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Centre Number	
71	
Candidate Number	

Chemistry

Assessment Unit A2 3
Internal Assessment
Practical Examination 2

[AC232]

THURSDAY 19 MAY, MORNING



TIME

2 hours 30 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Answer **all three** questions.
Write your answers in the spaces provided.

INFORMATION FOR CANDIDATES

The total mark for this paper is 70.
Questions 1 and 2 are practical exercises each worth 25 marks.
Question 3 is a planning exercise worth 20 marks.
Quality of written communication will be assessed in **Question 3**.
You may not have access to notes, textbooks and other material to assist you.
A Periodic Table of elements (including some data) is provided.

For Examiner's use only		
Question Number	Marks	Moderation Mark
1		
2		
3		
Total Marks		



6621.04R

(b) Carry out your procedure. Present your results in a suitable table and calculate the average titre.

Te.	Mar.	Remark

[10]

(c) State the colour change at the end point of your titration.

_____ to _____ [2]

(d) Write the equation for the reaction of iron(II) ions (Fe^{2+}) with acidified permanganate ions ($\text{H}^+/\text{MnO}_4^-$).

_____ [2]

(e) Calculate the molarity of the ammonium iron(II) sulfate solution.

[2]

(f) Determine the molar mass of the ammonium iron(II) sulfate and deduce the value of n.

[3]

Te. Mar.	Remark

2 Observation/deduction

Safety goggles must be worn at all times and care should be exercised during this investigation.

(a) You are provided with a salt, labelled X. Carry out the following tests.

Record your observations in the spaces below.

Test	Observation	Deduction
1 Describe the appearance of X.	[1]	[1]
2 Add a spatula measure of X to approximately 50 cm ³ of water.	[2]	[1]
3 Add 10 drops of silver nitrate solution to 2 cm ³ of the solution of X in a test tube. Allow to stand.	[2]	[1]
4 Add 5 drops of sodium hydroxide solution to 2 cm ³ of the solution of X in a test tube.	[2]	[1]
5 In a fume cupboard, add 6 cm ³ of concentrated ammonia, slowly, to 2 cm ³ of the solution of X in a test tube.	[2]	No deduction required
6 Add 2 cm ³ of edta solution to 2 cm ³ of the solution of X in a test tube.	[1]	No deduction required

Deduce the name of compound X _____ [1]

Te.	Mar.	Remark

- (b) Substance Y is an organic compound with two functional groups. Carry out the following tests on Y and complete the table.

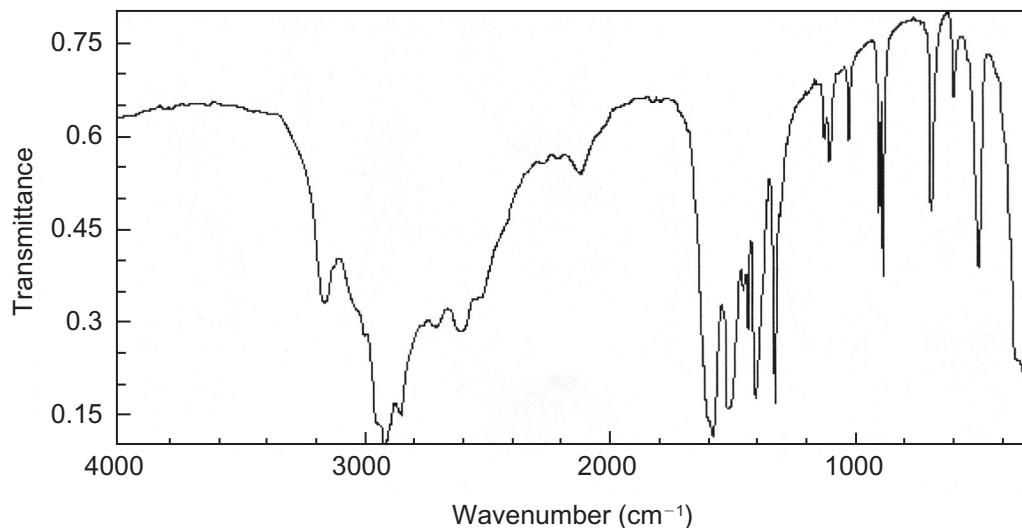
Test	Observation	Deduction
1 Describe the appearance of Y.		
	[1]	[1]
<i>Below is a description of test 2. Please read this but do not carry out this test.</i>		
2 Heat one spatula measure of Y in a test tube. Heat gently at first and then more strongly. Test any fumes with a glass rod dipped in concentrated hydrochloric acid.	White smoke	[1]
3 (i) Dissolve 2 spatula measures of Y in approximately 20 cm ³ of water. (ii) Use Universal Indicator paper to determine the pH of the solution of Y.	[1]	[1]
4 Add 6 drops of copper(II) sulfate solution, dropwise, to a test tube half-full of a solution of Y.	[1]	[1]
5 Add 3 cm ³ of acidified potassium dichromate(VI) solution. Add one spatula measure of Y and warm gently.	[1]	[1]

Test
Mark
Remark

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The infra-red and n.m.r. spectra of Y are shown below. Note that the molecule of Y has made an internal structural rearrangement. Use these spectra and the practical tests to suggest an identity of Y.

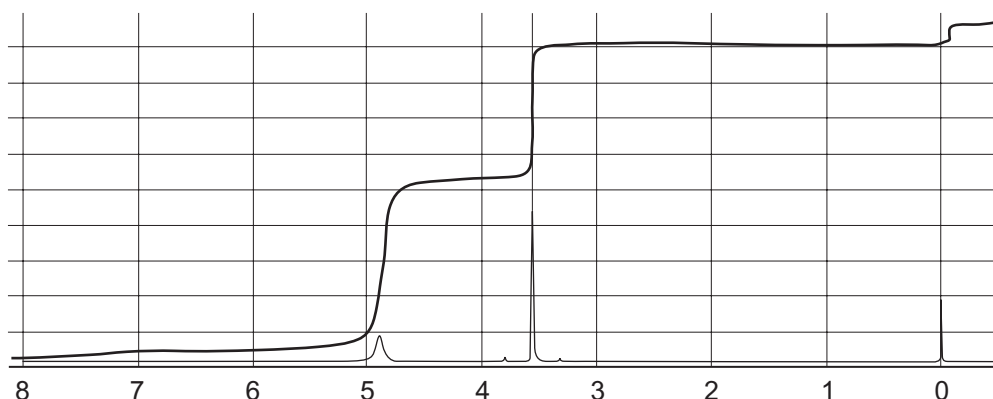
Infra-red Spectrum



Hydrogen atoms attached to electronegative atoms such as N or O absorb in the region above 3000 cm^{-1} . The actual absorption region is affected by acidity and whether the IR spectrum is obtained for the solid or a solution of the substance.

The carbonyl group in ketones absorbs at 1720 cm^{-1} . All other compounds containing C=O groups absorb from $1580\text{ to }1800\text{ cm}^{-1}$.

N.m.r. spectrum



Identity of Y _____ [1]

Maximum [25]

Planning exercise

3 Preparation of sodium thiosulfate, $\text{Na}_2\text{S}_2\text{O}_3$.

Sodium thiosulfate may be prepared by boiling a mixture of powdered roll sulfur and aqueous sodium sulfate (IV) for 30–40 minutes. Excess sulfur is removed. The resulting solution is concentrated by evaporation.

The evaporated solution, on cooling, produces crystals of sodium thiosulfate pentahydrate which are removed by vacuum filtration.

The crystals are washed with ethanol and dried using filter paper.

The purity of the crystals can be measured by titration with a standard solution of iodine (in potassium iodide solution).

You are required to prepare 2.5 g of sodium thiosulfate pentahydrate crystals.

- (a) (i)** Write an equation, including state symbols, for the reaction of sodium sulfate (IV) solution with sulfur to produce sodium thiosulfate.

_____ [2]

- (ii)** Write the formula of sodium thiosulfate pentahydrate.

_____ [1]

- (b)** Calculate the volume of 0.06 mol dm^{-3} sodium sulfate (IV) needed assuming an 80% yield.

 _____ [4]

Te. Mar.	Remark

(c) Draw a **labelled** diagram of the apparatus used to carry out vacuum filtration.

Te. Mar.	Remark

[4]

(d) Explain the purpose of washing the sodium thiosulfate with ethanol.

[2]

(e) The purity of the sodium thiosulfate may be determined using iodine solution.

(i) Write an equation for the reaction.

[2]

(ii) Calculate the percentage purity of a sample of sodium thiosulfate, if 1.2g of sodium thiosulfate, $\text{Na}_2\text{S}_2\text{O}_3$, required 25.0cm^3 of 0.1mol dm^3 iodine, I_2 , solution.

[3]

Quality of written communication

[2]

THIS IS THE END OF THE QUESTION PAPER

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