1. A chemist in analytical laboratory needs to standardize solution of sodium hydroxide. What primary standard solution can be applied for this purpose?

a. Chloride acid
b. Acetate acid
c. Oxalic acid
d. Sodium tatraborate
e. Sodium chloride

2. Choose reagents for detection of nitrite ions in presence of nitrate ions contained in a pharmaceutical under examination:

a. Iron (II) sulfate (diluted) and potassium iodide
b. Iron (II) chloride
c. Iron (III) chloride
d. Antipyrin and chlorohydrogen acid (diluted)
e. Iron (III) sulfate (concentrated) and potassium bromide

3. A chemist in an analytical laboratory needs to standardize a sodium hydroxide solution. What primary standard solution can be used for this purpose?

a. Sodium tetraborate
b. Sodium chloride
c. Acetic acid
d. Chlorohydrogen acid
e. Oxalic acid

4. Dimethyl glyoxime entered into reaction with a solution that contained cations of the IV analytical group (acid-base classification). The deposition turned crimson. What cation caused this analytical effect?

a. Copper cation (II)
b. Mercury cation (II)
c. Nickel cation (II)
d. Cadmium cation (II)
e. Cobalt cation (II)

5. Thiocyanatometry is based upon using of secondary standard solution of potassium thiocyanate that should be standardized according to the following standard solution of:

a. Hydrochloric acid
b. Iron (II) sulfate
c. Copper (II) nitrate
d. Silver nitrate
e. Sulfuric acid

6. Concentration of potassium dichromate in a solution was determined by means of iodometry. Name a titrant of iodometric method for determination of strong oxidizer:

a. Potassium iodide
b. Sodium hydroxide
c. Sodium thiosulfate
d. Potassium permanganate
e. Potassium bromate

7. Solution of potassium chromate was added to a solution under examination. As a result of it some yellow deposition settled down. This deposition cannot be dissolved in acetic acid. This means that the solution under examination contains cations of:

a. Cobalt
b. Magnesium
c. Calcium
d. Sodium
e. Barium

8. Solution of Trilon B is the titrant in chelatometry. It makes complex compounds with metal cations irrespective of their valency with the following proportion:

a. 1:2
b. 1:3
c. 1:1
d. 2:1
e. 3:1

9. Concentration of ethyl alcohol in some drug formulations and tinctures can be determined by means of refractometry. For this purpose the following characteristic is measured:

a. Angle of rotation of plane of polarized light
b. Light ray angle
c. Angle of light refraction
d. Index of solution refraction
e. Angle of total internal reflection of light ray

10. Quantitative determination of pharmaceutical substances can be done by means of acidimetry. Its titrant is the secondary standard solution of hydrochloric acid. According to which compound the precise concentration of hydrochloric acid can be determined?

a. Sodium thiosulfate
b. Magnesium sulphate
c. Oxalic acid
d. Potassium dichromate
e. Sodium tetraborate

11. For determination of nitrate ions diphenylamine was added to the solution under examination. The following changes were observed:

a. Generation of blue solution
b. Generation of blue deposition
c. Emergence of a typical smell
d. Generation of brown gas
e. Generation of yellow deposition

12. Concentrated nitric acid and crystalline lead dioxide were added to a solution under examination. The solution turned crimson. This analytical effect indicates presence of:

a. Manganese (II)
b. Iron (III)
c. Tantum (II)
d. Chromium (III)
e. Bismuth (III)

13. Determination of chlorides in potable water can be done by means of mercurymetry. The following solution is used as a titrant:

a. $Hg_2(NO_3)_2$
b. $HgSO_4$
c. Hg_2Cl_2
d. $Hg(NO_3)_2$
e. $HgCl_2$

14. Iodometric determination of formaldehyde in formaline can be done by the back titration. Iodine surplus is titrated with the standard solution of:

a. Sodium thiosulphate
b. Sodium sulphate
c. Sodium phosphate
d. Sodium carbonate
e. Sodium nitrate

15. Titrant of chelatometry method is trilon B solution that forms complex compounds with metal

cations irrespective of their valence at a ratio of:

a. 3:1

b. 1:1

c. 1:2

d. 1:3

e. 2:1

16. Name the type of reaction that takes place during detection of ascorbic acid in a preparation by iodometric method:

a. Oxidation-reduction

b. Neutralization

c. Complexing

d. Precipitation

e. Acylation

17. During quantitative estimation of glucose by polarimetric method the following factor is measured:

a. Angle of rotation of polarized beam plane

b. Rate of polarized beam absorption by a solution

c. Optical density of a solution

d. Beam dispersion by a solution

e. Coefficient of light refraction

18. Sodium arsenate solution can be distinguished from the arsenite solution by means of the following reagent:

a. Magnesia mixture

b. Potassium nitrate

c. Sodium fluoride

d. Sodium chloride

e. Potassium sulphate

19. Excess of ammonia was added to a solution under examination. The solution turned bright blue. This indicates presence of the following ions:

a. Silver

b. Bismuth

c. Mercury (II)

d. Copper

e. Lead

20. Quantitative determination of calcium chloride is carried out by method of direct chelatometric titration. Choose an indicator for fixation of the titration endpoint:

a. Eriochrome black T

b. Methyl red

c. Starch

d. Eosin

e. Phenolphthalein

21. Determination of sodium and potassium chlorides in pharmaceuticals can be done by means of:

a. Acidimetry

b. Chelatometry

c. Reduction-oxidation titration

d. Alkalimetry

e. Argentometry, Mohr method

22. Filter paper impregnated with solution of cobalt (II) nitrate and a solution under examination makes blue ash when burned down. This is the evidence of presence of the following ions:

a. Zn^{2+}

b. Al^{3+}

c. Ni2+
d. Cr3+
e. Sb3+

23. After a solution had been heated with (NH4)2S2O8 in presence of AgNO3, it turned crimson. What ions were present in the solution?
a. Co2+
b. Cu2+
c. Fe3+
d. Fe2+
e. Mn2+

24. A solution under examination was added to the solution of FeSO4 in presence of concentrated H2SO4. Formation of a brown ring indicates presence of:
a. Nitrate ions
b. Carbonate ions
c. Phosphate ions
d. Oxalate ions
e. Acetate ions

25. Specify standard substances used for standardization of titrant solutions (NaOH, KOH) in the alkalimetric method:
a. Oxalic and succinic acids
b. Formic and acetic acids
c. Sulphanilic and salicylic acids
d. Sulphanilic and oxalic acids
e. Acetic and succinic acids

26. Sulphuric acid of 1M solution was added to the solution under study. This resulted in formation of white sediment that was soluble in the alkalies. This indicated that the solution contains:
a. Plumbum cations
b. Barium cations
c. Mercury (I) cations
d. Argentum cations
e. Calcium cations

27. Cations of the third analytical group (acid-base classification) can be isolated in course of systematic analysis by means of the following group reagent:
a. 0,1 M solution of ammonium oxalate
b. 1 M solution of ammonium carbonate
c. 1 M solution of potassium chromate
d. 0,1 M solution of sodium carbonate
e. 1 M solution of sulfate acid in presence of ethanol

28. Solution of potassium iodide was added to the solution acidated with sulfate acid that contained anions of the third analytical group. Release of free iodine is observed. What anion are present in the solution?
a. Sulfate ion
b. Carbonate ion
c. Nitrite ion
d. Bromide ions
e. Acetate ions

29. A solution contaning anions of the second analytical group has been blended with the solution of argentum nitrate. This resulted in formation of black precipitate insoluble in the ammonia solution and soluble in the diluted nitric acid at heating. What anions are present in the solution?
a. Chloride ions
b. Iodide ions

c. Sulphide ions
d. Bromide ions
e. Arsenite ions

30. Argentum nitrate solution was added to a solution containing anions of the second analytical group. This resulted in formation of light-yellow sediment that was insoluble in the nitric acid and partly soluble in the ammonia solution. What anions were present in the solution?
a. Arsenite ions
b. Bromide ions
c. Chloride ions
d. Iodide ions
e. Sulphide ions

31. During gravimetric determination of mass fraction of sulfate ions in the magnesium sulfate preparation precipitation is performed by means of barium chloride solution. Precipitated barium sulfate should be rinsed with:
a. Diluted solution of sulfate acid
b. Solution of barium chloride
c. Solution of hydrochloride acid
d. Solution of sodium sulfate
e. Distilled water

32. Solution of 0,1M potassium permanganate is used as a titrant in permanganatometry. The solution is prepared like the secondary standard solution and standardized according to:
a. Ammonia oxide
b. Sodium chloride
c. Calcium oxide
d. Sodium carbonate
e. Potassium dichromate

33. Specify the standardized solutions used for direct and back titration of reducing agents in the iodometric method:
a. KMnO4, KI
b. K2Cr2O7, I2
c. K2Cr2O7, Na2S2O3
d. I2, KI
e. I2, Na2S2O3

34. Determination of medications containing cations of magnesium and calcium is done by trilonometric titration. What type of chemical reaction takes place in this case?
a. Alkylation
b. Precipitation
c. Oxidation-reduction
d. Electrophylic substitution
e. Complexation

35. Name a standard solution of iodometric determination of reducing agents (direct titration)?
a. Solution of KI
b. Solution of I2
c. Solution of Na2S2O3
d. Solution of KMnO4
e. Solution of K2Cr2O7

36. Choose a pair of electrodes for FeSO4 determination by method of potentiometric titration:
a. Hydrogen and glass
b. Antimonial and silver
c. Copper and glass
d. Chingidron and zink

e. Platinum and chlorosilver

37. During the qualitative analysis under the influence of group reagent NaOH upon the aluminium ions the following substance is produced:

a. Aluminium oxide

b. Sodium hexahydroxoaluminate

c. Sodium metaaluminate

d. Aluminium hydroxide

e. Basic aluminium salts

38. During the quantitative analysis carried out under the primary conditions, a specific reagent to Fe3+ cations is K4[Fe(CN)6]. Their interaction gives a precipitate of the following colour:

a. Black

b. Blue

c. Brown

d. White

e. Red

39. During analysis of cations of the IV analytic group Zn cations can be detected under certain conditions with the following reagent:

a. Alkali

b. Ammonia solution

c. Dithizone

d. Alkali metal carbonates

e. Dimethylglyoxime

40. Specify the titration method, in which a standardized titrant solution is gradually added to the solution under study until a titration endpoint is reached:

a. Back titration

b. Substitution titration

c. Residue titration

d. Direct titration

e. Indirect titration

41. What standard solution (titrant) is used in Folgards method of direct titration?

a. Silver nitrate

b. Sodium chloride

c. Ammonium thiocyanate

d. Potassium chromate

e. Potassium dichromate

42. While detecting Co2+ ions in presence of Fe3+ the following ions should be added to the solution in order to mask Fe3+ ions:

a. Sulphate ions

b. Fluoride ions

c. Bromide ions

d. Chloride ions

e. Nitrite ions

43. You need to prepare ammoniac buffer solution. For this purpose you should add the following solution to the water solution of ammonia:

a. Solution of ammonium chloride

b. Solution of sulfate acid

c. Solution of sodium sulfate

d. Solution of potassium chloride

e. Solution of chloride acid

44. What saturated heated solution is used for transformation of sulphates BaSO4, SrSO4, CaSO4 to carbonates during the systematic analysis?

a. CO_2
b. Na_2CO_3
c. $(NH_4)_2CO_3$
d. $CaCO_3$
e. $MgCO_3$

45. Which indicatorless method enables quantitative determination of iron (II) content?
a. Nitritometry
b. Permanganatometry
c. Argentometry
d. Chelatometry
e. Iodometry

46. Choose a pair of substances that can be used for standardization of 0,1 M solution of $KMnO_4$:
a. K_2CO_3, CH_3COOH
b. KHC_2O_4, $HCOOH$
c. $Na_2C_2O_4$, CH_3COOH
d. $Na_2C_2O_4$, $H_2C_2O_4$
e. CH_3COOK, $H_2C_2O_4$

47. Permanganatometry enebles determination of H_2O_2 in high-acidity medium. What acid can be used for production of such medium?
a. H_2SO_4
b. HNO_3
c. H_3PO_4
d. CH_3COOH
e. HCl

48. It is required to determine the amount of sodium salicylate in a solution. What titrimetric method can be applied for the quantitative determination of aromatic compounds?
a. Cerimetry
b. Mercurimetry
c. Bromometry
d. Argentometry
e. Chelatometry

49. You are given 0,05 M solution of versene. What is standard substance for standardization of this solution?
a. Metallic zinc
b. Sodium hydroxide
c. Potassium dichromate
d. Oxalic acid
e. Sodium tetraborate

50. Coulometry is based upon measurement of electrics that is spent on electrode reaction. What law underlies coulometric method?
a. Newton law
b. Archimedes principle
c. Faraday law
d. Stokes law
e. Bouguer-Lambert-Beer law

51. In order to determine mass fraction of calcium in a pharmaceutical preparation, gravimetric method was applied. Ammonium oxalate solution was used as a precipitating agent. What is the gravimetric form in this case?
a. Calcium hydroxide
b. Calcium chloride
c. Monohydrous calcium oxalate

d. Anhydrous calcium oxalate
e. Calcium carbonate

52. Analytical indication of effect of potassium iodide solution upon unstained oxidizing anions in presence of chloroform is:
a. Emission of gas bubbles
b. Origination of deposition and its solution in reagent excess
c. Settling down of white deposition
d. Change of aggregate state
e. Brown stain of free iodine

53. Specify the relevant indicators for fixation of the titration endpoint when using nitritometric method:
a. Methylene blue
b. Starch solution
c. Diphenylamine
d. Tropeolin 00 + methylene blue
e. Methylene orange

54. Choose a reduction-oxidation method for the quantitative determination of iron (II) salts in a solution that contains hydrochloric acid:
a. Permanganatometry
b. Iodometry
c. Dichromatometry
d. Nitritometry
e. Ascorbinometry

55. During thin-layer chromatography of novocaine, the developed plate represented a stain 3 cm away from the start line, and the length of solvent front was 10 cm. What is the Rf value of novocaine?
a. 0,7
b. 0,3
c. 0,5
d. 0,4
e. 0,6

56. A compound undeer examination contains cations of iron (III) and copper (II). What group reagent can separate these cations?
a. Solution of sodium hydroxide and hydrogen peroxide
b. Solution of sodium hydroxide
c. Concentrated solution of sulfuric acid
d. Concentrated ammonia solution
e. Concentrated solution of hydrochloride acid

57. In order to choose an indicator during the acid-bace titration a titration curve is made which is the dependence of:
a. pH solution from the volume of the added titrant
b. pH solution from the volume of the solution under analysis
c. pH solution from the temperature
d. Concentration of the solution under analysis from pH solution
e. pH solution from the concentration of the added titrant

58. What method of titrimetric analysis can be applied for the quantitative determination of sulphuric acid by means of the potassium hydroxide solution?
a. Alkalimetry
b. Oxidation-reduction
c. Complexation
d. Precipitation

e. Acidimetry

59. You have to carry out a qualitative analysis. What substance will originate from chromium ions under the influence of group reagent excess (solution of sodium hydroxide) upon cations of the IV analytical group?

a. Sodium hexahydroxochromate (III)
b. Chromium (III) oxide
c. Chromium (II) oxide
d. Chromium (II) hydroxide
e. Chromium (III) hydroxide

60. Choose the reagents for detection of the sulphate ions in a solution containing carbonate, sulphate and phosphate ions:

a. $CaCl_2$, NH_4OH
b. $AgNO_3$, HNO_3
c. $Ba(NO_3)_2$, NaOH
d. $BaCl_2$, H_2O
e. $Ba(NO_3)_2$, HCl

61. A composition under examination contains ions of Cl^-, Br^- and I^- in equimolar quantities. The sequence of precipitate formation in course of argentometric titration will be determined by:

a. Way of titration - either back or direct
b. Value of oxidation-reduction potentials
c. Solubility product of the corresponding silver halogenides
d. Value of corresponding ion mobility
e. Ionic strength of solution

62. Choose an appropriate indicator for fixation of titration end point in method of bromatometry:

a. Methyl red
b. Starch
c. Tropeolin 00
d. Methyl blue
e. Phenolphthalein

63. Choose a pair of titrants for the qualitative determination of ammonia in a solution by the method of back titration:

a. KOH, NaOH
b. HCl, H_2SO_4
c. HCl, NaOH
d. NaOH, KCl
e. H_2SO_4, K_2SO_4

64. Nitritometric determination of compounds containing primary aromatic amino group can be carried out under the following conditions:

a. With adding of the crystalline KBr (catalyst)
b. At a temperature up to 10°C
c. With observation of all the mentioned conditions
d. Chloric acid excess
e. Slow titration

65. What electrode is used as indicator during dichromatometric determination of $FeSO_4$ in a solution provided that fixation of the equivalence point is done by a potentiometric method?

a. Silver
b. Silver chloride
c. Glass
d. Quinhydrone
e. Platinum

66. Content of potassium dichromate in a solution was determined by iodometric method. Name the

titrant of iodometric method for oxidant determination:
a. Sodium hydroxide
b. Potassium permanganate
c. Potassium bromate
d. Sodium thiosulfate
e. Potassium iodide

67. What cations added to the solution of potassium iodide form orange-red deposition that is soluble in reagent excess and builds up a colourless solution?
a. Bismuth
b. Mercury (I)
c. Mercury (II)
d. Antimony (V)
e. Lead

68. Nitritometric determination of primary aromatic amines in acidic medium results in generation of the following reaction product:
a. Nitrose antipyrine
b. Azide
c. Nitrosoamine
d. Nitrose arylenamine
e. Diazonium salt

69. What is the primary standard for standardization of Hg2(NO3)2 solution?
a. Sodium hydroxide
b. Sodium dichromate
c. Sodium bromide
d. Sosium sulphate
e. Sodium chloride

70. Determination of sodium chloride by Folgards method involves the following techniques:
a. Back titration, mercurimetry
b. Direct titration, mercurimetry
c. Direct titration, argentometry
d. Substitute titration
e. Back titration, argentometry

71. Quantitative determination of iodide can be done by method of:
a. Oxidation-reduction titration
b. Chelatometry
c. Precipitating titration
d. Spectrophotometry
e. Acid-base titration

72. What analytical effect is observed when potassium cation is being determined by the sodium hexanitrocobaltate (III) solution?
a. Black crystalline precipitate
b. Red crystalline precipitate
c. White crystalline precipitate
d. Yellow colouring of the solution
e. Yellow crystalline precipitate

73. What substance can be identified by method of acid-base titration and oxidation-reduction titration?
a. Sodium sulphate
b. Sodium hydroxide
c. Ammonium chloride
d. Oxalate acid

e. Calcium nitrate

74. A drug solution under examination contains cations of magnesium (II) and aluminium (III). Which reagent can help to separate these cations during analysis of this drug?

a. Alkali solution

b. Solution of silver nitrate

c. Solution of chloride acid

d. Ammonia solution

e. Solution of hydrogen peroxide in acidic medium

75. Quantitative determination of pharmaceutical substances can be carried out by method of alkalimetry using 0,1 M sodium hydroxide solution as a titrant. Precise concentration of sodium hydroxide can be determined according to:

a. Ammonium hydroxide

b. Oxalic acid

c. Potassium dichromate

d. Sodium tetraborate

e. Sodium thiosulphate

76. A solution containing the cations of the V analytic group (acid-base classification) has been taken for the analysis. The solution of sodium hydroxostannite has been added to the composition which resulted in formation of black deposition. This is the evidence of presence of the following cation:

a. Fe2+

b. Fe3+

c. Mg2+

d. Bi3+

e. Sb3+

77. What cations relate to the I analytic group according to the acid-base classification?

a. Aluminium, magnesium, zinc

b. Potassium, barium, bismuth

c. Calcium, strontium, barium

d. Silver, lead, nickel

e. Sodium, potassium, ammonium

78. In course of the systematic analysis separation of cations of the V and VI analytic groups (according to the acid-base classification) is carried out under the action of excess of:

a. Sulphuric acid solution

b. Concentrated ammonia solution

c. Hydrochloric acid solution

d. Sodium hydroxide solution

e. Potassium hydroxide solution

79. An excess of concentrated ammonium hydroxide is a group reagent for the cations of the VI analytical group (acid-base classification) Co2+, Ni2+, Cd2+, Cu2+, Hg2+. In this case the following substances are formed:

a. Hydroxides of the cations insoluble in the excess of ammonium hydroxide

b. Water-soluble ammonia complexes

c. Stained, water-insoluble compounds

d. Hydroxides of acid-soluble cations

e. Hydroxides of alkali-soluble cations

80. Both external and internal indicators are used in the following titrimetric method of analysis

a. Argentometry

b. Nitritometry

c. Chelatometry

d. Alkalimetry

e. Permanganatometry

81. Choose reagents for detection of nitrite ions in presence of nitrate ions contained in a pharmaceutical under examination:

a. Iron (II) chloride
b. Iron (III) chloride
c. Iron (II) sulfate (diluted) and potassium iodide
d. Iron (III) sulfate (concentrated) and potassium bromide
e. Antipyrin and chlorohydrogen acid (diluted)

82. A chemist in an analytical laboratory needs to standardize a sodium hydroxide solution. What primary standard solution can be used for this purpose?

a. Sodium chloride
b. Oxalic acid
c. Chlorohydrogen acid
d. Acetic acid
e. Sodium tetraborate

83. Dimethyl glyoxime entered into reaction with a solution that contained cations of the IV analytical group (acid-base classification). The deposition turned crimson. What cation caused this analytical effect?

a. Mercury cation (II)
b. Cadmium cation (II)
c. Cobalt cation (II)
d. Nickel cation (II)
e. Copper cation (II)

84. Thiocyanatometry is based upon using of secondary standard solution of potassium thiocyanate that should be standardized according to the following standard solution of:

a. Silver nitrate
b. Sulfuric acid
c. Copper (II) nitrate
d. Iron (II) sulfate
e. Hydrochloric acid

85. Concentration of potassium dichromate in a solution was determined by means of iodometry. Name a titrant of iodometric method for determination of strong oxidizer:

a. Sodium thiosulfate
b. Potassium iodide
c. Potassium bromate
d. Potassium permanganate
e. Sodium hydroxide

86. Solution of potassium chromate was added to a solution under examination. As a result of it some yellow deposition settled down. This deposition cannot be dissolved in acetic acid. This means that the solution under examination contains cations of:

a. Barium
b. Sodium
c. Magnesium
d. Cobalt
e. Calcium

87. Solution of Trilon B is the titrant in chelatometry. It makes complex compounds with metal cations irrespective of their valency with the following proportion:

a. 1:3
b. 2:1
c. 3:1
d. 1:1
e. 1:2

88. What indicator is used for the quantitative determination of sodium carbonate in a preparation by the method of acid-base titration?

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

89. Quantitative determination of pharmaceutical substances can be done by means of acidimetry. Its titrant is the secondary standard solution of hydrochloric acid. According to which compound the precise concentration of hydrochloric acid can be determined?

a. Sodium tetraborate
b. Potassium dichromate
c. Magnesium sulphate
d. Sodium thiosulfate
e. Oxalic acid

90. For determination of nitrate ions diphenylamine was added to the solution under examination. The following changes were observed:

a. Generation of brown gas
b. Emergence of a typical smell
c. Generation of yellow deposition
d. Generation of blue deposition
e. Generation of blue solution

91. Concentrated nitric acid and crystalline lead dioxide were added to a solution under examination. The solution turned crimson. This analytical effect indicates presence of:

a. Tantum (II)
b. Manganese (II)
c. Iron (III)
d. Bismuth (III)
e. Chromium (III)

92. Determination of chlorides in potable water can be done by means of mercurymetry. The following solution is used as a titrant:

a. $HgSO_4$
b. Hg_2Cl_2
c. $Hg_2(NO_3)_2$
d. $HgCl_2$
e. $Hg(NO_3)_2$

93. Iodometric determination of formaldehyde in formaline can be done by the back titration. Iodine surplus is titrated with the standard solution of:

a. Sodium carbonate
b. Sodium phosphate
c. Sodium nitrate
d. Sodium sulphate
e. Sodium thiosulphate

94. Titrant of chelatometry method is trilon B solution that forms complex compounds with metal cations irrespective of their valence at a ratio of:

a. 1:1
b. 1:2
c. 3:1
d. 2:1
e. 1:3

95. Name the type of reaction that takes place during detection of ascorbic acid in a preparation by

iodometric method:

a. Acylation
b. Precipitation
c. Complexing
d. Oxidation-reduction
e. Neutralization

96. During quantitative estimation of glucose by polarimetric method the following factor is measured:

a. Rate of polarized beam absorption by a solution
b. Coefficient of light refraction
c. Angle of rotation of polarized beam plane
d. Beam dispersion by a solution
e. Optical density of a solution

97. Sodium arsenate solution can be distinguished from the arsenite solution by means of the following reagent:

a. Potassium nitrate
b. Potassium sulphate
c. Magnesia mixture
d. Sodium chloride
e. Sodium fluoride

98. Excess of ammonia was added to a solution under examination. The solution turned bright blue. This indicates presence of the following ions:

a. Copper
b. Lead
c. Mercury (II)
d. Bismuth
e. Silver

99. Quantitative determination of calcium chloride is carried out by method of direct chelatometric titration. Choose an indicator for fixation of the titration endpoint:

a. Methyl red
b. Phenolphthalein
c. Eriochrome black T
d. Eosin
e. Starch

100. Determination of sodium and potassium chlorides in pharmaceuticals can be done by means of:

a. Argentometry, Mohr method
b. Alkalimetry
c. Chelatometry
d. Acidimetry
e. Reduction-oxidation titration

101. The solid residue obtained after evaporation of the sample solution makes the colorless flame of burner turn yellow, and when watched through a blue glass, it looks purple. What cations are present in the solid residue?

a. Na+ , Sr2+
b. Ca2+, K+
c. Na+, K+
d. Li+, Ba2+
e. Na+, Ca2+

102. Filter paper impregnated with solution of cobalt (II) nitrate and a solution under examination makes blue ash when burned down. This is the evidence of presence of the following ions:

a. Sb3+

b. Zn2+
c. Cr3+
d. Ni2+
e. Al3+

103. After a solution had been heated with (NH4)2S2O8 in presence of AgNO3, it turned crimson. What ions were present in the solution?
a. Cu2+
b. Mn2+
c. Fe2+
d. Fe3+
e. Co2+

104. 1 M sulphuric acid solution was added to the solution under study. This resulted in formation of white sediment that was soluble in the alkalies. This indicated that the solution contains:
a. Mercury (I) cations
b. Plumbum cations
c. Barium cations
d. Calcium cations
e. Argentum cations

105. Cations of the third analytical group (acid-base classification) can be isolated in course of systematic analysis by means of the following group reagent:
a. 1 M solution of sulfate acid in presence of ethanol
b. 0,1 M solution of sodium carbonate
c. 1 M solution of ammonium carbonate
d. 0,1 M solution of ammonium oxalate
e. 1 M solution of potassium chromate

106. A solution contains cations of zinc and aluminum. Specify the reagent that allows to detect cations of zinc in this solution:
a. Excess of 6M sodium hydroxide in presence of hydrogen peroxide
b. Sulfuric acid solution
c. Sodium hydroxide solution
d. Cobalt nitrate Co(NO3)2
e. Potassium hexacyanoferrate (II) solution

107. In a solution containing cations of copper (II) and zinc, the copper cations can be identified by means of the excess of the following reagent:
a. 2M sulfuric acid solution
b. 2M hydrochloric acid solution
c. 2M solution of ammonium carbonate
d. 6M ammonia solution
e. 6M potassium hydroxide solution

108. Solution of potassium iodide was added to the solution acidated with sulfate acid that contained anions of the third analytical group. Release of free iodine is observed. What anion are present in the solution?
a. Acetate ions
b. Nitrite ion
c. Sulfate ion
d. Carbonate ion
e. Bromide ions

109. A solution contaning anions of the second analytical group has been blended with the solution of argentum nitrate. This resulted in formation of black precipitate insoluble in the ammonia solution and soluble in the diluted nitric acid at heating. What anions are present in the solution?
a. Sulphide ions

b. Chloride ions
c. Arsenite ions
d. Bromide ions
e. Iodide ions

110. Argentum nitrate solution was added to a solution containing anions of the second analytical group. This resulted in formation of light-yellow sediment that was insoluble in the nitric acid and partly soluble in the ammonia solution. What anions were present in the solution?
a. Bromide ions
b. Chloride ions
c. Arsenite ions
d. Sulphide ions
e. Iodide ions

111. A medicament comprises sodium bicarbonate and sodium chloride. What method is used for quantitative determination of sodium bicarbonate?
a. Complexometric titration
b. Coulometric titration
c. Precipitation titration
d. Redox titration
e. Acid-base titration

112. Concentration of magnesium sulfate in a drug can be determined by complexometric titration. Choose an indicator to detect the end point of titration:
a. Methyl orange
b. Phenolphtalein
c. Chromogen black
d. Eosin
e. -

113. Choose a pair of electrodes for potentiometric pH measurement of a solution:
a. Quinhydrone and antimonial
b. Calomel and silver chloride
c. Glass and silver chloride
d. Mercury sulphate and silver chloride
e. Glass and antimonial

114. The mass percentage of ascorbic acid can be determined by the cerimetric analysis in the presence of the following redox indicator:
a. Eosin
b. Methylene red
c. Ferroin
d. Fluorescein
e. Methylene orange

115. ,1 M solution of potassium permanganate is used as a titrant in permanganatometry. The solution is prepared like the secondary standard solution and standardized according to:
a. Ammonia oxide
b. Sodium chloride
c. Calcium oxide
d. Sodium carbonate
e. Potassium dichromate

116. Specify the reaction conditions (medium, to) in the standardization of potassium permanganate solution by sodium oxalate solution:
a. Acidic, heating
b. Alkaline, heating
c. Neutral, cooling

d. Acidic, cooling
e. Neutral, heating

117. Specify the standardized solutions used for direct and back titration of reducing agents in the iodometric method:
a. I2, Na2S2O3
b. I2, KI
c. K2Cr2O7, I2
d. KMnO4, KI
e. K2Cr2O7, Na2S2O3

118. Determination of medications containing cations of magnesium and calcium is done by trilonometric titration. What type of chemical reaction takes place in this case?
a. Oxidation-reduction
b. Alkylation
c. Precipitation
d. Complexation
e. Electrophylic substitution

119. Halide ions in drugs are determined by titration based upon the reaction of:
a. Oxidation-reduction
b. Acid-base
c. Complexing
d. Precipitation
e. Substitution

120. Name a standard solution of iodometric determination of reducing agents (direct titration)?
a. Solution of Na2S2O3
b. Solution of KMnO4
c. Solution of I2
d. Solution of K2Cr2O7
e. Solution of KI

121. Specify the standard solution for the iodometric determination of reducing agents (direct titration):
a. I2 solution
b. Na2S2O3 solution
c. KI solution
d. K2Cr2O7 solution
e. KMnO4 solution

122. Choose a pair of electrodes for FeSO4 determination by method of potentiometric titration:
a. Platinum and chlorosilver
b. Chingidron and zink
c. Antimonial and silver
d. Hydrogen and glass
e. Copper and glass

123. The fourth group of cations includes the cations Al3+, Sn2+, Sn(IV), As(V), As(III), Zn2+, C3+. The group reagent for the fourth group of cations is the solution of:
a. N2S2O4
b. H2SO4, N2O2
c. HCl
d. NH3, N2O2
e. NaOH, N2O2

124. During the qualitative analysis under the influence of group reagent NaOH upon the aluminium ions the following substance is produced:
a. Aluminium hydroxide

b. Basic aluminium salts
c. Aluminium oxide
d. Sodium hexahydroxoaluminate
e. Sodium metaaluminate

125. During the quantitative analysis carried out under the primary conditions, a specific reagent to Fe3+ cations is K4[Fe(CN)6]. Their interaction gives a precipitate of the following colour:
a. White
b. Red
c. Black
d. Blue
e. Brown

126. In the qualitative analysis which involves precipitation of sulphates of the third analytical group cations (Ca2+, Sr2+, Ba2+) the solubility of sulphates can be reduced by adding:
a. Ethyl alcohol
b. Benzene
c. Amyl alcohol
d. Chloroform
e. Distilled water

127. In a qualitative analysis, when an excess of the group reagent (NH3 solution) reacts with the cations of the sixth analytical group (Cu2+, Co2+, Ni2+, Cd2+, Hg2+), the following compounds are formed:
a. Basic metal salts
b. Metal hydroxides
c. Metal ammine complexes
d. Aqua complexes of metals
e. Hydroxocomplexes of metals

128. Sodium fluoride is one of the components of the drugs used in the treatment of dental caries. NaF reacts with the following compound:
a. NaCl
b. CO2
c. H2SO4
d. KI
e. CH3COOH

129. The most common technology in pharmaceutical production is maintaining constant temperature and pressure. What is this process called?
a. Isochoric
b. Isothermal
c. Isochoric-isothermal
d. Isobaric
e. Isobaric-isothermal

130. Some medications are colloidal solutions. What size of the colloidal particles is typical for the colloidal dispersion?
a. 10-5 – 10-7 м
b. 10-5 - 10-3 м
c. > 10-3 м
d. 10-7 – 10-9 м
e. 10-10 – 10-11 м

131. The ability of reagent to ensure a stable analytical effect in the interaction with the analyzed substance is characterized by:
a. -
b. Reaction sensitivity

c. Reaction specificity
d. Reaction selectivity
e. Reagent amount

132. To maintain a certain level of pH-medium, the buffer solutions are used. Specify a composition of substances that DOES NOT EXHIBIT buffer properties:
a. HCOOH+HCOONa
b. NaH2PO4+Na2HPO4
c. CH3COOH+CH3COONa
d. NH4Cl+NH3 H2O
e. NaOH+NaCl

133. Quantitative analysis of zinc salts is performed by method of trilonometry. What indicator is used for this purpose?
a. Eriohrome black-T
b. Methyl black
c. Thymol blue
d. Potassium dichromate
e. Phenolphtalein

134. During analysis of cations of the IV analytic group Zn cations can be detected under certain conditions with the following reagent:
a. Ammonia solution
b. Alkali metal carbonates
c. Dimethylglyoxime
d. Dithizone
e. Alkali

135. Specify the titration method, in which a standardized titrant solution is gradually added to the solution under study until a titration endpoint is reached:
a. Direct titration
b. Indirect titration
c. Residue titration
d. Substitution titration
e. Back titration

136. What analytical effect is observed after fixing the endpoint during the titration by Mohr method?
a. White precipitate
b. Yellow precipitate
c. Red colour of solution
d. Yellow colour of solution
e. Brick-red precipitate

137. What solution can be determined by photocolorimetric method by self-absorbance?
a. Potassium phosphate
b. Potassium chromate
c. Potassium sulphate
d. Potassium chloride
e. Potassium nitrate

138. Nitrite ions in presence of nitrate ions can be detected by means of:
a. Crystalline antipyrine in presence of dilute HCl
b. Dimethylglyoxime
c. Diphenylcarbazone
d. Crystalline iron (III) sulfate
e. Crystalline sodium thiosulfate

139. You need to prepare ammoniac buffer solution. For this purpose you should add the following solution to the water solution of ammonia:

a. Solution of potassium chloride
b. Solution of sodium sulfate
c. Solution of chloride acid
d. Solution of sulfate acid
e. Solution of ammonium chloride

140. Choose a pair of substances that can be used for standardization of 0,1 M solution of KMnO4:
a. Na2C2O4, CH3COOH
b. Na2C2O4, H2C2O4
c. CH3COOK, H2C2O4
d. K2CO3, CH3COOH
e. KHC2O4, HCOOH

141. Permanganatometry enebles determination of H2O2 in high-acidity medium. What acid can be used for production of such medium?
a. HNO3
b. HCl
c. H2SO4
d. CH3COOH
e. H3PO4

142. It is required to determine the amount of sodium salicylate in a solution. What titrimetric method can be applied for the quantitative determination of aromatic compounds?
a. Mercurimetry
b. Argentometry
c. Chelatometry
d. Bromometry
e. Cerimetry

143. You are given 0,05 M solution of versene. What is standard substance for standardization of this solution?
a. Potassium dichromate
b. Metallic zinc
c. Sodium hydroxide
d. Sodium tetraborate
e. Oxalic acid

144. For the quantitative analysis of ethanol the gas chromatography was used. Which parameter was measured?
a. Peak width
b. Peak width at half height
c. Retention time
d. Retention volume
e. Peak height or area

145. Coulometry is based upon measurement of electrics that is spent on electrode reaction. What law underlies coulometric method?
a. Bouguer-Lambert-Beer law
b. Faraday law
c. Newton law
d. Archimedes principle
e. Stokes law

146. In order to determine mass fraction of calcium in a pharmaceutical preparation, gravimetric method was applied. Ammonium oxalate solution was used as a precipitating agent. What is the gravimetric form in this case?
a. Calcium chloride
b. Monohydrous calcium oxalate

c. Calcium hydroxide
d. Calcium carbonate
e. Anhydrous calcium oxalate

147. Analytical indication of effect of potassium iodide solution upon unstained oxidizing anions in presence of chloroform is:
a. Origination of deposition and its solution in reagent excess
b. Brown stain of free iodine
c. Change of aggregate state
d. Settling down of white deposition
e. Emission of gas bubbles

148. Dosage forms produced as coarse dispersion systems with the liquid dispersion medium and the solid phase are called:
a. Emulsion
b. Powder
c. Foam
d. Suspension
e. Aerosol

149. Specify the relevant indicators for fixation of the titration endpoint when using nitritometric method:
a. Starch solution
b. Diphenylamine
c. Methylene blue
d. Methylene orange
e. Tropeolin 00+methylene blue

150. Choose a reduction-oxidation method for the quantitative determination of iron (II) salts in a solution that contains hydrochloric acid:
a. Ascorbinometry
b. Dichromatometry
c. Permanganatometry
d. Iodometry
e. Nitritometry

151. A compound undeer examination contains cations of iron (III) and copper (II). What group reagent can separate these cations?
a. Concentrated solution of hydrochloride acid
b. Solution of sodium hydroxide and hydrogen peroxide
c. Concentrated ammonia solution
d. Solution of sodium hydroxide
e. Concentrated solution of sulfuric acid

152. In order to choose an indicator during the acid-bace titration a titration curve is made which is the dependence of:
a. pH solution from the volume of the solution under analysis
b. pH solution from the concentration of the added titrant
c. pH solution from the volume of the added titrant
d. Concentration of the solution under analysis from pH solution
e. pH solution from the temperature

153. What method of titrimetric analysis can be applied for the quantitative determination of sulphuric acid by means of the potassium hydroxide solution?
a. Oxidation-reduction
b. Acidimetry
c. Alkalimetry
d. Precipitation

e. Complexation

154. You have to carry out a qualitative analysis. What substance will originate from chromium ions under the influence of group reagent excess (solution of sodium hydroxide) upon cations of the IV analytical group?

a. Chromium (II) oxide

b. Sodium hexahydroxochromate (III)

c. Chromium (III) oxide

d. Chromium (III) hydroxide

e. Chromium (II) hydroxide

155. Choose the reagents for detection of the sulphate ions in a solution containing carbonate, sulphate and phosphate ions:

a. CaCl2, NH4OH

b. AgNO3, HNO3

c. Ba(NO3)-2, NaOH

d. BaCl2, H2O

e. Ba(NO3)2, HCl

156. Emulsions of 0.1 - 74% dispersed-phase volume relate to:

a. Concentrated

b. Highly concentrated

c. O/W type

d. WO type

e. Diluted

157. A composition under examination contains ions of Cl-, Brl- and I- in equimolar quantities. The sequence of precipitate formation in course of argentometric titration will be determined by:

a. Value of oxidation-reduction potentials

b. Value of corresponding ion mobility

c. Ionic strength of solution

d. Solubility product of the corresponding silver halogenides

e. Way of titration - either back or direct

158. The molar mass of calcium hydroxide equivalent (M(Ca(OH)2) = 74 g/mol) is:

a. 148 g/mol

b. 37 g/mol

c. 32 g/mol

d. 19 g/mol

e. 74 g/mol

159. Choose an appropriate indicator for fixation of titration end point in method of bromatometry:

a. Phenolphthalein

b. Methyl blue

c. Tropeolin 00

d. Methyl red

e. Starch

160. Choose a pair of titrants for the qualitative determination of ammonia in a solution by the method of back titration:

a. HCl, H2SO4

b. NaOH, KCl

c. H2SO4, K2SO4

d. HCl, NaOH

e. KOH, NaOH

161. Nitritometric determination of compounds containing primary aromatic amino group can be carried out under the following conditions:

a. With observation of all the mentioned conditions

b. With adding of the crystalline KBr (catalyst)
c. Slow titration
d. Chloric acid excess
e. At a temperature up to 10oC

162. To identify a drug by thin-layer chromatography the following parameter is used:
a. Kp
b. Rf
c. E, mV
d. n
e. I, A

163. What electrode is used as indicator during dichromatometric determination of FeSO4 in a solution provided that fixation of the equivalence point is done by a potentiometric method?
a. Platinum
b. Quinhydrone
c. Silver chloride
d. Silver
e. Glass

164. When ammonia enters into reaction with acids, this results in formation of ammonium salts. Which properties of ammonia characterize this process?
a. Ability to hydrolyze
b. Ability to accept the hydrogen ions
c. Acidic properties
d. Reductive properties
e. Oxidative properties

165. What cations added to the solution of potassium iodide form orange-red deposition that is soluble in reagent excess and builds up a colourless solution?
a. Mercury (II)
b. Bismuth
c. Lead
d. Antimony (V)
e. Mercury (I)

166. Nitritometric determination of primary aromatic amines in acidic medium results in generation of the following reaction product:
a. Nitrose arylenamine
b. Nitrosoamine
c. Diazonium salt
d. Nitrose antipyrine
e. Azide

167. What is the primary standard for standardization of Hg2(NO3)2 solution?
a. Sodium dichromate
b. Sodium chloride
c. Sosium sulphate
d. Sodium bromide
e. Sodium hydroxide

168. Determination of sodium chloride by Folgards method involves the following techniques:
a. Substitute titration
b. Direct titration, argentometry
c. Back titration, argentometry
d. Back titration, mercurimetry
e. Direct titration, mercurimetry

169. What reactions are used in the methods of permanganatometry, dichromatometry, iodometry?

a. Neutralization
b. Hydrolysis
c. Precipitation
d. Complexation
e. Oxidation-reduction

170. Quantitative determination of iodide can be done by method of:
a. Spectrophotometry
b. Precipitating titration
c. Acid-base titration
d. Chelatometry
e. Oxidation-reduction titration

171. In order to bind hydrogen ions during the identification of potassium ions with tartaric acid the following solution is used:
a. Sulfuric acid
b. Hydrochloric acid
c. Sodium hydroxide
d. Ammonia
e. Sodium acetate

172. A solution containing calcium and magnesium cations is titrated with Trilon B solution. Complexometric titration of these cations requires the following medium:
a. Ammonium buffer solution
b. Neutral medium
c. Acetate buffer solution
d. Acidic solution
e. Formate buffer solution

173. What analytical effect is observed when potassium cation is being determined by the sodium hexanitrocobaltate (III) solution?
a. White crystalline precipitate
b. Black crystalline precipitate
c. Red crystalline precipitate
d. Yellow crystalline precipitate
e. Yellow colouring of the solution

174. What substance can be identified by method of acid-base titration and oxidation-reduction titration?
a. Calcium nitrate
b. Sodium sulphate
c. Oxalate acid
d. Sodium hydroxide
e. Ammonium chloride

175. Quantitative determination of pharmaceutical substances can be carried out by method of alkalimetry using 0,1 M sodium hydroxide solution as a titrant. Precise concentration of sodium hydroxide can be determined according to:
a. Potassium dichromate
b. Sodium tetraborate
c. Oxalic acid
d. Sodium thiosulphate
e. Ammonium hydroxide

176. A drug solution under examination contains cations of magnesium (II) and aluminium (III). Which reagent can help to separate these cations during analysis of this drug?
a. Solution of chloride acid
b. Alkali solution

c. Solution of silver nitrate
d. Solution of hydrogen peroxide in acidic medium
e. Ammonia solution

177. As a rule, the maximum oxidation number of an element is:
a. Row number
b. -
c. Subgroup number in the periodic system
d. Period number
e. Group number in the periodic system

178. Pharmacopoeia test reaction for determination of benzoate ions is the interaction with the following solution:
a. Diphenylamine
b. Iron (III) chloride
c. Resorcinol
d. Potassium chloride
e. Acetic anhydride

179. A solution containing the cations of the V analytic group (acid-base classification) has been taken for the analysis. The solution of sodium hydroxostannite has been added to the composition which resulted in formation of black deposition. This is the evidence of presence of the following cation:
a. Bi^{3+}
b. Sb^{3+}
c. Mg^{2+}
d. Fe^{3+}
e. Fe^{2+}

180. What cations relate to the I analytic group according to the acid-base classification?
a. Potassium, barium, bismuth
b. Sodium, potassium, ammonium
c. Silver, lead, nickel
d. Calcium, strontium, barium
e. Aluminium, magnesium, zinc

181. What working solutions (titrants) are used in the method of precipitation titration - Folgard method?
a. $KMnO_4$ and $KBrO_3$
b. $HClO_4$ and KOH
c. H_2SO_4 and NaOH
d. $Na_2S_2O_3$ and $K(I_3)$
e. $AgNO_3$ and NH_4SCN

182. In which of these reactions hydrogen acts as an oxidizing agent?
a. $CuO+H_2$ H_2O+Cu
b. Cl_2+H_2 $2HCl$
c. $2Na+H_2$ $2NaH$
d. N_2+3H_2 $2NH_3$
e. F_2+H_2 $2HF$

183. In course of the systematic analysis separation of cations of the V and VI analytic groups (according to the acid-base classification) is carried out under the action of excess of:
a. Sodium hydroxide solution
b. Potassium hydroxide solution
c. Sulphuric acid solution
d. Concentrated ammonia solution
e. Hydrochloric acid solution

184. What is the equivalent of $Al(OH)_3$ in the reaction $Al(OH)_3+2HCl = Al(OH)Cl_2+2H_2O$?

a. 1/3 mol
b. 2 mol
c. 3 mol
d. 1/2 mol
e. 1 mol

185. In order to identify the cations of zinc (II) an analytical chemist used the reagent solution of hexacyanoferrate (II) potassium (Pharmacopeia reaction). What colour precipitate is formed in this reaction?
a. Black
b. Yellow
c. White
d. Green
e. Red

186. Choose a reaction, in which a basic salt is formed:
a. KOH+H2SO4
b. NaOH+HCl
c. Fe(OH)3+3KCl
d. 2NaOH+H2SO4
e. Fe(OH)3+2HCl

187. Ammonia solution has been added to the solution under examination. A black precipitate fell out. This indicates the presence of the following cations in the solution:
a. Silver (I)
b. Mercury (I)
c. Iron (III)
d. Copper (II)
e. Iron (II)

188. An excess of concentrated ammonium hydroxide is a group reagent for the cations of the VI analytical group (acid-base classification) Co2+, Ni2+, Cd2+, Cu2+, Hg2+. In this case the following substances are formed:
a. Hydroxides of acid-soluble cations
b. Hydroxides of alkali-soluble cations
c. Hydroxides of the cations insoluble in the excess of ammonium hydroxide
d. Water-soluble ammonia complexes
e. Stained, water-insoluble compounds

189. Both external and internal indicators are used in the following titrimetric method of analysis
a. Alkalimetry
b. Permanganatometry
c. Argentometry
d. Nitritometry
e. Chelatometry

190. A chemist in analytical laboratory needs to standardize solution of sodium hydroxide. What primary standard solution can be applied for this purpose?
a. Sodium tatraborate
b. Sodium chloride
c. Acetate acid
d. Chloride acid
e. Oxalic acid

191. Choose reagents for detection of nitrite ions in presence of nitrate ions contained in a pharmaceutical under examination:
a. Iron (III) chloride
b. Antipyrin and chlorohydrogen acid (diluted)

c. Iron (III) sulfate (concentrated) and potassium bromide
d. Iron (II) sulfate (diluted) and potassium iodide
e. Iron (II) chloride

192. A chemist in an analytical laboratory needs to standardize a sodium hydroxide solution. What primary standard solution can be used for this purpose?
a. Oxalic acid
b. Chlorohydrogen acid
c. Sodium chloride
d. Sodium tetraborate
e. Acetic acid

193. Dimethyl glyoxime entered into reaction with a solution that contained cations of the IV analytical group (acid-base classification). The deposition turned crimson. What cation caused this analytical effect?
a. Cobalt cation (II)
b. Nickel cation (II)
c. Copper cation (II)
d. Mercury cation (II)
e. Cadmium cation (II)

194. Thiocyanatometry is based upon using of secondary standard solution of potassium thiocyanate that should be standardized according to the following standard solution of:
a. Copper (II) nitrate
b. Silver nitrate
c. Sulfuric acid
d. Hydrochloric acid
e. Iron (II) sulfate

195. Concentration of potassium dichromate in a solution was determined by means of iodometry. Name a titrant of iodometric method for determination of strong oxidizer:
a. Sodium hydroxide
b. Potassium permanganate
c. Potassium bromate
d. Sodium thiosulfate
e. Potassium iodide

196. Solution of potassium chromate was added to a solution under examination. As a result of it some yellow deposition settled down. This deposition cannot be dissolved in acetic acid. This means that the solution under examination contains cations of:
a. Sodium
b. Calcium
c. Barium
d. Cobalt
e. Magnesium

197. Quantitative determination of pharmaceutical substances can be done by means of acidimetry. Its titrant is the secondary standard solution of hydrochloric acid. According to which compound the precise concentration of hydrochloric acid can be determined?
a. Magnesium sulphate
b. Sodium tetraborate
c. Potassium dichromate
d. Oxalic acid
e. Sodium thiosulfate

198. Concentrated nitric acid and crystalline lead dioxide were added to a solution under examination. The solution turned crimson. This analytical effect indicates presence of:
a. Chromium (III)

b. Tantum (II)
c. Bismuth (III)
d. Iron (III)
e. Manganese (II)

199. Iodometric determination of formaldehyde in formaline can be done by the back titration. Iodine surplus is titrated with the standard solution of:
a. Sodium nitrate
b. Sodium carbonate
c. Sodium phosphate
d. Sodium thiosulphate
e. Sodium sulphate

200. Name the type of reaction that takes place during detection of ascorbic acid in a preparation by iodometric method:
a. Precipitation
b. Complexing
c. Acylation
d. Neutralization
e. Oxidation-reduction

201. During quantitative estimation of glucose by polarimetric method the following factor is measured:
a. Beam dispersion by a solution
b. Optical density of a solution
c. Coefficient of light refraction
d. Rate of polarized beam absorption by a solution
e. Angle of rotation of polarized beam plane

202. Sodium arsenate solution can be distinguished from the arsenite solution by means of the following reagent:
a. Sodium chloride
b. Sodium fluoride
c. Potassium sulphate
d. Potassium nitrate
e. Magnesia mixture

203. Excess of ammonia was added to a solution under examination. The solution turned bright blue. This indicates presence of the following ions:
a. Lead
b. Silver
c. Copper
d. Bismuth
e. Mercury (II)

204. Determination of sodium and potassium chlorides in pharmaceuticals can be done by means of:
a. Reduction-oxidation titration
b. Acidimetry
c. Chelatometry
d. Argentometry, Mohr method
e. Alkalimetry

205. The solid residue obtained after evaporation of the sample solution makes the colorless flame of burner turn yellow, and when watched through a blue glass, it looks purple. What cations are present in the solid residue?
a. Na+, Ca2+
b. Na+, K+
c. Na+, Sr2+

d. Na2+, K+
e. Li+, Ba2+

206. After a solution had been heated with (NH4)2S2O8 in presence of AgNO3, it turned crimson. What ions were present in the solution?
a. Mn2+
b. Fe2+
c. Cu2+
d. Co2+
e. Fe3+

207. A solution under examination was added to the solution of FeSO4 in presence of concentrated H2SO4. Formation of a brown ring indicates presence of:
a. Carbonate ions
b. Acetate ions
c. Nitrate ions
d. Oxalate ions
e. Phosphate ions

208. Specify standard substances used for standardization of titrant solutions (NaOH, KOH) in the alkalimetric method:
a. Formic and acetic acids
b. Acetic and succinic acids
c. Oxalic and succinic acids
d. Sulphanilic and oxalic acids
e. Sulphanilic and salicylic acids

209. Cations of the third analytical group (acid-base classification) can be isolated in course of systematic analysis by means of the following group reagent:
a. 1 M solution of ammonium carbonate
b. 1 M solution of sulfate acid in presence of ethanol
c. 0,1 M solution of sodium carbonate
d. 1 M solution of potassium chromate
e. 0,1 M solution of ammonium oxalate

210. In a solution containing cations of copper (II) and zinc, the copper cations can be identified by means of the excess of the following reagent:
a. 2M hydrochloric acid solution
b. 2M solution of ammonium carbonate
c. 2M sulfuric acid solution
d. 6M potassium hydroxide solution
e. 6M ammonia solution

211. Solution of potassium iodide was added to the solution acidated with sulfate acid that contained anions of the third analytical group. Release of free iodine is observed. What anion are present in the solution?
a. Nitrite ion
b. Sulfate ion
c. Acetate ions
d. Bromide ions
e. Carbonate ion

212. A solution contaning anions of the second analytical group has been blended with the solution of argentum nitrate. This resulted in formation of black precipitate insoluble in the ammonia solution and soluble in the diluted nitric acid at heating. What anions are present in the solution?
a. Iodide ions
b. Bromide ions
c. Arsenite ions

d. Sulphide ions
e. Chloride ions

213. Argentum nitrate solution was added to a solution containing anions of the second analytical group. This resulted in formation of light-yellow sediment that was insoluble in the nitric acid and partly soluble in the ammonia solution. What anions were present in the solution?
a. Iodide ions
b. Sulphide ions
c. Arsenite ions
d. Bromide ions
e. Chloride ions

214. During gravimetric determination of mass fraction of sulfate ions in the magnesium sulfate preparation precipitation is performed by means of barium chloride solution. Precipitated barium sulfate should be rinsed with:
a. Solution of barium chloride
b. Distilled water
c. Diluted solution of sulfate acid
d. Solution of sodium sulfate
e. Solution of hydrochloride acid

215. A medicament comprises sodium bicarbonate and sodium chloride. What method is used for quantitative determination of sodium bicarbonate?
a. Acid-base titration
b. Redox titration
c. Coulometric titration
d. Complexometric titration
e. Precipitation titration

216. Concentration of magnesium sulfate in a drug can be determined by complexometric titration. Choose an indicator to detect the end point of titration:
a. Phenolphtalein
b. Eosin
c. -
d. Chromogen black
e. Methyl orange

217. 0,1 M solution of potassium permanganate is used as a titrant in permanganatometry. The solution is prepared like the secondary standard solution and standardized according to:
a. Calcium oxide
b. Ammonia oxide
c. Sodium chloride
d. Potassium dichromate
e. Sodium carbonate

218. Specify the reaction conditions (medium, to) in the standardization of potassium permanganate solution by sodium oxalate solution:
a. Neutral, cooling
b. Acidic, heating
c. Alkaline, heating
d. Neutral, heating
e. Acidic, cooling

219. Specify the standardized solutions used for direct and back titration of reducing agents in the iodometric method:
a. $K_2Cr_2O_7$, I_2
b. I_2, $Na_2S_2O_3$
c. I_2, KI

d. $K_2Cr_2O_7$, $Na_2S_2O_3$
e. $KMnO_4$, KI

220. Halide ions in drugs are determined by titration based upon the reaction of:
a. Acid-base
b. Complexing
c. Oxidation-reduction
d. Substitution
e. Precipitation

221. Specify the standard solution for the iodometric determination of reducing agents (direct titration):
a. KI solution
b. I_2 solution
c. $Na_2S_2O_3$ solution
d. $KMnO_4$ solution
e. $K_2Cr_2O_7$ solution

222. Choose a pair of electrodes for $FeSO_4$ determination by method of potentiometric titration:
a. Chingidron and zink
b. Copper and glass
c. Platinum and chlorosilver
d. Hydrogen and glass
e. Antimonial and silver

223. The fourth group of cations includes the cations Al^{3+}, Sn^{2+}, Sn(IV), As(V), As(III), Zn^{2+}, C^{3+}. The group reagent for the fourth group of cations is the solution of:
a. H_2SO_4, N_2O_2
b. NaOH, N_2O_2
c. NH_3, N_2O_2
d. HCl
e. $N_2S_2O_4$

224. During the qualitative analysis under the influence of group reagent NaOH upon the aluminium ions the following substance is produced:
a. Sodium hexahydroxoaluminate
b. Sodium metaaluminate
c. Aluminium oxide
d. Basic aluminium salts
e. Aluminium hydroxide

225. During the quantitative analysis carried out under the primary conditions, a specific reagent to Fe^{3+} cations is $K_4[Fe(CN)_6]$. Their interaction gives a precipitate of the following colour:
a. Red
b. Black
c. White
d. Brown
e. Blue

226. In the qualitative analysis which involves precipitation of sulphates of the third analytical group cations (Ca^{2+}, Sr^{2+}, Ba^{2+}) the solubility of sulphates can be reduced by adding:
a. Amyl alcohol
b. Ethyl alcohol
c. Benzene
d. Distilled water
e. Chloroform

227. In a qualitative analysis, when an excess of the group reagent (NH_3 solution) reacts with the cations of the sixth analytical group (Cu^{2+}, Co^{2+}, Ni^{2+}, Cd^{2+}, Hg^{2+}), the following compounds are

formed:

a. Metal ammine complexes

b. Basic metal salts

c. Hydroxocomplexes of metals

d. Aqua complexes of metals

e. Metal hydroxides

228. Sodium fluoride is one of the components of the drugs used in the treatment of dental caries. NaF reacts with the following compound:

a. CH3COOH

b. H2SO4

c. NaCl

d. CO2

e. KI

229. The most common technology in pharmaceutical production is maintaining constant temperature and pressure. What is this process called?

a. Isochoric-isothermal

b. Isochoric

c. Isothermal

d. Isobaric-isothermal

e. Isobaric

230. Some medications are colloidal solutions. What size of the colloidal particles is typical for the colloidal dispersion?

a. 10-5 – 10-7 ?

b. 10-5 - 10-3 ?

c. > 10-3 ?

d. 10-7 – 10-9 ?

e. 10-10 – 10-11 ?

231. The ability of reagent to ensure a stable analytical effect in the interaction with the analyzed substance is characterized by:

a. Reaction sensitivity

b. Reaction specificity

c. -

d. Reagent amount

e. Reaction selectivity

232. To maintain a certain level of pH-medium, the buffer solutions are used. Specify a composition of substances that DOES NOT EXHIBIT buffer properties:

a. HCOOH + HCOONa

b. NaH2PO4+Na2HPO4

c. CH3COOH+CH3COONa

d. NH4Cl+NH3 * H2O

e. NaOH+NaCl

233. Quantitative analysis of zinc salts is performed by method of trilonometry. What indicator is used for this purpose?

a. Methyl black

b. Phenolphtalein

c. Eriohrome black-T

d. Potassium dichromate

e. Thymol blue

234. During analysis of cations of the IV analytic group Zn cations can be detected under certain conditions with the following reagent:

a. Alkali metal carbonates

b. Dimethylglyoxime
c. Ammonia solution
d. Alkali
e. Dithizone

235. Specify the titration method, in which a standardized titrant solution is gradually added to the solution under study until a titration endpoint is reached:
a. Indirect titration
b. Back titration
c. Direct titration
d. Substitution titration
e. Residue titration

236. What analytical effect is observed after fixing the endpoint during the titration by Mohr method?
a. Yellow precipitate
b. Brick-red precipitate
c. Yellow colour of solution
d. Red colour of solution
e. White precipitate

237. What standard solution (titrant) is used in Folgards method of direct titration?
a. Potassium dichromate
b. Ammonium thiocyanate
c. Silver nitrate
d. Sodium chloride
e. Potassium chromate

238. While detecting Co^{2+} ions in presence of Fe^{3+} the following ions should be added to the solution in order to mask Fe^{3+} ions:
a. Chloride ions
b. Nitrite ions
c. Sulphate ions
d. Fluoride ions
e. Bromide ions

239. Which indicatorless method enables quantitative determination of iron (II) content?
a. Chelatometry
b. Iodometry
c. Nitritometry
d. Permanganatometry
e. Argentometry

240. For the quantitative analysis of ethanol the gas chromatography was used. Which parameter was measured?
a. Peak height or area
b. Retention volume
c. Peak width at half height
d. Peak width
e. Retention time

241. Coulometry is based upon measurement of electrics that is spent on electrode reaction. What law underlies coulometric method?
a. Archimedes' principle
b. Stokes law
c. Bouguer-Lambert-Beer law
d. Faraday law
e. Newton law

242. In order to determine mass fraction of calcium in a pharmaceutical preparation, gravimetric

method was applied. Ammonium oxalate solution was used as a precipitating agent. What is the gravimetric form in this case?

a. Anhydrous calcium oxalate
b. Calcium carbonate
c. Calcium hydroxide
d. Calcium chloride
e. Monohydrous calcium oxalate

243. Analytical indication of effect of potassium iodide solution upon unstained oxidizing anions in presence of chloroform is:

a. Brown stain of free iodine
b. Change of aggregate state
c. Origination of deposition and its solution in reagent excess
d. Emission of gas bubbles
e. Settling down of white deposition

244. Dosage forms produced as coarse dispersion systems with the liquid dispersion medium and the solid phase are called:

a. Foam
b. Suspension
c. Aerosol
d. Emulsion
e. Powder

245. Specify the relevant indicators for fixation of the titration endpoint when using nitritometric method:

a. Tropeolin 00 + methylene blue
b. Methylene orange
c. Diphenylamine
d. Starch solution
e. Methylene blue

246. Choose a reduction-oxidation method for the quantitative determination of iron (II) salts in a solution that contains hydrochloric acid:

a. Dichromatometry
b. Permanganatometry
c. Ascorbinometry
d. Nitritometry
e. Iodometry

247. During thin-layer chromatography of novocaine, the developed plate represented a stain 3 cm away from the start line, and the length of solvent front was 10 cm. What is the Rf value of novocaine?

a. 0,5
b. 0,4
c. 0,3
d. 0,6
e. 0,7

248. In order to choose an indicator during the acid-bace titration a titration curve is made which is the dependence of:

a. pH solution from the concentration of the added titrant
b. Concentration of the solution under analysis from pH solution
c. pH solution from the temperature
d. pH solution from the volume of the added titrant
e. pH solution from the volume of the solution under analysis

249. What method of titrimetric analysis can be applied for the quantitative determination of

sulphuric acid by means of the potassium hydroxide solution?
a. Acidimetry
b. Precipitation
c. Complexation
d. Alkalimetry
e. Oxidation-reduction

250. You have to carry out a qualitative analysis. What substance will originate from chromium ions under the influence of group reagent excess (solution of sodium hydroxide) upon cations of the IV analytical group?
a. Chromium (III) oxide
b. Chromium (III) hydroxide
c. Sodium hexahydroxochromate (III)
d. Chromium (II) hydroxide
e. Chromium (II) oxide

251. Choose the reagents for detection of the sulphate ions in a solution containing carbonate, sulphate and phosphate ions:
a. Ba(NO3)2, HCl
b. BaCl2, H2O
c. AgNO3, HNO3
d. CaCl2, NH4OH
e. Ba(NO3)2, NaOH

252. Emulsions of 0.1 - 74% dispersed-phase volume relate to:
a. Diluted
b. W\O type
c. O/W type
d. Concentrated
e. Highly concentrated

253. A composition under examination contains ions of Cl–, Br– and I– in equimolar quantities. The sequence of precipitate formation in course of argentometric titration will be determined by:
a. Value of oxidation-reduction potentials
b. Value of corresponding ion mobility
c. Ionic strength of solution
d. Solubility product of the corresponding silver halogenides
e. Way of titration - either back or direct

254. The molar mass of calcium hydroxide equivalent (M(Ca(OH)2) = 74 g/mol) is:
a. 19 g/mol
b. 74 g/mol
c. 148 g/mol
d. 37 g/mol
e. 32 g/mol

255. Choose an appropriate indicator for fixation of titration end point in method of bromatometry:
a. Methyl blue
b. Tropeolin 00
c. Phenolphthalein
d. Starch
e. Methyl red

256. Nitritometric determination of compounds containing primary aromatic amino group can be carried out under the following conditions:
a. Slow titration
b. With observation of all the mentioned conditions
c. With adding of the crystalline KBr (catalyst)

d. At a temperature up to 10 degrees
e. Chloric acid excess

257. To identify a drug by thin-layer chromatography the following parameter is used:
a. n
b. I, A
c. Kp
d. Rf
e. E, mV

258. What electrode is used as indicator during dichromatometric determination of FeSO4 in a solution provided that fixation of the equivalence point is done by a potentiometric method?
a. Quinhydrone
b. Glass
c. Platinum
d. Silver
e. Silver chloride

259. Content of potassium dichromate in a solution was determined by iodometric method. Name the titrant of iodometric method for oxidant determination:
a. Potassium bromate
b. Sodium thiosulfate
c. Potassium iodide
d. Sodium hydroxide
e. Potassium permanganate

260. When ammonia enters into reaction with acids, this results in formation of ammonium salts. Which properties of ammonia characterize this process?
a. Ability to accept the hydrogen ions
b. Acidic properties
c. Ability to hydrolyze
d. Oxidative properties
e. Reductive properties

261. Nitritometric determination of primary aromatic amines in acidic medium results in generation of the following reaction product:
a. Nitrosoamine
b. Nitrose antipyrine
c. Azide
d. Diazonium salt
e. Nitrose arylenamine

262. What is the primary standard for standardization of Hg2(NO3)2 solution?
a. Sodium chloride
b. Sosium sulphate
c. Sodium dichromate
d. Sodium hydroxide
e. Sodium bromide

263. Determination of sodium chloride by Folgards method involves the following techniques:
a. Direct titration, mercurimetry
b. Back titration, argentometry
c. Substitute titration
d. Direct titration, argentometry
e. Back titration, mercurimetry

264. What reactions are used in the methods of permanganatometry, dichromatometry, iodometry?
a. Hydrolysis
b. Oxidation-reduction

c. Complexation
d. Precipitation
e. Neutralization

265. Quantitative determination of iodide can be done by method of:
a. Acid-base titration
b. Spectrophotometry
c. Precipitating titration
d. Oxidation-reduction titration
e. Chelatometry

266. In order to bind hydrogen ions during the identification of potassium ions with tartaric acid the following solution is used:
a. Sodium acetate
b. Ammonia
c. Hydrochloric acid
d. Sulfuric acid
e. Sodium hydroxide

267. A solution containing calcium and magnesium cations is titrated with Trilon B solution. Complexometric titration of these cations requires the following medium:
a. Formate buffer solution
b. Acidic solution
c. Acetate buffer solution
d. Ammonium buffer solution
e. Neutral medium

268. What analytical effect is observed when potassium cation is being determined by the sodium hexanitrocobaltate (III) solution?
a. Yellow crystalline precipitate
b. Yellow colouring of the solution
c. Red crystalline precipitate
d. Black crystalline precipitate
e. White crystalline precipitate

269. What substance can be identified by method of acid-base titration and oxidation-reduction titration?
a. Ammonium chloride
b. Oxalate acid
c. Calcium nitrate
d. Sodium sulphate
e. Sodium hydroxide

270. Quantitative determination of pharmaceutical substances can be carried out by method of alkalimetry using 0,1 M sodium hydroxide solution as a titrant. Precise concentration of sodium hydroxide can be determined according to:
a. Oxalic acid
b. Potassium dichromate
c. Ammonium hydroxide
d. Sodium thiosulphate
e. Sodium tetraborate

271. A drug solution under examination contains cations of magnesium (II) and aluminium (III). Which reagent can help to separate these cations during analysis of this drug?
a. Ammonia solution
b. Solution of chloride acid
c. Solution of hydrogen peroxide in acidic medium
d. Solution of silver nitrate

e. Alkali solution

272. As a rule, the maximum oxidation number of an element is:
a. Subgroup number in the periodic system
b. Row number
c. -
d. Group number in the periodic system
e. Period number

273. Pharmacopoeia test reaction for determination of benzoate ions is the interaction with the following solution:
a. Iron (III) chloride
b. Resorcinol
c. Diphenylamine
d. Acetic anhydride
e. Potassium chloride

274. A solution containing the cations of the V analytic group (acid-base classification) has been taken for the analysis. The solution of sodium hydroxostannite has been added to the composition which resulted in formation of black deposition. This is the evidence of presence of the following cation:
a. Fe^{3+}
b. Mg^{2+}
c. Fe^{2+}
d. Sb^{3+}
e. Bi^{3+}

275. What cations relate to the I analytic group according to the acid-base classification?
a. Silver, lead, nickel
b. Calcium, strontium, barium
c. Sodium, potassium, ammonium
d. Aluminium, magnesium, zinc
e. Potassium, barium, bismuth

276. What working solutions (titrants) are used in the method of precipitation titration - Folgard method?
a. $HClO_4$ and KOH
b. $AgNO_3$ and NH_4SCN
c. $Na_2S_2O_3$ and $K(I_3)$
d. H_2SO_4 and NaOH
e. $KMnO_4$ and $KBrO_3$

277. In which of these reactions hydrogen acts as an oxidizing agent?
a. $CuO + H_2 \rightarrow H_2O + Cu$
b. $Cl_2 + H_2 \rightarrow 2HCl$
c. $2Na + H_2 \rightarrow 2NaH$
d. $N_2 + 3H_2 \rightarrow 2NH_3$
e. $F_2 + H_2 \rightarrow 2HF$

278. What is the equivalent of $Al(OH)_3$ in the reaction $Al(OH)_3 + 2HCl = Al(OH)Cl_2 + 2H_2O$?
a. 1 mol
b. 1/3 mol
c. 1/2 mol
d. 2 mol
e. 3 mol

279. In order to identify the cations of zinc (II) an analytical chemist used the reagent solution of hexacyanoferrate (II) potassium (Pharmacopeia reaction). What colour precipitate is formed in this reaction?
a. Green

b. Red
c. Yellow
d. Black
e. White

280. Choose a reaction, in which a basic salt is formed:
a. 2NaOH + H2SO4
b. Fe(OH)3 + 3KCl
c. Fe(OH)3 + 2HCl
d. KOH + H2SO4
e. NaOH + HCl

281. What reagent is used to separate AgCl precipitate from AgI precipitate?
a. Concentrated nitric acid
b. Concentrated solution of potassium chloride
c. Sulfuric acid solution
d. Aqueous solution of ammonia
e. Diluted nitric acid

282. In chemico-analytical laboratory a specialist studies the mixture of the 5th analytical group cations. When thiocyanate ions are added the solution becomes red-colored. This analytical effect indicates presence of the following cation:
a. Mn2+
b. Fe3+
c. Mg2+
d. Fe2+
e. Bi3+

283. Mass fraction of pharmaceutical preparations that contain aromatic amino groups is defined through nitrite titration. What external indicator is used in this case?
a. Starch-iodide paper
b. Eriochrome Black T
c. Eosin
d. Phenolphthalein
e. Methylene red

284. Identical analytical effect is observed when NO3- and NO2- ions interact with:
a. Solution of I2, KI
b. Solution of KMnO4
c. Diphenylamine and concentrated H2SO4
d. Solution of AgNO3
e. Solution of BaCl2

285. How to separate PbSO4 from mixture of the 3rd analytical group cation sulphates in the process of systematic analysis?
a. Processing precipitate with ammonia solution
b. Processing precipitate with 30% ammonium acetate solution
c. Processing precipitate with concentrated sulfate acid
d. Precipitate recrystallization
e. Processing precipitate with acetate acid solution

286. Potassium iodide solution has been added to the solution containing cations of the sixth analytical group (acid-base classification). It resulted in red precipitate soluble in excess of reagent. What cations are present in the solution?
a. Cadmium
b. Mercury (II)
c. Cobalt (II)
d. Nickel

e. Bismuth

287. Silver nitrate solution was added to a solution containing anions of the second analytical group. It resulted in generation of light yellow precipitate that was unsoluble in nitric acid and partly soluble in ammonium solution. What anions are contained in the solution?

a. Bromide ions
b. Arsenate ions
c. Iodide ions
d. Sulphate ions
e. Arsenite ions

288. The Mohr method is used to define sodium chloride mass concentration in isotonic solution. Titration is carried out with the following indicator present:

a. Potassium chromate
b. Ammonium iron (III) sulfate
c. Ferroin
d. Diphenylcarbazone
e. Fluorescein

289. In the process of conductometric titration of HCl and CH3COOH acids mixture 0,1 ? solution of N?OH is used to measure:

a. Refractive index
b. Electrical conduction in solution
c. Potential difference
d. pH of medium
e. Rotation angle of polarized light plane

290. In potentiometric titration the following indicator electrode is used for chloride and borate acids quantitative determination in their mixture:

a. Silver
b. Silver-chlorine
c. Glass
d. Platinum
e. Calomel