



Rewarding Learning

**ADVANCED SUBSIDIARY (AS)
General Certificate of Education
2014**

Chemistry

Assessment Unit AS 3

assessing

Module 3: Practical Examination

Practical Booklet B

[AC134]

THURSDAY 8 MAY, MORNING

**MARK
SCHEME**

Annotation

1. Please do all marking in **red** ink.
2. All scripts should be checked for mathematical errors. Please adopt a system of one tick (✓) equals 1 mark, e.g. if you have awarded 4 marks for part of a question then 4 ticks (✓) should be on this candidate's answer.
3. The total mark for each question should be recorded in a circle placed opposite the question number in the teacher mark column.
4. As candidates have access to scripts please do not write any inappropriate comments on their scripts.

General points

- All calculations are marked according to the number of errors made.
- Errors can be carried through. If the wrong calculation is carried out then the incorrect answer can be carried through. One mistake at the start of a question does not always mean that all marks are lost.
- Listing is when more than one answer is given for a question that only requires one answer, e.g. the precipitate from a chloride with silver nitrate is a white solid; if the candidate states a white or a cream solid, one answer is correct and one answer is wrong. Hence they cancel out.
- Although names might be in the mark scheme it is generally accepted that formulae can replace them. Formulae and names are often interchangeable in chemistry.
- The marking of colours is defined in the 'CCEA GCE Chemistry Acceptable Colours' document.

MARKING GUIDELINES

Interpretation of the Mark Scheme

- **Carry error through**
This is where mistakes/wrong answers are penalised when made, but if carried into further steps of the question, then no further penalty is applied. This pertains to calculations and observational/ deduction exercises. Please annotate candidates' answers by writing the letters c.e.t. on the appropriate place in the candidates' answers.
- **Oblique/forward slash**
This indicates an acceptable alternative answer(s).
- **Brackets**
Where an answer is given in the mark scheme and is followed by a word/words in brackets, this indicates that the information within the brackets is non-essential for awarding the mark(s).

Section A

- | | | AVAILABLE MARKS |
|---|--|-----------------|
| 1 | (a) Colourless to pink/red | [2] |
| | (b) (i) $\text{CaCO}_3 + 2\text{HCl} \rightarrow \text{CaCl}_2 + \text{H}_2\text{O} + \text{CO}_2$ | [2] |
| | (ii) $\text{HCl} + \text{NaOH} \rightarrow \text{NaCl} + \text{H}_2\text{O}$ | [1] |
| | (c) (i) Number of moles of sodium hydroxide = $\frac{23.8 \times 0.1}{1000}$
= 0.00238 | [1] |
| | (ii) Number of moles of hydrochloric acid in 25.0 cm ³ of Solution A = 0.00238 | [1] |
| | (iii) Number of moles of unreacted hydrochloric acid in 250 cm ³ of Solution A = 0.00238 × 10 = 0.0238 | [1] |
| | (iv) Number of moles of hydrochloric acid added to the indigestion tablets = $\frac{25 \times 2.0}{1000} = 0.05$ | [1] |
| | (v) Number of moles of hydrochloric acid which reacted with the calcium carbonate in the indigestion tablets, i.e. (iv) – (iii) = 0.05 – 0.0238 = 0.0262 | [1] |
| | (vi) Number of moles of calcium carbonate in the indigestion tablets = $\frac{0.0262}{2} = 0.0131$ | [1] |
| | (vii) Mass of calcium carbonate in each indigestion tablet = $\frac{0.0131 \times 100}{2} = 0.655\text{g}$ units needed | [1] |
| | (d) (i) They do not react with the hydrochloric acid or sodium hydroxide | [1] |
| | (ii) Any material on the sides is returned to the solution | [1] |
| | (iii) Add (the sodium hydroxide) drop by drop near the end point | [1] |
| | (iv) Further titrations [1]
Repeat whole experiment [1]
Concordant readings within 0.2 cm ³ of each other [1] | [2] |

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2 Observation and deduction

(a)

Test	Observations	Deductions
1 Place a spatula measure of Y in a test tube and heat strongly. Bubble any gas given off through lime water.	<i>Colourless liquid on sides of test tube</i> <i>Lime water turns milky</i>	<i>Water formed/hydrated</i> [1] <i>Carbon dioxide given off/solid is carbonate or hydrogencarbonate</i> [1]
2 Make a solution of Y by dissolving a half spatula measure of Y in a test tube one third full of dilute hydrochloric acid. Add 1 cm ³ of barium chloride solution to the test tube.	<i>Effervescence</i> <i>No change</i>	<i>Carbonate/ Hydrogencarbonate (either or both)</i> [1] <i>Not a sulfate</i> [1]
3 Make a solution of Y by dissolving a half spatula measure of Y in a test tube one third full of deionised water. Add 1 cm ³ of magnesium sulfate solution.	<i>No change</i>	<i>Hydrogencarbonate/ Does not contain Ba²⁺ ions</i> [1]
4 Make a solution of Y by dissolving a quarter spatula measure of Y in a test tube one third full of dilute nitric acid. Add 1 cm ³ of silver nitrate solution and then, in a fume cupboard, 5 cm ³ of dilute ammonia solution.	<i>White precipitate</i> <i>Dissolves</i>	<i>Chloride (ion)</i> [1]
5 Dip a nichrome wire loop in concentrated hydrochloric acid; touch Y with the wire and then hold it in a blue Bunsen flame.	<i>Lilac flame</i>	<i>Potassium ion</i> [1]

Name the **two** salts present in **Y**:Potassium chloride [1] and potassium hydrogencarbonate [1]

[9]

AVAILABLE
MARKS

(b)

Test	Observations	Deductions
1 Place 1 cm ³ of Z in a test tube and add 1 cm ³ of water. Add a bung and shake the test tube	Two layers formed	Immiscible/no hydrogen bonds/non polar/insoluble [1]
2 Place 10 drops of Z on a watch glass placed on a heatproof mat and ignite it using a splint.	Yellow, smoky flame	High carbon content alkane or alkene (both needed)/saturated or unsaturated hydrocarbon [1]
3 Add approximately 0.5 cm ³ of Z to a test tube one quarter full of bromine water and mix well in a fume cupboard.	Orange bromine water decolourised	Unsaturated/C=C [1]
4 Place 1 cm ³ of Z in a test tube and add 1 cm ³ of ethanol and 1 cm ³ of silver nitrate. Place the test tube in a beaker of water heated to just below boiling point. Leave for 5 minutes.	Yellow precipitate	Iodo compound/iodide ions formed Contains iodine [1]

Based on the test above, suggest:

two functional groups which may be present in **Z**.

alkene/C=C [1]

and

RI/C—I/iodo-/iodoalkene [1]

[2]

Section A

AVAILABLE
MARKS

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Section B

- 3** (a) $\text{CH}_3\text{COOH} + \text{C}_2\text{H}_5\text{OH} \rightarrow \text{CH}_3\text{COOC}_2\text{H}_5 + \text{H}_2\text{O}$ [1]
- (b) Water will move the equilibrium to the left [1]
reducing the yield of ethyl ethanoate [1] [2]
- (c) (i) Gloves/fume cupboard/safety glasses
Any **two** [1] each [2]
- (ii) Dissipate the heat given out [1]
- (iii) Sulfuric acid/ethanol/ethanoic acid/water
Any **two** [1] each [2]
- (d) (i) Remove any ethanoic acid/acidic impurity [1]
- (ii) Reduce the pressure from the gas given off [1]
- (e) (i) Anhydrous magnesium sulfate/calcium chloride/sodium sulfate [1]
- (ii) The liquid is no longer cloudy [1]
- (iii) Decanting/filtering [1]
- (f) (i) $7.9/46 = 0.172$ mole [1]
- (ii) $12.60/60 = 0.210$ mole [1]
- (iii) $0.172 \times 88 = 15.14$ g [1]
- (iv) $8.2 \times 0.92 = 7.54$ g [1]
- (v) $(7.54 \div 15.14) \times 100 = 49.8\%$ [1]
- (vi) Reaction incomplete
Loss of material during distillation
Loss of material during drying
Side reactions
Any **two** [1] each [2]
- 4** (a) Dissolves faster [1]
- (b) $100 \times 4.2 \times 0.2 = 84$ J unit needed [2]
(error [-1])
- (c) $(84 \times 250)/2.07 = 10145$ [1]/1000 = $10.145 \text{ kJ mol}^{-1}$ [1] [2]
- (d) Heat absorbed from the atmosphere [1] use a lid [1] [2]
- (e) Copper(II) sulfate hydrates (before dissolving) [1]

AVAILABLE
MARKS

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5 (a) $2\text{NH}_4\text{NO}_3 \rightarrow 2\text{N}_2 + \text{O}_2 + 4\text{H}_2\text{O}$	[2]	AVAILABLE MARKS
(b) Relights [1] a glowing splint [1]	[2]	
(c) Moles $\text{NH}_4\text{NO}_3 = 1.25/80 = 0.0156$ Moles of gas = $0.0156 \times 3/2 = 0.0234$ Volume of gas = $0.0234 \times 24 = 0.562 \text{ dm}^3$ ([−1] for each mistake)	[2]	
(d) Glass rod/stopper dipped in concentrated hydrochloric acid [1] White fumes/smoke [1]	[2]	
Section B		8
		36
	Total	68