CHEMISTRY

1. A nitrogen containing organic compound gave an oily liquid on heating with bromine and potassium hydroxide solution. On shaking the product with acetic anhydride, an antipyretic drug was obtained. The reactions indicate that the starting compound is :
   1) Acetamide
   2) Nitrobenzene
   3) Aniline
   4) Benzamide

2. The silver salt of a fatty acid on refluxing with an alkyl halide gives an :
   1) ether
   2) amine
   3) acid
   4) ester

3. Pick out the one which does not belong to the family :
   1) Ptyalin
   2) Lipase
   3) Pepsin
   4) Cellulose

4. Which of the following is wrongly matched ?
   1) Decomposition of H_2O_2 - First order reaction.
   2) Combination of H_2 and Br_2 to give HBr - Zero order reaction.
   3) Saponification of $CH_3COOC_2H_5$ - second order reaction.
   4) Hydrolysis of CH_3COOCH_3 - pseudo unimolecular reaction.

5. The diameter of colloidal particles range from :
   1) $10^3\ m$ to $10^{-3}m$
   2) $10^{-3}m$ to $10^{-6}\ m$
   3) $10^{-6}m$ to $10^{-9}m$
   4) $10^{-9}m$ to $10^{-12}m$

(Space for Rough Work)

6. The number of 2 p electrons having spin quantum number $S = -½$ are :
   1) 2
   2) 3
   3) 6
   4) 0

7. Pick out the alkane which differs from the other members of the group :
   1) 2 - methyl butane
   2) 2, 2 - dimethyl butane
   3) 2, 2 - dimethyl propane
   4) Pentane

8. 56 g of nitrogen and 8 g of hydrogen gas are heated in a closed vessel. At equilibrium 34 g of ammonia are present. The equilibrium number of moles of nitrogen, hydrogen and ammonia are respectively :
   1) 1, 1, 2
   2) 2, 1, 2
   3) 1, 2, 2
   4) 2, 2, 1

9. A process is taking place at constant temperature and pressure. Then :
   1) $\Delta H = 0$
   2) $\Delta S = 0$
   3) $\Delta H = \Delta E$
   4) $\Delta H = T\,\Delta S$

10. In a galvanic cell, the electrons flow from :
   1) Anode to cathode through the external circuit.
   2) Cathode to anode through the external circuit.
   3) Anode to cathode through the solution.
   4) Cathode to anode through the solution.

(Space for Rough Work)

11. On treating a mixture of two alkyl halides with sodium metal in dry ether, 2-methyl propane was obtained. The alkyl halides are :

1) Chloromethane and Chloroethane
2) Chloromethane and 1- Chloropropane
3) 2 - Chloropropane and Chloromethane
4) 2 - Chloropropane and Chloroethane

12. Which of the following statements about benzyl chloride is incorrect ?

1) It is a lachrymatory liquid and answers Beilstein's test.
2) It gives a white precipitate with alcoholic silver nitrate.
3) It is less reactive than alkyl halides.
4) It can be oxidised to benzaldehyde by boiling with copper nitrate solution.

13. The main product obtained when a solution of sodium carbonate reacts with mercuric chloride is :

1) $HgCO_3$
2) $HgCO_3 \cdot Hg(OH)_2$
3) $Hg(OH)_2$
4) $HgCO_3 \cdot HgO$

14. In the electrothermal process, the compound displaced by silica from calcium phosphate is :

1) Phosphorus
2) Phosphorus pentoxide
3) Calcium phosphide
4) Phosphine

15. The enthalpy of combustion of methane at 25°C is 890 kJ. The heat liberated when 3.2 g of methane is burnt in air is :

1) – 890 kJ
2) 178 kJ
3) 445 kJ
4) 278 kJ

(Space for Rough Work)

16. The pressure and temperature of 4 dm^3 of carbon dioxide gas are doubled. Then the volume of carbon dioxide gas would be :

1) 4 dm^3 2) 8 dm^3

3) 2 dm^3 4) 3 dm^3

17. 4g of copper was dissolved in concentrated nitric acid. The copper nitrate solution on strong heating gave 5g of its oxide. The equivalent weight of copper is :

1) 12 2) 20

3) 23 4) 32

18. In the manufacture of ammonia by the Haber's process,

$N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)} + 92.3\,kJ$, which of the following conditions is unfavourable ?

1) Reducing the temperature 2) Removing ammonia as it is formed

3) Increasing the temperature 4) Increasing the pressure

19. The chemical equilibrium of a reversible reaction is not influenced by :

1) concentration of the reactants 2) Temperature

3) Pressure 4) Catalyst

20. Cumene process is the most important commercial method for the manufacture of phenol. Cumene is :

1) Vinyl benzene 2) Propyl benzene

3) 1 - Methyl ethyl benzene 4) Ethyl benzene

(Space for Rough Work)

21. A solution contains 1.2046×10^{24} hydrochloric acid molecules in one dm^3 of the solution. The strength of the solution is :

1) $4\,N$ 2) $8\,N$
3) $6\,N$ 4) $2\,N$

22. Nuclear theory of the atom was put forward by :

1) Neils Bohr 2) J. J. Thomson
3) Rutherford 4) Aston

23. In acetylene molecule, the two carbon atoms are linked by :

1) three sigma bonds 2) three pi bonds
3) one sigma bond and two pi bonds 4) two sigma and one pi bond

24. The enthalpy of the reaction,

$H_{2(g)} + \frac{1}{2} O_{2(g)} \rightarrow H_2O_{(g)}$ is ΔH_1 and that of

$H_{2(g)} + \frac{1}{2} O_{2(g)} \rightarrow H_2O_{(l)}$ is ΔH_2. Then

1) $\Delta H_1 > \Delta H_2$ 2) $\Delta H_1 = \Delta H_2$
3) $\Delta H_1 < \Delta H_2$ 4) $\Delta H_1 + \Delta H_2 = 0$

25. A radioactive isotope decays at such a rate that after 192 minutes only $\frac{1}{16}$ of the original amount remains. The half life of the radioactive isotope is :

1) 12 min 2) 24 min
3) 32 min 4) 48 min

(Space for Rough Work)

26. The reagent which does not give acid chloride on treating with a carboxylic acid is :

1) $SOCl_2$ 2) PCl_3

3) PCl_5 4) Cl_2

27. Among the halogens, the one which is oxidised by nitric acid is :

1) Chlorine 2) Bromine

3) Fluorine 4) Iodine

28. The metal which does not form ammonium nitrate by reaction with dilute nitric acid is :

1) *Pb* 2) *Mg*

3) *Al* 4) *Fe*

29. The elements with atomic numbers 9, 17, 35, 53, 85 are all :

1) Heavy metals 2) Light metals

3) Noble gases 4) Halogens

30. In the electrolytic method of obtaining aluminium from purified bauxite, cryolite is added to the charge in order to :

1) dissolve bauxite and render it conductor of electricity.

2) lower the melting point of bauxite.

3) minimise the heat loss due to radiation.

4) protect aluminium produced from oxygen.

(Space for Rough Work)

31. Which of the following is not an amphoteric substance ?

1) H_2O 2) NH_3

3) HNO_3 4) HCO_3^-

32. When 50 cm^3 of 0.2 N H_2SO_4 is mixed with 50 cm^3 of 1N KOH, the heat liberated is :

1) 573 kJ 2) 573 J

3) 11.46 kJ 4) 57.3 kJ

33. An artificial radioactive isotope gave $^{14}_{7}N$ after two successive β -particle emissions. The number of neutrons in the parent nucleus must be :

1) 5 2) 7

3) 9 4) 14

34. Stainless steel does not rust because :

1) Nickel present in it, does not rust

2) Iron forms a hard chemical compound with chromium present in it.

3) Chromium and nickel combine with iron.

4) Chromium forms an oxide layer and protects iron from rusting.

35. Which of the following combinations can be used to synthesise ethanol ?

1) CH_3MgI and $CH_3COOC_2H_5$

2) CH_3MgI and $HCOOC_2H_5$

3) CH_3MgI and CH_3COCH_3

4) CH_3MgI and C_2H_5OH

(Space for Rough Work)

36. The reaction, $2SO_{2(g)} + O_{2(g)} \rightleftharpoons 2SO_{3(g)}$ is carried out in a 1 dm^3 vessel and 2 dm^3 vessel separately. The ratio of the reaction velocities will be :

1) 4 : 1 2) 8 : 1
3) 1 : 8 4) 1 : 4

37. In a mixture of acetic acid and sodium acetate the ratio of concentrations of the salt to the acid is increased ten times. Then the pH of the solution :

1) decreases ten fold 2) increases ten fold
3) increases by one 4) decreases by one

38. When a mixture of methane and oxygen is passed through heated molybdenum oxide, the main product formed is :

1) Methanol 2) Methanal
3) Methanoic acid 4) Ethanal

39. Benzene can be obtained by heating either benzoic acid with 'X' or phenol with 'Y'. 'X' and 'Y' are respectively :

1) Zinc dust and sodium hydroxide 2) Soda lime and copper
3) Zinc dust and soda lime 4) Soda lime and zinc dust

40. An organic compound is boiled with alcoholic potash. The product is cooled and acidified with *HCl*. A white solid separates out. The starting compound may be :

1) ethyl acetate 2) methyl acetate
3) ethyl benzoate 4) ethyl formate

(Space for Rough Work)

41. In qualitative analysis, in order to detect second group basic radical, H_2S gas is passed in the presence of dilute HCl to :

1) decrease the dissociation of H_2S
2) increase the dissociation of salt solution
3) increase the dissociation of H_2S
4) decrease the dissociation of salt solution

42. Aluminium displaces hydrogen from dilute HCl whereas silver does not. The E.M.F. of a cell prepared by combining Al / Al^{+3} and Ag / Ag^{+} is 2.46 V. The reduction potential of silver electrode is + 0.80 V. The reduction potential of aluminium electrode is :

1) 3.26 V
2) – 1.66 V
3) + 1.66 V
4) – 3.26 V

43. The first fraction obtained during the fractionation of petroleum is :

1) Gasoline
2) Diesel oil
3) Hydrocarbon gases
4) Kerosene oil

44. Which of the following compounds gives trichloromethane on distilling with bleaching powder ?

1) Ethanol
2) Methanol
3) Methanal
4) Phenol

45. Benzoin is :

1) α - hydroxy aldehyde
2) α - hydroxy ketone
3) compound containing an aldehyde and a ketonic group
4) α, β - unsaturated acid

(Space for Rough Work)

46. The velocity constant of a reaction at 290^0 K was found to be $3.2 \times 10^{-3} S^{-1}$. When the temperature is raised to 310^0 K, it will be about :

1) 9.6×10^{-3} 2) 1.28×10^{-2}

3) 6.4×10^{-3} 4) 3.2×10^{-4}

47. Select the pK_a value of the strongest acid from the following :

1) 2.0 2) 4.5

3) 1.0 4) 3.0

48. Pick out the unsaturated fatty acid from the following :

1) Oleic acid 2) Palmitic acid

3) Stearic acid 4) Lauric acid

49. Nylon is not a :

1) Copolymer 2) Homopolymer

3) Condensation polymer 4) Polyamide

50. The coal tar fraction which contains phenol is :

1) Heavy oil 2) Light oil

3) Middle oil 4) Green oil

(Space for Rough Work)

51. The compounds A and B are mixed in equimolar proportion to form the products, $A + B \rightleftharpoons C + D$. At equilibrium, one third of A and B are consumed. The equilibrium constant for the reaction is :

1) 2.5 2) 0.25
3) 0.5 4) 4.0

52. In froth floatation process for the purification of ores, the particles of ore float because :

1) They are insoluble
2) They bear electrostatic charge
3) Their surface is not easily wetted by water
4) They are light

53. Which of the following statements about amorphous solids is incorrect ?

1) There is no orderly arrangement of particles
2) They are rigid and incompressible.
3) They melt over a range of temperature.
4) They are anisotropic.

54. Hydrogen diffuses six times faster than gas A. The molar mass of gas A is :

1) 24 2) 36
3) 72 4) 6

55. Dulong and Petit's law is valid only for :

1) gaseous elements 2) solid elements
3) metals 4) non-metals

(Space for Rough Work)

56. Identify the gas which is readily adsorbed by activated charcoal :

1) H_2 2) O_2

3) N_2 4) SO_2

57. If the distance between Na^+ and Cl^- ions in sodium chloride crystal is X pm, the length of the edge of the unit cell is :

1) $\frac{X}{2}$ pm 2) $2X$ pm

3) $4X$ pm 4) $\frac{X}{4}$ pm

58. Which of the following statements is incorrect ?

1) In $K_4[Fe(CN)_6]$ the ligand has satisfied both primary and secondary valencies of ferrous ion.

2) In $[Cu(NH_3)_4]SO_4$, the ligand has satisfied only the secondary valency of copper.

3) In $K_3[Fe(CN)_6]$, the ligand has satisfied only the secondary valency of ferric ion.

4) In $K_3[Fe(CN)_6]$, the ligand has satisfied both primary and secondary valencies of ferric ion.

59. 2 - Acetoxy benzoic acid is used as an :

1) antiseptic 2) antipyretic

3) antimalarial 4) antidepressant

60. A nucleoside on hydrolysis gives :

1) an aldopentose and a heterocyclic base.

2) an aldopentose and orthophosphoric acid.

3) a heterocyclic base and orthophosphoric acid.

4) an aldopentose, a heterocyclic base and orthophosphoric acid

(Space for Rough Work)