Homework

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$HgO \longrightarrow Hg + O_2$

14.2g 13.2g 1.0g

$\%Hg = \frac{\text{mass Hg}}{\text{mass HgO}} \times 100\%$

$\%Hg = \frac{13.2g}{14.2g} \times 100\%$

$\%Hg = 93.0\%$

$\%O = \frac{\text{mass O}}{\text{mass HgO}} \times 100\%$

$\%O = \frac{1.0g}{14.2g} \times 100\%$

$\%O = 7.0\%$

35 a) $NH_3 \longrightarrow (1 \times 14.01) + (3 \times 1.01) = 17.04 g/mol$

$\%N = \frac{14.01\ g/mol}{17.04\ g/mol} \times 100\%$

$\%N = 82.2\%$

Empirical Formulas

The empirical formula of a compound is the smallest whole-number ratio of the atoms in a compound.

CO_2 $\quad$ ~~N_2H_4~~ $\rightarrow NH_2$

Determining the Empirical Formula of a Compound

Ex. A compound is analyzed and found to contain 25.9% nitrogen and 74.1% oxygen. What is the empirical formula of the compound?

$$25.9\,\text{g}\,\text{N} \times \frac{1\,\text{mol N}}{14.01\,\text{g N}} = \frac{1.849\,\text{mol N}}{1.849\,\text{mol}} = 1$$

$$74.1\,\text{g O} \times \frac{1\,\text{mol O}}{16.00\,\text{g O}} = \frac{4.631\,\text{mol O}}{1.849\,\text{mol}} = 2.5$$

$N_{1.849}O_{4.631} \rightarrow NO_{2.5}$

N_2O_5

Molecular Formulas

The molecular is the same as the empirical formula of a compound or is a simple whole-number multiple of the empirical formula.

$NH_2 \longrightarrow N_2H_4 \longrightarrow N_3H_6 \longrightarrow N_4H_8 \longrightarrow$

Determining the Molecular Formula of a Compound

Ex. Calculate the molecular formula of a compound whose molar mass is 60.0 g/mol and empirical formula is CH_4N.

EMPIRICAL → MOLECULAR

$CH_4N \xrightarrow{\times 2} C_2H_8N_2$

$30.06\ g/mol \xrightarrow{\times 2} 60.0\ g/mol$

$CH_4N \longrightarrow (1 \times 12.01) + (4 \times 1.01) + (1 \times 14.01)$

$= 30.06\ g/mol$

$$\frac{60.0\ g/mol}{30.06\ g/mol} = 2$$

Homework

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