# AS level Chemistry A

**H032/02** Depth in chemistry

## Question Set 14

**1.** This question is about the properties and reactions of the Group 2 element strontium.

**(a)** The relative atomic mass of strontium can be determined using a mass spectrometer.

**(i)** Explain what is meant by the term **relative atomic mass** of an element. **[2]**

**(ii)** A sample of strontium has a relative atomic mass of 87.73. **[2]**

The sample consists of:

- 82.9% Sr-88
- 6.9% Sr-87
- one other isotope.

Determine the other isotope of strontium in the sample.

**(b)** The table below shows two physical properties of the element strontium. **[5]**

| | |
|---|---|
| **Melting point** | high |
| **Electrical conductivity** | very good |

Explain these physical properties of strontium, in terms of bonding and structure. Include a labelled diagram in your answer.

**(c)** A student adds a small amount of strontium to water.

When the reaction has finished, the student measures the pH of the final solution.

**(i)** Write the equation for the reaction of strontium with water. **[1]**

**(ii)** Describe **two** observations which would be different if the student had used calcium in place of strontium. **[2]**

**(d)** When hydrated strontium chloride is heated, the water of crystallisation is removed, leaving a residue of anhydrous strontium chloride.

A student carries out an experiment to find the value of x in the formula of hydrated strontium chloride, $SrCl_2 \cdot xH_2O$.

The student's method is outlined below.

**Step 1**
Weigh an empty crucible.
Add $SrCl_2 \cdot xH_2O$ to the crucible and reweigh.

**Step 2**
Heat the crucible and contents for 10 minutes.
Allow to cool and reweigh.

**Step 3**
Heat the crucible and residue for another 5 minutes.
Allow to cool and weigh the crucible and residue.

Repeat step 3 a further two times.

The student's results are shown below:

| | |
|---|---|
| Mass of empty crucible / g | 15.96 |
| Mass of crucible + $SrCl_2 \cdot \mathbf{x}H_2O$ / g | 18.65 |
| First mass of crucible + residue / g | 17.66 |
| Second mass of crucible + residue / g | 17.61 |
| Third mass of crucible + residue / g | 17.58 |
| Fourth mass of crucible + residue / g | 17.58 |

**(i)** Calculate the value of **x** in $SrCl_2 \cdot \mathbf{x}H_2O$. **[3]**

Give your answer to **2** significant figures.

**(ii)** Suggest why the student takes four readings of the mass of the crucible and residue. **[1]**

**(iii)** Suggest **two** modifications to the method that would reduce the percentage uncertainty in the mass of the residue. **[2]**

## Total Marks for Question Set 1: 18