



Rewarding Learning

ADVANCED
General Certificate of Education
2011

Centre Number

71

Candidate Number

Chemistry

Assessment Unit A2 3
 Internal Assessment
 Practical Examination 1

[AC231]

TUESDAY 17 MAY, MORNING



AC231

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		



[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]

Teacher Mark	Examiner Check	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 A. Carry out the following tests.

Record your observations in the spaces below.

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

Deduce the name of compound A _____ [1]

Teacher Mark	Examiner Check	Remark

Test	Observation	Deduction
1 Describe the appearance of B.		
	[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 B 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 B in approximately 20 cm³ of water. (ii) Use Universal Indicator paper to determine the pH of the solution of B.	[1]	[1]
4 Add 6 drops of copper(II) sulfate solution, dropwise, to a test tube half-full of a solution of B.	[1]	[1]
5 To 3 cm ³ of acidified potassium dichromate solution add one spatula measure of B and warm gently.	[1]	[1]

Teacher Mark	Examiner Check	Remark

The infrared spectrum displays transmittance on the y-axis (ranging from 0.15 to 0.75) against wavenumber on the x-axis (ranging from 4000 to 1000 cm^{-1}). Key features include a broad O-H stretch around 3400 cm^{-1} , C-H stretches near 3000 cm^{-1} , a strong C=O carbonyl stretch at approximately 1680 cm^{-1} , and multiple sharp peaks in the 1500-1300 cm^{-1} region characteristic of nitro groups.

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

Identity of B _____ [1]

Maximum [25]

Teacher Mark	Examiner Check	Remark

Sodium peroxide may be prepared by passing dry oxygen over sodium in a “boat” made of aluminium foil which is placed in a combustion tube. The tube is heated until the sodium melts. It is further heated until the sodium burns.

After reaction a stream of dry air is passed through the combustion tube. The resulting sodium peroxide is placed in a stoppered bottle and weighed.

The sodium peroxide is obtained as a white solid with a slightly yellow appearance. It reacts readily with water to produce hydrogen peroxide or oxygen depending on the temperature at which the reaction is carried out.

You are required to prepare 1.3g of sodium peroxide based on the mass of sodium used.

- (a)** Write an equation, including state symbols, for the reaction of sodium with oxygen to produce sodium peroxide.

 [2]

- (b)** Calculate the mass of sodium needed assuming an 80% yield.

[4]

- (c)** Explain why it is essential that the oxygen, which is passed over the sodium, is dry.

[2]

Teacher Mark	Examiner Check	Remark

- (d) Draw a **labelled** diagram of the apparatus used to prepare sodium peroxide, showing how the oxygen gas may be dried.

[4]

- (e) The sodium peroxide may be used to prepare hydrogen peroxide by reacting it with acids at low temperatures. Adding phosphoric(V) acid to sodium peroxide produces disodium hydrogenphosphate, Na_2HPO_4 , which crystallises with twelve molecules of water.

- (i) Write an equation for the reaction of phosphoric(V) acid with sodium peroxide.

 [2]

- (ii) Suggest why this method is better than using hydrochloric acid producing sodium chloride, which crystallises without molecules of water, to prepare a *concentrated* solution of hydrogen peroxide.

[2]

- (f) Sodium peroxide reacts with water at higher temperatures to form sodium hydroxide and oxygen. Describe how you would use GLC to show that oxygen was given off.

[2]

Quality of written communication [2]

THIS IS THE END OF THE QUESTION PAPER

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