Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use
Total Task 1

General Certificate of Education
Advanced Subsidiary Examination
June 2012

Chemistry CHM3X/PM1

Unit 3X AS Externally Marked Practical Assignment
Task Sheet 1

To be completed before Task Sheet 2

For submission by 15 May 2012

For this paper you must have:
- a ruler
- a calculator.

The investigation of a hand-warmer

Hand-warmers are small packets containing chemicals that produce heat. The heat produced can be used to keep hands and feet warm. Some types of hand-warmer provide soothing heat for pain in muscles and joints. Depending on the type and the source of heat, hand-warmers can stay warm for between 30 minutes and 24 hours.

A student decided to investigate whether two common laboratory chemicals, hydrochloric acid and sodium hydroxide, would be suitable as components in a commercial hand-warmer. The first steps in the investigation were to determine a suitable concentration for hydrochloric acid and then determine the amount of heat released.

Task 1 Determination of the concentration of hydrochloric acid

The laboratory has a sample of approximately 1 mol dm^{-3} hydrochloric acid. This has been diluted to give a solution that is approximately 0.1 mol dm^{-3}. You are to titrate this diluted solution with 0.100 mol dm^{-3} sodium hydroxide solution.

Procedure

- **Wear eye protection at all times.**
- **Assume that all solutions are toxic and corrosive.**

1 Rinse a burette with the hydrochloric acid provided. Set up the burette and use a funnel to fill it with this hydrochloric acid. Record your initial burette reading in a table of your own design on the Candidate Results Sheet for Task 1.

2 Use a pipette filler to rinse a pipette with the sodium hydroxide solution. Use this pipette to transfer 25.0 cm^3 of the sodium hydroxide solution to a 250 cm^3 conical flask.

3 Add 2 or 3 drops of the phenolphthalein indicator to the conical flask. The solution should be pink.

4 Add hydrochloric acid from the burette until the mixture in the conical flask just becomes colourless. 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 for Task 1.
Show clearly the titres that you used in calculating the average titre.

You are not required to carry out any further calculations.
You will use your results to determine the concentration of the hydrochloric acid in **Section A** of the Written Test.

Candidate Results Sheet for Task 1

Teacher Group .....

Results

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

(7 marks)

Average titre / cm^3 .....

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R		P		C		A	

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There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED