

**MARK SCHEME for the October/November 2011 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.

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1 (a) Titration [12]

Accuracy 8 marks

For the two best titres give:

4 marks for a value within 0.2 cm³ of supervisor

2 marks for a value within 0.3 cm³ of supervisor

1 mark for a value within 0.4 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.

Assuming a 25 cm³ pipette and a titre of 24.8 cm³.

(b) concentration of sulfuric acid in P [2]

$$= \frac{25 \times 0.1}{2 \times 24.8} (1)$$

$$= 0.0504 (1)$$

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

(c) concentration of sulfuric acid in battery acid [1]

$$= 0.0504 \times 100 (1)$$

$$= 5.04$$

answer from (b) $\times 100$

(d) mass of sulfuric acid present in 4.50 dm³ of battery acid [1]

$$= 5.04 \times 4.5 \times 98 (1)$$

$$= 2220$$

answer from (c) $\times 4.5 \times 98$

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2 R is copper(II) sulfate S is copper(I) oxide

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 gas evolved</p> <p>Solutions Colourless not equivalent to clear, clear not equivalent to colourless</p>	
Solution R	
<p>Test 1</p> <p>(a) white ppt (1)</p> <p>(b) insoluble in nitric acid (1)</p>	
<p>Test 2</p> <p>blue ppt (1) soluble in excess (1) dark blue solution (1)</p>	
<p>Test 3</p> <p>(a) solution turns green (1)</p> <p>(b) blue ppt (1) insoluble in excess (1)</p>	allow green-blue or green-yellow
<p>Test 4</p> <p>solid turns red or brown (1) blue colour fades (1)</p>	
<p>Test 5</p> <p>solid turns brown (1) blue solution (1)</p>	allow colour darkens
<p>Test 6</p> <p>solid turns brown (1) blue solution (1) solid disappears (1) effervescence (1) yellow or brown gas (1)</p>	allow colour darkens

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<p>Test 7</p> <p>(a) solid turns white or off-white (1)</p> <p>(b) solid disappears (1) blue solution (1)</p>	
<p>Test 8</p> <p>(a) no reaction (1)</p> <p>(b) effervescence (1) gas relights a glowing splint (1) oxygen (1) blue solution (1)</p>	

Conclusions

Anion in **R** is sulfate or SO_4^{2-} (in **test 1** ppt in (a) must not dissolve in acid) (1)

The metal in **R** and **S** is copper, copper(II), Cu or Cu^{2+} (1)

Note: 27 marking points, maximum 24.