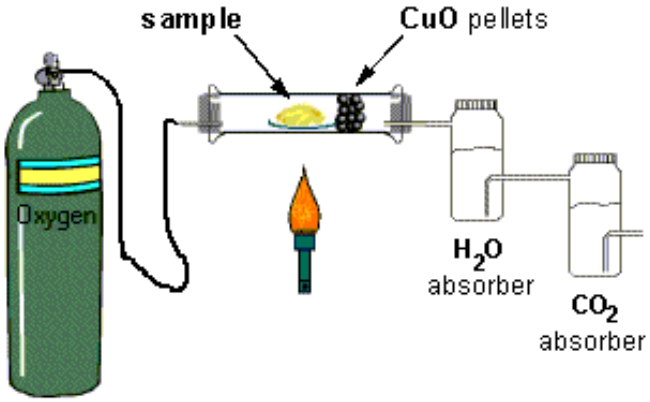
Finding Formulas by Experiment

1. Carbon-Hydrogen Combustion Analyzer



? + $O_{2\,(g)}$ Ⓞ $CO_{2\,(g)}$ + $H_2O_{(l)}$

CH analyzer captures all of the CO_2 and H_2O produced separately.

We can use this mass percent to find the mass of C and H in the original compound. Then find the empirical formula.

Ex 1. A 5.73 g sample containing C and H is burned in a CH analyzer. 2.76 g of CO2 and 2.97 g of H_2O is produced. What is the unknown compound's empirical formula?

Ex 2. A 2.524 g sample containing C,H and O is burned in a CH analyzer. 3.703 g of CO_2 and 1.514 g of water is produced. Determine the empirical formula of the sample.

2. Hydrated Ionic Compounds

Many ionic compounds trap water in their crystal lattices (hydrates).

This water contributes to the compound's mass and must be taken into account during measuring.

Ex. $CaSO_4 \cdot 2H_2O$
Calcium sulphate dihydrate (gypsum)

Ex 3. A 74.38 g sample of $Zn(NO_3)_2 \cdot xH_2O$ is heated. If its final mass is 47.36 g, complete the molecular formula.

Ex 4. What is the mass percent of water in $MgCl_2 \cdot 2H_2O$?