Do not write outside the box

0 8 This question is about iron.

Iron reacts with dilute hydrochloric acid to produce iron chloride solution and one other product.

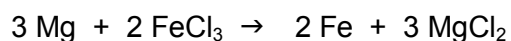**0 8 . 1** Name the other product.

[1 mark]

_____

0 8 . 2 Suggest how any unreacted iron can be separated from the mixture.

[1 mark]

_____

_____

Magnesium reacts with iron chloride solution.

$$3\ Mg\ +\ 2\ FeCl_3\ \rightarrow\ 2\ Fe\ +\ 3\ MgCl_2$$

0 8 . 3 0.120 g of magnesium reacts with excess iron chloride solution.

Relative atomic masses (A_r): Mg = 24   Fe = 56

Calculate the mass of iron produced, in mg

[5 marks]

_____

_____

_____

_____

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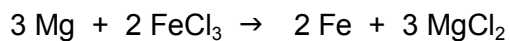
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Mass of iron = _____ mg

Question 8 continues on the next page

Turn over ▶

0 8 . 4 Explain which species is reduced in the reaction between magnesium and iron chloride.

$$3\,Mg\ +\ 2\,FeCl_3\ \rightarrow\ \ 2\,Fe\ +\ 3\,MgCl_2$$

Your answer should include the half equation for the reduction.

[3 marks]

_____

_____

_____

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10

END OF QUESTIONS

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.1	hydrogen **or** H_2	allow hydrogen gas ignore H without the 2 subscript	1	AO1 5.4.2.1
08.2	filtration / filter	allow magnet **or** decant ignore heating	1	AO1 5.1.1.2
08.3		an answer of 185–190 (mg) scores **5** marks an answer of 0.185–0.19 scores **4** marks		AO2 5.3.2.2
	(Mg) $\dfrac{0.12}{24}$ or 0.005 (moles)	mark is for ÷ by 24	1	
	(Fe) $\dfrac{2}{3} \times 0.005 = 0.00333$ (moles)	mark is for $\times \dfrac{2}{3}$	1	
	(mass Fe) = 0.00333 × 56	mark is for × 56	1	
	= 0.1866 (g)		1	
	= 187 (mg)		1	
		an answer of 280 (mg) scores **4** marks an answer of 0.280 scores **3** marks (no ratio from equation) 184 scores **0** [=(3×24) + (2×56)]		
	OR (Mg) = $\dfrac{0.12}{(3 \times 24 =)\ 72}$ (1) = 0.00166 **or** $\dfrac{1}{600}$ (moles) (1) (mass of Fe) = 0.00166 **or** $\dfrac{1}{600} \times 112\ (2 \times 56)$ (1) = 0.1866 (g) (1) 187 (mg) (1)			

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.3 cont.	**OR** 72 g Mg → 112g Fe (1) 1 g Mg → $\frac{112}{72}$ **or** 1.56 g Fe (1) 0.12 g Mg → $\frac{112}{72}$ × 0.12 (1) = 0.1866 (g) (1) = 187 (mg) (1)			
08.4	Fe^{3+} (because) reduction is gain <u>of</u> <u>electrons</u> $Fe^{3+} + 3e^{(-)}$ ➔ Fe	allow change in oxidation state / (+)3 to 0	1 1 1	AO2 AO1 AO2 5.4.1.2 5.4.1.4
Total			**10**	