

Question	Mark Scheme	Score
1 (a)	<p>Able to record all readings accurately to one decimal point with correct unit</p> <p>Answer:</p> <p>Experiment I : 29.0 °C 25.0 °C <i>Eksperimen I</i>            Experiment II : 28.5 °C 36.0 °C  <i>Eksperimen II</i>            Experiment 111: 30.0 °C 23.5 °C  <i>Eksperimen III</i>            Experiment IV : 28.0 °C 41.0 °C  <i>Eksperimen IV</i></p>	3
	<p>Able to record all readings correctly without decimal point with correct unit or Able to record all readings accurately to decimal point without unit</p> <p>Sample answer:</p> <p>Experiment I : 29 °C / 29.0 25 °C / 25.0  <i>Eksperimen I</i>            Experiment II : 28.5 °C / 28.5 36 °C / 36.0  <i>Eksperimen II</i>            Experiment 111: 30 °C / 30.0 23.5 °C 123.5  <i>Eksperimen 111</i>            Experiment IV : 28°C / 28.0 41 °C / 41.0  <i>Eksperimen IV</i></p>	2
	<p>Able to record at least four readings correctly without decimal point and without unit</p> <p>Samole answer:</p> <p>Experiment I : 29 25 <i>Eksperimen I</i>            Experiment II : 28.5 36 <i>Eksperimen II</i>            Experiment III: 30 23.5  <i>Eksperimen 111</i>            Experiment IV: 28 41 <i>Eksperimen IV</i></p>	1
	No response given / wrong response	0

Question	Mark Scheme	Score															
1 (b)	<p>Able to construct a table that contains the following information:</p> <p>1. Heading in the table : Experiment, Initial temperature, Lowest or Highest temperature</p> <p>2. Transfer all the temperature readings from (a)(i) correctly</p> <p>3. With unit</p> <p>Sample answer:</p> <table border="1"> <thead> <tr> <th>Experiment <i>Eksperimen</i></th> <th>initial temperature / °C <i>Suhu awal</i></th> <th>Lowest or highest temperature/ °C <i>Suhu terendah atau tertinggi</i></th> </tr> </thead> <tbody> <tr> <td>I</td> <td>29.0</td> <td>25.0</td> </tr> <tr> <td>II</td> <td>28.5</td> <td>36.0</td> </tr> <tr> <td>III</td> <td>30.0</td> <td>23.5</td> </tr> <tr> <td>IV</td> <td>28.0</td> <td>41.0</td> </tr> </tbody> </table>	Experiment <i>Eksperimen</i>	initial temperature / °C <i>Suhu awal</i>	Lowest or highest temperature/ °C <i>Suhu terendah atau tertinggi</i>	I	29.0	25.0	II	28.5	36.0	III	30.0	23.5	IV	28.0	41.0	3
	Experiment <i>Eksperimen</i>	initial temperature / °C <i>Suhu awal</i>	Lowest or highest temperature/ °C <i>Suhu terendah atau tertinggi</i>														
I	29.0	25.0															
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	<p>Able to construct a table that contains the following information:</p> <p>1. Heading in the table : Experiment. Initial temperature, Lowest or Highest temperature</p> <p>2. Transfer all the temperature readings from (a)(i) correctly</p> <p>3. Without unit</p> <p>Sample answer:</p> <table border="1"> <thead> <tr> <th>Experiment <i>Eksperimen</i></th> <th>Initial temperature <i>Suhu awal</i></th> <th>Lowest or highest temperature <i>Suhu terendah atau tertinggi</i></th> </tr> </thead> <tbody> <tr> <td>I</td> <td>29</td> <td>25</td> </tr> <tr> <td>II</td> <td>28.5</td> <td>36</td> </tr> <tr> <td>III</td> <td>30</td> <td>23.5</td> </tr> <tr> <td>IV</td> <td>28</td> <td>41</td> </tr> </tbody> </table>	Experiment <i>Eksperimen</i>	Initial temperature <i>Suhu awal</i>	Lowest or highest temperature <i>Suhu terendah atau tertinggi</i>	I	29	25	II	28.5	36	III	30	23.5	IV	28	41	2
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I	29	25															
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	Able to give an idea to construct a table	1															
	No response given / wrong response	0															

Question	Mark Scheme	Score						
1 (c)	<p>Able to classify four experiments correctly</p> <p>Sample answer:</p> <table border="1"> <thead> <tr> <th>Endothermic reaction <i>Tindak balas endotermik</i></th> <th>Exothermic reaction <i>Tindak balas eksotermik</i></th> </tr> </thead> <tbody> <tr> <td>Experiment I <i>Eksperimen i</i></td> <td>Experiment II <i>Eksperimen II</i></td> </tr> <tr> <td>Experiment III <i>Eksperimen III</i></td> <td>Experiment IV <i>Eksperimen IV</i></td> </tr> </tbody> </table>	Endothermic reaction <i>Tindak balas endotermik</i>	Exothermic reaction <i>Tindak balas eksotermik</i>	Experiment I <i>Eksperimen i</i>	Experiment II <i>Eksperimen II</i>	Experiment III <i>Eksperimen III</i>	Experiment IV <i>Eksperimen IV</i>	3
	Endothermic reaction <i>Tindak balas endotermik</i>	Exothermic reaction <i>Tindak balas eksotermik</i>						
	Experiment I <i>Eksperimen i</i>	Experiment II <i>Eksperimen II</i>						
	Experiment III <i>Eksperimen III</i>	Experiment IV <i>Eksperimen IV</i>						
	Able to classify any three experiments correctly	2						
	Able to classify any two experiments correctly	1						
	No response given / wrong response	0						

Question	Mark Scheme	Score
1 m)	Able to state three observations correctly Sample answer: 1. Thermometer reading decreases <i>it</i> Level of mercury decreases <i>Bacaan termometer menurun //Aras merkuri menurun</i> 2. Bubbles of gas released <i>ii</i> Effervescence <i>Gelembung-gelembung gas terbebas//Pembuakan</i> 3. The volume of solution increases <i>Isipadu larutan bertambah</i>	3
	Able to state any two observations correctly	2
	Able to state any one observation correctly	1
	No response given / wrong response	0

Question	Mark Scheme	Score
1 (d)(ii)	Able to state any one inference based on observation correctly Sample answer: Endothermic reaction <i>tt</i> Heat is absorbed from surrounding // Carbon dioxide gas is released <i>tt</i> Sodium hydrogen carbonate solution reacts with hydrochloric acid <i>Tindak balas endotermik // Haba diserap dari persekitaran// Gas karbon dioksida dibebaskan // Larutan natrium hidrogen karbonat</i>	3
	Able to state an inference less correctly Sample answer: Heat transfer <i>ft</i> Gas released <i>Haba dipindahkan ft Gas terbebas</i>	2
	Able to give an idea of inference Sample answer: Heat/energy change <i>tt</i> Air bubbles // Exothermic reaction <i>Haba f Tenaga berubah // Gelembung udara ft Tindak balas eksotermik</i>	1
	No response given / wrong response	0

Question	Mark Scheme	Score'	
1 (e)	Able to calculate the Hfeat of neutralisation for Experiment IV correctly with unit  Sample answer: Step 1 : Heat released = met) $= 100 \times 4.2 \times 13 // 5460 \text{ J}$  Step 2 : Number of mole of NaOH//HCl = (2.0)(50)/1000 // 0.1 mol  Step 3: 0.1 mol of water formed releases 5460 J heat energy Step 4: 1.0 mol of water formed releases = 5460 / 0.11154600 J  Step 5 : Heat of neutralisation = - 54.6 kJ mol <sup>-1</sup> (score 2 if without unit)	3	
	<i>Langkah 1 : Haba yang dibebaskan = mcG</i> $= 100 \times 4.2 \times 13 // 5460 \text{ J}$  <i>Langkah 2 : Biiangan mol NaOH//HCl = {2.0}(50)/1000! 0.1 mol</i>  <i>Langkah 3 .0.1 mol air membebaskan haba 5460 J</i> <i>Langkah 4: 1.0 mol air membebaskan haba = 5460 / 0.1 // 54600 J</i>  <i>Langkah 5 : Haba peneutralan = - 54.6 kJ mol<sup>-1</sup> (skor 2 jika tiada unit)</i>		
	Able to calculate the heat of neutralisation for Experiment IV correctly with the following steps : Step 1, 2 and 5		2
	Able to state the idea of calculation of heat of neutralisation ( any 1 step)		1
	No response given / wrong response		0

Question	Mark Scheme	Score
1(f)	Able to predict the temperature change accurately with correct unit  Sample answer: 26 °C / 26.0 °C	3
	Able to predict the temperature change correctly  Sample answer 26/26.0 // Twice // Double 26/26.0// 2 kali // Berqanda	2
	Able to state the idea of the temperature change Sample answer: Increases // Higher than 13 °C // (Any value less than 26.0 °C 1 Bertambah li Lebih tinggi dari 13 °C // [Mana-mana niiai kurang dari 26.0°C ]	1
	No response given / wrong response	0

Question	Mark Scheme	Score
1(9)0)	Able to state the three variables correctly.  Sample answer Manipulated variable : Hydrochloric acid and ethanoic acid // Type of acid Responding variable : Heat of neutralisation//Temperature change Constant variable : Sodium hydroxide solution // Type of alkali  <i>Pemboleh ubah dimanipulasi : Asid hidroklorik dan asid etanoik// Jenis asid Pemboleh ubah bergerak balas: Haba peneutralan // Pe rub ah an suhu Pemboleh ubah dimalarkan : Larutan natrium hidroksida //Jenis alkali</i>	3
	Able to state any two variables correctly.	2
	Able to state any one variable correctly.	1
	No response given / wrong response	0

Question	Mark Scheme	Score
1 (9)(ii)	Able to state the relationship between the manipulated variable and responding variable with direction correctly  Sample answer: The reaction between (hydrochloric acid)/(strong acid) and (sodium hydroxide solution)/ (strong alkali) produce a higher heat of neutralisation than reaction between (ethanoic acid)/(weak acid) and (sodium hydroxide solution)/ (strong alkali) <i>Tindak balas antara (asid hidroklorik)/(asid kuat) dan (larutan natrium hidroksida)/(alkali kuat) menghasilkan haba peneutralan yang lebih tinggi daripada tindak balas antara (asid etanoik)/(asid lemah) dan (larutan natrium hidroksida)/(alkali kuat)</i>	3
	Able to state the relationship between the manipulated variable and responding variable with direction less correctly  Sample answer: Heat of neutralisation between a strong acid and a strong alkali is higher than a weak acid and a strong alkali // A strong add produces a higher heat of neutralisation <i>Haba peneutralan antara asid kuat dan alkali kuat lebih tinggi daripada asid lemah dan alkali kuat// Asid kuat menghasilkan haba peneutralan yang lebih tinggi</i>	2
	Able to state an idea of hypothesis Sample answer: Type of acid affects heat of neutralisation U Different type of acid produces different heat of neutralization <i>Jenis asid mempengaruhi haba peneutralan// Jenis asid yang berbeza menghasilkan haba peneutralan yang berbeza</i>	1
	No response given / wrong response	0

Question	Mark Scheme	Score
1 <g>(iii)	Able to state the relationship correctly Sample answer A strong acid produces a higher temperature change than a weak acid when reacts with sodium hydroxide solution <i>Asid kuat menghasilkan perubahan suhu yang lebih tinggi daripada asid lemah apabila bertindak balas dengan larutan natrium hidroksida</i>	3
	Able to state the relationship less correctly Sample answer A strong acid produces a higher temperature change // A weak acid produces a lower temperature change <i>Asid kuat menghasilkan perubahan suhu yang lebih tinggi // Asid lemah menghasilkan perubahan suhu yang lebih rendah</i>	2
	Able to give an idea of relationship Sample answer Type of acid affects the temperature change // Different type of acid produces different the temperature change <i>Jenis asid mempengaruhi perubahan suhu //</i> <i>Jenis asid berbeza menghasilkan perubahan suhu yang berbeza</i>	1
	No response given / wrong response	0

Question	Mark Scheme	Score
1 (g)(iv)	Able to state the operational definition for the heat of neutralisation accurately with the following criteria; i) What should be done ii) What should be observed Sample answer {Thermometer reading rises}/ (Temperature increases) when alkali / (sodium hydroxide solution) is added into acid/ (hydrochloric acid)/ (ethanoic acid) to produce 1 mol of water ( <i>Bacaan termometer meningkat</i> ) / ( <i>Suhu meningkat</i> ) apabila alkali/ ( <i>larutan natrium hidroksida</i> ) ditambah kepada asid / ( <i>asid hidroklorik</i> ) / ( <i>asid etanoik</i> ) untuk menghasilkan 1 mol air	3
	Able to state the operational definition for the heat of neutralisation less correctly Sample answer (Thermometer reading rises)/ (Temperature increases) when alkali is added into acid // Thermometer reading rises // Temperature increases // Acid is added into alkali <i>(Bacaan termometer meningkat) / (Suhu meningkat) apabila alkali ditambah kepada asid // Bacaan termometer meningkat // Suhu meningkat // Asid ditambahkan ke dalam alkali</i>	2
	Able to give an idea of operational definition for the heat of neutralisation Sample answer Heat is released // Alkali neutralises / (reacts with) acid	1
	No response given / wrong response	0

Question	Mark Scheme	Score
2(a)	Able to give the statement of the problem correctly Sample answer: Is the concentration of electrolyte affect the product of electrolysis at the anode? // How does the concentration of electrolyte affect the product formed at anode? <i>Adakah kepekatan elektrolit mempengaruhi hasil elektrolisis di anod?//Bagaimanakah kepekatan elektrolit mempengaruhi hasil terbentuk di anod?</i>	3
	Able to give the statement of the problem less correctly Sample answer: Is the concentration of electrolyte affect the product of electrolysis? // How does the concentration of electrolyte affect the product of electrolysis? <i>Adakah kepekatan elektrolit mempengaruhi hasil elektrolisis? // Bagaimanakah kepekatan elektrolit mempengaruhi hasil elektrolisis?</i>	2
	Able to state an idea the statement of problem SamDle answer: The concentration of electrolyte affects the product of electrolysis. <i>Kepekatan elektrolit mempengaruhi hasil elektrolisis</i>	1
	No response given / wrong response	0
Question	Mark Scheme	Score
2(b)	Able to state All variables correctly SamDle answer: Manipulated variable : Concentration of electrolyte // Concentration of iodide ion Responding variable : Product formed at anode Constant variable : Carbon electrode // Type of electrode // Potassium iodide solution // Type of electrolyte <i>Pemboleh ubah dimanipulasi: Kepekatan elektrolit // Kepekatan ion iodida Pemboleh ubah bergerak balas: Hasil di anod Pemboleh ubah dimalarkan: Elektrodkarbon //Jenis elektrod // Larutan kalium iodide // Jenis elektrolit</i>	3
	Able to state any two variables correctly	2
	Able to state any one variables correctly	1
	No response given / wrong response	0

Question	Mark Scheme	Score
2(c)	<p>Able to state the relationship between manipulated variable and responding variable correctly</p> <p>Samole answer.            If the concentrated potassium iodide solution is electrolysed /used, product at the anode is iodine solution, if the dilute potassium iodide solution is electrolysed/ used, the product at the anode is oxygen gas.  <i>Jika larutan kalium iodida p&amp;kat dielektrolisiskan / digunakan hasil di anod ialah larutan iodin.</i>  <i>Jika larutan kalium iodida cair dielektrolisiskan / digunakan hasil di anod ialah gas oksigen.</i></p>	3
	<p>Able to state the relationship between manipulated variable and responding variable less correctly</p> <p>Samole answer;            If the concentrated potassium iodide solution used, product at the anode is iodine solution //            If the dilute potassium iodide solution used, the product at the anode is oxygen gas.  <i>Jika larutan kalium iodida pekat digunakan hasil di anod ialah larutan iodin J/</i>  <i>Jika larutan kalium iodida cair digunakan hasil di anod ialah gas oksigen.</i></p>	2
	<p>Able to state an idea of the hypothesis Samole answer:            The concentration of <i>electrolyte</i> affects the product at the anode //            Different concentration of electrolyte produces different product at the anode  <i>Kepekatan etektrolit mempengaruhi hasil di anod //</i>  <i>Kepekatan elektrolit yang berbeza menghasilkan hasil yang berbeza di anod.</i></p>	1
	No response given / wrong response	0



Question	Rubric	Score
2(d)	<p>Able to give the list of the apparatus and materials correctly and completely</p> <p>Sample answer:</p> <p>Material            [ 0.0001 - 0.001 ] mol dm<sup>3</sup> potassium iodide solution,            [ 0.1 - 2.0 ] mol dm<sup>3</sup> potassium iodide solution <i>Bahan Larutan kalium iodida</i> [ 0.0001 - 0.001 ] mol dm<sup>3</sup>,  <i>Larutan kalium iodida</i> {0.1 - 2.0 1 mol dm<sup>-3</sup></p> <p>Apparatus            Carbon electrode, electrolytic cell, wire, battery, test tube. <i>Radas Elektrod karbon, sel elektroisis, wayar, bated, tabung uji</i></p>	3
	<p>Able to give the list of the apparatus and materials less correctly</p> <p>Material            [ 0.0001 - 0.001 ] mol dm<sup>-3</sup> potassium iodide solution <i>11</i> [ 0.1 - 2,0 ] mol dm<sup>3</sup>potassium iodide solution <i>Bahan Larutan kalium iodida</i> [ 0.0001 - 0.001 ] mol dm<sup>-3</sup> <i>ii Larutan kalium iodida</i> [ 0.1 - 2.0 ] mol dnrr<sup>3</sup></p> <p>Apparatus            Electrolytic cell, wire, battery <i>Radas Set elektroisis, wayar, bateri</i></p>	2
	<p>Able to give at least one substance and one apparatus</p> <p>Material            [Any electrolyte]  <i>Bahan [ Mana-mana elektrofitt]</i></p> <p>Apparatus            Battery  <i>Radas Bateri</i></p>	1
	No response given / wrong response	0

Question

Mark Scheme

Score

Abie to state ail procedures correctly Sample answer:

1. Pour half full of {0.0001 - 0.001 } mol dm<sup>3</sup> potassium iodide solution into an electrolytic cell.
2. Pour the solution into 2 small test tubes until full.
3. Turn the test tube upside down to both electrodes.
4. Connect both electrodes to the battery with connecting wires // Complete the circuit.
5. Record observation.
6. Repeat step 1 to 5 by replacing [ 0.0001 - 0.001 ] mol dm<sup>3</sup> potassium iodide solution with (0.1 - 2.0 ) mol dm<sup>3</sup> potassium iodide solution.

2(e)

1. Masukkan larutan kalium iodida [ 0.0001 - 0,001 ] mol drrr<sup>3</sup> ke dalam sel elektrolisis sehingga separuh penuh.
2. Masukkan larutan tersebut ke dalam 2 tabung uji kecil sehingga penuh.
3. Telangkupkan tabung uji yang berisi larutan kepada kedua-dua elektrod.
4. Sambungkan kedua-dua elektrod kepada bateri dengan wayar penyambung//Lengkapkan litar.
5. Rekod pemerhatian.
6. Ulang langkah 1 hingga 5 dengan menggantikan larutan kalium iodida 10.0001 - 0.001 ] mol dnr<sup>3</sup> dengan iarutan kafium iodida [ 0.1 - 2.0 1 mol dm<sup>3</sup>.

Able to list steps 1,4,5 and 6 correctly

Able to list steps 1 and 4 only

No response given / wrong response

Question

Mark Scheme

Able to exhibit the tabulation of data correctly

Tabulation of data has the following elements:

1. 2 columns and 3 rows

Score

Sample answer:

Concentration of electrolyte (mol dm <sup>3</sup> ) <i>Kepekatan elektrolit (mol dm<sup>-3</sup>)</i>	Observation <i>Pemerhatian</i>
(0.0001 -0.001 ]	
[0.1 -2.0]	

2(f)

Able to give an idea of tabulation of data

Sample answer:

Electrolyte <i>Elektrolit</i>	Observation <i>Pemerhatian</i>
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No response given / wrong response

END OF MARKING SCHEME SKEMA  
PEMARKAHAN TAMAT