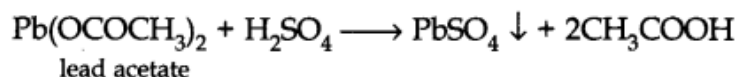




Question 31. Why is it necessary to use acetic acid and not sulphuric acid for acidification of sodium extract for testing sulphur by lead acetate test?

Answer: For testing sulphur sodium extract is acidified with acetic acid because lead acetate is soluble and does not interfere with the test.



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 CO₂ produced

Mass of compound = 0.20 g

Percentage of carbon = 69%

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

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

$$\therefore \text{Mass of CO}_2 \text{ formed} = \frac{69 \times 44 \times (0.20 \text{ g})}{12 \times 100} = 0.506 \text{ g}$$

Step II. Calculation of mass of H₂O produced

Mass of compound = 0.20 g

Percentage of hydrogen = 4.8%

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

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

$$\therefore \text{Mass of H}_2\text{O formed} = \frac{4.8 \times 18 \times (0.20 \text{ g})}{2 \times 100} = 0.0864 \text{ g}$$

Question 33. 0.50 g of an organic compound was Kjeldahlised. The ammonia evolved was passed in 50 cm³ of IN H₂SO₄. The residual acid required 60 cm³ of N/2 NaOH solution. Calculate the percentage of nitrogen in the compound.

Answer:

Step I. Calculation of volume of unused acidVolume of NaOH solution required = 60 cm³

Normality of NaOH solution = 1/2 N

Normality of H₂SO₄ solution = 1/N

Volume of unused acid can be calculated by applying normality equation

$$\frac{N_1 V_1}{\text{Acid}} = \frac{N_1 V_1}{\text{Base}}$$

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

Step II. Calculation of volume of acid usedVolume of acid added = 50 cm³Volume of unused acid = 30 cm³Volume of acid used = (50 - 30) = 20 cm³**Step III. Calculation of percentage of nitrogen**

Mass of compound = 0.50 g

Volume of acid used = 20 cm³

Normality of acid used = 1 N

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

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

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

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

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

Question 35. In an estimation of sulphur by Carius method, 0.468 g 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

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

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

Question 36.

In the organic compound $\text{CH}_2=\text{CH}-\text{CH}_2-\text{CH}_2-\text{C}\equiv\text{CH}$, the $\text{CH}-\text{CH}_2$ 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. $(\text{CH}_2=\overset{(sp^2)}{\text{CH}}-\overset{(sp^3)}{\text{CH}_2}-\text{CH}_2-\text{C}\equiv\text{CH})$

Question 37. In the Lassaigne's test for nitrogen in an organic compound, the Prussian blue colour is obtained due to the formation of:

(a) $\text{Na}_4[\text{Fe}(\text{CN})_6]$ (b) $\text{Fe}_4[\text{Fe}(\text{CN})_6]_3$ (c) $\text{Fe}_2[\text{Fe}(\text{CN})_6]$ (d) $\text{Fe}_3[\text{Fe}(\text{CN})_6]_4$

Answer: (b) is the correct answer.

Question 38. Which of the following carbocation is most stable?

(a) $(\text{CH}_3)_3\text{C}^+\text{H}_2$ (b) $(\text{CH}_3)_3\text{C}^+$ (c) $\text{CH}_3\text{CH}_2\text{C}^+\text{H}_2$ (d) $\text{CH}_3\text{C}^+\text{HCH}_2\text{CH}_3$

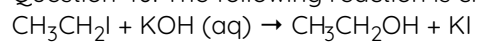
Answer: (b) is the most stable since it is a tertiary carbocation.

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:



- (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 *****