



Rewarding Learning

ADVANCED SUBSIDIARY (AS)  
General Certificate of Education  
2013

Centre Number

71

Candidate Number

## Chemistry

### Assessment Unit AS 3

*assessing*

### Module 3: Practical Examination 1

[AC131]

MONDAY 20 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 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 the Elements, containing some data, is included in this question paper.

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

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

Total Marks		
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(b) Carry out the titration by:

- rinsing out the burette with the  $0.10 \text{ mol dm}^{-3}$  hydrochloric acid
- filling the burette with the  $0.10 \text{ mol dm}^{-3}$  hydrochloric acid
- transferring  $25.0 \text{ cm}^3$  of the washing soda solution, **R**, to the conical flask
- adding three drops of methyl orange 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.

[8]

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

\_\_\_\_\_ to \_\_\_\_\_ [2]

(d) Write the equation for the reaction of hydrochloric acid with anhydrous sodium carbonate.

\_\_\_\_\_ [2]

Teacher Mark	Examiner Check	Remark



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**(Questions continue overleaf)**

## 2 Observation and deduction

Safety glasses should 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 **A**, which have a common anion. Carry out the following experiments on the mixture. Record your observations and deductions in the spaces below and identify the two salts.

Teacher Mark	Examiner Check	Remark

Experiment	Observations	Deductions
1 Describe <b>A</b> .	[1]	[1]
2 Make a solution of <b>A</b> by dissolving half a spatula-measure of <b>A</b> in a test tube half-full of water. Put 1 cm <sup>3</sup> of the solution into each of two separate test tubes.  (a) Add three drops of sodium hydroxide solution to the first test tube. Then add a further 2 cm <sup>3</sup> of sodium hydroxide solution to the test tube.  (b) Add three drops of dilute ammonia solution to the second test tube. Then add a further 2 cm <sup>3</sup> of the ammonia solution to the test tube.	[2]  [2]	[2]  [2]
3 Make a solution of <b>A</b> by dissolving a half spatula-measure of <b>A</b> in a test tube one third full of dilute hydrochloric acid.  Add 1 cm <sup>3</sup> of barium chloride solution to the test tube.	[1]  [1]	[1]  [1]
4 Add a spatula-measure of <b>A</b> to a test tube one third full of sodium hydroxide solution and warm gently. Carefully smell any gas given off and test it with moist Universal Indicator paper.	[2]	[3]

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

\_\_\_\_\_ and \_\_\_\_\_ [2]

Teacher Mark	Examiner Check	Remark

- (b) You are provided with an organic liquid labelled **B**. Carry out the following experiments on the liquid. Record your observations and deductions in the spaces below.

Experiment	Observations	Deductions
1 Place 1 cm <sup>3</sup> of <b>B</b> in a test tube and add 1 cm <sup>3</sup> of water. Stopper and shake the mixture.	[1]	[1]
2 Place 10 drops of <b>B</b> on a watch glass placed on a heatproof mat and ignite it using a burning splint.	[1]	[1]
3 In a fume cupboard, add approximately 1 cm <sup>3</sup> of <b>B</b> to a test tube one quarter full of bromine water and shake the mixture.	[1]	[1]
4 Add six drops of <b>B</b> to 1 cm <sup>3</sup> of potassium dichromate solution in a test tube and acidify by adding 1 cm <sup>3</sup> of dilute sulfuric acid. Warm the mixture gently.	[2]	[2]

Based on the experiments above, suggest:

a functional group which may be present in **B**.

\_\_\_\_\_ [1]

a functional group which may be absent from **B**.

\_\_\_\_\_ [1]

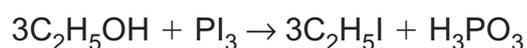
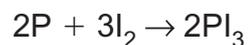
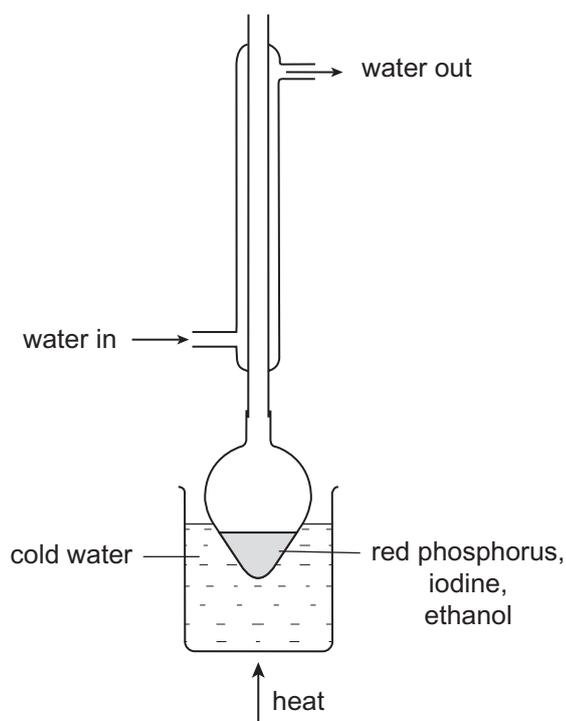
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Teacher Mark	Examiner Check	Remark

## Section B

## 3 Planning

Iodoethane can be prepared in the laboratory by the following method.



Place 0.5g of red phosphorus and 5g of iodine in a flask. Immerse the flask in a beaker of cold water and, using a dropping pipette, add 5 cm<sup>3</sup> of ethanol, in 1 cm<sup>3</sup> portions, down the reflux condenser. When all the ethanol has been added, slowly bring the water in the beaker to the boil. Allow the contents of the flask to reflux for an hour.

Allow the apparatus to cool and adjust the condenser for distillation. Bring the water in the bath gently to the boil and maintain at this temperature until no more oily drops of impure distillate are obtained.

Purify, dry and redistil the iodoethane. Collect the fraction boiling in the range 68–73 °C.

Teacher Mark	Examiner Check	Remark



(b) (i) Explain what is meant by the term **reflux**.

\_\_\_\_\_  
 \_\_\_\_\_ [2]

(ii) Suggest why the flask is kept in a beaker of cold water as the ethanol is added.

\_\_\_\_\_ [1]

(iii) Name **two** inorganic impurities which will be present after refluxing.

\_\_\_\_\_ [2]

(iv) Describe, giving practical details, how phosphoric(V) acid may be removed from the distillate using a separating funnel.

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_ [3]

(v) Name a suitable reagent for drying the impure distillate and suggest how it may be removed.

\_\_\_\_\_  
 \_\_\_\_\_ [2]

(vi) Suggest why a water bath can be used to heat the mixture during the refluxing.

\_\_\_\_\_ [1]

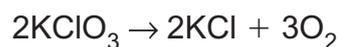
(vii) State **two** reasons why the range 68–73 °C is used to collect the distillate.

\_\_\_\_\_  
 \_\_\_\_\_ [2]

Teacher Mark	Examiner Check	Remark



5 Potassium chlorate(V) decomposes when heated.



The decomposition is catalysed by manganese(IV) oxide.

(a) Describe a test to show the presence of oxygen gas.

\_\_\_\_\_  
\_\_\_\_\_ [2]

(b) A 4.0g mixture of potassium chlorate(V) and manganese(IV) oxide formed  $365\text{ cm}^3$  of oxygen on complete decomposition at room temperature and pressure.

Use the following headings to calculate the mass of manganese(IV) oxide in the mixture.

Moles of oxygen

\_\_\_\_\_

Moles of potassium chlorate(V)

\_\_\_\_\_

Mass of potassium chlorate(V)

\_\_\_\_\_

Mass of manganese(IV) oxide

\_\_\_\_\_ [4]

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**THIS IS THE END OF THE QUESTION PAPER**

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Teacher Mark	Examiner Check	Remark







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2013**

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## **Chemistry**

**Assessment Unit AS 3**

*Internal Assessment*

**Practical Examinations 1 and 2**

**[AC131] [AC132]**

**MONDAY 20 MAY AND TUESDAY 21 MAY**

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AC131 AC132

# **APPARATUS AND MATERIALS LIST**

### Advice for centres

- All chemicals used should be at least laboratory reagent specification and labelled with appropriate safety symbols, e.g. irritant.
- For centres running multiple sessions – candidates for the later session should be supplied with clean, dry glassware. If it is not feasible then glassware from the first session should be thoroughly washed, rinsed with deionised water and allowed to drain.
- **Ensure all chemicals are in date otherwise expected observations may not be seen.**

## Practical Examination 1

Each candidate must be supplied with safety goggles or glasses.

### Question No. 1

Each candidate must be supplied with:

- one 50 cm<sup>3</sup> burette of at least class B quality;
- a funnel for filling the burette;
- a retort stand and clamp;
- two beakers of 100 cm<sup>3</sup> capacity;
- one 25 cm<sup>3</sup> pipette of at least class B quality;
- a safety pipette filler;
- three conical flasks of 250 cm<sup>3</sup> capacity;
- methyl orange indicator with dropper;
- a white tile or white paper;
- a wash bottle containing deionised/distilled water;
- 150 cm<sup>3</sup> of 0.1 mol dm<sup>-3</sup> sodium hydroxide solution labelled **R** and **irritant**;
- 150 cm<sup>3</sup> of 0.1 mol dm<sup>-3</sup> hydrochloric acid labelled **hydrochloric acid 0.1 mol dm<sup>-3</sup>** and **irritant**.

**Question No. 2**

Each candidate must be supplied with:

- eight test tubes;
- a test tube/boiling tube holder;
- a test tube/boiling tube rack;
- a spatula;
- a glass rod;
- a heat-proof mat;
- a Bunsen burner;
- four droppers with teats;
- two watch-glasses;
- a beaker of 100 cm<sup>3</sup> capacity;
- a rubber bung to fit a test tube;
- two wooden splints;
- distilled water;
- about 5g of a mixture of 2.5g of aluminium sulfate and 2.5g of ammonium sulfate crystals in a 50/100 cm<sup>3</sup> beaker labelled **A**;
- about 10 cm<sup>3</sup> of dilute sodium hydroxide in a stoppered reagent bottle/beaker labelled **dilute sodium hydroxide** and **corrosive**. This solution should be approximately 2 mol dm<sup>-3</sup>;
- about 10 cm<sup>3</sup> of dilute ammonia solution in a stoppered reagent bottle/beaker labelled **dilute ammonia solution** and **irritant**. This solution should be approximately 2 mol dm<sup>-3</sup>;
- about 10 cm<sup>3</sup> of dilute hydrochloric acid in a stoppered reagent bottle labelled **dilute hydrochloric acid** and **irritant**. This solution should be approximately 2 mol dm<sup>-3</sup>;
- about 10 cm<sup>3</sup> of barium chloride solution in a stoppered reagent bottle labelled **barium chloride solution** and **harmful**. This solution should be approximately 0.1 mol dm<sup>-3</sup>;
- Universal indicator paper (Johnson's pH 1–11);
- about 15 cm<sup>3</sup> of butan-1-ol in a stoppered reagent bottle labelled **B**;
- about 10 cm<sup>3</sup> of bromine water in a stoppered reagent bottle labelled **bromine water** and **harmful**. This solution should be approximately 0.02 mol dm<sup>-3</sup> (i.e. 0.1% v/v);

- about 5 cm<sup>3</sup> of dilute sulfuric acid in a stoppered reagent bottle and labelled **dilute sulfuric acid** and **corrosive**. This solution should be approximately 2 mol dm<sup>-3</sup>;
- about 10 cm<sup>3</sup> of potassium dichromate(VI) solution in a stoppered reagent bottle labelled **potassium dichromate(VI) solution** and **irritant**. This solution should be approximately 0.1 mol dm<sup>-3</sup>, made by dissolving 30 g of potassium dichromate(VI) in 100 cm<sup>3</sup> of deionised water and made up to 1 dm<sup>3</sup> with deionised water;
- A kettle for hot water.

## Practical Examination 2

Each candidate must be supplied with safety goggles or glasses.

### Question No. 1

Each candidate must be supplied with:

- one 50 cm<sup>3</sup> burette of at least class B quality;
- a funnel for filling the burette;
- a retort stand and clamp;
- two beakers of 100 cm<sup>3</sup> capacity;
- one 25 cm<sup>3</sup> pipette of at least class B quality;
- a safety pipette filler;
- three conical flasks of 250 cm<sup>3</sup> capacity;
- methyl orange indicator with dropper;
- a white tile or white paper;
- a wash bottle containing deionised/distilled water;
- 150 cm<sup>3</sup> of 0.1 mol dm<sup>-3</sup> sodium hydroxide solution labelled **S** and **irritant**;
- 150 cm<sup>3</sup> of 0.1 mol dm<sup>-3</sup> hydrochloric acid labelled **hydrochloric acid 0.1 mol dm<sup>-3</sup>** and **irritant**.

**Question No. 2**

Each candidate must be supplied with:

- eight test tubes;
- a test tube/boiling tube holder;
- a test tube/boiling tube rack;
- a spatula;
- a glass rod;
- a heat-proof mat;
- a Bunsen burner;
- four droppers with teats;
- two watch-glasses;
- a beaker of 100 cm<sup>3</sup> capacity;
- a rubber bung to fit a test tube;
- two wooden splints;
- distilled water;
- about 5 g of a mixture of 2.5 g of zinc chloride and 2.5 g of ammonium chloride crystals in a 50/100 cm<sup>3</sup> beaker labelled **X**;
- about 10 cm<sup>3</sup> of dilute sodium hydroxide in a stoppered reagent bottle/beaker labelled **dilute sodium hydroxide** and **corrosive**. This solution should be approximately 2 mol dm<sup>-3</sup>;
- about 10 cm<sup>3</sup> of dilute ammonia solution in a stoppered reagent bottle/beaker labelled **dilute ammonia solution** and **irritant**. This solution should be approximately 2 mol dm<sup>-3</sup>;
- about 10 cm<sup>3</sup> of dilute nitric acid in a stoppered reagent bottle labelled **dilute nitric acid**. This solution should be approximately 0.5 mol dm<sup>-3</sup>;
- about 10 cm<sup>3</sup> of silver nitrate solution in a stoppered reagent bottle labelled **silver nitrate solution**. This solution should be approximately 0.1 mol dm<sup>-3</sup> (17.0 g dm<sup>-3</sup>);
- Universal indicator paper (Johnson's pH 1–11);
- about 15 cm<sup>3</sup> of cyclohexene in a stoppered reagent bottle labelled **Y**;
- about 10 cm<sup>3</sup> of bromine water in a stoppered reagent bottle labelled **bromine water** and **harmful**. This solution should be approximately 0.02 mol dm<sup>-3</sup> (i.e. 0.1% v/v);
- about 5 cm<sup>3</sup> of dilute sulfuric acid in a stoppered reagent bottle and labelled **dilute sulfuric acid** and **corrosive**. This solution should be approximately 2 mol dm<sup>-3</sup>;

- about 10 cm<sup>3</sup> of potassium dichromate(VI) solution in a stoppered reagent bottle labelled **potassium dichromate(VI) solution** and **irritant**. This solution should be approximately 0.1 mol dm<sup>-3</sup>, made by dissolving 30 g of potassium dichromate(VI) in 100 cm<sup>3</sup> of deionised water and made up to 1 dm<sup>3</sup> with deionised water;
- A kettle for hot water.



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## **Chemistry**

**Assessment Unit AS 3**

*Internal Assessment*

**Practical Examinations 1 and 2**

**[AC131] [AC132]**

**MONDAY 20 AND TUESDAY 21 MAY**

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# **Confidential Instructions to the Supervisor of the Practical Examination**

## INSTRUCTIONS TO THE SUPERVISOR OF THE PRACTICAL EXAMINATION

### General

1. The instructions contained in this document are for the use of the Supervisor **and are strictly confidential**. Under no circumstances may information concerning apparatus or materials be given before the examination to a candidate or other unauthorised person.
2. In a centre with a large number of candidates it may be necessary for two or more examination sessions to be organised. **It is the responsibility of the schools to ensure that there should be no contact between candidates taking each session.**
3. A suitable laboratory must be reserved for the examination and kept locked throughout the period of preparation. Unauthorised persons not involved in the preparation for the examination must not be allowed to enter. Candidates must not be admitted until the specified time for commencement of the examination.
4. The Supervisor must ensure that the solutions provided for the candidates are of the nature and concentrations specified in the Apparatus and Materials List.
5. **The Supervisor is to be granted access to the Teacher's Copy of the Question Paper, showing parts of questions 1 and 2 only, on Wednesday 15 May 2013.** The Supervisor is asked to check, at the earliest opportunity, that the experiments and tests in the question paper may be completed satisfactorily using the apparatus, materials and solutions that have been assembled. **This question paper must then be returned to safe custody** at the earliest possible moment after the Supervisor has ensured that all is in order. **No access to the question paper should be allowed before 15 May 2013.**
6. In the case of centres who have candidates entered for both practical examinations, the Supervisor must **return all unused scripts of Practical Examination 1** to the Examinations Officer immediately on completion of the examination. **The contents of this examination must be kept confidential until the completion of Practical Examination 2.**
7. Pipettes and burettes should be checked before the examination, and there should be an adequate supply of spare apparatus in case of breakages. The Apparatus and Materials List should be regarded as a minimum and there should be no objection to candidates being supplied with more than the minimum amount of apparatus and materials.
8. **Candidates may not use text books and laboratory notes for reference during the examination, and must be informed of this beforehand.**

9. Clear instructions must be given by the Supervisor to all candidates at the beginning of the examination concerning appropriate safety procedures and precautions. Supervisors are also advised to remind candidates that all substances in the examination must be treated with caution. **Only those tests specified in the question paper should be attempted. Candidates must not attempt any additional confirmatory tests.** Anything spilled on the skin should be washed off immediately with plenty of water. The use of appropriate eye protection is essential.
10. Supervisors are reminded that they may not assist candidates during the examination. However, if in the opinion of the Supervisor, a candidate is about to do something which may endanger him/herself or others, the Supervisor should intervene. A full written report must be sent to CCEA at once.
11. Upon request, a candidate may be given additional quantities of materials (answer paper, reagents and unknowns) without penalty. No notification need be sent to CCEA.
12. The examination room must be cleared of candidates immediately after the examination.
13. No materials will be supplied by CCEA.









