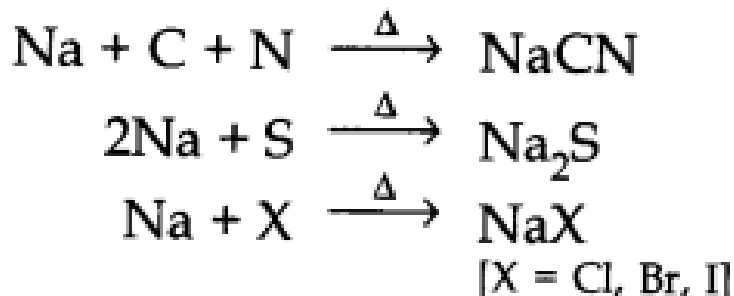




Question 21. Discuss the chemistry of Lassaigne's test.

Answer: Lassaigne's test: Nitrogen, sulphur, halogens and phosphorous present in an organic compound are detected by Lassaigne's test.

First of all compounds are converted to ionic form by fusing the compound with sodium metal.



Cyanide, sulphide or halide of sodium are extracted from the fused mass by boiling it with distilled water. This extract is known as sodium fusion extract.

Question 22. Differentiate between the principle of estimation of nitrogen in an organic compound by (i) Dumas method (ii) Kjeldahl's method.

Answer:

(i) Dumas method: The organic compound is heated strongly with excess of CuO (Cupric Oxide) in an atmosphere of CO_2 when free nitrogen, CO_2 and H_2O are obtained.

(ii) Kjeldahl's method: A known mass of the organic compound is heated strongly with cone. H_2SO_4 , a little potassium sulphate and a little mercury (a catalyst). As a result of reaction the nitrogen present in the organic compound is converted to ammonium sulphate.

Question 23. Discuss the principle of estimation of halogens, sulphur and phosphorus present in an organic compound.

Answer: Estimation of halogens: It involves oxidising the organic substance with fuming nitric acid in the presence of silver nitrate. The halogen of the substance is thus converted to silver halide which is separated and weighed:

Weight of organic compound = W gm

weight of silver halide = x g.

$$\% \text{ of halogen} = \frac{\text{At. wt. of halogen} \times 100x}{\text{Mol. wt of silver halide} \times w}$$

Estimation of sulphur: The organic substance is heated with fuming nitric acid but no silver nitrate is added. The sulphur of the substance is oxidised to sulphuric acid which is then precipitated as barium sulphate by adding excess of barium chloride solution. From the weight of BaSO_4 so obtained the percentage of sulphur can be calculated.

$$\% \text{ of sulphur} = \frac{32 (\text{At. weight of S})}{233 (\text{mol weight of BaSO}_4)} \times \frac{\text{weight of } \times 100 \text{ BaSO}_4}{\text{weight of organic compound}}$$

Estimation of phosphorous: The organic substance is heated with

fuming nitric acid whereupon phosphorous is oxidised to phosphoric acid. The phosphoric acid is precipitated as ammonium phosphomolybdate, $(\text{NH}_4)_3 \text{PO}_4 \cdot 12\text{MOO}_3$, by the addition of ammonia and ammonium molybdate solution which is then separated, dried and weighed.

$$\% \text{ of P} = \frac{31 \times w_1 \times 100}{1877 \times w}$$

where Molar mass of $(\text{NH}_4)_3 \text{PO}_4 \cdot 12\text{MoO}_3 = 1877 \text{ g}$

If phosphorous is estimated as $\text{Mg}_2\text{P}_2\text{O}_7$

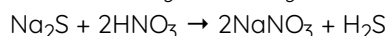
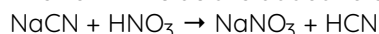
$$\% \text{ of P} = \frac{62 \times w_1 \times 100}{222 \times w} \%$$

Question 24. Explain the principle of paper chromatography.

Answer: This is the simplest form of chromatography. Here a strip of paper acts as an adsorbent. It is based on the principle which is partly adsorption. The paper is made of cellulose fibres with molecules of water adsorbed on them. This acts as stationary phase. The mobile phase is the mixture of the components to be identified prepared in a suitable solvent.

Question 25. Why is nitric acid added to sodium extract before adding silver nitrate for testing halogens ?

Answer: Nitric acid is added to sodium extract so as to decompose



Question 26. Explain the reason for the fusion of an organic compound with metallic sodium for testing nitrogen, sulphur and halogens.

Answer: Organic compound is fused with sodium metal so as to convert organic compounds into NaCN , Na_2S , NaX and Na_3PO_4 . Since these are ionic compounds and become more reactive and thus can be easily tested by suitable reagents.

Question 27. Name a suitable technique of separation of the components from a mixture of calcium sulphate and camphor.

Answer: Sublimation. Because camphor can sublime whereas CaSO_4 does not.

Question 28. Explain, why an organic liquid vaporises at a temperature below its boiling point in its steam distillation ?

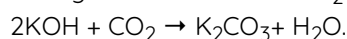
Answer: It is because in steam distillation the sum of vapour pressure of organic compound and steam should be equal to atmospheric pressure.

Question 29. Will CCl_4 give white precipitate of AgCl on heating it with silver nitrate? Give reason for your answer.

Answer: No. CCl_4 is a completely non-polar covalent compound whereas AgNO_3 is ionic in nature. Therefore they are not expected to react and thus a white ppt. of silver chloride will not be formed.

Question 30. Why is a solution of potassium hydroxide used to absorb carbon dioxide evolved during the estimation of carbon present in an organic compound?

Answer: CO_2 is acidic in nature and therefore, it reacts with the strong base KOH to form K_2CO_3 .



***** END *****

