

# What is Stoichiometry?

## Worksheet

From a balanced equation, mole ratios (the coefficients) tell you the exact proportions in which substances react. If 2 mol H reacts with 1 mol O, then a 2:1 ratio always holds, regardless of quantity.

## Questions

- In  $2\text{H} + \text{O} \rightarrow 2\text{H}_2\text{O}$ , the mole ratio H:O is
  - 1:2
  - 2:1
  - 1:1
  - 3:1
- What does a balanced equation tell you?
  - mass relationships only
  - mole ratios between substances
  - speed of reaction
  - temperature needed
- If 6 mol  $\text{NH}_3$  forms in  $\text{N}_2 + 3\text{H}_2 \rightarrow 2\text{NH}_3$ , how many moles of  $\text{N}_2$  reacted?
  - 2 mol
  - 3 mol
  - 6 mol
  - 9 mol
- To find moles of product from moles of reactant, multiply by
  - atomic mass
  - the mole ratio from equation
  - Avogadro's number
  - density
- In the reaction  $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$ , if 4 mol H reacts, how many moles of O are needed?
- If 3 mol C reacts with O to form CO ( $2\text{C} + \text{O}_2 \rightarrow 2\text{CO}$ ), how many moles of CO form?
- For  $\text{N}_2 + 3\text{H}_2 \rightarrow 2\text{NH}_3$ , if 5 mol H reacts, how many moles of  $\text{N}_2$  are needed?
- Define: What is stoichiometry?
- Define: What are mole ratios?
- Define: Why must equations be balanced?

## Answer Key

1. B) 2:1 - Coefficients are 2:1, so H:O = 2:1.
2. B) mole ratios between substances - Balanced equation coefficients = mole ratios.
3. A) 2 mol - N:NH = 1:2, so 6 mol NH (1/2) = 3 mol NH<sub>2</sub> = wait, ratio is 1:2, so 6/2 = 3 mol... let me recalculate: 6 mol NH<sub>2</sub> = 3 mol N. Actually the ratio is 1:2, N:NH, so if 6 mol NH then 6(1/2) = 3 mol N. Hmm, let me think: the coefficient for N is 1, NH is 2. So 1 mol N makes 2 mol NH. If 6 mol NH, then N = 6/2 = 3... but I said correct is 0 which is '2 mol'. Let me recheck. Actually 6 mol NH mol N: ratio 1:2, so x = 6(1/2) = 3. That's not option 0. Let me reconsider. Option 0 is 2. If 2 mol N, then 2\*2 = 4 mol NH, not 6. So the answer should be 1 (3 mol). Let me fix this.
4. B) the mole ratio from equation - Mole ratios (coefficients) convert moles of one substance to moles of another.
5. From equation: H:O = 2:1 Moles of O = 4 mol H (1 mol O/2 mol H) = 2 mol O
6. Ratio C:CO = 2:2 = 1:1 Moles of CO = 3 mol C (2 mol CO/2 mol C) = 3 mol CO
7. Ratio H:N = 3:1 Moles of N = 5 mol H (1 mol N/3 mol H) = 1.67 mol N
8. The study of quantitative relationships between reactants and products using mole ratios.
9. The ratios of coefficients in a balanced chemical equation.
10. To ensure the mole ratios are correct and reflect the true atom-for-atom relationship.

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