UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Ordinary Level

MARK SCHEME for the May/June 2010 question paper

for the guidance of teachers

5070 CHEMISTRY

5070/31 Paper 3 (Practical Test), maximum raw mark 40

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes must be read in conjunction with the question papers and the report on the examination.

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1 (a) Titration

Accuracy 8 marks

For the two best titres give:
4 marks for a value within 0.2 cm^3 of supervisor
2 marks for a value within 0.3 cm^3 of supervisor
1 mark for a value within 0.4 cm^3 of supervisor

Concordance 3 marks

Give:
3 marks if all the ticked values are within 0.2 cm^3
2 marks if all the ticked values are within 0.3 cm^3
1 mark if all the ticked values are within 0.4 cm^3

Average 1 mark

Give 1 mark if the candidate calculates a correct average (error not greater than 0.05) of all the ticked values. [12]

Assuming a 25 cm^3 pipette and a titre of 24.8 cm^3.

(b) moles of sodium hydroxide in 25 cm^3 of **P**

$= \frac{25 \times 0.3}{1000}$

= 0.0075 [1]

(c) concentration in mol/dm^3 of organic acid in **Q**

$= \frac{18.0}{120}$

= 0.15 [1]

(d) moles of organic acid in average titre of **Q**

$= \frac{24.8 \times 0.15}{1000}$

= 0.00372

Answers should be correct to + or – 1 in the third significant figure. [1]

(e) moles of sodium hydroxide which react with 1 mole of $C_3H_4O_5$

$= \frac{0.0075}{0.00372}$

= 2.02 [1]

(f) balanced equation for the reaction

$2NaOH + C_3H_4O_5 = C_3H_2O_5Na_2 + 2H_2O$

left hand side of equation i.e. whole numbers consistent with **(e)** (1)

right hand side of equation i.e. correct formulae and overall equation balanced (1) [2]

2 **R** is sodium carbonate **S** is potassium iodide **T** is potassium chromate(VI)

Test	Notes
General points For ppt Allow solid, suspension, powder For gases Name of gas requires test to be at least partially correct. Effervesces = bubbles = gas vigorously evolved (but not just gas evolved) Solutions Colourless not equivalent to clear, clear not equivalent to colourless	
Solution **R**	
Test 1 **4 marks** **(a)** Effervescence (1) Gas turns limewater milky (1) Carbon dioxide (1) **(b)** No reaction (1)	Alternatively marks for test on gas and identification can be awarded in **Test 2(b)** or **3(c)**.
Test 2 **3 marks** **(a)** Brown ppt (1) **(b)** Ppt disappears (1) Colourless solution (1)	Accept cream or yellow but not white. Alternatively this mark can be awarded in **Test 3(b)**.
Test 3 **2 marks** **(a)** White ppt (1) **(b)** Ppt disappears (1)	

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General points For ppt Allow solid, suspension, powder For gases Name of gas requires test to be at least partially correct. Effervesces = bubbles = gas vigorously evolved (but not just gas evolved) Solutions Colourless not equivalent to clear, clear not equivalent to colourless	
Solution **S**	
Test 1 **2 marks** **(a)** No reaction (1) **(b)** Solution turns red/brown or black solid formed (1)	
Test 2 **2 marks** **(a)** Yellow ppt (1) **(b)** Ppt remains (1)	
Test 3 **1 mark** No reaction (1)	Any indication of reaction in either **(a)** or **(b)** scores 0.

Test	Notes
General points For ppt Allow solid, suspension, powder For gases Name of gas requires test to be at least partially correct. Effervesces = bubbles = gas vigorously evolved (but not just gas evolved) Solutions Colourless not equivalent to clear, clear not equivalent to colourless	
Solution **T**	
Test 1 **6 marks** **(a)** Orange solution (1) **(b)** Blue solution (1) Effervescence (1) Gas relights a glowing splint (1) Oxygen (1) Green solution (1)	
Test 2 **3 marks** **(a)** Red or brown ppt (1) **(b)** Ppt disappears (1) Yellow or orange solution (1)	Alternatively this mark can be awarded in **Test 3(b)**.
Test 3 **2 marks** **(a)** Yellow ppt (1) **(b)** Ppt disappears (1)	

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R is CO_3^{2-} (carbon dioxide identified in test 1) (1)
S is I^- (test 1 correct or insoluble yellow ppt in test 2) (1)
T contains a transition metal (1) [3]

Note: 25 marking points, maximum 22.