

GENERAL AND INORGANIC CHEMISTRY

1. Which of the following substances is an element:

- a) ammonia b) helium c) water d) air e) cryolite

2. An element with electron configuration $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2$ is in the following periode:

- a) the fifth b) the fourth c) the first d) the third e) the second

3. An element with electron configuration $1s^2 2s^2 2p^6 3s^2 3p^3$ is in the following periode:

- a) the first b) the fifth c) the fourth d) the sixth e) the third

4. In which sequence of elements are there elements with the lowest ionization energy?

- a) C, Si, Ge, Sn, Pb
b) Be, P, Ca, S, Mn
c) N, P, As, Sb, Bi
d) Na, K, Rb, Cs, Fr

5. If an element is in the fourth periode and in the second group, its ordinal number is:

- a) 15 b) 25 c) 20 d) 18 e) 12

6. If the atomic masses for calcium 40 and for phosphorus 31, then the molecular weight for primary calcium phosphate is:

- a) 256 b) 218 c) 234 d) 236 e) 416

7. Of these molecules, the largest dipole moment is in:

- a) nitrogen b) hydrogen c) hydrogen chloride d) helium e) fluorine

8. An element with atomic number 16 has the properties most similar to an element which atomic number is:

- a) 6 b) 32 c) 34 d) 17 e) 15

9. The molecular weight of tertiary calcium phosphate is: (Ca = 40, P = 31)

- a) 212 b) 365 c) 135 d) 310 e) 175

10. The relative atomic mass of iodine is 127. What is the mass of the molecule of that element?

- a) $4,23 \times 10^{19}$ b) 254 c) $2,11 \times 10^{-22}$ d) $4,23 \times 10^{-22}$ e) $4,23 \times 10^{-1}$

11. Which of the following compounds has a covalent bond type?

- a) PH_3 b) NaH c) CaH_2 d) Na_2O_2

12. Which of the following pairs of chemical elements does not build ionic compounds:

- a) Ca and O b) Ba and J c) Li and Cl d) Na and F e) C and Cl

13. Which of the following compounds has an ionic type of bond?

- a) PH_3 b) Na_2O_2 c) AsH_3 d) NH_3 e) P_2O_5

14. How much litres NO, calculated under standard conditions, results from the complete combustion of 2 moles of ammonia?

- a) 11,2 b) 4,48 c) 2,24 d) 22,4 e) 44,8

15. Circle the letter in front of the acid oxide formula!

- a) NO b) Al_2O_3 c) P_2O_5 d) Na_2O e) ZnO

16. Circle the letter in front of the base oxide formula!

- a) CS_2O b) SO_3 c) CO d) SiO_2 e) NO_2

17. Circle the letter in front of the nitric acid anhydride formula!

- a) NO_2 b) N_2O_3 c) N_2O_5 d) N_2O e) NO

18. Circle the letter in front of the amphoteric oxide formula!

- a) P_2O_3 b) Li_2O c) N_2O_5 d) ZnO e) Na_2O

19. Circle the letter in front of the oxide formula which, in reaction with water, gives a double-acid base!

- a) CaO b) K_2O c) Cl_2O d) N_2O_5 e) CO_2

20. Circle the letter in front of the oxide formula which, in reaction with sodium hydroxide, can give two types of salts, one acidic and one neutral!

- a) Cl_2O b) SO_3 c) N_2O_5 d) N_2O_3 e) Cl_2O_7

21. Which sequence contains only elements that can build up acidic oxides?

- a) N, P, Cu, Hg, S b) Cl, P, C, N, B c) Ca, Sr, Cu, Hg, P
d) Cr, N, P, B, Mn e) S, Mn, Si, Mg, Li

22. Which sequence contains only elements that can build up base oxide?

- a) Si, B, Al, Hg, Na b) B, As, Ca, S, Cl c) F, Fe, Hg, Cu, Ca
d) Cu, Co, Hg, Na, Ca e) F, Na, Mg, Li, Pb

23. Which of these oxides, when reacted with 0.6 moles of calcium hydroxide, provides 0.6 moles of neutral salt?

- a) N_2O b) Fe_2O_3 c) P_2O_5 d) As_2O_5 e) N_2O_3

24. Which reaction shows the oxidoreduction reaction?

- a) $2NH_3 + H_2CO_3 = (NH_4)_2CO_3$ b) $Mn_2O_7 + 2KOH = 2KMnO_4 + H_2O$
c) $SO_3 + H_2O = H_2SO_4$ d) $Fe_2O_3 + 3H_2SO_4 = Fe_2(SO_4)_3 + H_2O$
e) $2KClO_3 = 2KCl + 3O_2$

25. Which reaction is possible?

- a) $2Ag + H_2SO_4 = Ag_2SO_4 + H_2$ b) $Cu + 2HCl = CuCl_2 + H_2$
c) $Zn + 2H_2SO_4 = ZnSO_4 + SO_2 + 2H_2O$
d) $Hg + 2HNO_3 = Hg(NO_3)_2 + H_2$ e) $Mg + H_2SO_4 = MgSO_4 + H_2$

26.

In what sequence are substances that can only be used as reducing agents?

- a) H_2S , CaH_2 , Cu , NH_3 b) H_2S , H_2O_2 , J_2 , Na c) Cl_2 , NaH , H_2S , H_2O_2
d) $NaCl$, J_2 , H_2S , Cu e) Br_2 , KBr , H_2S , K

27. Reaction of 0.4 moles of ferric chloride (iron (III) chloride) with sulfur hydrogen gives:

- a) 0,4 moles of sulfur b) 0,8 moles of sulfur c) 0,2 moles of sulfur
d) 2 moles of sulfur e) 0,04 moles of sulfur

28. Which solution obtained by mixing (of equal volume) two solutions of the same concentration (mol / L) reacts acidically?

- a) $\text{CO}_2 + \text{NaOH}$ b) $\text{H}_2\text{S} + \text{KOH}$ c) $\text{Ca}(\text{OH})_2 + \text{HNO}_3$
d) $\text{H}_3\text{PO}_4 + \text{KOH}$ e) $\text{KOH} + \text{HCN}$

29. What is the pH value of the solution containing 3.15 g of nitric acid in 50 mL of solution. N-14?

- a) 1 b) 2 c) 3 d) 4 e) 0

30. Circle the letter in front of the concentration for the acidic solution!

- a) $[\text{OH}^-] = 10^{-4} \text{ mol/L}$ b) $\text{pH} = 7$ c) $[\text{H}^+] = 10^{-8} \text{ mol/L}$
d) $\text{pOH} = 5$ e) $6,023 \times 10^{20} \text{ H}^+ \text{ ion/L}$

31. Which of the following formulas represents a base

salt?

- a) KH_2PO_4 b) NaHCO_3 c) CH_3COONa d) $\text{Mg}(\text{OH})\text{Cl}$ e) MgCl_2

32. What acid is formed by the action of sulfuric acid on sodium nitrite?

- a) HNO_3 b) HNO c) HNO_2 d) H_2SO_3 e) H_2

33. Ampholyte is:

- 1) HCO_3^{2-} 2) NH_4^+ 3) NaCl 4) NaOH 5) CO

34. Find the reaction where oxidation of the chlorine atom is occurring.

- 1) $\text{SnCl}_2 + \text{Cl}_2 \rightarrow \text{SnCl}_4$
2) $\text{NaCl} + \text{AgNO}_3 \rightarrow \text{AgCl} + \text{NaNO}_3$
3) $\text{MnO}_2 + 4\text{HCl} \rightarrow \text{Cl}_2 + \text{MnCl}_2 + 2\text{H}_2\text{O}$
4) $\text{HClO} \rightarrow \text{HCl} + \text{O}$
5) $\text{KIO}_3 + 5\text{KI} + 6\text{KCl} \rightarrow 6\text{KCl} + 3\text{I}_2 + 3\text{H}_2\text{O}$

35. Which of the following compounds is written in the form of molecules in ionic reactions?

- 1) HBr 2) LiOH 3) NH_4Cl 4) AgCl 5) NaNO_3

36. Conjugate acid of base H_2PO_4^- is:

- 1) PO_4^{3-} 2) H_3PO_4 3) HPO_4^{2-} 4) H_3O^+ 5) H_2O

37. Which of the following solution mixtures has buffering properties:

- a) HCl + NaCl b) $\text{NH}_3 + \text{NH}_4\text{Cl}$ c) NaOH + KCl

38. Circle the colligative property of the solution.

- a) quantitative concentration b) molality c) osmotic pressure of solution
d) vapor pressure of pure liquid e) boiling point of solution

39. In the oxide reduction equation $\text{H}_2\text{SO}_3 + \text{J}_2 + \text{H}_2\text{O} \rightarrow \text{H}_2\text{SO}_4 + \text{HJ}$ molar ratio of $\text{H}_2\text{SO}_4 + \text{HJ}$ is:

- a) 1:1 b) 3:2 c) 3:1 d) 2:3 e) 1:2

40. Bases were added to the acid solutions in the same molar ratio (1: 1). Which of the solutions obtained will react neutrally?

- a) NaOH + CH_3COOH b) KOH + H_2SO_4 c) KOH + HCl d) KOH + HCN e) LiOH + HF

41. In the oxide reduction equation $\text{H}_2\text{O}_2 + \text{KMnO}_4 + \text{H}_2\text{SO}_4 \rightarrow \text{MnSO}_4 + \text{O}_2 + \text{K}_2\text{SO}_4 + \text{H}_2\text{O}$ molar ratio of H_2O_2 i KMnO_4 is:

- a) 1:1 b) 5:2 c) 3:1 d) 2:3 e) 1:3

42. Calculate the volume under normal conditions of 5 g oxygen: $A_r(\text{O})=16$.a)

- 3.5 b) 2.9 c) 4.5 d) 7.0 e) 1.3

43. Circle the compound where iron has oxidation number two:

- a) FeSO_4 b) ZnCl_2 c) $\text{Fe}(\text{NO}_3)_3$ d) $\text{Fe}(\text{OH})_3$ e) FeCl_3

44. Which of the following compounds is secondary calcium phosphate?

- 1) $\text{Ca}(\text{H}_2\text{PO}_4)_2$ 2) CaHPO_4 3) $\text{Ca}_3(\text{PO}_4)_2$ 4) CaPHO_3 5) $\text{Ca}(\text{HPO}_3)_2$

45. Circle the letter in front of the acid oxide formula:

- a) Cs_2O b) N_2O_3 c) CO d) $\text{Mg}(\text{OH})_2$ e) ZnO

46. How many milliliters of sodium sulfate solution, concentration 1 mol/L can be obtained from 28.4 g of that salt? ($\text{Na}=23$; $\text{S}=32$).

- a) 240 b) 200 c) 24 d) 20 e) 220

47. How many milliliters of sodium carbonate solution, at a concentration of 2 mol / L, can get from 31.8 g of that salt? ($\text{Na} = 23$)

- a) 150 b) 190 c) 175 d) 19 e) 15

48. If 5.3 g of sodium-carbonate is dissolved in 500 mL of solution, calculate the

concentration of sodium ions in mol/L. Na-23?

- a) 0,2 b) 0,1 c) 0,15 d) 0,3 e) 0,35

49. Molar ratio in reaction of aluminum-hydroxide and phosphoric (phosphate) acid producing neutral salt is:

- a) 1:1 b) 3:2 c) 3:1 d) 2:3 e) 1:3

50. How many moles of neutral salt will be obtained in reaction of 200 mL of phosphoric (phosphate) acid solution ($C = 2 \text{ mol/L}$) on magnesium-oxide?

- a) 0,4 b) 0,2 c) 0,1 d) 0,3 e) 1

51. How many moles of neutral (normal) salt will be obtained in reaction of 100 mL ($C = 1 \text{ mol/L}$) of potassium hydroxide solution with nitrogen-pentoxide (nitrogen(V)-oxide)?

- a) 0,1 b) 1 c) 0,2 d) 2 e) 0,5

52. How many grams of calcium bisulfate (acid sulfate) will be obtained by reacting calcium hydroxide with 400 mL of a sulfuric acid solution which concentration is 0.2 mol/L ? ($\text{Ca} = 40, \text{S} = 32$)

- a) 23,40 b) 28,72 c) 9,36 d) 10,96 e) 5,48

53. Which of these oxides gives 0.04 moles of neutral salt when reacted with 0.12 moles of magnesium-hydroxide?

- a) Na_2O_2 b) N_2O_3 c) Cl_2O d) SO_2 e) P_2O_5

54. The acid and base were mixed in the same molar ratio. Which of the following solutions is acidic?

- a) $\text{HCl} + \text{NaOH}$ b) $\text{H}_2\text{CO}_3 + \text{NaOH}$ c) $\text{H}_2\text{S} + \text{KOH}$
d) $\text{HNO}_2 + \text{KOH}$ e) $\text{H}_2\text{SO}_4 + \text{Cu}(\text{OH})_2$

55. Which salt in the aqueous solution reacts neutrally?

- a) K_2SO_4 b) NaHSO_4 c) KCN d) CaOHCl e) NaNO_2

56. Which salt in the aqueous solution reacts alkali?

- a) NaHSO_4 b) CaOHCl c) CaSO_4 d) KJ e) NH_4NO_3

57. Which salt, due to hydrolysis, reacts acidic?

- a) FeCl_3 b) $\text{Ba}(\text{NO}_3)_2$ c) NaHS d) NaHSO_4 e) NaBr

58. Which salt in the aqueous solution hydrolyzes?

a) NaNO_3 b) KHCO_3 c) K_2SO_4 d) CaOHNO_3 e) NaHSO_4

59. In which of the following electrolyte solutions is the concentration of OH^- ions higher than in water?

a) NH_4Cl b) NaHSO_4 c) NaNO_3 d) KCl e) CaOHCl

60. In which of the following solutions will be the highest pH be at equal concentrations?

a) CaCl_2 b) NH_4Cl c) AlCl_3 d) NaCN e) FeCl_3

61. In which sequence are only those compounds which aqueous solutions are acidic?

- a) KHS , H_2SO_4 , ZnOHCl , CO_2 , NaNO_2
- b) Cl_2O_7 , H_2S , NaH_2PO_4 , NH_4Cl , HNO_3
- c) NH_4Cl , Na_2HPO_4 , HCl , N_2O_5 , NaHSO_4
- d) KHS , HBr , Na_2O_3 , CO_2 , NaHSO_3
- e) KHSO_4 , HNO_3 , N_2O , KH_2PO_4 , Cl_2O_7

62. Which solution obtained by mixing (of equal volume) two solutions of the same concentration (mol/L) reacts acidic?

a) $\text{K}_2\text{O} + \text{H}_2\text{SO}_4$ b) $\text{H}_2\text{SO}_4 + \text{Ca}(\text{OH})_2$ c) $\text{CO}_2 + \text{NaOH}$ d) $\text{NH}_3 + \text{HCl}$ e) $\text{BaO} + \text{HCl}$

63. Catalysts are substances that:

- a) increase the kinetic energy of the molecules
- b) reduce the amount of heat generated in the reaction
- c) increase the number of collisions between molecules
- d) reduce the activation energy of the reaction
- e) increase the activation energy of the reaction

64. Which of the following compounds in reaction with nitric acid will provide a salt that hydrolyzes in aqueous solution?

a) $\text{Cu}(\text{OH})_2$ b) BaO c) Na_2O d) $\text{Ca}(\text{OH})_2$ e) KOH

65. Which of the following compounds in reaction with sodium hydroxide will give a salt that hydrolyzes in aqueous solution?

a) HBr b) HNO_2 c) N_2O_5 d) H_2SO_4 e) HCl

66. Which of these oxides, in reaction with hydrochloric acid, builds up a salt that reacts acidically in an aqueous solution?

a) Na_2O b) BeO c) SO_2 d) N_2O e) CO_2

67. In which of the following electrolyte solutions the concentration of OH ions is higher than in water?

- a) NaCl b) $\text{Ca}(\text{NO}_3)_2$ c) NH_4Cl d) NaHSO_2 e) Na_2S

68. Which of the following compounds in reaction with nitric acid will give a salt that hydrolyzes in aqueous solution?

- a) CaO b) PbO c) Na_2O d) NaCl e) CO

69. Which of the solutions of the same concentrations (1 mol/L), when mixed in the same volume ratio, react acidically?

- a) $\text{HCl} + \text{NaOH}$ b) $\text{HCl} + \text{Zn}(\text{OH})_2$ c) $\text{HNO}_3 + \text{KOH}$

- d) $\text{HCN} + \text{NaOH}$ e) $\text{HCN} + \text{Ca}(\text{OH})_2$

70. In which of the following aqueous electrolyte solutions the concentration of OH ions is higher than in water?

- a) NaHSO_4 b) $\text{Ca}(\text{NO}_3)_2$ c) KJ d) $\text{Al}(\text{OH})\text{SO}_4$ e) NaHS

71. Which of the following compounds with potassium hydroxide gives a salt that hydrolyzes in water?

- a) As_2O_3 b) N_2O c) SO_3 d) NH_3 e) HJ

72. In which sequence are only those compounds which aqueous solutions react alkali?

- a) Li_2O , $\text{Ba}(\text{OH})_2$, ZnOHCl , BaO, NaOH
b) K_2O , BaOHNO_3 , NaHS, KCN, KOH
c) BaO, KOH, NaHS, AlOHSO_4 , NaHCO_3
d) NaHCO_3 , BaO, NaNO_2 , ZnOHCl , KHS
e) AlOHSO_4 , ZnO, NH_3 , KHS, CaOHJ

ORGANIC CHEMISTRY

1. What is the name, according to IUPAC nomenclature, for a hydrocarbon having one tertiary atom and a molecular formula C_4H_8 ?

- a) 2-methyl-1-butane b) 2-methyl-1,3-butadiene c) 2-methylpropene
d) 2-methylpropane e) 1-butene

2. How many secondary C-atoms does the 2-methyl-4-ethylhexane molecule contain?

- a) 2 b) 3 c) 4 d) 5 e) 1

3. Which of the following molecular types is an electrophilic reagent?

- a) H_2O b) NH_3 c) OH^- d) CN^- e) NO^+

4. What is the oxidation number of C-atom in methane?

- a) 0 b) -4 c) +4 d) +2 e) -2

5. Which of the following gases (under the same conditions) has the highest density?

- a) C_3H_8 b) C_2H_2 c) C_2H_6 d) CO e) C_2H_4

6. Which of the following gases (under the same conditions) has the lowest density?

- a) C_3H_8 b) C_2H_2 c) C_2H_6 d) CO e) C_2H_4

7. How many monochlorine derivatives can be obtained by chlorination of 2-methyl-propane?

- a) one b) two c) three d) four e) none

8. The number of hydrocarbons isomeric to 2,2-dimethylbutane is: a) 4

- b) 2 c) 6 d) 3 e) 1

9. In which of the following hydrocarbons does the optical isomer occur?:

- a) 2-methylpentane b) 3-methylpentane c) 2,2-dimethylpentane
d) 2,3-dimethylpentane e) 2,4-dimethylpentane

10. Which of the following compounds is isomeric with vinyl-alcohol??

- a) allyl alcohol b) acetaldehyde c) divinyl ether
d) acrolein e) vinyl acetic acid

11. Which of these compounds does the geometric (*cis-trans*) isomer occur in?

- a) 1-butene b) 2-butene c) 1-pentene d) ethene e) propene

12. Which of the following compounds does the *cis-trans* isomer occur in?

- a) 4-methyl-1-pentene b) 1,3-dimethylcyclopentane c) isoprene
d) 3-methyl-1-butyne e) 2-pentene

13. In how many isomeric forms does 1,3-dimethylcyclobutane occur?

- a) two b) three c) four d) five e) none

14. Eten is always more reactive than:

- a) acetylene b) methane c) butylene d) propylene e) butadiene

15. Addition of water to 1-butene results in:

- a) 1-butanol b) 2-butanol c) 1,2-butanediol d) diethylethere) butanone

16. Addition of sulfuric acid to 2-methyl-1-butene and than hydrolysis of the resulting product results in:

- a) 2-methylbutanol-2 b) 2-methylbutanol c) butanone
d) 2-methylbutanol-1 e) sulfuric acid ester

17. From which of the following compounds can toluene be obtained by dehydrogenation?

- a) o-xylene b) ethyl-benzene c) benzyl-chloride
d) methyl-cyclohexane e) anthracene

18. An aromatic hydrocarbon containing five rings of benzene is:

- a) naphthalene b) benzanthracene c) benzpyrene
d) anthracene e) aniline

19. Addition of hydrogen iodide to propene produces:

- a) 1-iod-propane b) 3-iod-propane c) 2-iod-propane
d) 2,2-diiod-propane e) propane

20. The reaction of cyclopropane with bromine produces:

- a) 1,2-dibromocyclopropane b) 1,3-dibromocyclopropane c) 1,3-dibromopropane
d) 1,2-dibromopropane e) 1,1-dibromocyclopropane

21. Oxidation of propylbenzene with a strong oxidizing agent results in:

- a) formic acid b) propionic acid c) salicylic acid d) benzoic acid e) 1,4-dioxane

22. If by dehydrogenation of a compound of the molecular formula C_3H_8O a product which reduces the Tollens reagent is obtained, the starting compound is:

- a) primary alcohol b) ketone c) aldehyde d) secondary alcohol e) ether

23. What alcohol gives 2-methylpropanoic acid by oxidation?

- a) 2-methyl-1-propanol b) 2-butanol c) 2-methyl-2-propanol
d) 1-butanol e) 2-methyl-propanol

24. 2-methylpropene is produced by dehydration of:

- a) butanone b) 2-butanol c) 1,2-propanediol
d) 2-methyl-2-butanol e) 2-methyl-2-propanol

25. Which of the following is an enol?

- a) vinyl-alcohol b) phenol c) allyl-alcohol
d) 1,2,3-propanetriol e) cresol

26. How many grams of phenol are needed to react with sodium to produce 448 mL of hydrogen (normal conditions)?

- a) 7,52 b) 5,64 c) 4,70 d) 3,76 e) 1,88

27. Which of the following statements related to phenols is incorrect?

- a) with Fe (III) –chloride, they give colored complexes
b) polyhydroxyl phenols are more easily oxidized than phenols
c) they can give ethers
d) the phenolic group can be easily replaced by halogen
e) they form esters

28. In which of the following compounds there is no substitution of –OH group under ordinary conditions?

- a) methane acid b) malic acid c) benzyl alcohol
d) catechol e) 2-methylpropanol-2

29. One of the following compounds contain a nitro group. Which one?
 a) chloramphenicol b) guanine c) bilirubin d) choline e) thymine
30. When producing nitrophenol from phenol, the location of the $-\text{NO}_2$ group was determined by the present OH group. The nitrogroup with respect to the OH group can be bound:
 a) only in the *o*-position b) only in the *p*- position c) only in the *m*-position
 d) in the *o*- and *p*-positions e) in the *o*- and *m*-positions
31. In the following sequence of compounds, circle the acrolein formula:
 a) $\text{CH}_2=\text{CHCHO}$ b) $\text{CH}_2\text{CH}(\text{OH})\text{CHO}$ c) $\text{CH}_2(\text{OH})\text{COCH}_2\text{OH}$
 d) $\text{CH}_2=\text{CHCH}_2\text{OH}$ e) $\text{CH}_2(\text{OH})\text{CH}(\text{OH})\text{COOH}$
32. Acrolein is produced from glycerol by the reaction of:
 a) dehydration b) oxidation c) hydrogenation
 d) reduction e) dehydrogenation
33. Which of the following compounds in the alkaline medium react by to aldol addition mechanism?
 a) formaldehyde and benzaldehyde b) formaldehyde and trimethylacetaldehyde
 c) formaldehyde and formaldehyde d) trimethylacetaldehyde and benzaldehyde
 e) formaldehyde and propanal
34. Semi-acetals are obtained by reaction of:
 a) primary and secondary alcohol b) ether and alcohol c) ketone and aldehyde
 d) alcohol and aldehyde e) aldehyde and ether
35. Addition of one molecule of alcohol to an aldehyde in an acidic environment results in:
 a) ester b) acetal c) acid anhydride
 d) semiacetal e) ether
36. Mixture of aldehydes and alcohols, in presence of gaseous hydrogen chloride, produces:
 a) acetal b) aldol c) alkoxide ion of aldol
 d) aldoxime e) alkyl halide
37. The reaction of benzene nitration is:
 a) addition reaction b) substitution reaction c) polymerization reaction
 d) oxidation reaction e) elimination reaction
38. The same molecular formula is in:
 a) benzene and toluene b) naphthalene and xylene c) xylene and ethylbenzene
 d) naphthalene and fenatrene e) cyclohexane and benzene

39. Addition of hydrogen chloride to 3-methyl-1-butene results in:

- a) 1-chloro-3-methylbutane b) 1-chloro-2-methylbutane c) 3-chlorobutane
d) 2-chloro-3-methylbutane e) 1-chlorobutane

40. Propantriol is:

- a) monohydroxyl alcohol b) trihydroxyl alcohol c) dihydroxyl alcohol
d) tetrahydroxyl alcohol e) unsaturated alcohol

41. Reduction of butanone produces:

- a) butyl alcohol b) 2-butanol c) secondary propyl alcohol
d) ethanediol e) 1,2-butanediol

42. 1,2-dihydroxypropane is:

- a) primary alcohol b) secondary alcohol c) primary and secondary alcohol
d) primary and tertiary alcohol e) tertiary alcohol

43. Phenol sulfation results in:

- a) m-sulfophenol b) o-sulfophenol c) p-sulfophenol
e) o-sulfophenol and p-sulfophenol e) m-sulfophenol and o-sulfophenol

44. Which of these compounds reacts with potassium-hydroxide?

- a) ethanol b) ethanediol c) phenol d) acetylene e) 2-propanol

45. Acrolein is:

- a) cyclic ketone b) aromatic aldehyde c) unsaturated aliphatic aldehyde d) alkyne e) ether

46. Which statement is correct?

- a) benzene is more easily oxidized than phenol
b) polyhydroxyl phenols are more difficult to oxidize than phenols
c) pyridine is a weaker base than piperidine
d) alcohols are stronger acids than water

47. Which of the following acids is the strongest in aqueous solution?

- a) CH_3COOH b) CH_2ClCOOH c) CHCl_2COOH d) CCl_3COOH e) $\text{ClCH}_2\text{CH}_2\text{COOH}$

48. Hydroxysuccinic acid salts are:

- a) citrates b) tartarates c) malates d) lactates e) urates

49. Ortho-hydroxy-benzoic acid is:

- a) salicylic acid b) tartaric acid c) oxalic acid d) phthalic acid e) terephthalic acid

50. Fats and oils are:

- a) ethers b) esters c) salts d) anhydrides e) amines

51. At the isoelectric point, the amino acid is in the form of:

- a) anion b) cation c) zwitter ion

e) nonionized molecules e) ionized molecules

52. The peptide bond is formed by:

- a) condensation of the carboxyl and amino groups
b) condensation of two hydroxyl groups
c) condensation of two carboxyl groups
d) condensation of the carboxyl and hydroxyl groups
e) condensation of the amino and aldehyde groups

53. The peptide bond is proven by:

- a) ninhydrin reaction
b) biure reaction
c) xanthoprotein reaction
d) Tollens' reaction
e) Fhelling's reaction

54. Amines are:

- a) acidic substances b) neutral substances c) base substances
d) amphoteric substances e) acidic or neutral substances

55. Which of the following compounds does not contain a carbonyl group?

- a) benzophenone b) acetophenone c) cyclohexane-carbaldehyde
d) 1,4-dioxane e) pyridoxal

56. Which of the following compounds does not have a phenol functional group?

- a) thymol b) picric acid c) catechol
d) salicylic aldehyde e) benzophenone

57. In the silver mirror reaction the following occurs:

- a) reduction of silver ions b) oxidation of silver ions c) oxidation of elemental silver
d) aldehyde group reductions e) aldehyde dehydration

58. Oxalic acid is obtained by oxidation:

- a) 1,2-propanediol b) propanetriol c) ethylene glycol d) glyceraldehyde e) dioxyacetone

59. The relative molecular weight of acrylic acid is:

- a) 74 b) 58 c) 56 d) 73 e) 72

60. Dihydroxysuccinic acid is:

- a) lactic acid b) salicylic acid c) phthalic acid d) oxalic acid e) tartaric acid

61. Which of the following is not an organic acid derivative?

- a) $C_6H_5CONHCH_3$ b) $C_6H_5COOCOC_6H_5$ c) $CH_3OCOCH_2CH_3$
d) $C_6H_5CH(NH_2)COOH$ e) $CH_3CH_2CONH_2$

62. Ethyl urethane belongs to:

- a) amide esters b) diesters c) chloride esters d) diamides e) dichlorides

63. Which of the following is ethyl carbamate?

- a) $H_2NCOOC_2H_5$ b) $H_2NCO-COOC_2H_5$ c) $CH_3CH_2CONH_2$
d) $H_2NC_6H_4COOC_2H_5$ e) $H_2NCH_2COOC_2H_5$

64. Which of the following is diethyl carbonate?

- a) CH_3OCOCH_3 b) $C_2H_5COC_2H_5$ c) $C_2H_5OCOOC_2H_5$ d) $C_2H_5CONH_2$ e) $C_2H_5OCONH_2$

65. The formula of formic acid amide is:

- a) CH_3CONH_2 b) $HCOONH_4$ c) CH_3COONH_4 d) $C_6H_5CONH_2$ e) $HCONH_2$

66. The catalytic hydrogenation of nitriles produces:

- a) nitro compounds b) carboxylic acids c) amides d) primary amines e) nitroso-amines

67. Pyrimidine is:

- a) a five-membered heterocyclic compound with a single nitrogen atom
b) a five-membered heterocyclic compound with two nitrogen atoms
c) a six-membered heterocyclic compound having a single nitrogen atom
d) a six-membered heterocyclic compound having two nitrogen atoms
e) a nine-membered heterocyclic compound with four nitrogen atoms

68. Purin is:

- a) a nine-membered heterocyclic compound with four nitrogen atoms
- b) a five-membered heterocyclic compound with two nitrogen atoms
- c) a six-membered heterocyclic compound having a single nitrogen atom
- d) a six-membered heterocyclic compound having two nitrogen atoms
- e) a five membered heterocyclic compound having a single nitrogen atom

69. Cysteine is:

- a) alpha-amino-butyric acid
- b) alpha-amino-beta-methyl-butyric acid
- c) para hydroxy-phenylalanine
- d) alpha-amino-beta-hydroxy-propionic acid
- e) alpha-amino-beta-thiol-propionic acid

70. Lactose consists of:

- a) glucose and galactose
- b) glucose and mannose
- c) galactose and mannose
- d) mannose and fructose
- e) glucose and fructose

71. Carbamic acid provides by heating:

- a) ammonia and carbon dioxide
- b) ammonia and carbon monoxide
- c) urea
- d) ammonium carbonate
- e) cyanamide

72. In reaction with mineral acids, the amines give:

- a) esters
- b) ethers
- c) salts
- d) anhydrides
- e) amides

73. Which of the following compounds has an aromatic property?

- a) cyclopentadiene
- b) pyrrole
- c) glycerol
- d) cyclohexanol
- e) glucose

74. Which compound is included in the composition of a porphyrin ring?

- a) pyridine
- b) quinoline
- c) imidazole
- d) pyrimidine
- e) pyrrole

75. The formula CH_3OCH_3 represents:

- a) dimethyl-ether
- b) dimethyl ester
- c) semiacetal
- d) dimethyl peroxide
- e) aldehyde

76. Which of the following amino acids contains heterocyclic compounds in the side sequence?
a) phenylalanine b) alanine c) tyrosine d) histidine e) glutamine

77. The heterocyclic nucleic acid base is:

- a) aniline
- b) adenine
- c) an aldehyde
- d) alanine
- e) albumin

78. Purine bases:

- a) enter the protein composition
- b) build polysaccharides
- c) are included in the nucleotide composition
- d) contain pyridine
- e) are acidic in nature