

# Chemistry

1

## PAPER 3 MARKING SCHEME

Question No.	Rubric	Score
1 (a)	<i>Able to measure and record all the lengths of each rubber strips to two decimal points <u>accurately</u>.</i>	3
	Answer:  Rubber strip A: 5.00; 5.00; 5.00; 6.00 Rubber strip B: 5.00; 5.50; 6.30; 8.50	
	<i>Able to measure and record all the lengths of each rubber strips <u>correctly</u>.</i>	2
	Sample Answer:  Rubber strip A: 5.0; 5.0; 5.0; 6.0 Rubber strip B: 5.0; 5.5; 6.3; 8.5	
	<i>Able to measure and record <u>at least 2 readings</u> for each rubber strip correctly.</i>	1
	<i>No response or wrong response</i>	0

Question No.	Rubric	Score																											
1(b)	<p><i>Able to construct a table that contains:</i></p> <ol style="list-style-type: none"> <li>1. <i>Type of rubber, weight and length with correct unit.</i></li> <li>2. <i>Transfer <u>all</u> the readings from (a) correctly.</i></li> </ol> <p>Sample Answer:</p> <table border="1"> <thead> <tr> <th>Type of rubber</th> <th colspan="4">Rubber strip A</th> <th colspan="4">Rubber strip B</th> </tr> </thead> <tbody> <tr> <td>Weight / g</td> <td>0.0</td> <td>15.0</td> <td>30.0</td> <td>45.0</td> <td>0.0</td> <td>15.0</td> <td>30.0</td> <td>45.0</td> </tr> <tr> <td>Length/ cm</td> <td>5.00</td> <td>5.00</td> <td>5.00</td> <td>6.00</td> <td>5.00</td> <td>5.50</td> <td>6.30</td> <td>8.50</td> </tr> </tbody> </table>	Type of rubber	Rubber strip A				Rubber strip B				Weight / g	0.0	15.0	30.0	45.0	0.0	15.0	30.0	45.0	Length/ cm	5.00	5.00	5.00	6.00	5.00	5.50	6.30	8.50	3
Type of rubber	Rubber strip A				Rubber strip B																								
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	<p><i>Able to construct a table that contains:</i></p> <ol style="list-style-type: none"> <li>1. <i>Suitable headings.</i></li> <li>2. <i>Transfer <u>at least two</u> readings from (a) <u>correctly</u>.</i></li> </ol> <p>Sample Answer:</p> <table border="1"> <thead> <tr> <th></th> <th colspan="4">Rubber strip A</th> <th colspan="4">Rubber strip B</th> </tr> </thead> <tbody> <tr> <td>Weight</td> <td>0</td> <td>15</td> <td>30</td> <td>45</td> <td>0</td> <td>15</td> <td>30</td> <td>45</td> </tr> <tr> <td>Length</td> <td>5.0</td> <td>5.0</td> <td>6.5</td> <td>6.5</td> <td>5.0</td> <td>5.5</td> <td>6.8</td> <td>10</td> </tr> </tbody> </table>		Rubber strip A				Rubber strip B				Weight	0	15	30	45	0	15	30	45	Length	5.0	5.0	6.5	6.5	5.0	5.5	6.8	10	1
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	<i>No response or wrong response</i>	0																											

Question No.	Rubric	Score
1(c)	<p><i>Able to state correctly all the following:</i></p> <ol style="list-style-type: none"> <li>1. <i>Method to manipulate variable.</i></li> <li>2. <i>What to record in the responding variable.</i></li> <li>3. <i>Method to maintain controlled variable.</i></li> </ol> <p>Sample Answer:</p> <p>(i) Use Rubber strip A and Rubber strip B.            (ii) The length of rubber strips (after the weight removed).            (iii) Use the same mass of weight for both strips // use the same size/length of rubber at each experiment.</p>	3
	<i>Able to state any two answers correctly.</i>	2
	<i>Able to state any one answer correctly.</i>	1
	<i>No response or wrong response</i>	0

Question No.	Rubric	Score
1(d)	<p><i>Able to state the hypothesis accurately by stating the manipulated variable and the elasticity of the rubber.</i></p> <p>Sample Answer:</p> <p>Rubber strip A is <u>more</u> elastic than Rubber strip B // Rubber strip B is <u>less</u> elastic than Rubber strip A.</p>	3
	<p><i>Able to state the hypothesis correctly by stating the manipulated variable and the elasticity of the rubber.</i></p> <p>Sample Answer:</p> <p>Rubber strip A is able to stretch easily compared to Rubber strip B.</p>	2
	<p>Able to give any idea of hypothesis.</p> <p>Sample Answer:</p> <p>Different types of rubber strip have different elasticity / stretchiness / hardness</p>	1
	<i>No response or wrong response</i>	0

Question No.	Rubric	Score
1(e)	<i>Able to predict which rubber will snap and give the type of rubber strip correctly.</i>	3
	Sample Answer:  <ul style="list-style-type: none"> <li>- Rubber strip B</li> <li>- Rubber strip A: Vulcanized rubber</li> <li>- Rubber strip B: Unvulcanized rubber</li> </ul>	
	<i>Able to predict which rubber will snap and able to give one correct answer the type of rubber.</i>	2
	<i>Able to give any one of the answer.</i>	1
	<i>No response or wrong response</i>	0

Question No.	Rubric	Score
2 (a)	<i>Able to write all observations at the anode and cathode for carbon and copper correctly.</i>	3
	Sample Answer:  <b>Carbon electrodes:</b> Anode: Mass/size of anode did not change // colourless gas released. Cathode: Mass/size of cathode / carbon increased/becomes bigger/thicker // a brown solid deposited.  <b>Copper electrodes:</b> Anode: Mass/size of anode decreased // anode become thinner. Cathode: Mass/size of cathode increased/becomes bigger/thicker // cathode become thicker.	
	<i>Able to any three observations correctly.</i>	2
	<i>Able to any two observations correctly.</i>	1
	<i>No response or wrong response</i>	0

Question No.	Rubric	Score
2 (b)	<p><i>Able to write the inference correctly.</i></p> <p>Sample Answer:</p> <p>The mass of carbon and copper cathode increase because the copper ions / <math>\text{Cu}^{2+}</math> ion were selected to be discharged and copper atom / Cu is formed</p>	3
	<p><i>Able to write the inference.</i></p> <p>Sample Answer:</p> <p>The mass of cathode increase // The copper atom / Cu is formed.</p>	2
	<p><i>Able to write any idea of inference.</i></p> <p>Sample Answer:</p> <p><math>\text{Cu}^{2+}</math> ion were discharged.</p>	1
	<i>No response or wrong response</i>	0

Question No.	Rubric	Score
2 (c)	<p><i>Able to write the half-equation at the anode for both electrodes accurately.</i></p> <p>Answer:</p> <p>Carbon anode: <math>4\text{OH}^- \rightarrow \text{O}_2 + 2\text{H}_2\text{O} + 4\text{e}</math></p> <p>Copper anode: <math>\text{Cu} \rightarrow \text{Cu}^{2+} + 2\text{e}</math></p>	3
	<p><i>Able to write the half-equation at the anode for both electrodes.</i></p> <p>Sample Answer:</p> <p>[unbalanced half-equation]</p> <p>Carbon anode: <math>4\text{OH}^- \rightarrow \text{O}_2 + \text{H}_2\text{O} + \text{e}</math></p> <p>Copper anode: <math>\text{Cu} \rightarrow \text{Cu}^{2+} + \text{e}</math></p>	2
	<p><i>Able to write any half-equation at the anode for any electrode.</i></p> <p>Sample Answer:</p> <p>[unbalanced half-equation]</p> <p>Carbon anode: <math>4\text{OH}^- \rightarrow \text{O}_2 + \text{H}_2\text{O} + \text{e}</math></p> <p><b>OR</b></p> <p>Copper anode: <math>\text{Cu} \rightarrow \text{Cu}^{2+} + \text{e}</math></p>	1
	<i>No response or wrong response</i>	0

Question No.	Rubric	Score
2 (d)	<p><i>Able to give the operational definition accurately.</i></p> <p>Sample Answer:</p> <p>Hydroxide ions / OH<sup>-</sup> will be selected to be discharged when carbon electrodes are used while copper anode will dissolve in copper (II) sulphate solution when copper is used as anode.</p>	3
	<p><i>Able to give the operational definition less accurately.</i></p> <p>Sample Answer:</p> <p>Hydroxide ions / OH<sup>-</sup> will be selected to be while copper anode will dissolve.</p>	2
	<p><i>Able to give any idea of operational definition.</i></p> <p>Sample Answer:</p> <p>Hydroxide ions / OH<sup>-</sup> will be selected to be discharged // copper anode will dissolve.</p>	1
	<p><i>No response or wrong response</i></p>	0

Question No.	Rubric	Score
2 (e)	<p><i>Able to describe the changes in copper(II) sulphate solution accurately after 45 minutes.</i></p> <p>Sample answer:</p> <p>The blue colour of copper(II) sulphate solution become light blue/more paler // The blue intensity of copper(II) sulphate solution decreases. [Reject colourless]</p>	3
	<p><i>Able to describe the change in copper(II) sulphate solution less correctly after 45 minutes.</i></p> <p>Sample answer:</p> <p>The colour of copper(II) sulphate solution become paler // The intensity of copper(II) sulphate solution decreases.</p>	2
	<p><i>Able to give any idea of the changes in copper(II) sulphate solution after 45 minutes.</i></p> <p>Sample answer:</p> <p>Light blue/the concentration of <math>\text{Cu}^{2+}</math> ions decrease.</p>	1
	<i>No response or wrong response</i>	0

Question No.	Rubric	Score
2 (f)	<p><i>Able to classify all the ions that are found in the copper(II) sulphate solution accurately.</i></p> <p>Sample answer:</p> <p>Positive ion: Copper ion / <math>\text{Cu}^{2+}</math> and hydrogen ion / <math>\text{H}^+</math>            Negative ion: hydroxide ion / <math>\text{OH}^-</math> and sulphate ion / <math>\text{SO}_4^{2-}</math></p>	3
	<p><i>Able to classify all the ions that are found in the copper(II) sulphate solution less accurately.</i></p> <p>Sample answer:</p> <p>Positive ion: Copper ion / <math>\text{Cu}^{2+}</math> // hydrogen ion / <math>\text{H}^+</math>            Negative ion: hydroxide ion / <math>\text{OH}^-</math> // sulphate ion / <math>\text{SO}_4^{2-}</math></p>	2
	<p><i>Able to give any idea of classification.</i></p> <p>Sample answer:</p> <p>Positive ion: Copper ion / <math>\text{Cu}^{2+}</math> // hydrogen ion / <math>\text{H}^+</math></p> <p>Or</p> <p>Negative ion: hydroxide ion / <math>\text{OH}^-</math> // sulphate ion / <math>\text{SO}_4^{2-}</math></p>	1
	<i>No response or wrong response</i>	0

Question No.	Rubric	Score
3 (i)	<i>Able to give the problem statement accurately.</i>	2
	Sample answer: How does the reactivity of lithium, sodium and potassium change when they react with water? // How does the reactivity of Group 1 metals change when they react with water?	
	<i>Able to give the problem statement correctly.</i>	1
	How does the reactivity of the three elements change with water?	
	<i>No response or wrong response</i>	0

Question No.	Rubric	Score
ii	<i>Able to state the three variables correctly.</i>	3
	Sample answer: Manipulated Variable : Different types of alkali metals // Li, Na, K Responding Variable : Reactivity of metals // the movement of metals on water surface Fixed Variables : Water, size of metals	
	<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 No.	Rubric	Score
iii	<i>Able to state the hypothesis correctly.</i>  Sample answer: Potassium is more reactive than sodium & lithium // The reactivity increases when going down the Group 1.	3
	<i>Able to state the hypothesis less correctly.</i>  Sample answer: -Different types of alkali metals, different reactivity of metals -Reactivity of metal depends on different types of alkali metals	2
	<i>Able to state any idea of the hypothesis.</i>  Sample answer: Reactivity of metal depends on the metal. // Potassium is the most reactive metal	1
	<i>No response or wrong response</i>	0

Question No.	Rubric	Score
iv	<i>Able to list all materials and apparatus accurately.</i>  Sample answer: Material : lithium, sodium and potassium, Water and Filter paper Apparatus : Small knife, forceps, basin	3
	<i>Able to list at least 3 materials and 1 apparatus correctly.</i>	2
	<i>Able to list at least 2 materials and 1 apparatus correctly.</i>	1
	<i>No response or wrong response</i>	0

Question No.	Rubric	Score
v	<p><i>Able to list all the procedures accurately.</i></p> <p>Sample answer:</p> <ol style="list-style-type: none"><li>1. Cut a small piece of lithium using a knife and forceps.</li><li>2. Dry the oil on the surface of the lithium with filter paper</li><li>3. Place the lithium slowly onto the water surface in a trough using forceps</li><li>4. Record your observations in the table</li><li>5. Repeat steps 1-4 using sodium and potassium.</li></ol>	3
	<p><i>Able to list steps 1, 3 and 4 correctly.</i></p>	2
	<p><i>Able to list steps 3 and 4 correctly.</i></p>	1
	<p><i>No response or wrong response</i></p>	0

Question No.	Rubric	Score								
vi	<p><i>Able to construct a table to tabulate the data that includes the heading for the manipulated variable and the observations.</i></p> <p>Sample answer:</p> <table border="1"> <thead> <tr> <th>Elements</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	Observation	Lithium		Sodium		Potassium		3
Elements	Observation									
Lithium										
Sodium										
Potassium										
	<p><i>Able to construct a table to tabulate the data that contain the elements or the observation.</i></p> <p>Sample answer:</p> <table border="1"> <thead> <tr> <th>Elements</th> <th>Observation</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td></td> <td></td> </tr> </tbody> </table>	Elements	Observation							2
Elements	Observation									
	<p><i>Able to construct any table to tabulate the data.</i></p> <p>Sample answer:</p> <table border="1"> <tbody> <tr> <td>Lithium</td> <td></td> </tr> <tr> <td>Sodium</td> <td></td> </tr> <tr> <td>Potassium</td> <td></td> </tr> </tbody> </table>	Lithium		Sodium		Potassium		1		
Lithium										
Sodium										
Potassium										
	<i>No response or wrong response</i>	0								

**END OF MARKING SCHEME**