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.

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

CIE is publishing the mark schemes for the May/June 2008 question papers for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level syllabuses and some Ordinary Level syllabuses.
1 (a) Identification of the acid

<table>
<thead>
<tr>
<th>Test 1</th>
<th>1 mark</th>
<th>White ppt</th>
<th>(1) See Question 2 for acceptable alternatives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test 2</td>
<td>1 mark</td>
<td>No reaction</td>
<td>(1) Allow solution stays colourless or clear</td>
</tr>
<tr>
<td>Test 3</td>
<td>1 mark</td>
<td>White ppt</td>
<td>(1)</td>
</tr>
</tbody>
</table>

Conclusion

1 mark Acid is sulphuric acid (1)

(b) Titration

Accuracy (8 marks)

For each of the two best titres give:

- 4 marks for a value within 0.2 cm$^3$ of supervisor
- 3 marks for a value within 0.3 cm$^3$ of supervisor
- 2 marks 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.

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 cm$^3$
- 2 marks if all the ticked values are within 0.3 cm$^3$
- 1 mark if all the ticked values are within 0.4 cm$^3$

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

Average (1 mark)

Give 1 mark if the candidate calculates a correct average (error not greater than 0.05) of all his ticked value.
Assuming a 25 cm$^3$ pipette and a titre of 24.6 cm$^3$

(c) Concentration of sulphuric acid, in mol/dm$^3$

\[
\text{conc} = \frac{25.0 \times 0.1}{24.6 \times 2} \quad (1)
\]

\[
= 0.0508 \text{ (correct to 0.0001)} \quad (1)
\]

Allow 0.05 for 0.0500 etc, answers should be correct to + or – 1 in the third significant figure.

If the acid has been identified as hydrochloric acid, allow correct calculation using a mole ratio of 1:1 to score without penalty. [2]

2 S is FeCl$_3$
   R is CuSO$_4$
   U is NiSO$_4$

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

<table>
<thead>
<tr>
<th>Tests on S</th>
<th>Tests on T</th>
<th>Tests on U</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Test 1</strong></td>
<td><strong>Test 2</strong></td>
<td><strong>Test 3</strong></td>
</tr>
<tr>
<td>Brown ppt</td>
<td>Brown ppt</td>
<td>Brown ppt</td>
</tr>
<tr>
<td>allow red/brown</td>
<td>see Test 1</td>
<td>see Test 1</td>
</tr>
<tr>
<td>do not allow red or orange</td>
<td>Insoluble in excess</td>
<td>Insoluble in excess</td>
</tr>
<tr>
<td>Insoluble in excess</td>
<td>Insoluble in excess</td>
<td>Insoluble in excess</td>
</tr>
</tbody>
</table>

Give one mark for final dark blue solution if no initial ppt seen

Give one mark for final blue solution if no initial ppt seen

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<table>
<thead>
<tr>
<th>Test 3</th>
<th>5 marks</th>
<th>Solution becomes redder (1)</th>
<th>White ppt (2) Give 1 mark for a ppt of any colour. Allow any colour paler than brown for the colour mark. Brown solution (1) Allow yellow or orange for colour of the solution.</th>
<th>No reaction (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test 4</td>
<td>2 marks</td>
<td>No reaction (1) Ignore slight change in colour i.e. becomes paler yellow</td>
<td>White ppt (1) Allow only white</td>
<td></td>
</tr>
<tr>
<td>Test 5</td>
<td>2 marks</td>
<td>White ppt (1) Allow only white</td>
<td>No reaction (1) Ignore slight change in colour i.e. becomes paler blue</td>
<td></td>
</tr>
<tr>
<td>Conclusion</td>
<td>2 marks</td>
<td><strong>S</strong> is FeCl₃</td>
<td><strong>R</strong> is CuSO₄</td>
<td></td>
</tr>
</tbody>
</table>

Conclusion marks require the tests for the individual ions to be at least partially correct and ppts with only barium nitrate or silver nitrate not both.

Any 22 marks to score.  

[Total: 40]