

**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<sup>3</sup> of supervisor

2 marks for a value within 0.3 cm<sup>3</sup> of supervisor

1 mark for a value within 0.4 cm<sup>3</sup> of supervisor

Concordance                      3 marks

Give:

3 marks if all the ticked values are within 0.2 cm<sup>3</sup>

2 marks if all the ticked values are within 0.3 cm<sup>3</sup>

1 mark if all the ticked values are within 0.4 cm<sup>3</sup>

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<sup>3</sup> pipette and a titre of 24.8 cm<sup>3</sup>.

**(b)** moles of sodium hydroxide in 25 cm<sup>3</sup> of **P**

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

$$= 0.0075$$

[1]

**(c)** concentration in mol/dm<sup>3</sup> 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]

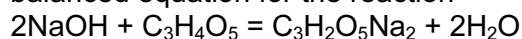
**(e)** moles of sodium hydroxide which react with 1 mole of C<sub>3</sub>H<sub>4</sub>O<sub>5</sub>

$$= \frac{0.0075}{0.00372}$$

$$= 2.02$$

[1]

**(f)** balanced equation for the reaction



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]

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

<b>Test</b>	<b>Notes</b>
<p><b>General points</b>            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>	
<b>Solution R</b>	
Test 1 <b>4 marks</b>  <b>(a)</b> Effervescence (1) Gas turns limewater milky (1) Carbon dioxide (1)  <b>(b)</b> No reaction (1)	Alternatively marks for test on gas and identification can be awarded in <b>Test 2(b)</b> or <b>3(c)</b> .
Test 2 <b>3 marks</b>  <b>(a)</b> Brown ppt (1)  <b>(b)</b> Ppt disappears (1) Colourless solution (1)	Accept cream or yellow but not white.  Alternatively this mark can be awarded in <b>Test 3(b)</b> .
Test 3 <b>2 marks</b>  <b>(a)</b> White ppt (1)  <b>(b)</b> Ppt disappears (1)	

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<b>Test</b>	<b>Notes</b>
<p><b>General points</b>            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>	
<b>Solution S</b>	
Test 1 <b>2 marks</b>  <b>(a)</b> No reaction (1)  <b>(b)</b> Solution turns red/brown or black solid formed (1)	
Test 2 <b>2 marks</b>  <b>(a)</b> Yellow ppt (1)  <b>(b)</b> Ppt remains (1)	
Test 3 <b>1 mark</b>  No reaction (1)	Any indication of reaction in either <b>(a)</b> or <b>(b)</b> scores 0.

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<b>Test</b>	<b>Notes</b>
<p><b>General points</b>            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>	
<b>Solution T</b>	
<p>Test 1  <b>6 marks</b></p> <p>(a) Orange solution (1)</p> <p>(b) Blue solution (1)            Effervescence (1)            Gas relights a glowing splint (1)            Oxygen (1)            Green solution (1)</p>	
<p>Test 2  <b>3 marks</b></p> <p>(a) Red or brown ppt (1)</p> <p>(b) Ppt disappears (1)            Yellow or orange solution (1)</p>	Alternatively this mark can be awarded in <b>Test 3(b)</b> .
<p>Test 3  <b>2 marks</b></p> <p>(a) Yellow ppt (1)</p> <p>(b) Ppt disappears (1)</p>	

[19]

**R** is  $\text{CO}_3^{2-}$  (carbon dioxide identified in test 1) (1)  
**S** is  $\text{I}^-$  (test 1 correct or insoluble yellow ppt in test 2) (1)  
**T** contains a transition metal (1)

[3]

**Note:** 25 marking points, maximum 22.