



*Rewarding Learning*

**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 [1]
- (ii)** fizzing stops [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]  
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 cm<sup>3</sup> portion  
0.0012
- Number of moles of hydrochloric acid in the 250 cm<sup>3</sup> 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  
 $(0.4/2) \times 100\% = 20\%$  [6]
- error [-1]

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## 2 Observation and deduction

(a)

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

AVAILABLE  
MARKS



**Section B**

**AVAILABLE  
MARKS**

- 3 (a) (i)** RFM  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O} = 250 \therefore$  mass required =  $250/4 = 62.5\text{g}$  [2]
- (ii)** Weigh out calculated mass of hydrated copper sulfate into a beaker [1]  
 Dissolve in (stated volume of) deionised water [1]  
 Pour into  $250\text{ cm}^3$  volumetric flask with washings [1]  
 Make up to the mark with deionised water and shake [1]
- (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 =  $(50 \times 1.0)/1000 = 0.05$  [1]
- (ii)** magnesium is in excess [1]
- (f) (i)**  $\Delta H = mc\Delta T = 50 \times 4.2 \times 35 = 7350\text{ J [1]} = 7.35\text{ kJ}$  [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]
- 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 =  $0.143 \times 230 = 32.89\text{g}$   
 percentage yield =  $26.3/32.89 \times 100\% = 80\%$  [4]

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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]

**Section B**

**Total**

**AVAILABLE  
MARKS**

6

**36**

**66**