CAMBRIDGE
INTERNATIONAL EXAMINATIONS

NOVEMBER 2002

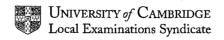
GCE Advanced Subsidiary Level

MARKSCHEME

MAXIMUM MARK: 25

SYLLABUS/COMPONENT:9701/3

CHEMISTRY (PRACTICAL (AS))



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N.B. Boxed references within this marking scheme relate to the accompanying booklet of Instructions

1 Tables 1.1 and 1.2

Give one mark if all weighings are to 2 decimal places or better.

Give **one mark** if the mass of **FA 1** recorded in Table 1.1 is between 2.00g and 2.50g inclusive.

Give one mark if there is evidence of reheating and reweighing the tube.

Give one mark if two masses of tube + FA 1 after heating are within 0.05 g.

Withhold one of these marks if

there is an error in subtraction the mass of empty tube differs between the two tables the smallest mass of tube + FA 1 after heating was not used in calculating the residual mass of FA 1.

Accuracy

Supervisor's Script

Check and correct any errors in subtraction

Calculate mass lost on heating correct to 2 decimal places.

Record this as a ringed total on the front of the Supervisor's script. The value of this ratio \Rightarrow 1.05 If there is a significant difference in the value obtained for the Supervisor it may suggest an impure sample of MgSO₄.7H₂O has been used or the wrong salt distributed.

Candidate Scripts

Check and correct any errors in subtraction

Calculate mass lost on heating correct to 2 decimal places.

Record this ratio, correct to 2 decimal places, below Table 1.2.

Compare the ratio obtained from the candidate's results (corrected where necessary) with the theoretical value of 1.05.

Accuracy marks are awarded for differences between the ratios as follows:

Mark	Difference in Ratio	
6	Up to 0.03	
5	0.03+ to 0.04	
4	0.04+ to 0.05	
3	0.05+ to 0.07	
2	0.07+ to 0.10	
1	0.10+ to 0.15	
0	Greater than 0.15	

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In all calculations, ignore evaluation errors if working is shown

- (d) Ignore
- (i) Calculated mass of anhydrous magnesium sulphate

and

Give one mark for (ii) Correctly calculated mass of water

(e) Give one mark for moles of water = $\frac{\text{mass of water}}{18}$

(If an incorrect M_r is used this mark is not awarded but subsequent marks may be given)

- (f) Give one mark for moles of $XSO_4 = \frac{Answer to (e)}{7}$
- (g) Give one mark for M_r of XSO₄ = $\frac{\text{Answer to (d)(i)}}{\text{Answer to (f)}}$ No Units
- (h) Give one mark for answer to (g) 96 No Units

 (Do not penalise twice)

Total for Question 1 15

1

1

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FA 2 is a solution containing Mn²⁺, Zn²⁺, SO₄²⁻, NO₃

	Test	Observations	Deductions	
(a)	To 3 cm depth of FA 2 in a boiling- tube, add an equal depth of dilute aqueous sodium hydroxide.	Off-white, buff or light brown precipitate. (Not dirty brown, brown or any yellow or red in the colour) [1]	Manganese or Mn ²⁺ [1]	
	Cautiously warm the tube.	No ammonia, no alkaline gas, no gas turning litmus or UI paper blue	No ammonium salt, no NH ₄ ⁺ [1] for observation and deduction	3
(b)	Filter the mixture from (a) and collect the filtrate. Leave the residue in the filter paper and observe again after several minutes.	Allow precipitate colour here if not given in (a). Deduction in (a) can be given from observation here. Precipitate turns brown or darkens (No red or yellow in colour) [1]	Manganese or Mn ²⁺ (one mark if not already given in (a))	1
(c)	Place 2 cm depth of the filtrate from (b) in a test-tube and add dilute nitric acid, drop by drop, until no further change is seen.	White precipitate forms and re-dissolves	Pb ²⁺ , Al ³⁺ or Zn ²⁺ (any one) [1] for observation and deduction	1
(d)	Place the remainder of the filtrate from (b) in a boiling-tube. Add a piece of aluminium foil. Cautiously warm the tube.	Gas turns red litmus blue or gives white smoke with HCl or Ammonia gas [1]	Nitrate or nitrite NO ₃ or NO ₂ [1]	2
(e)	To 3 cm depth of FA 2 in a test- tube, add an equal depth of dilute aqueous ammonia.	The observation marks from (a) or (b) can be given here.	Manganese or Mn ²⁺ (one mark if not already given in (a) or (b))	
-	Filter the mixture and add dilute nitric acid, drop by drop, until no further change is seen.	White precipitate forms and re-dissolves	Zn ²⁺ [1] for observation and deduction Take care that deduction mark is not given for a ppt formed on adding ammonia	1
(f) -	To 2 cm depth of FA 2 in a test-tube, add dilute hydrochloric acid	No brown gas	No nitrite [1] for observation and deduction	
	followed by aqueous barium chloride.	White precipitate	Sulphate [1] for observation and deduction	2
(g)	To 2 cm depth of FA 2 in a test-tube, add dilute nitric acid	No brown gas	No nitrite [1] for observation and deduction if not already given in (f)	
	followed by aqueous silver nitrate.	No precipitate, no reaction, no change	No halide or No chloride, bromide, iodide (any one) [1] for observation and deduction	1

Summary

(Only award these marks if there is supporting evidence in the individual tests)

FA 3 contains the cations

Mn²⁺ and Zn²⁺

and the anions

SO₄² and NO₃

Total of 12 scoring points

If the mark is in excess of 10 cross through the mark and record 10 max.