



JABATAN PELAJARAN NEGERI TERENGGANU

**PEPERIKSAAN PERCUBAAN
SIJIL PELAJARAN MALAYSIA 2011
CHEMISTRY**

4541/1(PP)

**Kertas 1
Sept. 2011**

PERATURAN PEMARKAHAN

UNTUK KEGUNAAN PEMERIKSA SAHAJA

Peraturan pemarkahan ini mengandungi 2 halaman bercetak

**CHEMISTRY
PAPER 1
ANSWER**

Question	Answer	Question	Answer
1	C	26	B
2	B	27	D
3	A	28	C
4	D	29	C
5	A	30	B
6	C	31	D
7	C	32	B
8	A	33	B
9	A	34	B
10	A	35	D
11	B	36	A
12	C	37	B
13	A	38	B
14	D	39	C
15	A	40	D
16	D	41	A
17	C	42	B
18	A	43	D
19	B	44	A
20	D	45	C
21	A	46	D
22	C	47	B
23	D	48	A
24	C	49	B
25	A	50	C

END OF MARKING SCHEME
PERATURAN PEMARKAHAN TAMAT



JABATAN PELAJARAN NEGERI TERENGGANU

**PEPERIKSAAN PERCUBAAN
SIJIL PELAJARAN MALAYSIA 2011
CHEMISTRY**

4541/2(PP)

**Kertas 2
Sept. 2011**

PERATURAN PEMARKAHAN

UNTUK KEGUNAAN PEMERIKSA SAHAJA

Peraturan pemarkahan ini mengandungi 9 halaman bercetak

SECTION A [60 MARKS]

Question			Marking Criteria	Marks						
1	(a)	(i)	Melting point: 53 °C Boiling point: 259 °C [values and unit]	1						
		(ii)	<table border="1"> <thead> <tr> <th>Region</th> <th>Physical state</th> </tr> </thead> <tbody> <tr> <td>AB</td> <td>Solid</td> </tr> <tr> <td>DE</td> <td>Liquid and gas</td> </tr> </tbody> </table>	Region	Physical state	AB	Solid	DE	Liquid and gas	1
Region	Physical state									
AB	Solid									
DE	Liquid and gas									
		(iii)	The heat energy absorbed by the particles Is used to overcome the forces of attraction between particles	1 1						
	(b)	(i)	7	1						
		(ii)	${}^{33}_{16}\text{Q}$	1						
		(iii)	P and S	1						
		(iv)	Q and R Have same number of protons but different number of neutrons // Have same proton number but different nucleon number	1 1						
TOTAL				9						
2	(a)	(i)	Ammonia	1						
		(ii)	$(\text{NH}_4)_2\text{SO}_4$	1						
	(b)		<ul style="list-style-type: none"> ▪ Corrodes buildings ▪ Corrodes metal structures ▪ pH of the soil decreases ▪ Lakes and rivers become acidic 	1 1 1 1						
	(c)	(i)	Urea, $(\text{NH}_4)_4\text{CO}$ $\frac{2 \times 14}{2(14 + 4) + 12 + 16} \times 100\%$ or 43.8%	1 1						
			Compound Y / Ammonium Sulphate, $(\text{NH}_4)_2\text{SO}_4$ $\frac{2 \times 14}{2(14 + 4) + 32 + 4(16)} \times 100\%$ or 21.2%	1 1						
		(ii)	Urea Urea has a higher percentage or nitrogen by mass	1 1						
	(d)	(i)	Produce poisonous / toxic gases	1						
		(ii)	Recycle // Reuse // Pirolysis // Use biodegradable polymers	1						
TOTAL				9						
3	(a)	(i)	Proton number	1						
		(ii)	18	1						
		(iii)	Electric bulb // (Any suitable uses)	1						
	(b)	(i)	Group 17, Period 3	1						
		(ii)	<ul style="list-style-type: none"> ▪ Size of sodium atom is bigger than chlorine atom ▪ Number of protons in sodium atom is more than chlorine atom ▪ Attraction force between nucleus and electron sodium atom is stronger 	1 1 1						
		(iii)	Ionic	1						

			<ul style="list-style-type: none"> Number of electron occupied with electron and symbol Charge of Na⁺ and Cl⁻ 	1 1
			TOTAL	10
4	(a)	(i)	0.1 mol of HCl in 1 dm ³ of solution	1
		(ii)	Mole of HCl = 0.1 Concentration = 0.2 mol dm ⁻³	1 1
	(b)		<ul style="list-style-type: none"> Concentration of hydrogen ion in Experiment I is higher than Experiment II The higher the concentration of hydrogen ion, the lower the pH value 	1 1
	(c)	(i)	pH value of Experiment II is higher than Experiment III	1
		(ii)	Concentration of hydrogen ion / H ⁺ in sulphuric acid is higher than hydrochloric acid	1
	(d)	(i)	Volumetric flask	1
		(ii)	Mol = 1 × 250 ÷ 1000 // 0.25 mol Mass = 0.25 × 40 // 10 g	1 1
			TOTAL	10
5	(a)	(i)	Lead (II) nitrate	1
		(ii)	White	1
	(b)		To ensure all acid to be reacted completely	1
	(c)	(i)	Formula of reactants and products correct Balance $\text{PbO} + 2\text{HNO}_3 \rightarrow \text{Pb}(\text{NO}_3)_2 + \text{H}_2\text{O}$	1 1
		(ii)	Mole of HNO ₃ = 1 × 50 ÷ 1000 // 0.05 2 mol HNO ₃ → 1 mol Pb(NO ₃) ₂ // 0.05 mol HNO ₃ → 0.025 mol Pb(NO ₃) ₂ Mass of Pb(NO ₃) ₂ = 0.025 × 331 // 8.275 g	1 1 1
	(d)		<ul style="list-style-type: none"> Add dilute sulphuric acid to solution followed by Iron(II) sulphate solution Drop concentrated sulphuric acid slowly A brown ring is formed 	1 1 1
			TOTAL	11

6	(a)	(i)	A reaction where oxidation and reduction occur at the same time			1
		(ii)	Set	1	2	1+1 1+1 1+1
			Changes oxidation number of iron	+2 to +3	+2 to 0	
			Half equation	$\text{Fe}^{2+} \rightarrow \text{Fe}^{3+} + e$	$\text{Fe}^{2+} + 2e \rightarrow \text{Fe}$	
			Type of reaction	Oxidation	Reduction	
	(b)	(i)	<ul style="list-style-type: none"> X: Copper // Silver // (Other metals situated lower than iron in the electrochemical series) Y: Magnesium // Zinc // (Other metals situated higher than iron in the electrochemical series) 			1 1
		(ii)	<ul style="list-style-type: none"> Iron atoms lost electrons to form Iron(II) ion / Fe^{2+} // Iron undergoes oxidation The Iron (II) ion // Fe^{2+} is present 			1 1
TOTAL						11

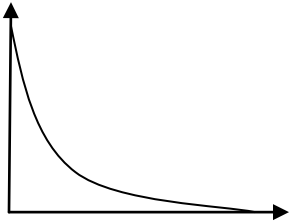
SECTION B [20 MARKS]

Question		Marking Criteria			Marks	
7	(a)		<ul style="list-style-type: none"> Electrode Copper X: Type of electrode Electrode carbon Y: The position of ions in the electrochemical series 			1 1
	(b)		Electrode	Carbon electrode Y (cathode)	Copper electrode X (anode)	1 1+1 1+1 1 2+2
			List of all ions present in electrolyte	$\text{Cu}^{2+}, \text{H}^+, \text{SO}_4^{2-}, \text{OH}^-$		
			List of ions attracted to each electrodes	$\text{Cu}^{2+}, \text{H}^+$	$\text{SO}_4^{2-}, \text{OH}^-$	
			Name of the ion selectively discharge and ion formed at the electrode	Copper(II) ion	Copper(II) ion	
			The reason why the ion selectively discharge at cathode	Cu^{2+} ion lower in the electrochemical series	-	
			Half equation for the reaction at each electrodes	$\text{Cu}^{2+} + 2e \rightarrow \text{Cu}$	$\text{Cu} \rightarrow \text{Cu}^{2+} + 2e$	
	(c)	(i)	<ul style="list-style-type: none"> Oxidation Release / donate electron 			1 1

		(ii)	<ul style="list-style-type: none"> ▪ Formula of reactant and products correct ▪ Balanced $4\text{OH}^- \rightarrow \text{O}_2 + 2\text{H}_2\text{O} + 4\text{e}^-$	1 1
	(d)	(i)	<ul style="list-style-type: none"> ▪ Zinc ▪ More electropositive than copper 	1 1
		(ii)	To allow the movement of ions Sulphuric acid // (Any suitable answers)	1 1
TOTAL				20
8	(a)	(i)	Heat is released when 1 mole of metal copper is displaced from copper sulphate solution by zinc metal	1
		(ii)	<ul style="list-style-type: none"> ▪ Formula of reactants ▪ Formula of products $\text{Zn} + \text{Cu}^{2+} \rightarrow \text{Zn}^{2+} + \text{Cu}$	1 1
		(iii)	<ul style="list-style-type: none"> ▪ Reactant: Zn & CuSO₄ ▪ Products: Cu & ZnSO₄ ▪ Total energy of Zn and CuSO₄ is higher / more than total energy of Cu & ZnSO₄ ▪ The reaction is exothermic / release energy ▪ P kJ heat is released when 1 mole of copper is displaced 	1 1 1 1 1
		(iv)	<ul style="list-style-type: none"> ▪ Heat released, Q ▪ $Q = 2.5 \times 4.2 \times 10$ // 1050 J mol^{-1} / 1.05 kJ mol^{-1} ▪ Mole of Cu ion = $0.2 \times 25 \div 1000$ // 0.005 mol ▪ $\Delta H = -1.05 \div 0.005 \text{ kJ mol}^{-1}$ // -210 kJ mol^{-1} ▪ (Correct sign and unit) 	1 1 1 1 1
		(v)	<ul style="list-style-type: none"> ▪ Heat is lost to the surrounding ▪ Thermometer and beaker absorb some heat 	1 1
	(b)	(i)	<ul style="list-style-type: none"> ▪ HCl is strong acid // CH₃COOH is a weak acid ▪ HCl ionises completely // CH₃COOH ionises partially ▪ Some of heat released are absorbed by the CH₃COOH molecules to break down the O-H bonds 	1 1 1
		(ii)	<ul style="list-style-type: none"> ▪ HCl is a monoprotic acid // H₂SO₄ is a diprotic acid // Number of H⁺ ion in H₂SO₄ is twice ▪ In Experiment I, 1 mol of H⁺ ion reacts with 1 mol of OH⁻ produced 1 mol of water; heat released is 57 kJ ▪ In Experiment II, 2 mol of H⁺ ion reacts with 2 mol of OH⁻ produced 2 mol of water; heat released is $2 \times 57 \text{ kJ}$ 	1 1 1
TOTAL				20

SECTION C [20 MARKS]

Question		Marking Criteria	Marks
9	(a)	(i) <ul style="list-style-type: none"> ▪ P: (Name of any metal situated above Cu in the electrochemical series) ▪ Sample answer: Magnesium // Zinc // Aluminium ▪ [reject: Sodium // Potassium] 	1
		<ul style="list-style-type: none"> ▪ Q: (Name of any acid) ▪ Sample answer: Hydrochloric acid // Sulphuric acid // Nitric acid ▪ [Accept weak acid] 	1
		<ul style="list-style-type: none"> ▪ (Chemical equation) ▪ Correct formula of reactants and products ▪ Balanced ▪ $Mg + 2HCl \rightarrow MgCl_2 + H_2$ 	1 1
		(ii) <p>Experiment I = $30 \div 10$ or $3.0 \text{ cm}^3\text{s}^{-1}$</p> <p>Experiment II = $30 \div 20$ or $1.5 \text{ cm}^3\text{s}^{-1}$</p> <p>[With correct unit]</p>	1 1
		(iii) <ul style="list-style-type: none"> ▪ Rate of reaction in Experiment I is higher than Experiment II ▪ The concentration of acid in Experiment I is higher than Experiment II // The number of hydrogen ions per unit volume in Experiment I higher than Experiment II ▪ Frequency of collision between hydrogen ions and atoms of P in Experiment I is higher than in Experiment II ▪ Frequency of effective collision between the particles in Experiment I is higher than in Experiment II 	1 1 1 1
	(b)	<p>Factor: <u>Size of Reactant</u></p> <p>[Name of catalyst used]</p> <p>Example: calcium carbonate / marble chips and hydrochloric acid // Zinc and sulphuric acid</p> <p>[Procedure]</p> <ul style="list-style-type: none"> ▪ A burette is filled with water and inverted over a basin of water and the burette is clamped vertically using retort stand. ▪ Initial burette reading is recorded ▪ (1.0 – 2.0 g) of large pieces / granules / pieces of metal / metal carbonate is weighed and put into a conical flask ▪ (20 – 50 cm³) of (0.5 – 2.0) mol dm⁻³ of acid is poured and into the conical flask. The conical flask is closed immediately with stopper and delivery tube ▪ Stopwatch is started and the conical flask is swirled throughout the experiment ▪ The burette reading is recorded at 30 seconds interval 	1 1 1 1 1 1

		<p>swirled throughout the experiment</p> <ul style="list-style-type: none"> A stopwatch is started immediately The time taken for the mark "X" to disappear from sight is recorded The experiment is repeated using sodium thiosulphate solution at 35°C, 40°C, 45°C and 50°C <p>[Results]</p> <table border="1"> <tbody> <tr> <td>Temperature / °C</td> <td>30</td> <td>35</td> <td>40</td> <td>45</td> <td>50</td> <td>55</td> <td>...</td> </tr> <tr> <td>Time / s</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>$\frac{1}{\text{time}} / \text{s}^{-1}$</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>Plot the graph of temperature against time or temperature against 1/time</p> <p>Temperature / °C</p>  <p>Time / s</p> <p>Conclusion: The higher the temperature, the higher the rate of reaction</p>	Temperature / °C	30	35	40	45	50	55	...	Time / s								$\frac{1}{\text{time}} / \text{s}^{-1}$								<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>[Max 10]</p>
Temperature / °C	30	35	40	45	50	55	...																				
Time / s																											
$\frac{1}{\text{time}} / \text{s}^{-1}$																											
		TOTAL	20																								
10	(a)	<p>Carbon dioxide / CO₂ and water / H₂O</p> <p>[Any correct chemical equation]</p> <p>Chemical formula of reactant</p> <p>Balanced</p> <p>Example:</p> $2\text{C}_4\text{H}_{10} + 13\text{O}_2 \rightarrow 8\text{CO}_2 + 10\text{H}_2\text{O}$	<p>1</p> <p>1</p> <p>1</p>																								
	(b)	<ul style="list-style-type: none"> Compound B and Compound D Same molecular formula, C₄H₈ Different structural formula 	<p>1</p> <p>1</p> <p>1</p>																								
	(c)	<p>Pour compound A / B into a test tube</p> <p>Add bromine water to the test tube</p> <p>Test tube contain compound A unchanged</p> <p>Test tube contain compound B brown colour turns colourless</p> <p>OR</p> <p>Pour compound A/B into a test tube</p> <p>Add acidified potassium manganate(VII) solution into the test tube</p> <p>Test tube contain compound A unchanged</p> <p>Test tube contain compound B purple turn colourless</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p>																								

	(d)	(i)	Any members of carboxylic acid and correct ester Example: <ul style="list-style-type: none"> ▪ Methanoic acid ▪ Propylmethanoate <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> $\begin{array}{c} \text{H} \\ \\ \text{H}-\text{C}-\text{OH} \end{array}$ </div> <div style="border: 1px solid black; padding: 5px;"> $\begin{array}{ccccccc} & \text{O} & & \text{H} & \text{H} & \text{H} & \\ & & & & & & \\ \text{H}-\text{C}-\text{O}-\text{C}-\text{C}-\text{C}-\text{H} & & & & & & \\ & & & \text{H} & \text{H} & \text{H} & \end{array}$ </div>	1 1 1 1
		(ii)	<ul style="list-style-type: none"> ▪ Pour 2 cm³ of (methanoic acid) into a boiling tube ▪ Add 2 cm³ of propanol / Compound E into the boiling tube ▪ Slowly / carefully drop 1 cm³ of concentrated sulphuric acid ▪ Heated the mixture (with a smaller flame) ▪ Pour the mixture in a beaker that contains water ▪ Observation: formed liquid that fruity smell / floats on water surface 	1 1 1 1 1 1
TOTAL			20	

END OF MARKING SCHEME
PERATURAN PEMARKAHAN TAMAT



JABATAN PELAJARAN NEGERI TERENGGANU

**PEPERIKSAAN PERCUBAAN
SIJIL PELAJARAN MALAYSIA 2011
CHEMISTRY**

4541/3(PP)

**Kertas 3
Sept. 2011**

PERATURAN PEMARKAHAN

UNTUK KEGUNAAN PEMERIKSA SAHAJA

Peraturan pemarkahan ini mengandungi 10 halaman bercetak

Question 1 (a)

Rubric	Score																				
<p>Able to construct a table to record the data that contains:</p> <ul style="list-style-type: none"> ▪ Correct titles ▪ Correct readings with 2 decimal places ▪ Correct unit <p><u>Sample Answer:</u></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="background-color: #d3d3d3;">Alcohol</th> <th style="background-color: #d3d3d3;">Initial reading / g</th> <th style="background-color: #d3d3d3;">Final reading / g</th> <th style="background-color: #d3d3d3;">Mass / g</th> </tr> </thead> <tbody> <tr> <td>Methanol</td> <td>374.95</td> <td>373.40</td> <td>1.55</td> </tr> <tr> <td>Ethanol</td> <td>332.00</td> <td>330.80</td> <td>1.20</td> </tr> <tr> <td>Propanol</td> <td>344.40</td> <td>343.29</td> <td>1.11</td> </tr> <tr> <td>Butanol</td> <td>372.90</td> <td>371.29</td> <td>1.61</td> </tr> </tbody> </table>	Alcohol	Initial reading / g	Final reading / g	Mass / g	Methanol	374.95	373.40	1.55	Ethanol	332.00	330.80	1.20	Propanol	344.40	343.29	1.11	Butanol	372.90	371.29	1.61	3
Alcohol	Initial reading / g	Final reading / g	Mass / g																		
Methanol	374.95	373.40	1.55																		
Ethanol	332.00	330.80	1.20																		
Propanol	344.40	343.29	1.11																		
Butanol	372.90	371.29	1.61																		
<p>Able to construct a less accurate table that contains:</p> <ul style="list-style-type: none"> ▪ Title ▪ Readings ▪ Without unit 	2																				
Able to construct a table with at least 3 correct reading	1																				
No response or wrong response	0																				

Question 1 (b)

Rubric	Score
<p>Able to state all the variables correctly</p> <p><u>Sample answer:</u> Manipulated variable: Alcohols // methanol // ethanol // propanol / butanol Responding variable: Heat of combustion // Change in temperature Constant variable: Water // Copper can / container // change in temperature</p>	3
Able to state any 2 variables correctly	2
Able to state any 1 variable correctly	1
No response or wrong response	0

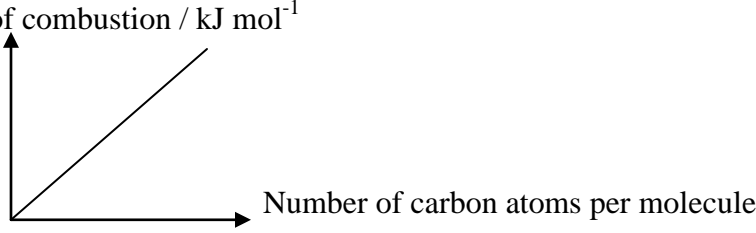
Question 1 (c)

Rubric	Score
Able to give the hypothesis accurately <u>Sample answer</u> The higher the number of carbon atom per molecule alcohol, the higher the heat of combustion	3
Able to give the hypothesis almost accurately <u>Sample answer</u> Different type of alcohol produce different heat of combustion	2
Able to state an idea of hypothesis <u>Sample answer</u> Type of alcohol affects heat of combustion	1
No response or wrong response	0

Question 1 (d)

Rubric	Score
Able to calculate the heat of combustion accurately <u>Sample answer</u> <ul style="list-style-type: none"> ▪ Change in temperature, $\theta = 58 - 28 // 30^{\circ}\text{C}$ ▪ Heat released, $Q = mc\theta$ $= 200 \times 4.2 \times 30 // 25\ 200\ \text{J}$ ▪ Number of moles of methanol = $\frac{1.55}{32} // 0.048\ \text{mol}$ ▪ Heat of combustion = $\frac{25200}{0.048}$ $= -525\ 000\ \text{J mol}^{-1} // -525\ \text{kJ mol}^{-1}$ (the value must be in negative and correct unit) 	3
Able to calculate the heat of combustion correctly <ul style="list-style-type: none"> ▪ Change in temperature ▪ Heat released ▪ Number of moles of methanol 	2
Able to calculate at least temperature change correctly	1
No response or wrong response	0

Question 1 (e)

Rubric	Score
<p>Able to draw the graph correctly</p> <ul style="list-style-type: none"> ▪ x-axis is Heat of combustion / kJ mol^{-1} and y-axis is number of carbon atom per molecule ▪ Consistent scale and the graph is half of the paper ▪ All the points are transferred correctly ▪ Straight line <p>Heat of combustion / kJ mol^{-1}</p>  <p>Number of carbon atoms per molecule</p>	3
<p>Able to draw the graph incorrectly</p> <ul style="list-style-type: none"> ▪ x-axis is Heat of combustion / kJ mol^{-1} and y-axis is number of carbon atom per molecule ▪ Consistent scale ▪ About 3 points are transferred correctly ▪ Straight line 	2
<p>Able to state an idea to draw the graph</p> <ul style="list-style-type: none"> ▪ Draw the x-axis and y-axis ▪ Straight line 	1
No response or wrong response	0

Question 2 (a)

Rubric	Score															
<p>Able to state 3 observations correctly</p> <p><u>Sample answer</u></p> <table border="1"> <thead> <tr> <th>Test tube</th> <th>I</th> <th>II</th> <th>III</th> <th>IV</th> </tr> </thead> <tbody> <tr> <td>Intensity of blue colour</td> <td>None</td> <td>-</td> <td>-</td> <td>Low</td> </tr> <tr> <td>Intensity of pink colour</td> <td>-</td> <td>High</td> <td>-</td> <td>-</td> </tr> </tbody> </table>	Test tube	I	II	III	IV	Intensity of blue colour	None	-	-	Low	Intensity of pink colour	-	High	-	-	3
Test tube	I	II	III	IV												
Intensity of blue colour	None	-	-	Low												
Intensity of pink colour	-	High	-	-												
Able to record any 2 observations correctly	2															
Able to record any 1 observation correctly	1															
No response or wrong response	0															

Question 2 (b)

Rubric	Score
Able to state the inference correctly based on the observation <u>Sample answer:</u> Iron(II) ions / Fe^{2+} is formed	3
Able to state the inference correctly based on the observation <u>Sample answer:</u> The iron nail rust	2
Able to state the inference correctly based on the observation <u>Sample answer:</u> Iron changed // Oxidation // Redox reaction	1
No response or wrong response	0

Question 2 (c)

Rubric	Score
Able to state the operational definition of rusting correctly <u>Sample answer:</u> Blue colour is formed when iron is contact with less electropositive metals	3
Able to state the operational definition of rusting less accurately <u>Sample answer:</u> Blue colour is formed when iron is contact with metals	2
Able to state any idea of operational definition <u>Sample answer:</u> Blue colour is formed	1
No response or wrong response	0

Question 2 (d)

Rubric	Score
Able to predict the observation correctly <u>Sample answer:</u> Blue colour is formed // The intensity of blue colour higher	3
Able to predict the observation less accurately <u>Sample answer:</u> Iron rust // rusting occurs	2
Able to state an idea of observation <u>Sample answer:</u> Colour changed	1
No response or wrong response	0

Question 2 (e)

Rubric	Score
Able to state the relationship correctly <u>Sample answer:</u> The higher the intensity of blue colour, the higher the rate of rusting // vice versa	3
Able to state the relationship less correctly <u>Sample answer:</u> Different of the intensity of blue colour, different of the rate of rusting	2
Able to give an idea of relationship <u>Sample answer:</u> The intensity of blue colour affect the rate of rusting	1
No response or wrong response	0

Question 2 (f)

Rubric		Score
Able to classify all the metals correctly		3
<u>Sample answer:</u>		
Metal that inhibit rusting of iron	Metal that speed up the rusting of iron	
Aluminium / Al	Lead / Pb Tin / Sn Silver / Ag	
Able to classify any 3 metals correctly		2
Able to classify any 2 metals correctly or give opposite heading		1
<u>Sample answer:</u>		
Metal that speed up the rusting of iron	Metal that inhibit rusting of iron	
Lead / Pb Tin / Sn Silver / Ag	Aluminium / Al	
No response or wrong response		0

Question 3 (a)

Rubric		Score
Able to the aim of the experiment correctly		2
<u>Sample answer</u>		
To construct the Electrochemical series based on the potential difference between two metals		
Able to state the aim of the experiment incorrectly		1
<u>Sample answer</u>		
To construct the Electrochemical series based on the potential difference // Can an Electrochemical series of metals be constructed based on the potential difference between two metals?		
No response or wrong response		0

Question 3 (b)

Rubric	Score
Able to state the 3 variables correctly	3
<u>Sample answer</u> <ul style="list-style-type: none"> ▪ Manipulated variable: Pair of metal ▪ Responding variable: Potential difference // Voltmeter reading // Voltage ▪ Constant variable: Copper(II) sulphate // CuSO_4 // Electrolyte // Positive terminal [reject volume and solution] 	
Able to state any 2 variables correctly	2
Able to state any 1 variable correctly	1
No response or wrong response	0

Question 3 (c)

Rubric	Score
Able to state the relationship between manipulated variable and responding variable correctly	3
<u>Sample answer</u> The further the distance between two metals in the electrochemical series, the higher the potential difference / voltage / voltmeter reading	
Able to state the relationship between manipulated variable and responding variable but in the opposite direction	2
<u>Sample answer</u> The higher the potential difference / voltage / voltmeter reading, the further the distance between two metals in the electrochemical series // The further the distance between two metals, the higher the potential difference / voltage / voltmeter reading	
Able to state an idea of hypothesis	1
<u>Sample answer</u> The distance between two metals affect the potential difference / voltage / voltmeter reading	
No response or wrong response	0

Question 3 (d)

Rubric	Score
Able to give complete list of materials and apparatus	3
<u>Sample answer</u>	
<ul style="list-style-type: none"> ▪ Materials: Copper(II) sulphate solution, magnesium metal, zinc metal, iron metal, copper metal, sandpaper ▪ Apparatus: Beaker, connecting wire, voltmeter 	
Able to give at least two materials and at least two apparatus	2
Able to give at least one material and at least one apparatus	1
No response or wrong response	0

Question 3 (e)

Rubric	Score
Able to list all the procedure correctly	3
<u>Sample answer</u>	
<ul style="list-style-type: none"> ▪ Clean the metals with sandpaper ▪ Pour / fill a beaker with Copper(II) sulphate solution ▪ Dip / immerse the magnesium strip and copper strip into Copper(II) sulphate solution ▪ Complete the circuit // Connect the electrolyte to the voltmeter ▪ Record the potential difference / voltage / voltmeter reading ▪ Repeat the experiment using zinc, iron and lead to replace the magnesium 	
Able to list down Steps 2, 3, 4 and 6	2
Able to list down Steps 2, 3 and 4	1
No response or wrong response	0

Question 3 (f)

Rubric	Score															
<p>Able to tabulate the data with the following aspects</p> <ul style="list-style-type: none"> ▪ Correct titles ▪ Correct unit ▪ Correct list of pair of metals <p><u>Sample answer</u></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Pair of metal</th> <th style="text-align: center;">Potential difference / V</th> <th style="text-align: center;">Negative terminal</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Mg and Cu</td> <td></td> <td></td> </tr> <tr> <td style="text-align: center;">Zn and Cu</td> <td></td> <td></td> </tr> <tr> <td style="text-align: center;">Fe and Cu</td> <td></td> <td></td> </tr> <tr> <td style="text-align: center;">Pb and Cu</td> <td></td> <td></td> </tr> </tbody> </table>	Pair of metal	Potential difference / V	Negative terminal	Mg and Cu			Zn and Cu			Fe and Cu			Pb and Cu			3
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END OF MARKING SCHEME
PERATURAN PEMARKAHAN TAMAT