

What Is Stoichiometry?

Worksheet

Stoichiometry is the calculation of quantitative relationships between reactants and products in a chemical reaction, using the coefficients of a balanced equation as mole ratios.

$$\frac{n_1}{\nu_1} = \frac{n_2}{\nu_2}$$

Questions

1. Stoichiometry calculations are based on:

- A) Atomic radius
- B) Mole ratios from a balanced equation
- C) Boiling points
- D) Electron configuration

2. In $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$, moles of H_2O from 5 mol H_2 :

- A) 2.5 mol
- B) 5 mol
- C) 10 mol
- D) 1 mol

3. What must you do before using mole ratios?

- A) Convert to grams
- B) Balance the chemical equation
- C) Find the melting point
- D) Calculate density

4. General stoichiometry order for a mass-to-mass problem:

- A) massmolesratiomolesmass
- B) molesmassratiomass
- C) massratiomass
- D) ratiomassmoles

5. In $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$, how many moles of H_2O form from 3 mol H_2 ?

6. For $\text{N}_2 + 3\text{H}_2 \rightarrow 2\text{NH}_3$, how many moles of NH_3 form from 6 mol H_2 ?

7. How many grams of CO_2 form when 4 mol C_3H_8 burns completely? ($\text{C}_3\text{H}_8 + 5\text{O}_2 \rightarrow 3\text{CO}_2 + 4\text{H}_2\text{O}$, $M(\text{CO}_2) = 44 \text{ g/mol}$)

8. Define: What is stoichiometry?

9. Define: Where do mole ratios come from?

10. Define: What's the general stoichiometry roadmap?

Answer Key

1. B) Mole ratios from a balanced equation - The coefficients of a balanced equation give the mole ratios used in stoichiometry.
2. B) 5 mol - Ratio $\text{H}_2:\text{H}_2\text{O} = 2:2 = 1:1$, so 5 mol H_2 5 mol H_2O .
3. B) Balance the chemical equation - Mole ratios only come from the coefficients of a correctly balanced equation.
4. A) massmolesratiomolesmass - Convert given mass to moles, apply the mole ratio, then convert to the target's mass.
5. Mole ratio $\text{H}_2:\text{H}_2\text{O} = 2:2 = 1:1$ $n(\text{H}_2\text{O}) = 3 \text{ mol}$ $(2/2) = 3 \text{ mol}$ So 3 mol of H_2 produce 3 mol of H_2O
6. Mole ratio $\text{H}_2:\text{NH}_3 = 3:2$ $n(\text{NH}_3) = 6 \text{ mol}$ $(2/3) = 4 \text{ mol}$ So 6 mol H_2 yields 4 mol NH_3
7. Mole ratio $\text{C}_3\text{H}_8:\text{CO}_2 = 1:3$ $n(\text{CO}_2) = 4 \text{ mol}$ $(3/1) = 12 \text{ mol}$ mass = $n M = 12 \cdot 44 = 528 \text{ g CO}_2$
8. The calculation of reactant/product amounts using mole ratios from a balanced equation.
9. From the coefficients of a balanced chemical equation.
10. Mass moles (M) mole ratio (b/a) moles of target mass (M).

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