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Candidate Number

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Chemistry

Assessment Unit A2 3
Internal Assessment
Practical Examination 2

[AC232]

FRIDAY 21 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 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	Modera-tion Mark
1		
2		
3		

Total Marks		
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6033

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

Te. Mar.	Remark

[10]

Te. Mar.	Remark

(c) (i) Calculate the number of moles of iodine liberated in the conical flask.

[2]

(ii) Balance the following half-equation:



(iii) Combine the reduction half-equation above with the following oxidation half-equation:



[2]

(iv) Calculate the concentration of the sodium iodate(V) solution in g dm^{-3} .

[3]

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(Questions continue overleaf)

- (c) Compounds D and E have the molecular formula $C_3H_6O_2$. They both produce a triplet, quartet and singlet in their NMR spectra. Carry out the following test on D. A sample of E is **not** required. Record your observations in the space below.

Test	Observations
Add a spatula measure of sodium carbonate to about 1cm^3 of D in a test tube.	[3]

Deduce the structural formula of D

_____ [1]

Deduce the structural formula of E

_____ [1]

Te. Mar.	Remark

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(Questions continue overleaf)

Te. Mar.	Remark

Planning exercise

3 Preparation of butyl butanoate, $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOCH}_2\text{CH}_2\text{CH}_2\text{CH}_3$

Butyl butanoate is a liquid with a boiling point of 165°C and a density of 0.87 g cm^{-3} . It may be prepared by reaction between butanoic acid and butan-1-ol using concentrated sulphuric acid as a catalyst.

You are required to prepare 30 cm^3 of pure butyl butanoate based on the mass of butanoic acid used.

(a) Write an equation for the esterification.

_____ [2]

(b) Calculate the mass of butanoic acid needed assuming a 70% yield.

 _____ [4]

(c) The first stage produces a crude sample of the ester. Describe this procedure, including an **explanation** for any relevant safety precautions, apart from using safety glasses.

 _____ [5]

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