GIANT IONIC STRUCTURES

1. a) Draw a sketch to show the arrangement of sodium ions and chloride ions in a crystal of sodium chloride.

   b) Sodium chloride is described as 6,6-co-ordinated. Use your sketch to explain what this means.

2. (Only if caesium chloride is specifically mentioned by your syllabus.)

   a) Unlike sodium chloride, caesium chloride is 8,8-co-ordinated. Explain what this means with the help of simple sketches.

   b) Caesium chloride takes up an 8,8-co-ordination in order to maximise the attractions between the positive and negative ions. This gives the compound the greatest possible energetic stability. So why isn't sodium chloride also 8,8-co-ordinated?

3. Sodium chloride and magnesium oxide have exactly the same structure. Their melting and boiling points are:

	NaCl	MgO
melting point (K)	1074	3125
boiling point (K)	1686	3873

   Explain why the values for magnesium oxide are much higher than those for sodium chloride.

4. Explain why ionic compounds such as sodium chloride have brittle crystals.

5. Molten sodium chloride undergoes electrolysis. Electrolysis is a chemical change produced by passing an electric current through a molten substance or a solution in water.

   a) Explain (including an electrode equation) what happens at the cathode (the negative electrode).

   b) Explain (including an electrode equation) what happens at the anode (the positive electrode).

   c) Explain why this enables an electric current to flow around the external circuit.

   c) Why doesn't solid sodium chloride conduct electricity?

6. Explain as fully as you can why sodium chloride dissolves in water but not in hexane, C_6H_{14}.