

a. 5g sample of pesticide was decomposed with metallic sodium in alcohol and the liberate ion was precipitated as AgCl. the amount of AgCl obtained by this method is .1606g. Express the results in terms of percent weight by Cl,
 b. percent weight of Cl₂, and percent weight by weight
 DDT(C₁₄H₉Cl₅)(354.47g/mol)

Solution:

a. Determine the mass of Cl in AgCl according to the equivalent's law:

$$\frac{m(\text{AgCl})}{m(\text{Cl})} = \frac{E(\text{AgCl})}{E(\text{Cl})}$$

Using atomic masses from the periodic table and valence of Ag and Cl we will find the following:

$$E(\text{AgCl})=143.321\text{g/mol};$$

$$E(\text{Cl})=35.453\text{g/mol}.$$

$$\text{Therefore, } m(\text{Cl}) = \frac{m(\text{AgCl}) \cdot E(\text{Cl})}{E(\text{AgCl})} = \frac{0.1606 \cdot 35.453}{143.321} = 0.0397\text{g} .$$

The percent weight of Cl in pesticide is:

$$\omega(\text{Cl}) = \frac{0.0397}{5} \cdot 100 = 0.79\%$$

b. The percent weight of Cl₂ in pesticide is:

$$\omega(\text{Cl}_2) = \frac{0.0397 \cdot 2}{5} \cdot 100 = 1.588\%$$

The percent weight of Cl in DDT (C₁₄H₉Cl₅) is:

$$\omega(\text{Cl}) = \frac{35.453 \cdot 5}{354.47 \cdot 2} \cdot 100 = 25.004\%$$

The percent weight of Cl₂ in DDT (C₁₄H₉Cl₅) is:

$$\omega(\text{Cl}_2) = \frac{35.453 \cdot 2 \cdot 5}{354.47 \cdot 2} \cdot 100 = 50.008\%$$

Answer:

- a. The percent weight of Cl in pesticide is 0.79%.
- b. The percent weight of Cl₂ in pesticide is 1.588%; the percent weight of Cl in DDT (C₁₄H₉Cl₅) is 25.004%; the percent weight of Cl₂ in DDT (C₁₄H₉Cl₅) is 50.008%.