NOVEMBER 2001

ADVANCED SUBSIDIARY LEVEL

MARK SCHEME

MAXIMUM MARK : 25

SYLLABUS/COMPONENT : 8701/3

CHEMISTRY
(Extended)
N.B. Boxed references within this marking scheme relate to the accompanying booklet of Standing Instructions

1 (a) **Titration Table**

**Titration table**

Give **two marks** if:

- all final burette readings are to 2 decimal places,
- at least two recorded volumes of **FC 2** added are within 0.10 cm\(^3\),
- there is no error in subtraction in the table and an appropriate average has been calculated (a tick on a single titre is acceptable).

Deduct one mark for each error in the above (no negative marks).

Use (g) to calculate the Candidate’s average, if this is necessary

**Accuracy**

See section (g).

Assign accuracy marks by comparing the candidate’s average titre (corrected as necessary) with the Supervisor’s value.

Apply spread penalty as shown below

<table>
<thead>
<tr>
<th>Accuracy marks</th>
<th>Spread Penalty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mark</td>
<td>Difference from Supervisor / cm(^2)</td>
</tr>
<tr>
<td>8</td>
<td>up to 0.10</td>
</tr>
<tr>
<td>7</td>
<td>0.10+ to 0.15</td>
</tr>
<tr>
<td>6</td>
<td>0.15+ to 0.20</td>
</tr>
<tr>
<td>5</td>
<td>0.20+ to 0.30</td>
</tr>
<tr>
<td>4</td>
<td>0.30+ to 0.40</td>
</tr>
<tr>
<td>3</td>
<td>0.40+ to 0.60</td>
</tr>
<tr>
<td>2</td>
<td>0.60+ to 0.80</td>
</tr>
<tr>
<td>1</td>
<td>0.80+ to 1.00</td>
</tr>
<tr>
<td>0</td>
<td>Greater than 1.00</td>
</tr>
</tbody>
</table>

**Suspect Supervisor Values**

Adopt procedure (ii) in (h) for any suspect Supervisor results

If there is not an obvious value from the Candidates’ results, use 23.40 as the Standard Value. Report your action to Team Leader on the Centre Accuracy Return.
In all calculations, ignore evaluation errors if working is shown.

(b) Give one mark for \( \frac{\text{Titre}}{1000} \times 0.125 \) \hspace{1cm} 1

(c) Give one mark for \( \text{Answer to (b)} \times 0.5 \) \hspace{1cm} 1

(d) Give one mark for \( \text{Answer to (c)} \times \frac{1000}{25} \) or \( \frac{\text{Titre} \times 0.125}{25.0 \times X} = \frac{2}{1} \) \hspace{1cm} 1

(e) Give one mark for \( \text{Answer to (d)} \times 106.0 \) \hspace{1cm} 1

(f) Give one mark for \( 16.75 - \text{Answer to (e)} \) \hspace{1cm} 1

Total for Question 1 15
2  **FC 5** is a solution containing **Pb\(^{2+}\)**, **Zn\(^{2+}\)**, **NO\(_3^-\)**

|------|------------------|----------------|
| **(a)** | To 2 cm depth of **FC 3** in a test-tube, add dilute nitric acid. | No reaction  one mark  
No colour change  
No precipitate  
No gas evolved | Not CO\(_3^{2-}\), SO\(_3^{2-}\) or NO\(_2^-\)  
**one mark**  
This deduction can only be made from no reaction or no gas (evolved)  
(NO CrO\(_4^{2-}\) is wrong – colour) |
| **(b)** | To 2 cm depth of **FC 3** in a boiling-tube, add aqueous sodium hydroxide.  
Warm the solution. | White precipitate  one mark  
Soluble in excess (from both observations)  
No ammonia  
or  
no positive test for ammonia described)  
**one mark** | Al\(^{3+}\), Pb\(^{2+}\) or Zn\(^{2+}\)  
**one mark**  
(from both observations)  
No NH\(_4^+\)  
**one mark**  
Allow this deduction from no gas (evolved) or gas having no effect on litmus paper |
| **(c)** | Cool the solution remaining from test **(b)**, add aluminium foil and cautiously warm again. | Ammonia  one mark  
Test for ammonia described  one mark | NO\(_3^-\) or NO\(_2^-\)  
**one mark** |
| **(d)** | To 2 cm depth of **FC 3** in a test-tube, add aqueous potassium iodide. | Yellow precipitate  one mark | Pb\(^{2+}\)  
**one mark** |
| **(e)** | To 2 cm depth of **FC 3** in a boiling-tube, add dilute aqueous ammonia until in excess.  
Filter the mixture and then add dilute nitric acid drop by drop to neutralise the solution and then in excess. | White precipitate.  one mark  
White precipitate.  
Soluble or partially soluble (excess). (from both observations)  
**one mark** | Ignore any ions from white precipitate  
Zn\(^{2+}\)  
**one mark** |

Give **one mark** if all three ions are correctly identified in the summary:

**Summary**  
**FC 3** contains the cations **Pb\(^{2+}\)** and **Zn\(^{2+}\)**  
and the anion **NO\(_3^-\)**  

**Total of 15 scoring points**

If the mark is in excess of **10** cross through the mark and record **10 max.**

**Total for Question 2 is 10 and for the Paper 25.**