GCSE and IGCSE Chemistry: Moles and Calculations Worksheet

Year 10-11 · GCSE (AQA 4.3) and Cambridge IGCSE 0620 topic 3 · Exam-style questions

Name: ..... **Class:** ..... **Date:** ..... **Score:** / 44

Section A: Relative formula mass and percentage by mass [11 marks]

Relative atomic masses (Ar): H = 1 | C = 12 | N = 14 | O = 16 | Na = 23 | Mg = 24 | S = 32 | Cl = 35.5 | Ca = 40 | Fe = 56 | Cu = 64

1 Calculate the relative formula mass (Mr) of each substance. **[6]**

Substance	Working	Mr
Water, H_2O		
Carbon dioxide, CO_2		
Sodium hydroxide, NaOH		
Sulfuric acid, H_2SO_4		
Calcium hydroxide, $Ca(OH)_2$		
Ammonium sulfate, $(NH_4)_2SO_4$		

2 Calculate the percentage by mass of (a) oxygen in magnesium oxide, MgO and (b) iron in iron(III) oxide, Fe_2O_3. **[5]**

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Section B: The mole [8 marks]

3 Use moles = mass ÷ Mr. Show your working.

(a) Calculate the moles in 36 g of water (Mr = 18). **[2]**

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(b) Calculate the mass of 0.5 mol of carbon dioxide (Mr = 44). **[2]**

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(c) Calculate the moles in 4.9 g of sulfuric acid (Mr = 98). **[2]**

(d) Calculate the number of molecules in 0.5 mol of water. (Avogadro constant = 6.02×10^{23}) **[2]**

Section C: Reacting masses and limiting reactants [11 marks]

4 Magnesium reacts with hydrochloric acid: $Mg + 2HCl \longrightarrow MgCl_2 + H_2$

(a) Calculate the moles of magnesium in 2.4 g. **[1]**

(b) State the moles of hydrogen produced. **[1]**

(c) Calculate the mass of hydrogen produced. **[2]**

5 $2Mg + O_2 \longrightarrow 2MgO$. Calculate the mass of magnesium oxide made when 6.0 g of magnesium is burned. **[3]**

6 $2H_2 + O_2 \longrightarrow 2H_2O$. 4 g of hydrogen reacts with 16 g of oxygen. Which is the limiting reactant? Calculate the mass of water made. (Higher tier / Extended) **[4]**

Section D: Concentration, gases and yield [14 marks]

7 Concentration and titration.

(a) 5 g of sodium chloride is dissolved in 250 cm^3 of solution. Calculate the concentration in g/dm^3. **[2]**

(b) Calculate the moles of hydrochloric acid in 25.0 cm^3 of 0.10 mol/dm^3 solution. **[2]**

(c) 25.0 cm^3 of 0.10 mol/dm^3 sodium hydroxide is neutralised by 20.0 cm^3 of hydrochloric acid. $NaOH + HCl \longrightarrow NaCl + H_2O$. Calculate the concentration of the acid in mol/dm^3. **[4]**

(d) Calculate the volume of 0.2 mol of gas at room temperature and pressure. (1 mole of gas occupies 24 dm^3) **[2]**

(e) A reaction should make 12 g of product. Only 9 g is made. Calculate the percentage yield. **[2]**

8 Give two reasons why the percentage yield of a reaction is less than 100%. **[2]**