

**MARK SCHEME for the October/November 2006 question paper**

**5070 CHEMISTRY**

**5070/03**

Paper 3 (Practical Test), maximum raw 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 instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began.

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.

The grade thresholds for various grades are published in the report on the examination for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level syllabuses.

- CIE will not enter into discussions or correspondence in connection with these mark schemes.

CIE is publishing the mark schemes for the October/November 2006 question papers for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level syllabuses and some Ordinary Level syllabuses.

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(a) Titration

12 marks

Accuracy

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  $0.2 \text{ cm}^3$  of supervisor
- 2 marks for a value within  $0.3 \text{ cm}^3$  of supervisor
- 1 mark for a value within  $0.4 \text{ cm}^3$  of supervisor

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

Concordance

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 the ticked values are within  $0.2 \text{ cm}^3$
- 2 marks if all the ticked values are within  $0.3 \text{ cm}^3$
- 1 mark if all the ticked values are within  $0.4 \text{ cm}^3$

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

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

Average

1 mark

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

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Assuming a 25 cm<sup>3</sup> pipette and a titre of 24.6 cm<sup>3</sup>

**(b)** Concentration of hydrogen peroxide, in mol/dm<sup>3</sup>

**2 marks**

$$\text{conc} = \frac{24.6 \times 0.02 \times 5}{25.0 \times 2} \quad (1)$$

$$= 0.0492 \text{ (correct to 0.0001)} \quad (1)$$

Allow 0.05 for 0.0500 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.

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### Question 2

R is sodium nitrite      S is sodium sulphite

Test	Notes
<p><b>General points</b></p> <p>For ppt allow solid, suspension, powder do not allow substance, particles, deposit, residue, sediment, gelatinous, insoluble etc</p> <p>do not allow cloudy/milky etc for ppt forms but do allow cloudy/milky remains or clears for ppt remains or dissolves.</p> <p>For gases Name of gas requires test to be at least partially correct.</p> <p>Effervesces = Bubbles = gas vigorously evolved but not gas evolved</p> <p>Solutions Colourless not equivalent to clear, clear not equivalent to colourless As in 5068 colours of solutions need not specifically say solution but must not imply a ppt.</p>	
<p>Test 1 <b>4 marks</b></p> <p>Effervesces (1)</p> <p>Gas turns litmus red (1)</p> <p>Gas is brown (1)</p> <p>Blue solution (1)</p>	<p>Allow gas turns litmus red or brown gas (once only for each) anywhere in Tests 1-4</p> <p>Bubbles etc</p> <p>Allow gas turns dichromate green as an alternative to turns litmus red</p> <p>Allow yellow/orange but colour must be linked to a gas</p> <p>Allow any shade</p>
<p>Test 2 <b>1 mark</b></p> <p>Solution is decolourised (1)</p>	<p>Turns colourless but not turns clear, ignore any additional reactions that involve bubbles etc.</p>
<p>Test 3 <b>3 marks</b></p> <p>No initial reaction with KI (1)</p> <p>Black ppt (with HCl) (1)</p> <p>Effervesces (1)</p>	<p>Solution stays or turns colourless/clear. Any suggestion of a reaction (ppt or bubbles) loses the mark</p> <p>Must have colour and ppt</p>

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<p>Test 4 <b>4 marks</b> Solution turns brown</p> <p><u>On heating</u></p> <p>Effervesces</p> <p>Solution becomes paler</p> <p><u>+ NaOH</u></p> <p>Brown ppt</p>	<p>(1)</p> <p>(1)</p> <p>(1)</p> <p>(1)</p>	<p>Dark green or any other reasonable dark colour but not</p> <p>Allow any reasonable paler colour, change must be linked to the solution and must be lighter/more yellow than earlier.</p> <p>Colour and ppt required, allow red/brown or red or orange</p>
<p>Test 5 <b>3 marks</b></p> <p>Effervesces</p> <p><b>Gas</b> turns litmus blue</p> <p>Ammonia produced</p>	<p>(1)</p> <p>(1)</p> <p>(1)</p>	<p>Ammonia mark requires test or smell</p>
<p>Test 6 <b>1 mark</b></p> <p>Solution is decolourised</p>	<p>(1)</p>	<p>As test 2</p>
<p>Test 7 <b>1 mark</b></p> <p>No reaction</p>	<p>(1)</p>	<p>Solution stays or turns colourless/clear. Any suggestion of a reaction (ppt or bubbles) loses the mark</p>
<p>Test 8 <b>2 marks</b></p> <p>White ppt</p> <p>Ppt dissolves</p>	<p>(1)</p> <p>(1)</p>	<p>Both colour and ppt required</p> <p>Allow partially soluble or forms a solution or less ppt</p>

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Test 9 <b>6 marks</b>		
Red solution	(1)	Brown/red or red/brown
<u>Heating</u>		
Brown ppt	(1)	Colour and ppt required, allow red/brown or red or orange
+HCl Solution becomes paler	(1)	Allow yellow or green or colourless solution
Gas turns dichromate green	(1)	Allow this test and identification of sulphur dioxide here or in any other test.
Sulphur dioxide produced	(1)	Sulphur dioxide mark requires Test or smell
Green ppt	(1)	Not black ppt
Conclusion <b>3 marks</b>		
<b>R</b> is both a reducing and oxidising agent	(1)	
<b>S</b> is a reducing agent	(1)	
<b>R</b> contains nitrogen	(1)	Ammonia detected or named in Test 5 or brown gas in Tests 1-4. Do not allow nitrate.

Any 26 marks to score.