



MARK SCHEME
PEPERIKSAAN PERTENGAHAN TAHUN
2010

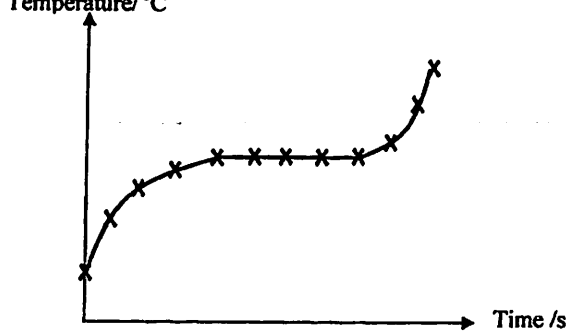
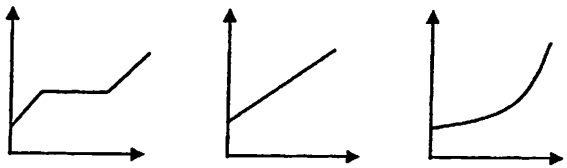
4541/3 CHEMISTRY FORM 4

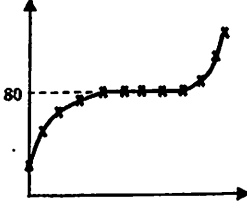
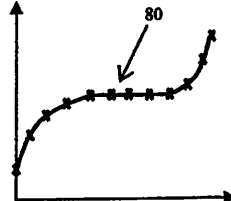
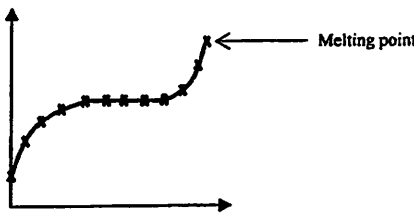
Paper 3



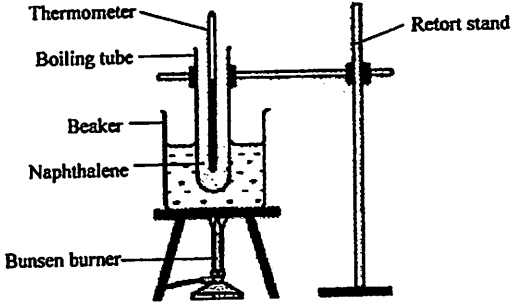
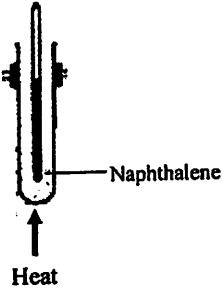
PEPERIKSAAN PERTENGAHAN TAHUN 2010
4541/3 CHEMISTRY, FORM 4
Paper 3

| Question | Rubric | Score | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|--|---------|---------|---------|-------|---------|---------|---------|---------|-------|-------|-------|-------|---------|---------|---------|---------|-------|-------|-------|-------|---------|---------|---------|---------|------|------|------|------|------|------|------|-------|-------|-------|-------|------|------|------|------|-------|-------|-------|-------|------|------|------|------|---|
| 1(a) | <p>Able to write all values with units accurately at one decimal point</p> <p>Answer :</p> <table border="1"> <tr> <td>Initial</td> <td>30 s</td> <td>60 s</td> <td>90 s</td> </tr> <tr> <td>65.0 °C</td> <td>70.0 °C</td> <td>75.0 °C</td> <td>78.0 °C</td> </tr> <tr> <td>120 s</td> <td>150 s</td> <td>180 s</td> <td>210 s</td> </tr> <tr> <td>80.0 °C</td> <td>80.0 °C</td> <td>80.0 °C</td> <td>80.0 °C</td> </tr> <tr> <td>240 s</td> <td>270 s</td> <td>300 s</td> <td>330 s</td> </tr> <tr> <td>80.0 °C</td> <td>82.0 °C</td> <td>85.0 °C</td> <td>90.0 °C</td> </tr> </table> | Initial | 30 s | 60 s | 90 s | 65.0 °C | 70.0 °C | 75.0 °C | 78.0 °C | 120 s | 150 s | 180 s | 210 s | 80.0 °C | 80.0 °C | 80.0 °C | 80.0 °C | 240 s | 270 s | 300 s | 330 s | 80.0 °C | 82.0 °C | 85.0 °C | 90.0 °C | 3 | | | | | | | | | | | | | | | | | | | | | | | |
| | Initial | 30 s | 60 s | 90 s | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 65.0 °C | 70.0 °C | 75.0 °C | 78.0 °C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 120 s | 150 s | 180 s | 210 s | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 80.0 °C | 80.0 °C | 80.0 °C | 80.0 °C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| 80.0 °C | 82.0 °C | 85.0 °C | 90.0 °C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>Able to state all accurate values without decimal point or without unit</p> <p>Sample answer:</p> <p>⇒ [without decimal point]</p> <table border="1"> <tr> <td>Initial</td> <td>30 s</td> <td>60 s</td> <td>90 s</td> </tr> <tr> <td>65 °C</td> <td>70 °C</td> <td>75 °C</td> <td>78 °C</td> </tr> <tr> <td>120 s</td> <td>150 s</td> <td>180 s</td> <td>210 s</td> </tr> <tr> <td>80 °C</td> <td>80 °C</td> <td>80 °C</td> <td>80 °C</td> </tr> <tr> <td>240 s</td> <td>270 s</td> <td>300 s</td> <td>330 s</td> </tr> <tr> <td>80 °C</td> <td>82 °C</td> <td>85 °C</td> <td>90 °C</td> </tr> </table> <p>OR</p> <p>⇒ [without unit]</p> <table border="1"> <tr> <td>Initial</td> <td>30 s</td> <td>60 s</td> <td>90 s</td> </tr> <tr> <td>65.0</td> <td>70.0</td> <td>75.0</td> <td>78.0</td> </tr> <tr> <td>120 s</td> <td>150 s</td> <td>180 s</td> <td>210 s</td> </tr> <tr> <td>80.0</td> <td>80.0</td> <td>80.0</td> <td>80.0</td> </tr> <tr> <td>240 s</td> <td>270 s</td> <td>300 s</td> <td>330 s</td> </tr> <tr> <td>80.0</td> <td>82.0</td> <td>85.0</td> <td>90.0</td> </tr> </table> | Initial | 30 s | 60 s | 90 s | 65 °C | 70 °C | 75 °C | 78 °C | 120 s | 150 s | 180 s | 210 s | 80 °C | 80 °C | 80 °C | 80 °C | 240 s | 270 s | 300 s | 330 s | 80 °C | 82 °C | 85 °C | 90 °C | Initial | 30 s | 60 s | 90 s | 65.0 | 70.0 | 75.0 | 78.0 | 120 s | 150 s | 180 s | 210 s | 80.0 | 80.0 | 80.0 | 80.0 | 240 s | 270 s | 300 s | 330 s | 80.0 | 82.0 | 85.0 | 90.0 | 2 |
| Initial | 30 s | 60 s | 90 s | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 65 °C | 70 °C | 75 °C | 78 °C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 120 s | 150 s | 180 s | 210 s | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| 80.0 | 82.0 | 85.0 | 90.0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Able to state any six accurate values without decimal point / unit | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | No response or wrong response | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Question | Rubric | Score |
|----------|---|-------|
| 1(b) | <p>Able to draw the graph of the heating correctly and completely</p> <p>The graph consist of :</p> <ul style="list-style-type: none"> ▪ Axes x : time /s and axes y : temperature/°C ▪ Consistent scale and the graph half of graph paper ▪ All the points are transferred correctly ▪ Best fit curve <p>Sample answer :</p>  | 3 |
| | <p>Able to draw the graph of the heating correctly</p> <ul style="list-style-type: none"> ▪ Axes x : time /s and axes y : temperature/°C // Inverse axes ▪ Consistent scale and the graph half of graph paper ▪ At least 8 points are transferred correctly ▪ Fit curve | 2 |
| | <p>[Able to sketch any form of heating curve]</p> <p>Sample answer :</p>  | 1 |
| | No response or wrong response | 0 |

| Question | Rubric | Score |
|----------|---|-------|
| | <p>Able to show the melting point on the graph accurately and stating the melting point of X with unit</p> <ul style="list-style-type: none"> • The melting point is marked accurately on the graph • Stating 80 °C <p><u>Sample answer :</u></p>  | 3 |
| 1(c) | <p>Able to show any correct mark of melting point on the graph and stating the melting point of X</p>  | 2 |
| | <p>Able to show any idea of the melting point on the graph</p>  | 1 |
| | No response or wrong response | 0 |

| Question | Rubric | Score |
|----------|--|-------|
| I(d) | <p>Able to explain why the temperature of substance X from the 120th second until the 240th second did not change during the heating process correctly</p> <p><u>Sample answer :</u></p> <p>Heat energy <u>absorbed</u> by the particles is used to <u>overcome</u> the forces of attraction between particles.</p> | 3 |
| | <p>Able to explain why the temperature of substance X from the 120th second until the 240th second did not change during the heating process</p> <p><u>Sample answer :</u></p> <p>Heat energy is used to <u>overcome</u> the forces of attraction between particles.</p> | 2 |
| | <p>Able to state an idea why the temperature did not change during the heating process</p> <p><u>Sample answer :</u></p> <ol style="list-style-type: none"> 1. Heat energy is <u>absorbed</u>. 2. Heat energy is used to <u>overcome</u> the forces of attraction. | 1 |
| | No response or wrong response | 0 |

| Question | Rubric | Score |
|----------|--|-------|
| | <p>[Able to draw the set-up of apparatus to carry out this experiment correctly]</p> <ul style="list-style-type: none"> [Functional diagram] [Complete labelling] <p><u>Sample answer :</u></p>  | 3 |
| 1(e) | <p>[Able to draw the set-up of apparatus to carry out this experiment]</p> <ul style="list-style-type: none"> [Functional diagram <u>without</u> label] | 2 |
| | <p>[Able to draw an idea of the set-up of apparatus to carry out this experiment]</p> <p><u>Sample answer :</u></p>  | 1 |
| | No response or wrong response | 0 |

| Question | Rubric | Score |
|----------|---|-------|
| 2(a)(i) | Able to state the observation correctly <u>Sample answer:</u> Black solid changed to brown solid | 3 |
| | Able to state any the observation less accurately <u>Sample answer:</u> Brown solid formed. | 2 |
| | Able to give an idea of observation <u>Sample answer:</u> Copper(II)oxide changed to copper // Copper is formed | 1 |
| | No response given / wrong response | 0 |

| Question | Rubric | Score |
|----------|---|-------|
| 2(a)(ii) | Able to give the inference correctly <u>Sample answer:</u> Copper(II)oxide/CuO changed to copper/Cu//Copper(II)oxide is reduced | 3 |
| | Able to give the inference less accurately. <u>Sample answer:</u> Metal oxide changed to metal | 2 |
| | Able to give an idea of inference <u>Sample answer:</u> Copper(II) oxide changes | 1 |
| | No response given / wrong response | 0 |

| Question | Rubric | Score | | | | | | | | | | | | |
|---|--|--|---------------------------|----------------------|----------------------------------|----------------------------------|-------|--|--|-------|--|--|-------|---|
| 2(b) | <p>Able to complete a table and record the mass correctly contain:</p> <ol style="list-style-type: none"> Correct description Readings (2 decimal places) <p><u>Sample answer :</u></p> <table border="1"> <thead> <tr> <th>Step Langkah</th> <th>Description Penerangan</th> <th>Mass (g) Mass (g)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Combustion tube + asbestos paper</td> <td>54.31</td> </tr> <tr> <td>2</td> <td>Combustion tube + asbestos paper + copper(II) oxide/ black solid</td> <td>62.33</td> </tr> <tr> <td>3</td> <td>Combustion tube + asbestos paper + copper/ brown solid</td> <td>60.71</td> </tr> </tbody> </table> | Step Langkah | Description Penerangan | Mass (g) Mass (g) | 1 | Combustion tube + asbestos paper | 54.31 | 2 | Combustion tube + asbestos paper + copper(II) oxide/ black solid | 62.33 | 3 | Combustion tube + asbestos paper + copper/ brown solid | 60.71 | 3 |
| | Step Langkah | Description Penerangan | Mass (g) Mass (g) | | | | | | | | | | | |
| | 1 | Combustion tube + asbestos paper | 54.31 | | | | | | | | | | | |
| | 2 | Combustion tube + asbestos paper + copper(II) oxide/ black solid | 62.33 | | | | | | | | | | | |
| 3 | Combustion tube + asbestos paper + copper/ brown solid | 60.71 | | | | | | | | | | | | |
| <p>Able to construct a less accurate table that contains:</p> <ol style="list-style-type: none"> Correct description Readings (4 decimal places) <p><u>Sample answer :</u></p> <table border="1"> <thead> <tr> <th>Step Langkah</th> <th>Description Penerangan</th> <th>Mass (g) Mass (g)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Combustion tube + asbestos paper</td> <td>54.3095</td> </tr> <tr> <td>2</td> <td>Combustion tube + asbestos paper + copper(II) oxide/ black solid</td> <td>62.3267</td> </tr> <tr> <td>3</td> <td>Combustion tube + asbestos paper + copper/ brown solid</td> <td>60.7128</td> </tr> </tbody> </table> | Step Langkah | Description Penerangan | Mass (g) Mass (g) | 1 | Combustion tube + asbestos paper | 54.3095 | 2 | Combustion tube + asbestos paper + copper(II) oxide/ black solid | 62.3267 | 3 | Combustion tube + asbestos paper + copper/ brown solid | 60.7128 | 2 | |
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| 3 | Combustion tube + asbestos paper + copper/ brown solid | 60.7128 | | | | | | | | | | | | |
| Able to construct a table with at least one description / reading | 1 | | | | | | | | | | | | | |
| No response or wrong response | 0 | | | | | | | | | | | | | |

| Question | Rubric | Score | | | | | | | | | | | | | | | |
|---|---|----------------------|----------------------|----------|-------------------|----------------------|-----------------------|-----------------------|-----------------|----------------|----------------|----------------|---------------------------------------|-------------------------|--|---|---|
| 2(c) | <p>Able to calculate the empirical formula of copper(II) oxide correctly.</p> <p><u>Sample answer:</u></p> <table border="1"> <thead> <tr> <th>Element</th> <th>Cu</th> <th>O</th> </tr> </thead> <tbody> <tr> <td>Mass (g)</td> <td>60.71-54.31// 6.4</td> <td>62.32 – 60.71// 1.61</td> </tr> <tr> <td>Number of moles (mol)</td> <td>6.4/64 // 0.1</td> <td>1.61/16 // 0.1</td> </tr> <tr> <td>Ratio of moles</td> <td>0.1/0.1 // 1</td> <td>0.1/0.1 // 1</td> </tr> <tr> <td colspan="3" style="text-align: center;">Empirical formula : CuO</td> </tr> </tbody> </table> | Element | Cu | O | Mass (g) | 60.71-54.31// 6.4 | 62.32 – 60.71// 1.61 | Number of moles (mol) | 6.4/64 // 0.1 | 1.61/16 // 0.1 | Ratio of moles | 0.1/0.1 // 1 | 0.1/0.1 // 1 | Empirical formula : CuO | | | 3 |
| | Element | Cu | O | | | | | | | | | | | | | | |
| | Mass (g) | 60.71-54.31// 6.4 | 62.32 – 60.71// 1.61 | | | | | | | | | | | | | | |
| | Number of moles (mol) | 6.4/64 // 0.1 | 1.61/16 // 0.1 | | | | | | | | | | | | | | |
| Ratio of moles | 0.1/0.1 // 1 | 0.1/0.1 // 1 | | | | | | | | | | | | | | | |
| Empirical formula : CuO | | | | | | | | | | | | | | | | | |
| <p>Able to calculate the empirical formula of copper (II) oxide incompletely.</p> <p><u>Sample answer:</u></p> <table border="1"> <thead> <tr> <th>Element</th> <th>Cu</th> <th>O</th> </tr> </thead> <tbody> <tr> <td>Mass (g)</td> <td>60.71-54.31// 6.4</td> <td>62.32 – 60.71// 1.61</td> </tr> <tr> <td>Number of moles (mol)</td> <td>6.4/64 // 0.1</td> <td>1.61/32 // 0.05</td> </tr> <tr> <td>Ratio of moles</td> <td>0.1/0.05 // 2</td> <td>0.05/0.05 // 1</td> </tr> <tr> <td colspan="3" style="text-align: center;">Empirical formula : Cu₂O</td> </tr> </tbody> </table> | Element | Cu | O | Mass (g) | 60.71-54.31// 6.4 | 62.32 – 60.71// 1.61 | Number of moles (mol) | 6.4/64 // 0.1 | 1.61/32 // 0.05 | Ratio of moles | 0.1/0.05 // 2 | 0.05/0.05 // 1 | Empirical formula : Cu ₂ O | | | 2 | |
| Element | Cu | O | | | | | | | | | | | | | | | |
| Mass (g) | 60.71-54.31// 6.4 | 62.32 – 60.71// 1.61 | | | | | | | | | | | | | | | |
| Number of moles (mol) | 6.4/64 // 0.1 | 1.61/32 // 0.05 | | | | | | | | | | | | | | | |
| Ratio of moles | 0.1/0.05 // 2 | 0.05/0.05 // 1 | | | | | | | | | | | | | | | |
| Empirical formula : Cu ₂ O | | | | | | | | | | | | | | | | | |
| <p>Able to give an idea of calculating the empirical formula of copper (II) oxide.</p> <p><u>Sample answer:</u> Mass of Cu and O // number of moles of Cu and O</p> | 1 | | | | | | | | | | | | | | | | |
| No response given / wrong response | 0 | | | | | | | | | | | | | | | | |

| Question | Rubric | Score |
|----------|--|-------|
| 2(d) | Able to write the chemical equation correctly <u>Sample answer:</u> $\text{CuO} + \text{H}_2 \longrightarrow \text{Cu} + \text{H}_2\text{O}$ | 3 |
| | Able to write the chemical equation less correctly <u>Sample answer:</u> $\text{CuO} + \text{H}_2 // \text{Cu} + \text{H}_2\text{O}$ | 2 |
| | Able to state an idea of writing chemical equation. <u>Sample answer:</u> Copper(II)oxide + Hydrogen \longrightarrow Copper + water | 1 |
| | No response given / wrong response | 0 |

| Question | Rubric | Score |
|----------|--|-------|
| 2(e) | Able to describe the method correctly <u>Sample answer:</u> 1. Collect the gas in the test tube 2. Enter/place the lighted/burning wooden splinter 3. No 'pop' sound | 3 |
| | Able to describe at least two steps correctly | 2 |
| | Able to describe at least one step correctly | 1 |
| | No response given / wrong response | 0 |

| Question Number | Rubric | Score |
|-----------------|--|-------|
| 3(a) | Able to state the aim of the experiment correctly <u>Sample answer:</u> To compare/ investigate/ study the reactivity of Group 1 elements/ lithium, sodium and potassium with water | 3 |
| | Able to state the aim of the experiment less accurately <u>Sample answer:</u> To investigate/ compare/ study the reactions of Group 1 elements/ lithium, sodium and potassium with water// To investigate/ compare/ study the reactivity of Group 1 elements/ lithium, sodium and potassium | 2 |
| | Able to give an idea of the aim of the experiment <u>Sample answer</u> To investigate/ compare/ study the reaction of Group 1 elements/ lithium, sodium and potassium | 1 |
| | No response given / wrong response | 0 |

| Question Number | Rubric | Score |
|-----------------|--|-------|
| 3(b) | Able to state the three variables correctly <u>Sample answer:</u> Manipulated variable: Elements of Group 1// Lithium, sodium, potassium// alkali metal Responding variable: Reactivity// vigorous reaction// speed of movement// intensity of sound/ flame// rate of reaction// time taken to complete the reaction Constant variable: Temperature// size of alkali metal// water | 3 |
| | Able to state any two variables correctly | 2 |
| | Able to state any one variable correctly | 1 |
| | No response given / wrong response | 0 |

| Question Number | Rubric | Score |
|-----------------|---|-------|
| 3(c) | Able to state the relationship correctly between the manipulated variable and the responding variable with direction <u>Sample answer:</u> (The lower/ higher the position of metal in)/ (going down/ up) Group 1, the more/ less reactive is the metal in reaction with water | 3 |
| | Able to state the relationship between the manipulated variable and the responding variable with direction <u>Sample answer:</u> The more/ less reactive is the metal in reaction with water , (the lower/ higher the position of metal in)/ (going down/ up) Group 1 //(The lower/ higher the position of metal in)/ (going down/ up) Group 1, the more/ less reactive is the metal// vice versa //Potassium more reactive when react with water, followed by sodium and lithium //Reactivity increases when going down/ up the Group 1 | 2 |
| | Able to state the idea of hypothesis <u>Sample answer:</u> Alkali metals have different reactivity | 1 |
| | No response given / wrong response | 0 |

| Question Number | Rubric | Score |
|-----------------|--|-------|
| 3(d) | Able to give complete list of substances and apparatus <u>Sample answers</u> Substances Lithium, sodium, potassium, waters Apparatus Water trough/ basin/ pail/ tray/ tank, knife, forceps/ tongs/ scissors, filter paper | 3 |
| | Able to give at least two substances and at least two apparatus | 2 |
| | Able to give at least one substance and at least one apparatus | 1 |
| | No response given / wrong response | 0 |

| Question Number | Rubric | Score |
|-----------------|---|-------|
| 3(e) | Able to list all the steps correctly <u>Sample answer:</u> 1. Fill the water trough/ basin/ pail/ tray/ tank with water 2. Cut a piece of lithium 3. Dry the lithium using filter paper 4. Place/ put the lithium on the surface of the water 5. Record all the changes/ observation 6. Repeat (steps 1 – 5)/(experiment) using sodium and potassium | 3 |
| | Able to list down steps 2, 4, 6 | 2 |
| | Able to give an idea for step 4 | 1 |
| | No response given / wrong response | 0 |

| Question Number | Rubric | Score | | | | | | | | |
|---|--|---------------------------|-------------|---------|---|--------|--|-----------|--|---|
| 3(f) | Able to tabulate the data with the following aspects 1. Correct titles 2. Complete list of elements <u>Sample answer:</u> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Elements/ metals/ Group I</th> <th>Observation</th> </tr> </thead> <tbody> <tr> <td>Lithium</td> <td></td> </tr> <tr> <td>Sodium</td> <td></td> </tr> <tr> <td>Potassium</td> <td></td> </tr> </tbody> </table> | Elements/ metals/ Group I | Observation | Lithium | | Sodium | | Potassium | | 2 |
| | Elements/ metals/ Group I | Observation | | | | | | | | |
| | Lithium | | | | | | | | | |
| Sodium | | | | | | | | | | |
| Potassium | | | | | | | | | | |
| Able to construct a table with 1. At least one title 2. Incomplete list of elements <u>Sample answer:</u> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Element</th> <th>Observation</th> </tr> </thead> <tbody> <tr> <td>Lithium</td> <td></td> </tr> </tbody> </table> | Element | Observation | Lithium | | 1 | | | | | |
| Element | Observation | | | | | | | | | |
| Lithium | | | | | | | | | | |
| No response given / wrong response | 0 | | | | | | | | | |

END OF MARK SCHEME