

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, $\text{SrCl}_2 \cdot x\text{H}_2\text{O}$.

The student's method is outlined below.

Step 1

Weigh an empty crucible.

Add $\text{SrCl}_2 \cdot x\text{H}_2\text{O}$ 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 + $\text{SrCl}_2 \cdot x\text{H}_2\text{O}$ /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 $\text{SrCl}_2 \cdot x\text{H}_2\text{O}$. [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

OCR

Oxford Cambridge and RSA

Copyright Information

OCR is committed to seeking permission to reproduce all third-party content that it uses in its assessment materials. OCR has attempted to identify and contact all copyright holders whose work is used in this paper. To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced in the OCR Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download from our public website (www.ocr.org.uk) after the live examination series.

If OCR has unwittingly failed to correctly acknowledge or clear any third-party content in this assessment material, OCR will be happy to correct its mistake at the earliest possible opportunity.

For queries or further information please contact The OCR Copyright Team, The Triangle Building, Shaftesbury Road, Cambridge CB2 8EA.

OCR is part of the Cambridge Assessment Group; Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge