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ADVANCED
General Certificate of Education
2015

Centre Number

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Candidate Number

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Chemistry

Assessment Unit A2 3
assessing
Module 3: Practical Examination
Practical Booklet B



AC234

[AC234]

MONDAY 11 MAY, MORNING

TIME

1 hour 15 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 50.

Question 1 is a practical exercise worth 17 marks.

Question 2 is a practical exercise worth 13 marks.

Question 3 is a planning exercise worth 20 marks.

Quality of written communication will be assessed in **Question 3**.

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.

You may not have access to notes, textbooks and other material to assist you.

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

2 Deductions exercise

(a) (i) Based on the following observations, make deductions for salt **A**.

Test	Observations	Deductions
1 Dissolve A in 20 cm ³ of water.	<i>Orange solution.</i>	
2 Add a few drops of concentrated ammonia solution to 2 cm ³ of the solution of A in a test tube.	<i>Rust precipitate forms immediately.</i>	[1]
3 Add 1 cm ³ of barium chloride solution to 2 cm ³ of the solution of A in a test tube, allow the mixture to settle.	<i>White precipitate.</i>	[1]

(ii) Give the formula of salt **A**.

_____ [1]

Examiner Mark	Remark

- (b) (i) Interpret the following data and identify the structural formula of the organic compound **B**, which has the *empirical* formula C_2H_4O .

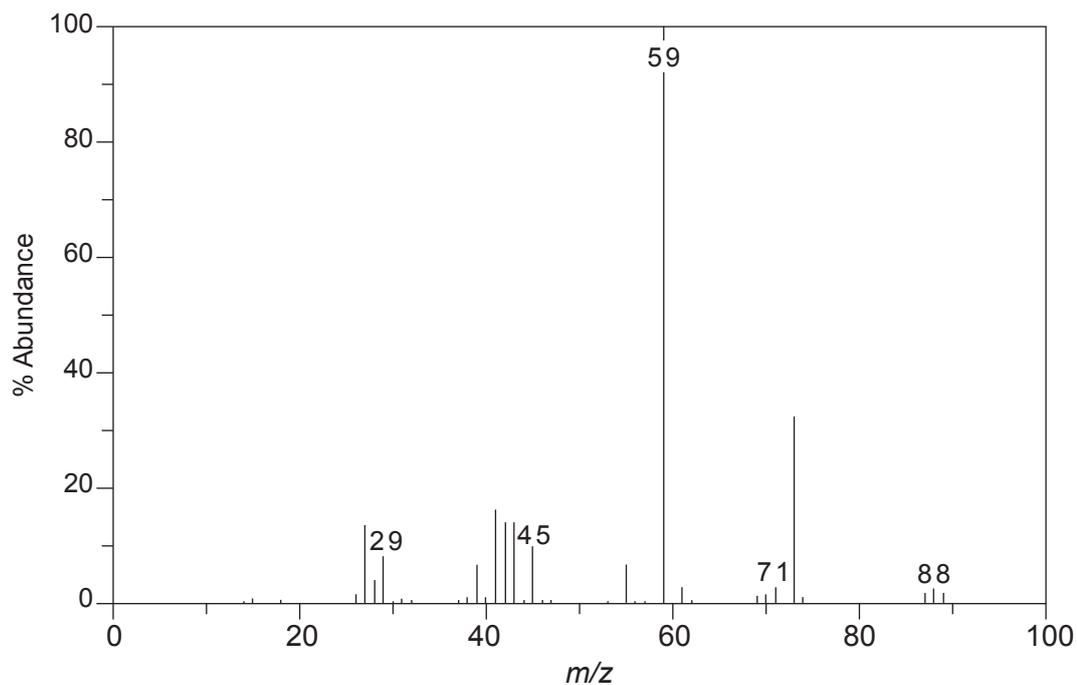
Test	Observations	Deductions
1 Describe the appearance of B .	<i>Colourless liquid.</i> <i>Pungent smell.</i>	
2 Add 2 cm ³ of deionised water to 2 cm ³ of B in a test tube.	<i>One layer forms.</i>	[1]
3 Add 10 drops of B to 2 cm ³ of acidified potassium dichromate solution in a test tube. Place the test tube in a hot water bath.	<i>Solution stays orange.</i>	[1]
4 Place 2 cm ³ of B into a test tube. In a fume cupboard cautiously add a very small spatula measure of phosphorus(V) chloride to the test tube.	<i>Fizzing.</i> <i>Solid reacts.</i> <i>White fumes.</i>	[1]
5 Place 5 cm ³ of B in a boiling tube. Add 5 cm ³ of ethanol, and then 1 cm ³ of concentrated sulfuric acid. Heat the boiling tube in a water bath. Cautiously smell the contents of the boiling tube.	<i>Sweet smell.</i>	[1]
6 Add a spatula measure of sodium carbonate to 2 cm ³ of B in a test tube.	<i>Fizzing.</i> <i>Solid dissolves.</i>	[2]

- (ii) To what homologous series does **B** belong?

_____ [1]

Examiner Mark	Remark

The mass spectrum of **B** is shown below:



(iii) Draw a structure for **B** showing all the bonds present.

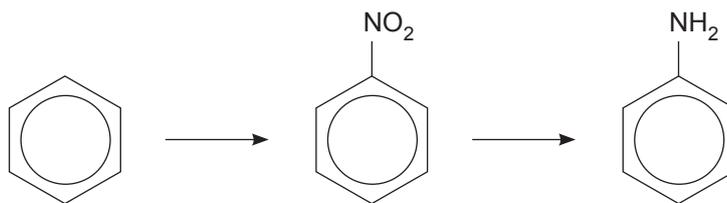
_____ [2]

(iv) Identify the species responsible for the base peak in the spectrum above.

_____ [1]

Examiner Mark	Remark

- 3 Benzene is used to prepare nitrobenzene (b pt. 211 °C), which is then used to make phenylamine (b pt. 184 °C).



Nitrobenzene is prepared from benzene as follows:

Concentrated nitric acid, concentrated sulfuric acid and benzene (density 0.88 g cm^{-3}) are mixed slowly in a round-bottomed flask, ensuring the temperature does not rise above 60°C . A reflux condenser is attached and the mixture is heated on a water bath for thirty minutes. The mixture is poured into 100 cm^3 of water and the acidic impurities are removed. The organic layer is run off, dried with anhydrous sodium sulfate and placed into a round-bottomed flask. The apparatus is rearranged for distillation and the contents of the round-bottomed flask are distilled using an air condenser (a condenser where no water flows through the outside jacket), collecting the fraction boiling between $207\text{--}211^\circ\text{C}$.

- (a) Suggest why ammonia will **not** react with benzene.

_____ [1]

- (b) (i) Define the term **reflux**.

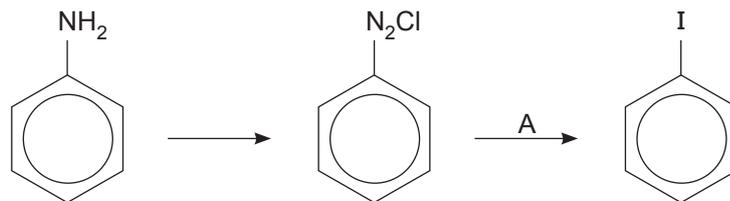
 _____ [1]

- (ii) Draw a labelled diagram of the apparatus used for this distillation.

[4]

Examiner Mark	Remark

- (e) Phenylamine can be converted to iodobenzene, according to the following flow scheme:



- (i) Draw the structure of the benzenediazonium ion.

[2]

- (ii) Identify the reagents and conditions for stage A.

_____ [2]

THIS IS THE END OF THE QUESTION PAPER

Examiner Mark	Remark

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