Question: A compound consists of carbon 75% and hydrogen 25% by mass. Determine empirical formula

$$C : H$$

$$\frac{75}{12.01} : \frac{25}{1.01}$$

$$\frac{6.24}{6.24} : \frac{24.8}{6.24}$$

$$1 : 4$$

Therefore, the empirical formula is CH_4.

Molecular formula

- Molecular formula: The formula of a compound that shows the actual number of each type of atom in the molecule
- A molecular formula gives the actual number of different atoms covalently bonded in one molecule
- The molecular formula is always a **whole multiple** of the empirical formula
- **To work out molecular formula:**
  - First use the formula $molecular\ formula = \frac{molar\ mass}{EF_R}$, where EF_R is the sum of relative atomic masses of the empirical formula
  - Multiply all the elements in the empirical formula by the result to obtain the molecular formula

Question: Work out the molecular formula of CH_2 (M_r = 70)

$$Empirical\ Formula: A_r(C) + A_r(H_2) = 12 + 2 = 14$$

$$70 \div 14 = 5$$

$$CH_2 \times 5 = C_5H_{10}$$