



**ADVANCED SUBSIDIARY (AS)**  
**General Certificate of Education**  
**2015**

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**Chemistry**  
**Assessment Unit AS 3**  
*assessing*  
**Module 3: Practical Examination**  
**Practical Booklet B**  
**[AC134]**  
**WEDNESDAY 27 MAY, MORNING**

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**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) (i) to speed up the reaction<br><br>(ii) fizzing stops   | [1]<br>[1]      |
|   | (b) (i) $\text{CaCO}_3 + 2\text{HCl} \rightarrow \text{CaCl}_2 + \text{CO}_2 + \text{H}_2\text{O}$           | [2]             |
|   | (ii) $\text{NaOH} + \text{HCl} \rightarrow \text{NaCl} + \text{H}_2\text{O}$                                 | [1]             |
|   | (c) methyl orange [1] pink/red [1] to orange/yellow [1]<br>or phenolphthalein [1] colourless [1] to pink [1] | [3]             |

- (d) Number of moles of hydrochloric acid added to the toothpaste  
 $(40 \times 0.5)/1000 = 0.02$

Number of moles of sodium hydroxide required for neutralisation  
 $(12 \times 0.1)/1000 = 0.0012$

Number of moles of hydrochloric acid in the  $25.0 \text{ cm}^3$  portion  
0.0012

Number of moles of hydrochloric acid in the  $250 \text{ cm}^3$  mixture  
 $0.0012 \times 10 = 0.012$

Number of moles of hydrochloric acid reacting with calcium carbonate  
in the toothpaste  
 $0.02 - 0.012 = 0.008$

Number of moles of calcium carbonate present in the 2.0 g sample of  
toothpaste  
(1:2) 0.004

Mass of calcium carbonate present in the 2.0 g sample of toothpaste  
 $0.004 \times 100 = 0.4 \text{ g}$

The percentage calcium carbonate in the toothpaste  
 $(0.4/2) \times 100\% = 20\%$

error [-1]

[6]

14

## 2 Observation and deduction

AVAILABLE  
MARKS

(a)

Test	Observations	Deductions
1 Add a spatula measure of X to a boiling tube half filled with deionised water. Retain for Tests 2, 3 and 5.	<b>Colourless solution</b> [1]	
2 Pour 1 cm <sup>3</sup> of the solution from Test 1 into a test tube.  (a) Add 5 drops of silver nitrate solution.  (b) Add 4 cm <sup>3</sup> dilute ammonia solution.	<b>white precipitate</b> [2]  <b>precipitate disappears/ colourless solution</b> [1]	<i>Chloride ions present</i>  <i>Chloride ions confirmed</i>
3 Pour 1 cm <sup>3</sup> of the solution from Test 1 into a test tube.  (a) Add 5 drops of potassium chromate solution.  (b) Add 5 cm <sup>3</sup> of dilute hydrochloric acid.	<b>yellow precipitate</b> [2]  <b>yellow solution</b> [1]	<i>Barium ions present</i>
4 Dip a nichrome wire loop in concentrated hydrochloric acid, touch sample X with the wire, then hold it in a blue Bunsen flame.	<b>green flame</b> [1]	<i>Confirms barium ions present</i>
5 Place 1 cm <sup>3</sup> of magnesium sulfate solution in a test tube and add 5 drops of the solution from Test 1.	<b>white precipitate</b> [2]	

(b)

AVAILABLE  
MARKS

Test	Observations	Deductions
1 To 10 drops of Y in a test tube add 1 cm <sup>3</sup> of water.	<i>Two layers formed</i>	<b>immiscible/no OH group/not soluble in water</b> [1]
2 Place 10 drops of Y on a watch glass on a heatproof mat and ignite it using a burning splint.	<i>Burns with a yellow, smoky flame</i>	<b>High carbon content</b> [1]
3 Add approximately 10 drops of Y to a test tube quarter full of bromine water and mix well.	<i>Orange bromine water is decolourised</i>	<b>contains C=C</b> [1]
4 Add 10 drops of Y to 2 cm <sup>3</sup> of acidified potassium dichromate solution in a test tube and warm gently.	<i>Orange colour remains</i>	<b>not a primary or secondary alcohol or an aldehyde</b> [1]

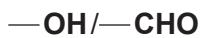
From Test 3 what functional group is present in Y?



[1]

16

From Test 4 what functional group may be absent from Y?



[1]

30

Section A

Section B		AVAILABLE MARKS
3	(a) (i) RFM CuSO <sub>4</sub> .5H <sub>2</sub> O = 250 ∴ mass required = 250/4 = 62.5g  (ii) Weigh out calculated mass of hydrated copper sulfate into a beaker [1] Dissolve in (stated volume of) deionised water [1] Pour into 250 cm <sup>3</sup> volumetric flask with washings [1] Make up to the mark with deionised water and shake [1]	[2]
	(b) measuring cylinder [1]	
	(c) cup has good insulation [1]	
	(d) solution turns from blue to colourless [1] red brown solid [1] [2]	
	(e) (i) number of moles of magnesium = 2/24 = 0.08 [1] number of moles of copper sulfate = (50 × 1.0)/1000 = 0.05 [1]	
	(ii) magnesium is in excess [1]	
	(f) (i) $\Delta H = mc\Delta T = 50 \times 4.2 \times 35 = 7350 \text{ J}$ [1] = 7.35 kJ [2]	
	(ii) $\Delta H = 7.35/0.05 = -147 \text{ kJ mol}^{-1}$ [1]	
	(g) insulating the polystyrene cup further with, e.g. cotton wool/cover with lid [1]	
	(h) add drops of dilute ammonia solution [1]; blue precipitate [1] dark/deep blue solution formed on addition of excess dilute ammonia solution [1] [3]	20
4	(a) bromine is toxic [1]	
	(b) the reaction is very vigorous [1]	
	(c) repeated boiling and condensing of the reaction mixture [1]	
	(d) to dry the product [1]	
	(e) (i) add (drops of) deionised water and observe which layer increases [1]  (ii) filter/decant [1]	
	(f) number of moles of 2-methylbut-2-ene = 10/70 = 0.143 number of moles of 2,3-dibromo-2-methylbutane expected = 0.143 mass of 2,3-dibromo-2-methylbutane expected = 0.143 × 230 = 32.89 g percentage yield = 26.3/32.89 × 100% = 80% [4]	10

- 5 Ammonium ion: warm with sodium hydroxide (solution) [1] gas given off produces white fumes [1] with a glass rod dipped in concentrated hydrochloric acid [1]

Magnesium ion: make a solution of the salt [1] white precipitate formed with drops of sodium hydroxide (solution) [1] precipitate remains on addition of excess sodium hydroxide [1] [6]

AVAILABLE MARKS
6
<b>36</b>
<b>66</b>

**Section B**

**Total**