MARK SCHEME for the June 2005 question paper

5070 CHEMISTRY

5070/03   **Paper 3 (Practical Test), maximum mark 40**

This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which Examiners were initially instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began. Any substantial changes to the mark scheme that arose from these discussions will be recorded in the published *Report on the Examination*.

All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes must be read in conjunction with the question papers and the *Report on the Examination*.

* CIE will not enter into discussion or correspondence in connection with these mark schemes.

CIE is publishing the mark schemes for the June 2005 question papers for most IGCSE and GCE Advanced Level and Advanced Subsidiary Level syllabuses and some Ordinary Level syllabuses.

UNIVERSITY *of* CAMBRIDGE
International Examinations

GCE O Level

MARK SCHEME

MAXIMUM MARK: 40

SYLLABUS/COMPONENT: 5070/03

CHEMISTRY
Paper 3 (Practical Test)

UNIVERSITY *of* CAMBRIDGE
International Examinations

1 [Total: 14 marks]

(a) **Titration** [12 marks]

<u>Accuracy</u> [8 marks]

These marks are given using any of the candidate's values not just ticked ones.

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

If candidates' or supervisors' results are given to 2 decimal places take to the nearest 0.1 cm^3. If halfway, round up or down so as to favour the candidate.

<u>Concordance</u> [3 marks]

These are based on all the values ticked by the candidate (not just those chosen for the accuracy marks) and are independent of the accuracy marks.

Give:

[3 marks] if all ticked values are within 0.2 cm^3

[2 marks] if all ticked values are within 0.3 cm^3

[1 mark] if all ticked values are within 0.4 cm^3

To score any concordance mark at least two of the ticked values must be within **0.6 cm^3** of the Supervisor's value.

If the candidate ticks only one value, or none at all, then see the notes on the next page.

<u>Average</u> [1 mark]

Give 1 mark if the candidate calculates a correct average (error not greater than **0.05**) of all his ticked value.

If the candidate ticks only <u>one</u> value, or none at all, then see notes on the next page.

If the majority of candidates are not scoring at least 6 out of 8 for accuracy, it may be necessary to consider awarding the accuracy marks based on a 'candidate average' rather than the Supervisor's value.

<u>Fewer than two ticked values.</u>

If the candidate has two or more identical values, ticks only one of them (or none) and uses this value in the calculation then he scores 3 for concordance (provided it is within 0.6 cm^3 of the Supervisor), 0 for the average but there is no deduction to apply. Maximum is then 11 (4+4+3+0).

If the candidate ticks one value, uses this, and has no identical values then the concordance and average marks are both 0, there is no further deduction. Maximum is then 8 (4+4+0+0). However if the ticked value is also an **obvious** average then treat it as in the next paragraph.
i.e. 23.5, 23.4(3), 23.5   23.45 used   then 4+4+3-1(T)+1.

In all other circumstances the concordance of the mark (provided there are two values within 0.6 cm^3 of the Supervisor's value) is based on all the values and there is a -1(T) applied to the concordance mark, **not to any accuracy of marks**. The average mark can be scored, **based on all the values.**
Maximum is then 11 (4+4+3-1(T)+1).
Values labelled rough (**or not clearly used**) may be ignored, if this helps the candidate.
i.e. 24.0, 23.6(3), 23.7   23.45 used   then 4+4+3-1(T)+1.

If a candidate has only two values which differ by 0.1 and ticks and uses one of them, then treat as in paragraph 3, i.e. maximum is 11.

If the candidate makes it clear by a method other than ticking (e.g. carrying out the averaging on his answer sheet) which values he has used, then the concordance and average marks are based on this and there is no deduction.

It is not intended that Examiners should try to work out which values the candidate has used, he must make it clear how he has treated the results.

Other deductions from the total marks so far are made for the following reasons, which should be indicated by the appropriate abbreviations.

Initial and final burette readings not shown or 50 used instead of 0.   **deduct 2 (Br)**
If candidates titre has to be deducted from 50 to give him accuracy
marks then the deduction is -3(Br).
There is no penalty for reversing initial and final values.

Decimal point never shown, or **all** integer values.   **deduct 2 (Dp)**

Error in subtracting burette readings or no subtraction attempted,
(unless initial value is zero).   **deduct 1 (Sub)**
Apply irrespective of whether the value is used **(max -2)**.

Accuracy marks should be given on the corrected value but concordance marks are given on the uncorrected value, provided the corrected values are within 0.6cm^3.

Wrong solution in the burette (only apply if absolutely certain that solutions have been interchanged).   **deduct 2(B)**
No penalty for incorrect pipette size, even if results have to be scaled.
Assuming a 25 cm^3 pipette and a titre of 24.0 cm^3

(b) Concentration of hydrochloric acid in mol/dm^3 **[2 marks]**

$$conc \qquad = \frac{25.0 \times 0.10}{24}$$ **(1)**

$$= 0.104 \text{ (correct to 0.0001)}$$ **(1)**

Allow 0.1 for 0.100 etc., answers should be correct to + or - 1 in the third significant figure.

Candidates who work out, and write down, the answer to the correct number of significant figures, but in the answer line use fewer figures are not penalised.

2 [Total: 26 marks]

R is sodium thiosulphate, **S** potassium iodide

Test	Notes
General points	
For ppt: Allow solid, suspension, powder Do not allow substance, particles, deposit, residue, sediment, gelatinous, insoluble etc. Do not allow cloudy/milky etc. for ppt forms but do allow cloudy/milky remains or clears for ppt remains or dissolves. For gases: Name of gas requires test to be at least partially correct. Effervesces = Bubbles = gas vigorously evolved but not gas evolved. Solutions: Colourless not equivalent to clear, clear not equivalent to colourless.	
Test 1 **[6 marks]** No initial reaction or reaction takes place slowly **(1)** White ppt **(1)** Ppt turns yellow **(1)** Gas turns dichromate green **(2)** Sulphur dioxide formed **(1)** Gas turns litmus red (as an alternative) **(1)** But sulphur dioxide does not score.	Both colour and ppt required Yellow ppt = **(1)**
Test 2 **[2 marks]** Solution decolourised **(1)** White or yellow ppt formed **(1)**	Allow milky or cloudy or white solution here and in Test 5 but not in Tests 1 or 4.
Test 3 **[5 marks]** White ppt **(2)** Ppt turns yellow **(1)** Ppt turns red **(1)** Ppt turns black **(1)**	Ppt (any colour = 1) Colour changes must be linked to a solid. Full marks require, white and black ppts. Allow brown, orange as alternative colours to yellow and red.

© University of Cambridge International Examinations 2005

Test 4	**[2 marks]**	
White ppt	**(1)**	Both white and ppt required.
Pt insoluble in acid	**(1)**	

Test 5	**[3 marks]**	
Red/brown solution	**(1)**	Allow yellow or orange, colour must be linked to a solid.
Solution decolourised	**(1)**	
White or yellow ppt	**(1)**	See Test 2.

Test 6	**[2 marks]**	
Pale yellow ppt	**(2)**	Ppt (any colour = 1) Allow cream etc. for pale yellow but not white. Allow yellow but then ppt in Test 7 must be 'yellower'. Allow yellow/green but not green. Colour mark must be linked to a solid.

Test 7	**[6 marks]**	
Yellow ppt	**(2)**	See Test 6.
Ppt insoluble in acid	**(1)**	
Ppt dissolves on heating	**(1)**	Do not allow partially soluble etc.
Colourless solution formed	**(1)**	
Crystals etc. formed	**(1)**	Allow any implication of crystals as distinct from ppt. Ppt does not have to dissolve for the crystals mark.

Conclusions **[2 marks]**

The ion is I^- (1) (allow iodide) Yellow ppt in Test 5 or 6
Both R and S are **reducing agents** **(1)**

[Any 26 marks to score]