

**A Level Chemistry B (Salters)**  
**H433/01** Fundamentals of chemistry

**Question Set 23**

- 1 (a) One suggested method of carbon capture and storage is reacting carbon dioxide with naturally occurring metal oxides in the Earth's crust.

Magnesium oxide and calcium oxide could have formed when dolomite marble was subjected to high temperatures in the Earth.

Dolomite contains both calcium and magnesium compounds.

A student says that magnesium and calcium have similar chemistry because they are close in the Periodic Table.

Comment on the student's statement.

[1]

- 1 (b) A student finds that magnesium carbonate decomposes at a lower temperature than calcium carbonate.

Suggest the reason for this in terms of the ions present.

[2]

- 1 (c) Calculate the volume of carbon dioxide (in  $\text{dm}^3$ ) at 298 K and 95.0 kPa that could be captured by reacting it with 1.00 kg of MgO.

volume = ..... $\text{dm}^3$  [3]

- 1 (d)\* Strontianite is a mineral first found in 1790. It contained a new element, strontium.

The element was first thought to be barium, which was known at the time.

However, strontium gave a red flame colour when heated and barium's flame is green.

Explain how elements can give off coloured light when heated and how analysis of the light from strontium proved that it was a new element.

[6]

- 1 (e) Strontianite may also contain small amounts of barium carbonate, lead carbonate or iron(II) carbonate.

Some students took separate samples of barium carbonate, lead carbonate and iron(II) carbonate and reacted them with nitric acid. They then devised tests on the resulting nitrate solutions that would show the presence of each metal ion and distinguish it from the other two.

Give three reagents they could use and the expected observations for each. Within the table there must be a positive reaction for each ion.

Reagent solution	Observation for $\text{Ba}^{2+}$	Observation for $\text{Pb}^{2+}$	Observation for $\text{Fe}^{2+}$

[3]

**Total Marks for Question Set 23: 15**

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