

9-1 Stoichiometry

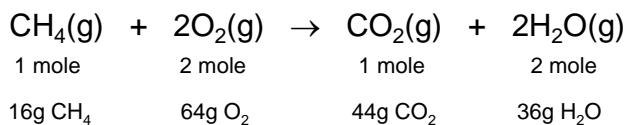
stoicheion: element metron: measure

Composition Stoichiometry – involves mass relationships of elements in compounds (Chapter 3, mass/mole conversions)

Ex. How much does 2.5 moles of carbon weigh?

$$2.5 \text{ mole C} \left(\frac{12\text{g}}{\text{mol}} \right) = 30\text{g C}$$

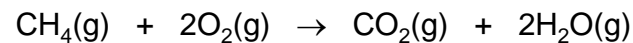
Reaction Stoichiometry – involves mass relationships between reactants and products in a chemical reaction



1

9-1 Stoichiometry

Mole ratio – conversion factor that relates moles of any two reactants or products



Examples:

Methane and Water

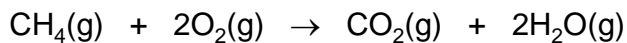
$$\left(\frac{1 \text{ mol CH}_4}{2 \text{ mol H}_2\text{O}} \right) \text{ or } \left(\frac{2 \text{ mol H}_2\text{O}}{1 \text{ mol CH}_4} \right)$$

Methane and Carbon Dioxide

$$\left(\frac{1 \text{ mol CH}_4}{1 \text{ mol CO}_2} \right) \text{ or } \left(\frac{1 \text{ mol CO}_2}{1 \text{ mol CH}_4} \right)$$

2

9-1 Stoichiometry



How many moles of water are produced from 8 moles of CH₄?

$$8 \text{ mol CH}_4 \left(\frac{2 \text{ mol H}_2\text{O}}{1 \text{ mol CH}_4} \right) = 16 \text{ mol H}_2\text{O}$$

How many moles of O₂ are needed to produce 6 moles of H₂O?

$$6 \text{ mol H}_2\text{O} \left(\frac{2 \text{ mol O}_2}{2 \text{ mol H}_2\text{O}} \right) = 6 \text{ mol O}_2$$

3