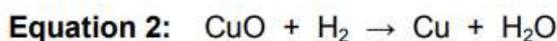
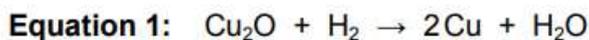


# AMOUNT OF SUBSTANCE

From page 7

Q6. A teacher found that the oxide of copper produced 2.54 g of copper and 0.72 g of water. Two possible equations for the reaction are:



Determine which is the correct equation for the reaction in the teacher's experiment.

Relative atomic masses (Ar): H = 1 O = 16 Cu = 63.5

$$\text{mol Cu} = \frac{2.54}{63.5} = 0.04 \quad \checkmark \quad \text{ratio is } 1:1$$

$$\text{mol H}_2\text{O} = \frac{0.72}{18} = 0.04 \quad \checkmark \quad \text{CuO}$$

so equation 2 ✓

[3 marks]

AQA June 19 H Q8.4

From page 8

Q8. A mixture contains 1.00 kg of aluminium and 3.00 kg of iron oxide.

The equation for the reaction is:  $2\text{Al} + \text{Fe}_2\text{O}_3 \rightarrow 2\text{Fe} + \text{Al}_2\text{O}_3$

Show that aluminium is the limiting reactant.

Relative atomic masses (Ar): O = 16 Al = 27 Fe = 56

$$\text{mol Fe}_2\text{O}_3 = \frac{3000}{160} = 18.75 \quad \checkmark$$

Mr  $\text{Fe}_2\text{O}_3$   
 $= ((56 \times 2) + (16 \times 3))$   
 $= 160 \quad \checkmark$

$$\text{mol Al} = \frac{1000}{27} = 37.0 \quad \checkmark$$

ratio 2:1 so 18.75 mol  $\text{Fe}_2\text{O}_3$  needs ✓

$2 \times 18.75$  mol Al = 37.5 so not enough

Al so is limiting reactant.

[4 marks]

AQA June 20 H Q6.2

# AMOUNT OF SUBSTANCE

From page 8

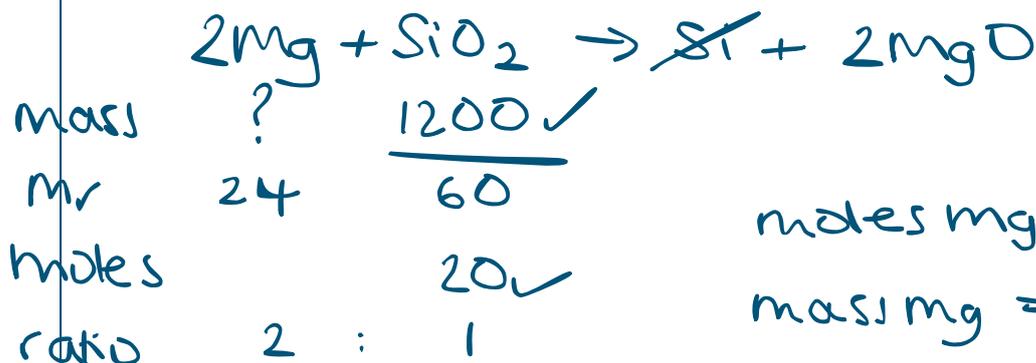
Q10. Calculate the minimum mass in grams of magnesium needed to completely reduce 1.2 kg of silicon dioxide.

The equation is  $2 \text{Mg(s)} + \text{SiO}_2\text{(s)} \rightarrow \text{Si(s)} + 2 \text{MgO(s)}$

Relative atomic masses (Ar): O = 16 Mg = 24 Si = 28

HT

$$\begin{aligned} \text{Mr SiO}_2 &= 28 + (16 \times 2) \\ &= 60 \end{aligned}$$



$$\begin{aligned} \text{moles Mg} &= 20 \times 2 = 40 \\ \text{mass Mg} &= 40 \times 24 = 960 \text{ g} \end{aligned}$$

[5 marks]

AQA June 22 H Q7.4

From page 9

Q12. Calculate the percentage atom economy for the production of silver iodide in this reaction. The equation for the reaction is:



$\text{AgNO}_3\text{(aq)} + \text{NaI(aq)} \rightarrow \text{AgI(s)} + \text{NaNO}_3\text{(aq)}$

Give your answer to 3 significant figures.

Relative formula masses (Mr):  $\text{AgNO}_3 = 170$   $\text{NaI} = 150$   $\text{AgI} = 235$

$\text{NaNO}_3 = 85$

$$\begin{aligned} \text{Mr total reactants} &= 170 + 150 = 320 \text{ g} \\ \frac{235}{320} \times 100 &= 73.4375 \\ &= 73.4\% \end{aligned}$$

[4 marks]

AQA June 20 H Q3.5



# CONCENTRATION

From page 11

Q15. Calculate the mass of sodium hydroxide in  $30.0 \text{ cm}^3$  of a  $0.105 \text{ mol/dm}^3$  solution. Relative formula mass (Mr):  $\text{NaOH} = 40$

$$\text{mol} = \frac{30}{1000} \times 0.105 = 0.00315 \checkmark$$

$$\text{mass} = 0.00315 \times 40 = 0.126\text{g} \checkmark$$

[2 marks]

AQA June 18 H Q9.5

Q16. A student made  $250 \text{ cm}^3$  of a solution of citric acid of concentration  $0.0500 \text{ mol/dm}^3$ . Calculate the mass of citric acid ( $\text{C}_6\text{H}_8\text{O}_7$ ) required. Relative atomic masses (Ar):  $\text{H} = 1$   $\text{C} = 12$   $\text{O} = 16$



$$\text{mol} = \frac{250}{1000} \times 0.05 = 0.0125 \checkmark$$

$$\text{Mr citric acid} = (6 \times 12) + (8 \times 1) + (7 \times 16) = 192 \checkmark$$

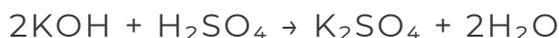
$$\text{mass} = 0.0125 \times 192 = 2.4\text{g}$$

[3 marks]

AQA June 20 H Q9.4



Q18. A student found that  $15.5 \text{ cm}^3$  of  $0.500 \text{ mol/dm}^3$  dilute sulfuric acid completely reacted with  $25.0 \text{ cm}^3$  of potassium hydroxide solution. The equation for the reaction is:



Calculate the concentration of the potassium hydroxide solution in  $\text{mol/dm}^3$  and in  $\text{g/dm}^3$

Relative atomic masses (Ar): H = 1 O = 16 K = 39

	$2\text{KOH}$	+	$\text{H}_2\text{SO}_4$		
vol	$25/1000$		$15.5/1000$	x	
conc			$0.500$		
mol	$0.00775 \times 2$ $= 0.0155$		$= 0.00775$		
ratio	2		1		

					Mr KOH
					$= 39 + 16 + 1$
					$= 56$
					$0.62 \times 56$
					$= 34.7 \text{ g/dm}^3$

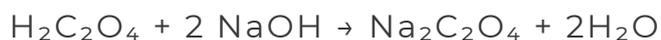
  

$$\text{Conc} = \frac{0.0155}{25/1000} = 0.62 \text{ mol/dm}^3$$

[6 marks]

AQA June 19 H Q9.5

Q19. A student found that  $25.0 \text{ cm}^3$  of the sodium hydroxide solution was neutralised by  $15.00 \text{ cm}^3$  of the  $0.0480 \text{ mol/dm}^3$  ethanedioic acid solution. The equation for the reaction is:



Calculate the concentration of the sodium hydroxide solution in  $\text{mol/dm}^3$

	$\text{H}_2\text{C}_2\text{O}_4$	+	$2\text{NaOH}$	
vol	$15/1000$		$25/1000$	
conc	$0.0480$		$= 0.00144$	$\div 25/1000 = 0.0576$
mol	$0.00072$ ✓		$= 0.0072 \times 2 = 0.00144$	
ratio	1	:	2	

[3 marks]

AQA June 21 H Q9.5

