Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use
Total Task 1

General Certificate of Education
Advanced Level Examination
June 2012

Chemistry CHM6X/PM1

Unit 6X A2 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.

An investigation of rates of reaction

The study of rates of reaction is an important area of Chemistry. It allows chemists to suggest better ways of performing everyday jobs, particularly in reducing the time taken. We may, for example, be able to speed up the cooking process, produce better cleaning materials and shorten setting times for glues and building materials.

Sometimes, we wish to slow reactions down. This is particularly important in the problem of food spoilage.

Important factors for the study of rates of reaction are temperature, concentration of reagents and catalysts.

Task 1 The effect of a change in concentration of iodide ions on the reaction between hydrogen peroxide and iodide ions

Hydrogen peroxide reacts with iodide ions in the presence of acid to form iodine.

$$H_2O_2(aq) + 2H^+(aq) + 2I^-(aq) \longrightarrow I_2(aq) + 2H_2O(l)$$

The initial rate of this reaction is found by measuring the time taken to form sufficient iodine that will react with a fixed amount of thiosulfate ions added to the reaction mixture. The thiosulfate ions react rapidly with the iodine formed and turn them back to iodide ions.

$$2S_2O_3^{2-}(aq) + I_2(aq) \longrightarrow 2I^-(aq) + S_4O_6^{2-}(aq)$$

When the fixed amount of thiosulfate ions has reacted completely, the iodine is not removed. In the presence of starch, this iodine produces a blue-black complex. The time taken for the blue-black colour to appear can be measured.

By varying the iodide ion concentration, and keeping all other concentrations constant, the order of reaction with respect to iodide ions can be found.

Wear eye protection at all times.

Assume that all solutions are toxic and corrosive.

Procedure

Read all of the following steps.
Design an appropriate results table on your Candidate Results Sheet for Task 1 to record **only** the volume of potassium iodide solution used and the time taken in each experiment.
When carrying out each experiment, it is essential that you complete the steps in the order shown.

1 Transfer 10.0 cm^3 of hydrogen peroxide solution from the burette provided to a clean, dry **100 cm^3** beaker. You will use this in step 6.

2 Using a pipette filler, rinse a 25.0 cm^3 pipette with sulfuric acid. Use this pipette and the pipette filler to transfer 25.0 cm^3 of sulfuric acid to a clean, dry **250 cm^3** beaker.

3 Use a measuring cylinder to place 20 cm^3 of distilled or deionised water into the 250 cm^3 beaker. Use a dropping pipette to add approximately 1 cm^3 of starch solution to this beaker.

4 Rinse a 50.0 cm^3 burette with potassium iodide solution. Fill the burette with potassium iodide solution. Use this burette to add 5.0 cm^3 of potassium iodide solution to the mixture in the 250 cm^3 beaker.

5 Finally, add 5.0 cm^3 of sodium thiosulfate solution from the burette provided to the mixture in the 250 cm^3 beaker. Make sure this sodium thiosulfate solution is added last.

6 Stir the mixture in the 250 cm^3 beaker. Pour the hydrogen peroxide solution from the 100 cm^3 beaker into the 250 cm^3 beaker and **immediately** start the timer.
Stir the mixture.

7 Stop timing when the mixture in the 250 cm^3 beaker turns blue-black. Record the time to an appropriate precision. This experiment could take several minutes.

8 Rinse the 250 cm^3 beaker with distilled or deionised water and dry it with a paper towel.

9 Repeat steps 1 to 8 in four further experiments but change the volumes of the water and the potassium iodide solution in the 250 cm^3 beaker as shown in the following table.
The volumes of the solutions of hydrogen peroxide, sulfuric acid, starch and sodium thiosulfate should be the same as in the first experiment.

Experiment	Water / cm^3	Potassium iodide solution / cm^3
2	15	10.0
3	10	15.0
4	5	20.0
5	0	25.0

You are not required to do any calculations in this Task. You will use your results in **Section A** of the Written Test.

Candidate Results Sheet for Task 1

Teacher Group .....

Design an appropriate results table here to record the volume of potassium iodide solution used and the time taken in each experiment.

(6 marks)

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