Centre No.					
Candidate No.					

Paper Reference					
6	2	4	6	/	01A

Surname	Initial(s)
Signature	

Paper Reference(s)

6246/01A

Schools, Colleges, International Centres and International Teaching Institutions

Examiner's use only

Team Leader's use only

Edexcel GCE

Chemistry

Advanced Level

Unit Test 6A: Practical Test

Wednesday 21 January 2004 – Morning

Time: 1 hour 45 minutes

Question Number	Leave Blank
1	
2	
3	
4	
Total	

Materials required for examination
See the Confidential Instructions (already issued to Centres) relating to this practical test

Items included with question papers
Nil

Candidates are allowed the use of textbooks and their own notes during the test.

Instructions to Candidates

In the boxes above, write your centre number and candidate number, your surname, initial(s) and signature.
Answer ALL the questions in the spaces provided in this question paper.
Show all the steps in any calculations and state the units.
Calculators may be used.

Information for Candidates

The total mark for this paper is 50. The marks for the various parts of questions are shown in round brackets: e.g. (**2**).

Advice to Candidates

You are reminded of the importance of clear English and careful presentation in your answers.
You are also reminded that you should take all usual safety precautions when working in a chemistry laboratory.

Printer's Log. No.
N16441A

Turn over

W850/R6246/57570 6/7/7/7/2/3470

Edexcel
Success through qualifications

Answer ALL questions in the spaces provided.

Leave blank

In **Question 1** you are required to find the apparent first order rate constant, k, for the reaction between peroxodisulphate ions and iodide ions.

(12)

In **Question 2** you are required to carry out a series of tests on an inorganic compound, **B**.

(15)

In **Question 3** you are required to carry out a series of tests on two organic compounds, **C** and **D**, and to interpret certain spectroscopic data.

(17)

In **Question 4** you are required to devise a quantitative procedure based upon one of the qualitative tests in Question 2.

(6)

1. You are provided with:

- Solution **L**, aqueous sodium thiosulphate
- Solution **M**, aqueous potassium peroxodisulphate
- Solution **N**, aqueous potassium iodide
- Aqueous starch solution.

1. Rinse and fill one burette with solution **N** and rinse and fill the other with solution **M**.

2. Transfer 10.00 cm^3 of solution **N** into a 100 cm^3 beaker. Use a rinsed pipette to add 5.00 cm^3 of solution **L**. Stand the beaker on a white tile.

3. Transfer 10.00 cm^3 of solution **M** into a second 100 cm^3 beaker and add 10 drops of starch solution.

4. Quickly add the whole of the mixture of **M** and the starch to the mixture of **N** and **L**. Start the stopwatch at the same time, stir the mixture for 10 seconds and measure the time taken for the blue-black colour to first appear. Record this time, to the nearest second, in **Table 1**. Measure the temperature of the reaction mixture to 1 decimal place and also record this in **Table 1**.

5. Empty the contents of the beaker. Then rinse both beakers with water, shaking free any remaining drops.

6. Repeat steps 2, 3 and 4 of the procedure with 20.00 cm^3 of solution **N** and 10.00 cm^3 of solution **L** in one 100 cm^3 beaker, and 20.00 cm^3 of solution **M** and 10 drops of starch solution in the other. Record the time for the blue-black colour to appear and the temperature of the reaction mixture, as before, in **Table 1**.

7. Complete the table by using the value of the reaction time in each experiment to calculate the apparent first order rate constant, k, by using the formula:

Leave blank

$$k = \frac{0.134}{\text{time for reaction in seconds}}$$

Table 1

	Temperature / °C	Time / seconds	Rate constant, k / s^{-1}
Experiment 1			
Experiment 2			

(10)

Evaluation

The experimental procedure in this question was repeated twice. State which experiment you consider to be the more accurate. Give a reason for your choice.

.....

.....

.....

.....

(2)

Q1

(Total 12 marks)

2. You are provided with approximately 1 g of an inorganic compound **B**.

Leave blank

Carry out the following tests, recording your observations and inferences in the spaces provided.

(a) Describe the appearance of solid **B**.

Observations	Inferences

(2)

(b) Dissolve the sample of **B** in 10 cm^3 of water in a boiling tube. Use separate samples for the tests that follow.

(i) To 2 cm^3 of the solution of **B**, in a boiling tube, add 2 cm^3 aqueous sodium hydroxide. Warm the contents gently and test any gas evolved with litmus paper.

Observations	Inferences

(7)

(ii) To 2 cm^3 of the solution of **B**, in a test tube, add 1 cm^3 of aqueous barium chloride, followed by an excess of dilute hydrochloric acid.

Leave blank

Observations	Inference

(3)

(iii) To the remaining solution of **B** in the boiling tube, add 5 cm^3 of water and approximately half the lead(IV) oxide supplied. Boil the mixture for 1 minute and filter. Divide the filtrate equally between two test tubes. **Keep one sample of filtrate for Question 3(a)(iii).**

To the other sample of filtrate, add 1 cm^3 of aqueous potassium thiocyanate.

Observations	Inferences

(3)

Q2

(Total 15 marks)

3. You are provided with approximately 0.5 g of organic compound **C** and 1.0 g of organic compound **D**.

Leave blank

Compounds **C** and **D** are produced when a third organic compound, **E**, is hydrolysed and the resulting mixture acidified.

Carry out the following tests, recording your observations and inferences in the spaces provided. In the inference column, record the functional group that may be suggested by your observations.

Tests on Compound C

(a) Add approximately half of the sample of **C** to 10 cm^3 of water in a boiling tube, stopper the tube and shake vigorously to dissolve some of the solid. It does not matter if some solid remains undissolved. Decant separate 2 cm^3 samples of the solution into each of three test tubes for the tests (i), (ii) and (iii).

(i) To 2 cm^3 of the solution of **C** add red and blue litmus paper.

Observations	Inferences

(3)

(ii) **This test should be carried out in a fume cupboard.**

To 2 cm^3 of the solution of **C** add 1 cm^3 of aqueous bromine, stopper the tube and shake it vigorously.

Observations	Inferences

(3)

(iii) To 2 cm^3 of the solution of **C** add three drops of the filtrate kept from the test in Question 2(b)(iii).

Leave blank

Observation

(1)

Tests on Compound D

(a) Add 10 drops of compound **D** to 2 cm^3 of water and then add 2 cm^3 of aqueous sodium carbonate.

Observations	Inferences

(4)

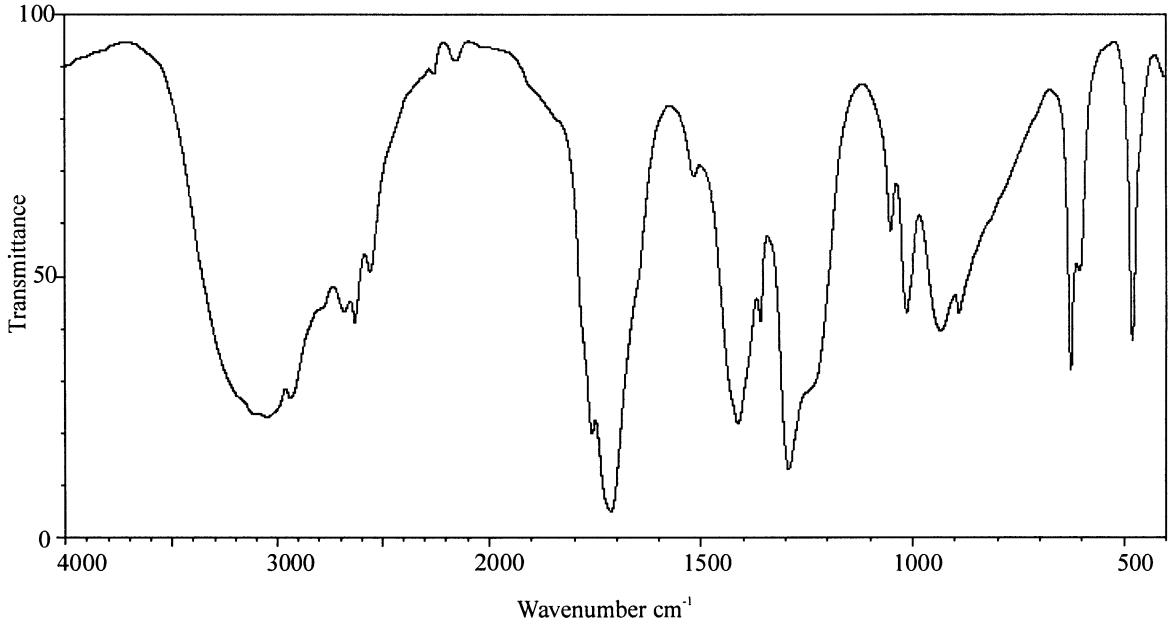
(b) To the remainder of your sample of compound **D** add approximately 0.5 cm^3 of ethanol and 2 drops of concentrated sulphuric acid. **Warm** the mixture **gently** for 1 minute and then pour the contents of the test tube into 10 cm^3 of aqueous sodium carbonate contained in an evaporating basin. Carefully smell the mixture.

Observations	Inferences

(3)

(c) The infra-red spectrum of compound **D** is given below. Use the table below to identify the absorbance bands that are caused by the functional group identified in the chemical tests on this compound.

Leave blank



Bond	Wavenumber / cm^{-1}
C—H (alkanes)	2850–2950
C—H (alkenes)	3000–3100
C═O (aldehydes, ketones, carboxylic acids)	1680–1750

Bond	Wavenumber / cm^{-1}
C—O (alcohols, esters)	1000–1300
O—H (hydrogen bonded alcohols)	3230–3550
O—H (hydrogen bonded carboxylic acids)	2500–3300

.....

.....

.....

(2)

(d) By considering the results of the tests on **C** and **D**, suggest a structure for the functional group in compound **E**, which yields **C** and **D** on hydrolysis.

(1)

Q3

(Total 17 marks)

4. Test (b)(iii) in Question 2 can be used in quantitative analysis. Given a water soluble compound **X**, that can be identified by its reaction with aqueous potassium thiocyanate, devise an experiment that would allow the determination of the minimum concentration of compound **X**, in g dm^{-3}, that this reagent could detect.

Leave blank

You are not required to carry out this plan.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

Q4

(Total 6 marks)

TOTAL FOR PAPER: 50 MARKS

END

BLANK PAGE

BLANK PAGE

BLANK PAGE