Question 31. Why is it necessary to use acetic acid and not sulphric acid for acidification of sodium extract for testing sulphur by lead acetate test?
Answer: For testing sulphur sodium extract is acidified with acetic acid because lead acetate is soluble and does not interfere with the test.

$$\underset{\text{lead acetate}}{Pb(OCOCH_3)_2} + H_2SO_4 \longrightarrow PbSO_4 \downarrow + 2CH_3COOH$$

Question 32. An organic compound contains 69% carbon and 4.8% hydrogen, the remainder being oxygen. Calculate the masses of carbon dioxide and water produced when 0.20 g of this compound is subjected to complete combustion.
Answer:

Step I. Calculation of mass of CO_2 produced

Mass of compound = 0.20 g
Percentage of carbon = 69%

$$\text{Percentage of carbon} = \frac{12}{44} \times \frac{\text{Mass of carbon dioxide formed}}{\text{Mass of compound}} \times 100$$

$$69 = \frac{12}{44} \times \frac{\text{Mass of carbon dioxide formed}}{(0.20\ g)} \times 100$$

$$\therefore \text{ Mass of } CO_2 \text{ formed} = \frac{69 \times 44 \times (0.20\ g)}{12 \times 100} = \mathbf{0.506\ g}$$

Step II. Calculation of mass of H_2O produced

Mass of compound = 0.20 g
Percentage of hydrogen = 4.8%

$$\text{Percentage of hydrogen} = \frac{2}{18} \times \frac{\text{Mass of water formed}}{\text{Mass of compound}} \times 100$$

$$4.8 = \frac{2}{18} \times \frac{\text{Mass of water formed}}{(0.20\ g)} \times 100$$

$$\therefore \text{ Mass of } H_2O \text{ formed} = \frac{4.8 \times 18 \times (0.20\ g)}{2 \times 100} = \mathbf{0.0864\ g}$$

Question 33. 0.50 g of an organic compound was Kjeldahlished. The ammonia evolved was passed in 50 cm^3 of IN H_2SO_4. The residual acid required 60 cm^3 of N/2 NaOH solution. Calculate the percentage of nitrogen in the compound.
Answer:

Step I. *Calculation of volume of unused acid*
Volume of NaOH solution required = 60 cm^3
Normality of NaOH solution = 1/2 N
Normality of H_2SO_4 solution = 1/N
Volume of unused acid can be calculated by applying normality equation

$$\underbrace{N_1V_1}_{\text{Acid}} = \underbrace{N_1V_1}_{\text{Base}}$$

$$1 \times V = \frac{1}{2} \times 60 = 30 \text{ cm}^3$$

Step II. *Calculation of volume of acid used*
Volume of acid added = 50 cm^3
Volume of unused acid = 30 cm^3
Volume of acid used = (50 – 30) = 20 cm^3
Step III. *Calculation of percentage of nitrogen*
Mass of compound = 0.50 g
Volume of acid used = 20 cm^3
Normality of acid used = 1 N

$$\text{Percentage of N} = \frac{1.4 \times \text{Volume of acid used} \times \text{Normality of acid used}}{\text{Mass of the compound}}$$

$$= \frac{1.4 \times 20 \times 1}{0.50} = \mathbf{56\%}$$

Question 34. 0.3780 g of an organic compound gave 0.5740 g of silver chloride in Carius estimation. Calculate the percentage of chlorine in the compound.
Answer:
Mass of the compound = 0.3780 g
Mass of silver chloride = 0.5740 g

$$\text{Percentage of chlorine} = \frac{35.5}{143.5} \times \frac{\text{Mass of siliver chloride}}{\text{Mass of compound}} \times 100$$

$$= \frac{35.5}{143.5} \times \frac{(0.5740 \text{ g})}{(0.3780 \text{ g})} \times 100 = \mathbf{37.57 \text{ g}}$$

Question 35. In an estimation of sulphur by Carius method, 0.468 of an organic sulphur compound gave 0.668 g of barium sulphate. Find the percentage of sulphur in the compound.
Answer:
Mass of the compound = 0.468 g
Mass of barium sulphate= 0.668 g

$$\text{Percentage of sulphur} = \frac{32}{233} \times \frac{\text{Mass of barium sulphate}}{\text{Mass of compound}} \times 100$$

$$= \frac{32}{233} \times \frac{(0.668\ g)}{(0.468\ g)} \times 100 = \mathbf{19.60\%}$$

Question 36.
In the organic compound $CH_2{=}CH{-}CH_2{-}CH_2{-}C{\equiv}CH$, the $CH{-}CH_2$ bond is formed by the interaction of a pair of hybridised orbitals:
(a) $sp - sp^2$ *(b)* $sp - sp^3$
(c) $sp^2 - sp^3$ *(d)* $sp^3 - sp^3$
Answer:
(c) is the correct answer. $(CH_2{=}\overset{(sp^2)}{C}H - \overset{(sp^3)}{C}H_2 - CH_2{-}C{\equiv}CH)$

Question 37. In the Lassaigne's test for ntrogen in an organic compound, the Prussian blue colour is obtaine d due to the formation of:
(a) $Na_4[Fe(CN)_6]$ (b)$Fe_4[Fe(CN)_6]_3$
(c) $Fe_2[Fe(CN)_6]$ (d)$Fe_3[Fe(CN)_6]_4$.
Answer: (b) is the correct answer.

Question 38. Which of the following carbocation is most stable?
(a) $(CH_3)_3C\overset{\oplus}{C}H_2$ *(b)* $(CH_3)_3\overset{\oplus}{C}$
(c) $CH_3CH_2\overset{\oplus}{C}H_2$ *(d)* $CH_3\overset{\oplus}{C}HCH_2CH_3$.
Answer: (b) is the most stable since it is a tertiary carbocation.

Question 39. The best and latest technique for isolation, purification and separation of organic compounds is:
(a) Crystallisation
(b) Distillation
(c) Sublimation
(d) Chromatography.
Answer: (d) is the correct answer.

Question 40. The following reaction is classified as:
$CH_3CH_2I + KOH\ (aq) \rightarrow CH_3CH_2OH + KI$
(a) electrophilic substitution
(b) nucleophilic substitution
(c) elimination
(d) addition
Answer:
(b) It is a nucleophilic substitution reaction. KOH (aq) provides OH^- ion for the nucleophile attack.

********** END **********