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General Certificate of Education
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Centre Number	
71	
Candidate Number	

Chemistry

Assessment Unit AS 3

assessing

Module 3: Practical Examination 1

[AC131]



TUESDAY 10 MAY

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 five** questions.

Write your answers in the spaces provided.

INFORMATION FOR CANDIDATES

The total mark for this paper is 90.

Section A

Question 1 is a practical exercise worth 25 marks.

Question 2 is a practical exercise worth 29 marks.

Section B

Question 3 is a planning exercise worth 20 marks.

Questions 4 and 5 are written questions worth a total of 16 marks, testing aspects of experimental chemistry.

Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

A Periodic Table of Elements (including some data) is provided.

Question Number	Marks	
	Teacher Mark	Examiner Check
1		
2		
3		
4		
5		

Total Marks		
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6959

(b) Carry out the titration by:

- rinsing out a burette with the 0.10 mol dm^{-3} sodium hydroxide solution
- filling the burette with the 0.10 mol dm^{-3} sodium hydroxide solution
- transferring 25.0 cm^3 of the diluted car battery acid to the conical flask
- adding 2–3 drops of phenolphthalein indicator to the solution in the conical flask and titrating until the end point is reached.

Present your results in a suitable table and calculate the average titre.

Te. Mar.	Remark

[12]

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

_____ to _____ [1]

(d) Write the equation for the reaction of sulfuric acid with sodium hydroxide.

_____ [2]

(e) (i) Calculate the number of moles of sodium hydroxide used in the titration.

_____ [1]

(ii) Calculate the number of moles of sulfuric acid in 25.0 cm³ of diluted car battery acid.

_____ [1]

(iii) Calculate the number of moles of sulfuric acid in 250 cm³ of diluted car battery acid.

_____ [1]

(iv) Calculate the number of moles of sulfuric acid in 0.80 cm³ of the undiluted car battery acid.

_____ [1]

(v) Calculate the concentration of sulfuric acid in the undiluted car battery acid in mol dm⁻³.

_____ [1]

(vi) Calculate the concentration of sulfuric acid in the undiluted car battery acid in g dm⁻³.

_____ [1]

Te. Mar.	Remark

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(Questions continue overleaf)

2 Observation/deduction

Safety glasses must be worn at all times and care should be taken during this practical examination.

- (a) You are provided with a mixture of two salts, labelled X, which have a common cation. Carry out the following experiments on the mixture. Record your observations and deductions in the spaces below and identify the two salts.

Teacher's Mark	Examiner's Mark	Remark

Experiment	Observations	Deductions
1 Describe X.	[1]	[1]
2 (a) Fill a test tube one quarter full of water and record the temperature. (b) Add three spatula measures of X to the test tube, stir and record the temperature. (c) Record the temperature change. Keep the contents of this test tube for experiments 3 and 4.	[1]	[1]
3 (a) Add 1–2 cm ³ of the solution formed in experiment 2 above to another test tube. (b) Acidify with 1 cm ³ of dilute nitric acid and then add 1 cm ³ of silver nitrate solution. (c) Add 5 cm ³ of dilute ammonia solution to the test tube.	[3]	[3]
4 (a) Add 1–2 cm ³ of the solution formed in experiment 2 above to another test tube. (b) Acidify with 3 drops of dilute nitric acid and then add 3 drops of barium chloride solution.	[1]	[1]
5 Add a spatula measure of X to a test tube one third full of dilute sodium hydroxide solution and warm gently, testing any gas evolved with moist Universal Indicator paper.	[2]	[3]

Name the **two** salts present in X:

_____ [2]

Teacher Mark	Examiner Check	Remark

(b) You are provided with an aqueous solution of an organic liquid labelled Y. Carry out the following experiments on the solution. Record your observations and deductions in the spaces below.

Experiment	Observations	Deductions
1 Describe the smell of solution Y.		
	[1]	[1]
2 Using a glass rod place a drop of Y onto Universal Indicator paper.		
	[1]	[1]
3 Add a spatula measure of anhydrous sodium carbonate to a test tube one quarter full of solution Y and identify the gas evolved using a suitable reagent.		
	[2]	[2]
4 Add 1 cm ³ of Y to a test tube and then add a 2 cm length of magnesium ribbon.		
	[2]	[1]

Based on the above tests, suggest a functional group which is present in Y.

_____ [1]

Y contains only one functional group and two carbon atoms. Write an equation for the reaction occurring in experiment 4 above.

_____ [2]

max [29]

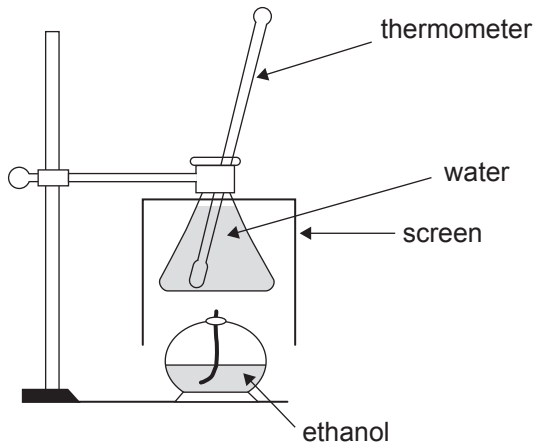
Teacher Mark	Examiner Check	Remark

Section B

Te.
Mar.
Remark

3 Planning

(a) The enthalpy of combustion of ethanol can be found using a calorimeter. The apparatus used is shown below.



(i) Explain the purpose of the screen.

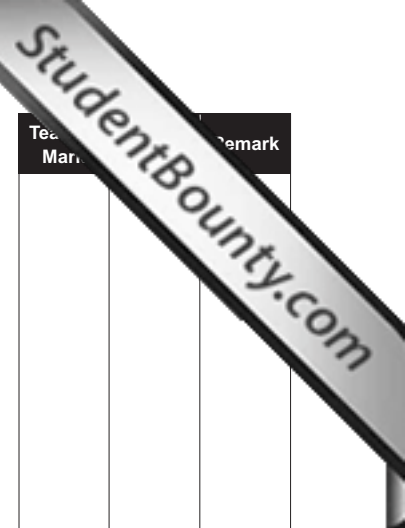
_____ [1]

(ii) State which **three** masses should be recorded at the start and end of the experiment.

_____ [3]

(iii) The specific heat capacity of water at 20°C is $4.18 \text{ J g}^{-1} \text{ } ^\circ\text{C}^{-1}$. Explain what this means.

_____ [2]



(iii) The tabulated values for the enthalpies of combustion for ethanol and propan-1-ol are -1367 and $-2021 \text{ kJ mol}^{-1}$ respectively. Use these values to estimate the enthalpy of combustion for pentan-1-ol.

 [2]

(iv) All alcohols burn in a plentiful supply of oxygen to produce carbon dioxide and water. Name **two** other chemicals which are produced in the incomplete combustion of an alcohol.

 [2]

Te. Mar.	Remark

(v) The diethyl ether is finally purified by distillation. Explain why distillation achieves a satisfactory separation.

_____ [1]

5 (a) Explain, with expected observations, how you would use aqueous sodium hydroxide to distinguish between aqueous solutions of aluminium nitrate and magnesium nitrate.

_____ [3]

(b) State **two** tests, including expected observations, which would confirm that an unknown solution contains dissolved iron(III) and sodium ions **without** the use of either aqueous ammonia or sodium hydroxide.

iron(III) ion test _____

_____ [2]

sodium ion test _____

_____ [2]

Te. Mar.	Remark

THIS IS THE END OF THE QUESTION PAPER

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