



General Certificate of Education
Advanced Subsidiary Examination
June 2013

Chemistry

CHM3T/P13/task

Unit 3T AS Investigative Skills Assignment

Task Sheet

An investigation of the water of crystallisation in washing soda

Washing soda is sold commercially as a substance that can remove oil and grease. It is usually sold as white crystals of sodium carbonate decahydrate ($\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$). In this compound the ten water molecules form part of the crystal structure and are called 'water of crystallisation'. Stored samples of these crystals may contain less water of crystallisation.

In this investigation, you will determine the number of moles of water molecules in one mole of a sample of washing soda that has been stored for some time. A sample of commercial washing soda of known mass has been dissolved in water to form solution **Y**. You will titrate this solution with $0.100 \text{ mol dm}^{-3}$ hydrochloric acid.

Procedure

- **Wear eye protection at all times.**
 - **Assume that all solutions are toxic and corrosive.**
- 1 Rinse the burette with the hydrochloric acid provided. Set up the burette and use a funnel to fill it with the hydrochloric acid. Record the initial burette reading in a table of your own design on the Candidate Results Sheet.
 - 2 Use a pipette filler to rinse a pipette with solution **Y**. Use this pipette to transfer 25.0 cm^3 of solution **Y** to a 250 cm^3 conical flask.
 - 3 Add 4 or 5 drops of methyl orange indicator to the solution in the conical flask. The solution should turn yellow.
 - 4 Add hydrochloric acid from the burette until the mixture in the conical flask just turns orange. (It will turn red if too much acid has been added). Record your final burette reading in your table.
 - 5 Rinse the conical flask with distilled or deionised water. Repeat the titration until you obtain **two** titres that are within 0.10 cm^3 of each other. You should do no more than five titrations.
Have one of your final burette readings checked by your teacher.
 - 6 Calculate and record the average titre on the Candidate Results Sheet. Show clearly those titres that you used in calculating this average titre.

You are **not** required to carry out any further calculations on the Candidate Results Sheet. You will use your results in **Section A** of the Written Test.

ISA CHM3T/P13 Candidate Results SheetCentre Number

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Teacher Group

Candidate Name Candidate Number

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Results

Record your titration results in an appropriate table in the space below.

*(8 marks)*Average titre / cm³

For Teacher's use only					
B		R		P	
C		A			