

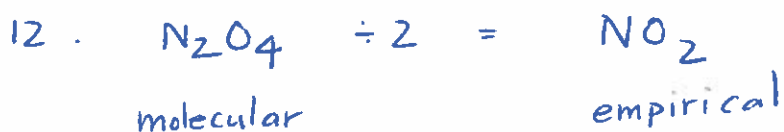
Empirical Formula HW

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9. The molecular formula tells you the actual number of atoms that make up the molecule or formula unit
11. It is important to know the molecular formula because even if two compounds have the same empirical formula they can have different chemical properties & applications.



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31. Assume 100g sample

$$m_C = 80.04 \text{ g}$$

$$m_H = 19.96 \text{ g}$$

$$n_C = 80.04 \text{ g} \times \frac{1 \text{ mol}}{12.011 \text{ g}}$$

$$n_H = 19.96 \text{ g} \times \frac{1 \text{ mol}}{1.008 \text{ g}}$$

$$= 6.6639 \text{ mol}$$

$$= 19.802 \text{ mol}$$

$$\begin{array}{l} \text{C} : \text{H} \\ \frac{6.6639}{6.6639} : \frac{19.802}{6.6639} \end{array}$$

$$1 : 3$$

\therefore the empirical formula is CH_3

$$32. \quad m_{\text{Mg}} = 58.2 \text{ g}$$

$$m_{\text{Cl}} = 41.8 \text{ g}$$

$$n_{\text{Mg}} = 58.2 \text{ g} \times \frac{1 \text{ mol}}{24.305 \text{ g}}$$

$$= 2.395 \text{ mol}$$

$$n_{\text{Cl}} = 41.8 \text{ g} \times \frac{1 \text{ mol}}{35.453 \text{ g}}$$

$$= 1.179 \text{ mol}$$



$$\frac{2.395 \text{ mol}}{1.179 \text{ mol}} : \frac{1.179 \text{ mol}}{1.179 \text{ mol}}$$



∴ the empirical formula is Mg_2Cl

33. Assume a 100 g sample

$$m_{\text{Cu}} = 40.0 \text{ g}$$

$$m_{\text{S}} = 20.0 \text{ g}$$

$$m_{\text{O}} = 40.0 \text{ g}$$

$$n_{\text{Cu}} = 40.0 \text{ g} \times \frac{1 \text{ mol}}{63.546 \text{ g}}$$

$$= 0.629 \text{ mol}$$

$$n_{\text{S}} = 20.0 \text{ g} \times \frac{1 \text{ mol}}{32.065 \text{ g}}$$

$$= 0.624 \text{ mol}$$

$$n_{\text{O}} = 40.0 \text{ g} \times \frac{1 \text{ mol}}{15.999 \text{ g}}$$

$$= 2.500 \text{ mol}$$



$$\frac{0.629}{0.624} : \frac{0.624}{0.624} : \frac{2.500}{0.624}$$



∴ the empirical formula is CuSO_4

$$35. \quad m_H = 17.6 \text{ g}$$

$$m_N = 82.4 \text{ g}$$

$$n_H = 17.6 \text{ g} \times \frac{1 \text{ mol}}{1.008 \text{ g}}$$

$$= 17.46 \text{ mol}$$

$$n_N = 82.4 \text{ g} \times \frac{1 \text{ mol}}{14.007 \text{ g}}$$

$$= 5.883 \text{ mol}$$

H : N

$$\frac{17.46}{5.883} : \frac{5.883}{5.883}$$

3 : 1



\therefore the empirical formula is H_3N or NH_3

