

MARK SCHEME for the October/November 2007 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 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.

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.

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1 (a) Titration

Accuracy 10 marks

For the two best titres give:

- 5 marks for a value within 0.2 cm³ of supervisor
- 3 marks for a value within 0.3 cm³ of supervisor
- 2 marks for a value within 0.4 cm³ of supervisor
- 1 mark for a value within 0.5 cm³ of supervisor

Concordance 3 marks

Give:

- 3 marks if all the ticked values are within 0.2 cm³
- 2 marks if all the ticked values are within 0.3 cm³
- 1 mark if all the ticked values are within 0.4 cm³

Average 1 mark

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

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(b) Assuming a 25 cm³ pipette and a titre of 24.6 cm³

Concentration of hydrochloric acid, in mol/dm³

$$\text{conc} = \frac{25.0 \times 0.1}{24.6} \quad (1)$$

$$= 0.102 \text{ (correct to 0.001)} \quad (1)$$

[2]

(c)(d) R + P

Effervesces (bubbles etc) (1)

Turns limewater milky etc. (1)

Carbon dioxide evolved (1)

Colourless or clear solution remains or partially soluble or some dissolves (1)

ZnCO₃ circled or indicated (1)

Carbon dioxide named or tested for (with limewater) or effervesces etc.

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Question 2

S is $\text{Cu}(\text{NH}_3)_4\text{SO}_4$

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Test	Notes
<p>General points For ppt allow solid, suspension, powder</p> <p>For gases Name of gas requires test to be at least partially correct. Effervesces = bubbles = gas vigorously evolved (but not just gas evolved)</p> <p>Solutions Colourless not equivalent to clear, clear not equivalent to colourless</p>	
<p>Test 1 4 marks</p> <p>Blue ppt (1)</p> <p>Turns black (1)</p> <p>Gas turns litmus blue (1)</p> <p>Ammonia (1)</p>	<p>Allow shades of blue here and elsewhere. Allow blue/green here but not elsewhere (for ppts)</p> <p>Allow brown, no need to link to solid, allow brown 'stain' etc.</p> <p>Allow turns litmus blue (without gas) if ammonia mentioned, fumes with HCl</p>
<p>Test 2 4 marks</p> <p>Blue ppt (2)</p> <p>Soluble in acid (1)</p> <p>Blue solution (1)</p>	<p>Give one mark for ppt of whatever colour. Mixed coloured (white ppt + blue ppt) do not score the colour mark here or in Test 3</p> <p>Allow green but not colourless Allow paler blue solution even if ppt remains</p>
<p>Test 3 4 marks</p> <p>White ppt (2)</p> <p>Insoluble in acid (1)</p> <p>Solution becomes colourless (1) or paler</p>	<p>Give one mark for ppt of whatever colour.</p> <p>Allow pale blue but not blue unless solution earlier is dark blue</p>

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<p>Test 4 9 marks</p> <p>No initial reaction with KI (1)</p> <p>+ <i>acid</i></p> <p>White ppt (2)</p> <p>Yellow or brown solution (1)</p> <p>+ <i>thiosulphate</i></p> <p>White ppt (1)</p> <p>Solution is now colourless (1)</p> <p>Ppt dissolves(1)</p> <p>Colourless solution (1)</p> <p>White ppt reforms (1)</p>	<p>Allow slight colour change but not (turns) blue Any implication of a reaction effervesces loses this mark</p> <p>Give one mark for a ppt of any colour. Give the colour of ppt mark for anything than is paler/yellower than brown. Ignore the order in which the colours appear and mixed colours. Not orange for colour of ppt</p> <p>Both colour and solution required if ppt mentioned but turns yellow/brown (1) if nothing else in part (b), allow orange for solution</p> <p>Allow pale pink, pale lilac for white</p> <p>Forms a colourless solution (2)</p> <p>Allow any pale colour ppt or even turns cloudy/milky or white solution at this stage i.e. after the earlier white ppt has dissolved</p>
<p>Conclusion 2 marks</p> <p>Allow any two of</p> <p>Cu²⁺ or copper(II) (1)</p> <p>SO₄²⁻ or sulphate (1)</p> <p>NH₄⁺ or ammonium (1)</p>	<p>Ppt of any colour in Test 3</p> <p>Ammonia named or tested for in Test 1</p>