

| Question | Mark Scheme | Marks | | | | |
|----------|---|-------|--------------|--------|--|---|
| 1(a) | <p><i>Able to state all the observations correctly</i> <i>Sample answer :</i></p> <table border="1"> <thead> <tr> <th>Metal</th> <th>Observations</th> </tr> </thead> <tbody> <tr> <td>Copper</td> <td>Glows faintly. Black solid when hot and cold.</td> </tr> </tbody> </table> | Metal | Observations | Copper | Glows faintly. Black solid when hot and cold. | 3 |
| Metal | Observations | | | | | |
| Copper | Glows faintly. Black solid when hot and cold. | | | | | |
| | <p><i>Able to state 2 of the above</i> <i>Sample answer:</i> Glows. Black solid.</p> | 2 | | | | |
| | <p><i>Able to state any 1 of the above</i> <i>Sample answer:</i> Glows // Black solid</p> | 1 | | | | |
| | <i>[No response given or wrong response]</i> | 0 | | | | |

| Question | Mark Scheme | Marks | | | | | | |
|--|--|-----------|---------------------|--|---|---|--|--|
| 1 (b) | <p><i>Able to state all the variables and actions to be taken correctly</i> <i>Sample answer:</i></p> <table border="1"> <thead> <tr> <th>Variables</th> <th>Actions to be taken</th> </tr> </thead> <tbody> <tr> <td>(i) Types of metals // Different types of metals // Magnesium, Aluminium, Zinc, Copper</td> <td>(i) Use magnesium , aluminium, zinc and copper alternately. // Use magnesium then aluminium then zinc then copper</td> </tr> <tr> <td>(ii) Brightness of the flame // Intensity of flame / glow</td> <td>(ii) Observe the brightness/ glow / how vigorously</td> </tr> </tbody> </table> | Variables | Actions to be taken | (i) Types of metals // Different types of metals // Magnesium, Aluminium, Zinc, Copper | (i) Use magnesium , aluminium, zinc and copper alternately. // Use magnesium then aluminium then zinc then copper | (ii) Brightness of the flame // Intensity of flame / glow | (ii) Observe the brightness/ glow / how vigorously | |
| Variables | Actions to be taken | | | | | | | |
| (i) Types of metals // Different types of metals // Magnesium, Aluminium, Zinc, Copper | (i) Use magnesium , aluminium, zinc and copper alternately. // Use magnesium then aluminium then zinc then copper | | | | | | | |
| (ii) Brightness of the flame // Intensity of flame / glow | (ii) Observe the brightness/ glow / how vigorously | | | | | | | |

| | | | |
|-----------------|--|---|--------------|
| | (iii) Amount of metal powder / potassium manganate(VII) solid | (iii) Use same amount /mass of metal powder // potassium manganate(VII) each reaction | |
| | <i>[Able to state any 6 of the above correctly]</i> | | 6 |
| | <i>[Able to state any 5 of the above correctly]</i> | | 5 |
| | <i>[Able to state any 4 of the above correctly]</i> | | 4 |
| | <i>[Able to state any 3 of the above correctly]</i> | | 3 |
| | <i>[Able to state any 2 of the above correctly]</i> | | 2 |
| | <i>[Able to state any 1 of the above correctly]</i> | | 1 |
| | <i>[[No response given or wrong response]</i> | | 0 |
| Question | Mark scheme | | Marks |
| 1 (c) | <p><i>Able to state the relationship between the manipulated variable and the responding variable with direction correctly</i> <i>Sample answer:</i></p> <p>The more reactive metal react more vigorous with oxygen // The more reactive a metal is, the more vigorous the metal burns in oxygen</p> | | 3 |
| | <p><i>Able to state the relationship between the manipulated variable and the responding variable</i> <i>Sample answer:</i></p> <p>Reactive metal react vigorously // Reactive metal burns vigorously // The more reactive metal react more vigorously // The more reactive a metal is, the more vigorously the metal burns</p> | | 2 |
| | <p><i>Able to state an idea of hypothesis</i></p> <p><i>Sample answer:</i></p> <p>Metals have different reactivity // Metals burn in oxygen // Metals burn in oxygen, so more reactive</p> | | 1 |
| | <i>[No response given or wrong response]</i> | | 0 |

| Question | Marks scheme | Marks |
|----------|--|-------|
| 1 (d) | <p><i>Able to state the function correctly</i> <i>Sample answer:</i></p> <p>Prevent the metal powder from mixing with potassium manganate(VII) solid because this mixture will explode when heated // Separate the metal powder from the potassium manganate(VII) solid because this mixture will explode when heated</p> | 3 |
| | <p><i>Able to state the function</i> <i>Sample answer:</i></p> <p>Prevent the metal powder from mixing with potassium manganate(VII) solid // Separate the metal powder from the potassium manganate(VII) solid</p> | 2 |
| | <p><i>Able to give an idea of the function</i> <i>Sample answer:</i></p> <p>Separate the metal powder / potassium manganate(VII) solid // Prevent the metal powder / potassium manganate(VII) solid from mixing</p> | 1 |
| | <p><i>No response given or wrong response</i></p> | 0 |

| Question | Mark Scheme | Marks |
|----------|---|-------|
| 1(e) | <p><i>Able to state the operational definition for the reactivity of metal powder with oxygen correctly</i> <i>Sample answer:</i></p> <p>A metal that reacts more vigorously with oxygen is a more reactive metal.</p> | 3 |
| | <p><i>Able to state the operational definition for the reactivity of metal powder with oxygen</i> <i>Sample answer:</i></p> <p>A metal reacts vigorously with oxygen</p> | 2 |

| | | |
|--|--|---|
| | <p><i>Able to give an idea of the operational definition for the reactivity of metal powder elements with oxygen</i></p> <p><i>Sample answer</i></p> <p>A metal is reactive // A metal react with oxygen</p> | 1 |
| | <i>[No response given or wrong response]</i> | 0 |

| Question | Marks scheme | Marks |
|-----------------|---|--------------|
| 1 (f) | <p><i>Able to arrange the position of all metals in descending order of reactivity towards oxygen correctly</i></p> <p><i>Sample answer:</i></p> <p>Magnesium/Mg , Aluminium/Al , Zinc / Zn, Copper/Cu</p> | 3 |
| | <p><i>Able to arrange the position of at least three metals in descending order of reactivity towards oxygen</i></p> <p><i>Sample answer:</i></p> <p>Magnesium/Mg, Aluminium/Al , Zinc/Zn // Magnesium/Mg, Zinc/Zn , Copper / Cu // Aluminium/Al , Zinc/Zn, Copper / Cu</p> | 2 |
| | <p><i>Able to give an idea to arrange the metals</i></p> <p><i>Sample answer:</i></p> <p>Magnesium/Mg, Copper/Cu Zinc/Zn // Aluminium/Al , Magnesium /Mg , Zinc/Zn // Copper/ Cu, Zinc/Zn, Aluminium / Al, Magnesium/Mg</p> | 1 |
| | <i>No response given or wrong response</i> | 0 |

| Question | Mark Scheme | Marks | | | | | | |
|---|--|--|-------------------------------|----------------------------------|---|---|--|---|
| 1(g)(i) | <p><i>Able to classify all the ions correctly</i> <i>Sample answer</i></p> <table border="1"> <thead> <tr> <th>Cation</th> <th>Anion</th> </tr> </thead> <tbody> <tr> <td>Hydrogen ion / H⁺</td> <td>Hydroxide ion / OH⁻¹</td> </tr> <tr> <td>Copper(II) ion / Cu²⁺</td> <td>Sulphate ion / SO₄²⁻</td> </tr> </tbody> </table> | Cation | Anion | Hydrogen ion / H ⁺ | Hydroxide ion / OH ⁻¹ | Copper(II) ion / Cu ²⁺ | Sulphate ion / SO ₄ ²⁻ | <p style="text-align: center;">3</p> |
| | Cation | Anion | | | | | | |
| | Hydrogen ion / H ⁺ | Hydroxide ion / OH ⁻¹ | | | | | | |
| | Copper(II) ion / Cu ²⁺ | Sulphate ion / SO ₄ ²⁻ | | | | | | |
| <p><i>Able to classify the ions less accurately</i> <i>Sample answer</i></p> <table border="1"> <thead> <tr> <th>Cation</th> <th>Anion</th> </tr> </thead> <tbody> <tr> <td>Hydrogen ion / H⁺</td> <td>Hydroxide ion / OH⁻¹</td> </tr> <tr> <td>// Copper(II) ion / Cu²⁺</td> <td>// Sulphate ion / SO₄²⁻</td> </tr> </tbody> </table> | Cation | Anion | Hydrogen ion / H ⁺ | Hydroxide ion / OH ⁻¹ | // Copper(II) ion / Cu ²⁺ | // Sulphate ion / SO ₄ ²⁻ | <p style="text-align: center;">2</p> | |
| Cation | Anion | | | | | | | |
| Hydrogen ion / H ⁺ | Hydroxide ion / OH ⁻¹ | | | | | | | |
| // Copper(II) ion / Cu ²⁺ | // Sulphate ion / SO ₄ ²⁻ | | | | | | | |
| <p><i>Able to classify one ion</i></p> | <p style="text-align: center;">1</p> | | | | | | | |
| <p><i>No response or wrong response</i></p> | <p style="text-align: center;">0</p> | | | | | | | |
| 1(g)(ii) | <p><i>Able to record all the readings correctly to 2 dec .p</i> <i>Sample answer</i></p> <table border="1"> <thead> <tr> <th>Voltage / V</th> </tr> </thead> <tbody> <tr> <td>2.70</td> </tr> <tr> <td>1.10</td> </tr> <tr> <td>2.00</td> </tr> </tbody> </table> | Voltage / V | 2.70 | 1.10 | 2.00 | <p style="text-align: center;">3</p> | | |
| | Voltage / V | | | | | | | |
| | 2.70 | | | | | | | |
| 1.10 | | | | | | | | |
| 2.00 | | | | | | | | |
| <p><i>Able to record all the readings correctly to 1 dec.p</i> <i>Sample answer</i></p> <table border="1"> <thead> <tr> <th>Voltage / V</th> </tr> </thead> <tbody> <tr> <td>2.7</td> </tr> <tr> <td>1.1</td> </tr> <tr> <td>2.0</td> </tr> </tbody> </table> | Voltage / V | 2.7 | 1.1 | 2.0 | <p style="text-align: center;">2</p> | | | |
| Voltage / V | | | | | | | | |
| 2.7 | | | | | | | | |
| 1.1 | | | | | | | | |
| 2.0 | | | | | | | | |
| <p><i>Able to record 2 readings correctly</i></p> | <p style="text-align: center;">1</p> | | | | | | | |

| | | |
|------------------|---|---|
| | <i>No response or wrong response</i> | 0 |
| 1(g)(iii) | <i>Able to arrange the metals in ascending order of tendency to lose electrons correctly</i> <i>Sample answer:</i> Copper,/ Cu, Zinc /Zn, Alumium/ Al, Magnesium/ Mg, | 3 |
| | <i>Able to arrange 3 metals in ascending order of tendency to lose electrons</i> <i>Sample answer</i> Copper,/ Cu, Zinc /Zn, Alumium/ Al Zinc /Zn, Alumium/ Al, Magnesium/ Mg, Copper,/ Cu, Zinc /Zn, Alumium/ Al | 2 |
| | <i>Able to arrange at least 2 the metals in order of tendency to lose electrons</i> <i>Sample answer</i> Copper,/ Cu, Alumium/ Al Zinc /Zn, Magnesium/ Mg, Copper,/ Cu, Zinc /Zn, Magnesium/Mg , Aluminium/Al, Zinc/Zn, Copper, Cu | 1 |
| | <i>No response or wrong response</i> | 0 |
| 1(g)(iv) | <i>Able to predict the voltmeter reading with unit and 2 dec. place correctly</i> <i>Sample answer</i> 1.70 V | 3 |
| | <i>Able to predict the voltmeter reading less accurately/ with no unit</i> <i>Sample answer</i> 1.7 // 1.70 | 2 |
| | <i>Able to have an idea to predict the voltmeter reading</i> <i>Sample answer</i> Between 1.1 to 1.65 | 1 |
| | <i>No response or wrong response</i> | 0 |

| Question | Marks Scheme | Marks |
|----------|--|-------|
| 2 (a) | <p><i>Able to state the problem statement by relating to the following 2 information correctly:</i></p> <ol style="list-style-type: none"> 1. <i>Role of water</i> 2. <i>Properties of acid</i> <p>Sample answer</p> <p>Is water needed for an acid to show its acidic properties? // Does an acid need water to show its acidic properties?</p> | 3 |
| | <p><i>Able to state the aim of the experiment.</i></p> <p>Sample answer</p> <p>To investigate the role of water in showing the properties of acids. // Water has an effect for the properties of acids</p> | 2 |
| | <p><i>Able to give an idea of statement of the problem.</i></p> <p><u>Sample answer:</u></p> <p>To investigate the effect of water on acids // To investigate the properties of acids</p> | 1 |
| | <i>No response or wrong response.</i> | 0 |

| Question | Marks Scheme | Marks |
|----------|---|-------|
| 2(b) | <p><i>Able to state all variables correctly:</i></p> <p><u>Sample answer:</u></p> <p><i>Manipulated variable:</i> Types of solvents // Water and dry propanone</p> <p><i>Responding variable:</i> Properties of the acid tested // [any suitable observations: e.g. change in colour of blue litmus paper]</p> <p><i>Fixed variable:</i> Type of acid // Ethanoic acid</p> | 3 |

| | | |
|--|--|---|
| | <i>Able to state any two variables correctly.</i> | 2 |
| | <i>Able to state any one variable correctly.</i> | 1 |
| | <i>No response or wrong response.</i> | 0 |

| Question | Marks Scheme | Marks |
|-----------------|---|--------------|
| 2(c) | <p><i>Able to state the relationship between the manipulated variable and the responding variable with direction correctly:</i></p> <p>Sample answer:</p> <p>Water is needed for an acid to show its acidic properties // An acid will only show its acidic properties when dissolve in water</p> | 3 |
| | <p><i>Able to state the relationship between the manipulated variable and the responding variable:</i></p> <p><u>Sample answer:</u></p> <p>Water helps acids to show its acidic properties</p> | 2 |
| | <p><i>Able to state an idea of hypothesis:</i></p> <p><u>Sample answer:</u></p> <p>Water affect the properties of acids.</p> | 1 |
| | <i>No response or wrong response.</i> | 0 |

| Question | Marks Scheme | Marks |
|----------|--|-------|
| 2(d) | <p><i>Able to give a complete list of materials and apparatus:</i></p> <p><u>Sample answer:</u></p> <p>Apparatus: Test-tubes , droppers, test-tube rack</p> <p>Materials: Glacial ethanoic acid, dry propanone, distilled water, blue litmus paper</p> | 3 |
| | <p><i>Able to give a list of materials and apparatus :</i></p> <p>Sample answer:</p> <p>Apparatus: Test-tubes, droppers</p> <p>Materials: Etanoic acid , propanone , water, blue litmus paper</p> | 2 |
| | <p><i>Able to give a list of basic materials and apparatus</i></p> <p>Apparatus: any suitable container</p> <p>Materials: Ethanoic acid , propanone, water, litmus paper</p> | 1 |
| | <i>No response or wrong response.</i> | 0 |

| Question | Marks Scheme | Marks |
|----------|--|-------|
| 2(e) | <p><i>Able to state the following 6 steps:</i></p> <ol style="list-style-type: none"> 1. [Label two test-tubes] 2. [Use a dropper to put in the glacial ethanoic acid to each test-tube] 3. [Add distilled water in one test-tube] 4. [Add dry propanone in the other test-tube] 5. [Put litmus paper] 6. [Record your observation] <p><u>Sample answer:</u></p> <ol style="list-style-type: none"> 1. Label two test-tubes as A and B and place in a test-tube rack. 2. Put in 5cm³ / a little of glacial ethanoic acid into each test-tube using a dropper. 3. Add 2 cm³ / a little of distilled water in test-tube A 4. Add 2 cm³ / a little of dry propanone in test-tube | 3 |

| | | |
|--|---|---|
| | 5. Put a dry blue litmus paper in both test-tubes 6. Record any changes. | |
| | Steps 2,3,4,5 | 2 |
| | Step 2,3, 5 | 1 |
| | <i>No response or wrong response.</i> | 0 |

| Question | Marks Scheme | Marks | | | | | | | | |
|------------------------|--|-----------------------|-------------|-----------|--|------------------------|--|--|--|---|
| 2(f) | <p><i>Able to exhibit the tabulation of data that includes the following four information.</i></p> <p>1. Heading for the manipulated variables <i>test-tube // solvents</i></p> <p>2. Examples of solvents //test-tube <i>water, dry propanone</i></p> <p>3. Heading for responding variable <i>observation</i></p> <p><u>Sample answer:</u></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Test-tube // solvents</th> <th style="width: 50%;">Observation</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">A // B //</td> <td></td> </tr> <tr> <td style="text-align: center;">water // dry propanone</td> <td></td> </tr> <tr> <td> </td> <td> </td> </tr> </tbody> </table> | Test-tube // solvents | Observation | A // B // | | water // dry propanone | | | | 2 |
| Test-tube // solvents | Observation | | | | | | | | | |
| A // B // | | | | | | | | | | |
| water // dry propanone | | | | | | | | | | |
| | | | | | | | | | | |
| | <p><i>Able to exhibit the tabulation of data that includes the following two information.</i></p> <p><u>Sample answer:</u></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Test-tube // solvents</th> <th style="width: 50%;">Observation</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> </tr> </tbody> </table> | Test-tube // solvents | Observation | | | 1 | | | | |
| Test-tube // solvents | Observation | | | | | | | | | |
| | | | | | | | | | | |
| | <i>No response or wrong response.</i> | 0 | | | | | | | | |

END OF MARKING SCHEME

