Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

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Total Task 2

General Certificate of Education
Advanced Subsidiary Examination
June 2012

Chemistry CHM3X/PM2

Unit 3X AS Externally Marked Practical Assignment
Task Sheet 2

To be completed before the EMPA Written Test

For submission by 15 May 2012

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

Task 2 Determination of the enthalpy change of neutralisation for the reaction between hydrochloric acid and sodium hydroxide.

After the titration of hydrochloric acid in Task 1, the student then determined a value for the enthalpy change of neutralisation for the reaction between hydrochloric acid and sodium hydroxide solution. These results allowed the student to make predictions about the suitability of using this reaction in a commercial hand-warmer.

To check the student's results, you will use 1.00 mol dm^{-3} hydrochloric acid together with 1.00 mol dm^{-3} sodium hydroxide solution.

Procedure

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

Read all the instructions below carefully so that you can design your results table before starting the Task.

1 Rinse a burette with the 1.00 mol dm^{-3} hydrochloric acid. Set up the burette and use a funnel to fill it with this hydrochloric acid.

2 Use this burette to transfer 25.0 cm^3 of the hydrochloric acid into a clean, dry, plastic cup.

3 Measure the initial temperature of the hydrochloric acid in the cup to one decimal place. Record your result in the box on the Candidate Results Sheet for Task 2.

Have one of your temperature readings checked by your teacher at some stage in the Task.

4 Wash the thermometer with distilled or deionised water and dry it.

5 Use a pipette filler to rinse a pipette with the 1.00 mol dm^{-3} sodium hydroxide solution provided. Use this pipette to transfer 25.0 cm^3 of the sodium hydroxide solution into a second clean, dry, plastic cup.

6 Place this second plastic cup containing the sodium hydroxide solution in a beaker to provide support and additional insulation. Mount the thermometer in the cup using a clamp and stand. Make sure that the bulb of the thermometer is completely immersed in the solution. Place a stirrer in the cup.

7 Stir the sodium hydroxide solution in the cup and measure the temperature to one decimal place. Start the timer. Record this temperature in a table you have designed on the Candidate Results Sheet for Task 2. This will be the temperature at zero minutes.

8 Take further temperature readings at one, two and three minutes. Make sure that the mixture is well stirred before taking a reading. Record these temperatures in your table.

9 At the fourth minute, add all the hydrochloric acid from the first plastic cup. Stir the mixture well but do not record the temperature at the fourth minute.

10 Continue to stir the mixture and measure the temperature at the fifth minute. Continue to stir the mixture and measure the temperature each minute up to and including the tenth minute. Record the temperatures in your table.

You are not required to complete any calculations in this Task. You will use the results from Tasks 1 and 2 in **Section A** of the Written Test.

Turn over for the Candidate Results Sheet for Task 2

Do not write outside the box

Candidate Results Sheet for Task 2

Teacher Group .....

Design an appropriate table in which to record your results.

(7 marks)

Results

Initial temperature of the hydrochloric acid / °C	

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R		P		A	

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