

GCE
AS and A Level

Chemistry

AS exams 2009 onwards
A2 exams 2010 onwards

Unit 3X: EMPA **Specimen mark scheme**

Version 1.0





General Certificate of Education

Chemistry 1421/2421

CHM3X Externally Marked Practical Assignment (EMPA) Board Assessed Unit

Marking Guidelines

Specimen Paper

Further copies of this Mark Scheme are available to download from the AQA Website: www.aqa.org.uk

Copyright © 2008 AQA and its licensors. All rights reserved.

COPYRIGHT

AQA retains the copyright on all its publications. However, registered centres for AQA are permitted to copy material from this booklet for their own internal use, with the following important exception: AQA cannot give permission to centres to photocopy any material that is acknowledged to a third party even for internal use within the centre.

Set and published by the Assessment and Qualifications Alliance.

TASK 1Points assessed from **Candidate Results Sheet Task 1**.

(a) the recording of results	results recorded clearly in a sensible table	1
(b) the accuracy of the observations.	22 scoring points	
	19 - 22 points scores	5
	15 - 18 points scores	4
	11 - 14 points scores	3
	6 - 10 points scores	2
	1 - 5 points scores	1
		Total 6 marks

Task 1

Test	Observation with varnish stripper	Observation with Mg^{2+}	Observation with Ca^{2+}	Observation with Ba^{2+}	Observation with Al^{3+}
1 Addition of sulphuric acid	white ppt (1)	no visible change (1)	white ppt (1)	white ppt (1)	no visible change (1)
2 Addition of sodium hydroxide solution	no visible change (1)	white ppt (1)	white ppt (1)	no visible change (1)	white ppt (1) soluble in excess or colourless solution (1)
3. Addition of ammonia solution	no visible change (1)	white ppt (1)	white ppt (1)	no visible change (1)	white ppt (1)
4. Addition of sodium carbonate solution	white ppt (1)	white ppt (1)	white ppt (1)	white ppt (1)	white ppt (1) effervescence (1)

TASK 2Points assessed from **Candidate Results Sheet Task 2.**

- | | |
|--|----------|
| (a) the recording of results recorded clearly in sensible table | 1 |
| (b) awareness of precision temperatures recorded appropriately and consistently | 1 |
| (c) The accuracy of the temperature rise, measured against a teacher value | |
| temperature rise is within 3% of target value | 4 |
| temperature rise is within 5% of target value | 3 |
| temperature rise is within 8 % of target value | 2 |
| temperature rise is within 10 % of target value | 1 |

Total 6 marks

Section A**Question 1**

Ba ²⁺	1
white ppt with H ₂ SO ₄ / no visible change with NaOH/ no visible change with NH ₃	
any two	2

Question 2

plots points correctly	1
line through the points before addition is smooth	1
line through the points after addition is smooth	1
best fit	1
extrapolates points before addition correctly	1
extrapolates points after addition correctly	1
reads the temperature rise correctly from the graph	1

Total **10 marks**

Section B**Question 3**

Draws a straight line which passes through origin **1**
Ignores point at 0.25g **1**

Question 4

Uses the graph to determine the mass to form 1.000g 1.20g **1**

Question 5

Calculate the number of moles in 1.000g of BaCl₂ 4.80 x 10⁻³ **1**

Question 6

Calculate the M_r of BaCl₂.xH₂O 250.0 **1**
M_r to 1 dec place **1**

Question 7

Calculate the degree of hydration, x 2(.32) **1**

Question 8

Calculates the percentage error in using the balance 4% **1**

Question 9

x likely to be a whole number so precision less important **1**

Question 10

wear gloves/ flood with water if alkali in contact with skin **1**

Question 11

- (a) yes / good straight line / can use with confidence **1**
(b) anomalous result at 0.25 g **1**

Question 12

ensure reaction complete/ ensure all water lost **1**

Question 13

calculations	difference	$250.0 - 244.3 = 5.7$	1
	percentage	$(5.7 * 100) / 244.3 = 2.3\%$	1

Question 14

- (a) % errors in weighing are too large with 0.100g **1**
(b) may not decompose fully **1**

Question 15

white precipitate **1**

Question 16

barium sulphate insoluble **1**

Question 17

100% **1**

Question 18

first result was anomalous **1**
several results will identify anomalies **1**

Total **22 marks**

Section C**Question 19**

add solution to a 250 cm ³ volumetric/ graduated flask	1
with washings	1
make up to the mark	1
shake well to mix	1

Question 20

volume of reagents used	1
lagging/ lid/ air space around calorimeter	1

Question 21

aqueous bromine	1
(orange to)colourless solution	1

Total **8 marks**