

Molar Mass & Composition Worksheet

Answers

- 1) The molar mass of a compound is 92 grams. An analysis indicates that it contains 0.606 grams N and 1.39 grams O. Find its molecular formula.

$$\text{Amount of N present} = (0.606/14) = 0.043$$

$$\text{Amount of O present} = (1.39/16) = 0.086$$

$$\text{So the ratio of N and O in the compound is} = (0.043/0.043) : (0.086/0.043) = 1:2$$

The molecular formula of the compound is NO_2 .

- 2) If 4.04 grams of N combine with 11.46 grams of O to produce a compound with a molar mass of 108 grams, what is the molecular formula of this compound?

$$\text{Amount of N present} = (4.04/14) = 0.288$$

$$\text{Amount of O present} = (11.46/16) = 0.716$$

$$\text{So the ratio of N and O in the compound is} = (0.288/0.288) : (0.716/0.288) = 1:2.48 = 1:2.5 = 2:5$$

The molecular formula of the compound is N_2O_5 .

- 3) An acid composes 31.6% P, 3.1% H, and 63.5% O. Determine its empirical formula.

$$\text{Amount of P present} = (31.6/31) = 1.02 \sim 1$$

$$\text{Amount of H present} = (3.1/1) = 3.1 \sim 3$$

$$\text{Amount of O present} = (63.5/16) = 3.96 \sim 4$$

$$\text{So the ratio of P, H, and O in the compound is} = (1/1):(3/1):(4/1) = 1:3:4$$

The molecular formula of the compound is H_3PO_4 .

- 4) A particular sugar is determined to have the following composition: 40.0% carbon, 6.7% hydrogen, and 53.5% oxygen. Determine its empirical formula.

$$\text{Amount of C present} = (40/12) = 3.33$$

$$\text{Amount of H present} = (6.7/1) = 6.7$$

$$\text{Amount of O present} = (53.5/16) = 3.34$$

$$\text{The ratio of C, H, and O in the compound is} = (3.33/3.33) : (6.7/3.33) : (3.34/3.33) = 1:2:1$$

So, the empirical formula of the compound is CH_2O .