHCl_3$)

c. Tetrachloromethane (CCl_4)

d. Dichloromethane (CH_2Cl_2)

e. Methane (CH_4)