

**M1.(a)** Q is calcium or magnesium

1

bromide

1

R is aluminium

1

chloride

1

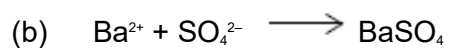
S is iron(III)

1

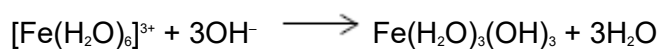
sulfate

1

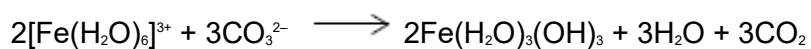
*Mark this question independently*



1



1



1



1

**M2.(a) M1** Used in a barium meal / barium swallow / barium enema

**OR** (used to absorb) X-rays

*Credit a correct reference to M1 written in the explanation in M2 unless contradictory.*

**M2** BaSO<sub>4</sub> / barium sulfate / it is insoluble

*For M2 penalise obvious reference to barium or to barium ions being insoluble.*

2



*Or multiples.*

*Ignore state symbols.*

1

(c) It / magnesium hydroxide is insoluble / insufficiently soluble / sparingly soluble / less soluble than barium hydroxide / forms low concentration solutions

*Weak alkali alone is insufficient.*

*Formation of a precipitate needs explanation.*

1



*Or multiples.*

*Ignore state symbols.*

1

(e) **M1** Hydrogen / H<sub>2</sub> produced

**OR** an equation to produce hydrogen / H<sub>2</sub>



**For M1**

*Do not penalise an incorrect equation; the mark is for H<sub>2</sub> or hydrogen.*

*Award one mark only for 'exothermic reaction with steam /*

*H<sub>2</sub>O' for a student who has not scored M1*

**M2** requires correct **M1**

risk of explosion

**OR** forms explosive mixture (with air)

**OR** (highly) flammable

*Ignore 'violent' reaction.*

2

[7]

**M3.(a)** (Measure the) volume of gas / mass of the container + contents

1

Suitable named piece of equipment

*Gas syringe (or inverted burette or measuring cylinder, as long as student has referred to the cylinder being filled with water) / balance.*

*Equipment must be correct for the measurement stated.*

1

(b) Any **one** of:

- Mass of magnesium  
*Allow amount of magnesium.*
- Surface area of magnesium

1

(c) (i) Gravity: Conical flask or beaker and funnel /

Vacuum: Sealed container with a side arm and Buchner or Hirsch funnel

*Must be either gravity filtration (with a V-shaped funnel) or vacuum filtration (with a side-arm conical flask) appropriately drawn.*

1

Filter paper

*Must show filter paper as at least two sides of a triangle*

*(V-shaped) for gravity filtration or horizontal filter paper for vacuum filtration.*

1

- (ii) Wash with / add (a small amount of cold) water  
*Ignore filtering.*

1

[6]

**M4.(a)** (i)  $1.08 \times 10^{-2}$

*Do not penalise precision but must be to at least 2 significant figures.*

*Do not accept  $1 \times 10^{-2}$*

1

(ii)  $5.4(0) \times 10^{-3}$

*Allow (i) / 2*

*Do not penalise precision but must be to at least 2 significant figures.*

1

(iii) 266.6

*Lose this mark if answer not given to 1 decimal place.*

1

(iv) mass =  $5.4(0) \times 10^{-3} \times 266.6 = 1.44$  g **M1**

*Allow (ii)  $\times$  (iii).*

1

percentage =  $1.44 \times 100 / 2.25 = 64.0$  **M2**

*Allow consequential answer from **M1***

*Lose this mark if answer not given to 3 significant figures.*

*Correct answer with no working scores **M2** only.*

1

(v) 1 Would give an incorrect / too large mass (of silver chloride)

*Do not allow 'to get an accurate result' without qualification.*

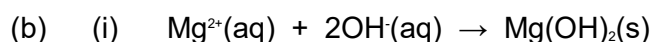
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2 To remove soluble impurities / excess silver nitrate (solution) / strontium nitrate (solution)

*Do not allow 'to remove impurities'.*

*Do not allow 'to remove excess strontium chloride solution'.*

1



*Allow  $\text{Mg}^{2+}(\text{aq}) + 2\text{OH}^{-}(\text{aq}) \rightarrow \text{Mg}^{2+}(\text{OH})_2(\text{s})$*

*Allow multiples, including fractions.*

*Lose mark if state symbols are missing or incorrect.*

*Lose mark if incorrect charge on an ion.*

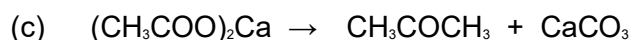
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(ii) Does not produce  $\text{CO}_2$  / gas which distends stomach / does not produce wind / does not increase pressure in stomach

*Allow 'prevents flatulence' and 'prevents burping'.*

*Do not allow 'gas' without qualification.*

1



*Allow multiples.*

*Allow propanone as  $\text{C}_3\text{H}_6\text{O}$*

*Allow  $(\text{CH}_3\text{COO})_2\text{Ca}^{2+} \rightarrow \text{CH}_3\text{COCH}_3 + \text{Ca}^{2+}\text{CO}_3^{2-}$*

1

(d) Ca (salt) - no visible change with sodium chromate(VI) **M1**

*Allow 'yellow solution formed' or 'no ppt. forms'.*

*Allow **M1** and **M2** in any order.*

1

Sr and Ba (salts) give (yellow) precipitate with sodium chromate(VI) **M2**

*Lose this mark if precipitate has an incorrect colour.*

1

Sr precipitate (chromate(VI)) dissolves in ethanoic acid / Ba precipitate (chromate(VI)) does not dissolve in ethanoic acid **M3**

*If ethanoic acid is added first, allow access to **M1** and **M3**.*

1

- (e) C 42.09 / 12, H 2.92 / 1, N 8.18 / 14, O 37.42 / 16 and S 9.39 / 32.1

*Accept any other correct method of working.*

*If relative atomic mass has been divided by the percentage composition is used then CE = 0 / 2*

1

$C_{12}H_{10}N_2O_8S$

*Correct answer with no working scores 1 mark only.*

1

[15]



*Allow multiples, including fractions.*

*Allow ionic equations.*

*Lose this mark if any of the state symbols are missing or incorrect.*

1

- (ii) Add nitric acid to the mixture (until in excess)

*Do not allow any suggestion that the solution is an emetic.*

1

Filter (to isolate strontium sulfate)

1

- (b) Insoluble barium sulfate is formed

*Allow 'removes barium ions as a precipitate'.*

1

- (c) Add silver nitrate, then dilute ammonia (solution) **M1**

*Do not allow answers which imply silver nitrate and ammonia*

*are added at the same time.*

*Allow 'add silver nitrate, then concentrated ammonia (solution)'.*

*Can score **M1** in the answer for **M3***

1

Cream precipitate **M2**

*Allow 'off white precipitate'.*

1

No visible change or precipitate dissolves slightly in dilute ammonia **M3**

*Allow 'soluble / colourless solution / precipitate dissolves in concentrated ammonia'.*

*Allow 3 marks for:*

*Add dilute ammonia (solution), then silver nitrate **M1***

*No visible change **M2***

*Cream / off white precipitate with silver nitrate **M3***

1

[7]