a Describe and explain the trend in ionisation down group 2.

- ionisation energy decrease
- atoms get bigger
- more shielding
- weaker attraction between nucleus and outer electron

b Explain why strontium has a lower melting point than calcium.

- Sr has weaker metallic bonding
due to bigger atoms/ions
giving weaker attraction between delocalised electrons and metal ions

c What would you see in each of the following reactions? If there is a reaction, write the simplest ionic equation.

- addition of aqueous potassium sulfate to aqueous magnesium nitrate
  - no reaction
- addition of aqueous sodium hydroxide to aqueous magnesium nitrate
  - colourless solution to white precipitate
  - \( \text{Mg}^{2+} (aq) + 2\text{OH}^- (aq) \rightarrow \text{Mg(OH)}_2 (s) \)

d Sulfate ions in aqueous solution can be tested for using acidified barium chloride. Why is acid added before the barium chloride solution and identify a suitable acid.

- hydrochloric acid (or nitric acid)
to react with / remove carbonate ions
  - as they would also give a white precipitate like sulfate ions would

e Write an equation and give observations for the reaction of magnesium with steam.

- \( \text{Mg} + \text{H}_2\text{O} \rightarrow \text{MgO} + \text{H}_2 \)
burns with bright white flame
forms white powder

f Write an equation and give observations for the reaction of calcium with water.

- \( \text{Ca} + 2\text{H}_2\text{O} \rightarrow \text{Ca(OH)}_2 + \text{H}_2 \)
fizzes
forms white solid/precipitate