



Quantitative Chemistry

Multiple Choice Questions

Set 3 (Chemistry Only)

Tick **one** box.

- The balanced symbol equation for the reaction between sodium and chlorine is $2\text{Na} + \text{Cl}_2 \rightarrow 2\text{NaCl}$. What mass of sodium chloride is produced when 42.6g of chlorine reacts with sodium?
Relative atomic masses (A_r): Na = 23, Cl = 35.5
 - 35.1g ☐
 - 42.0g ☐
 - 70.2g ☐
 - 195g ☐
- The percentage yield of a reaction that produces 22.0g of product is 80%. What is the maximum theoretical mass of product?
 - 4.4g ☐
 - 17.6g ☐
 - 26.4g ☐
 - 27.5g ☐
- Which of the following is **not** a reason why the actual yield of a reaction may be less than the expected yield?
 - some atoms are destroyed during the reaction process ☐
 - the reaction may not go to completion because it is reversible ☐
 - some of the product may be lost when it is separated from the reaction mixture ☐
 - some of the reactants may react in ways different to the expected reaction ☐
- The balanced symbol equation for the reaction between methane and water is $\text{CH}_4 + \text{H}_2\text{O} \rightarrow \text{CO} + 3\text{H}_2$. What is the atom economy of this reaction to produce hydrogen?
Relative formula masses (M_r): $\text{CH}_4 = 16$, $\text{H}_2\text{O} = 18$, $\text{CO} = 28$, $\text{H}_2 = 2$
 - 5.9% ☐
 - 17.6% ☐
 - 33.3% ☐
 - 82.4% ☐



5. 500cm³ of a solution contains 5 moles of solute. What is the concentration of the solution?

A. 0.01mol/dm³ ☐

B. 1mol/dm³ ☐

C. 10mol/dm³ ☐

D. 100mol/dm³ ☐

6. What will happen to the concentration of a solution if the mass of solute is doubled?

A. the concentration will double ☐

B. the concentration will triple ☐

C. the concentration will stay the same ☐

D. the concentration will halve ☐

7. A solution of copper sulfate (CuSO₄) has a concentration of 0.15mol/dm³. What mass of copper sulfate is dissolved in 0.2dm³ of the solution?

Relative formula mass (M_r): CuSO₄ = 159.5

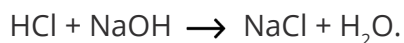
A. 0.03g ☐

B. 0.75g ☐

C. 4.79g ☐

D. 31.9g ☐

8. 25cm³ of hydrochloric acid (HCl) is needed to neutralise 30cm³ of 0.20mol/dm³ sodium hydroxide (NaOH). The balanced symbol equation for the reaction is



What is the concentration of the hydrochloric acid?

A. 0.15mol/dm³ ☐

B. 0.20mol/dm³ ☐

C. 0.24mol/dm³ ☐

D. 0.30mol/dm³ ☐

9. What is the volume of one mole of any gas at room temperature and pressure?

A. 1dm³ ☐

B. 20dm³ ☐

C. 24dm³ ☐

D. 100dm³ ☐



10. What is the volume of 264g of carbon dioxide (CO₂) at room temperature and pressure?

Relative atomic masses (A_r): C = 12, O = 16

A. 120dm³ ☐

B. 144dm³ ☐

C. 264dm³ ☐

D. 600cm³ ☐

Bonus Challenge Question

The balanced symbol equation for the reaction between sodium hydrogen carbonate and sulfuric acid is $2\text{NaHCO}_3 + \text{H}_2\text{SO}_4 \rightarrow \text{Na}_2\text{SO}_4 + 2\text{CO}_2 + 2\text{H}_2\text{O}$. What mass of sodium hydrogen carbonate (NaHCO₃) is needed to react with an excess of sulfuric acid to produce 10.65g of sodium sulfate (Na₂SO₄)?

Relative atomic masses (A_r): Na = 23, H = 1, C = 12, O = 16, S = 32

A. 5.6g ☐

B. 8.45g ☐

C. 10.65g ☐

D. 12.6g ☐