

Combined Science - Chemistry - Key Stage 4

Quantitative Chemistry

Balancing Equations - Higher

Mrs. Begum



Quick check

1. How many electrons do Group 2 elements have in their outer shell?
2. How many electrons do Group 7 elements have in their outer shell?
3. When an atom loses or gains electrons, what do they become?
4. What is the charge on Group 1 ions?
5. What is the charge on Group 6 ions?



Independent practice

Work out the formulae for the following compounds

1. Copper (II) sulphate
2. Sodium carbonate
3. Calcium nitrate

Work out the charge on the metal ions in these compounds

1. Zn in ZnSO_4
2. Cu in $\text{Cu}(\text{OH})_2$
3. Fe in FeCl_3



Independent practice



Independent practice

Use the following masses of reactants and products to write balanced symbol equations.

1. 81.2 g of butane (C_4H_{10}) reacts with 291.2 g of oxygen to produce 246.4 g of carbon dioxide and 126.0 g of water.
2. 48.0 g of methanol (CH_3OH) reacts with 72.0 g of oxygen to produce 66.0 g of carbon dioxide and 54.0 g of water.
3. 1.62 g of hydrogen bromide (HBr) reacts with 0.98 g of sulfuric acid (H_2SO_4) to produce 0.36 g of water, 0.64 g of sulfur dioxide (SO_2) and 1.60 g of bromine (Br_2).



Question 1

In a reaction, copper sulfate and sodium hydroxide react together to form copper hydroxide and sodium sulfate.

1. Write a word equation for this reaction.
2. Name the reactants and the products.
3. Write the formulae of the reactants copper sulfate and sodium hydroxide.
Ions are Cu^{2+} , SO_4^{2-} , Na^+ and OH^- .
4. Write a balanced symbol equation for this reaction. Formulae of products are copper hydroxide $\text{Cu}(\text{OH})_2$ and sodium sulfate Na_2SO_4 .



Question 2

In a reaction, calcium oxide and hydrochloric acid (HCl) react together to form calcium chloride and water (H₂O).

1. Write a word equation for this reaction.
2. Name the reactants and the products.
3. Write the formulae of the reactant calcium oxide and the product calcium chloride. Ions are Ca²⁺, O²⁻, and Cl⁻.
4. Write a balanced symbol equation for this reaction.



Question 3

Iron can be extracted from its ores by heating it with carbon. Some students found that 6.4g of Fe_2O_3 reacted with 0.72g of C to produce 4.48g of Fe and 2.64g of CO_2 .

Use the molar masses to deduce the balanced equation.



Answers - Question 1

1. copper sulfate + sodium hydroxide \longrightarrow copper hydroxide + sodium sulfate
2. Copper sulfate and sodium hydroxide are reactants. Copper hydroxide and sodium sulfate are products.
3. Copper sulfate = CuSO_4 . Sodium hydroxide = NaOH
4. $\text{CuSO}_4 + \mathbf{2} \text{NaOH} \longrightarrow \text{Cu(OH)}_2 + \text{Na}_2\text{SO}_4$



Answers - Question 2

1. calcium oxide + hydrochloric acid \longrightarrow calcium chloride + water
2. Calcium oxide and hydrochloric acid are the reactants. Calcium chloride and water are products.
3. Calcium oxide = CaO. Calcium chloride = CaCl₂
4. CaO + **2** HCl \longrightarrow CaCl₂ + H₂O



Answers - Question 3

