

SULIT

PROGRAM PENINGKATAN PRESTASI AKADEMIK  
SIJIL PELAJARAN MALAYSIA 2010

4541/1

Kimia  
Kertas 1

**SKEMA JAWAPAN  
PEPERIKSAAN PERCUBAAN  
SIJIL PELAJARAN MALAYSIA 2010**



**KIMIA**

*Kertas 1*

**PERATURAN PEMARKAHAN**

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**UNTUK KEGUNAAN PEMERIKSA SAHAJA**

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Peraturan Pemarkahan ini mengandungi **2** halaman bercetak

**SKEMA JAWAPAN KERTAS KIMIA 1 (4541/1)  
PPPA(2) SPM 2010**

**MARKING SCHEME OF PAPER 1 (4541/1)  
PPPA(2) SPM 2010**

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1.	B
2.	D
3.	C
4.	A
5.	D
6.	A
7.	D
8.	D
9.	D
10.	B
11.	D
12.	A
13.	C
14.	C
15.	B
16.	B
17.	D
18.	C
19.	D
20.	B
21.	B
22.	C
23.	A
24.	C
25.	B

26.	B
27.	D
28.	A
29.	B
30.	B
31.	A
32.	A
33.	B
34.	A
35.	D
36.	B
37.	B
38.	B
39.	A
40.	A
41.	A
42.	A
43.	C
44.	C
45.	C
46.	A
47.	D
48.	B
49.	B
50.	A

SULIT

PROGRAM PENINGKATAN PRESTASI AKADEMIK  
SIJIL PELAJARAN MALAYSIA 2010

4541/2

Kimia  
Kertas 2

**SKEMA JAWAPAN  
PEPERIKSAAN PERCUBAAN  
SIJIL PELAJARAN MALAYSIA 2010**



**KIMIA**

*Kertas 2*

**PERATURAN PEMARKAHAN**

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**UNTUK KEGUNAAN PEMERIKSA SAHAJA**

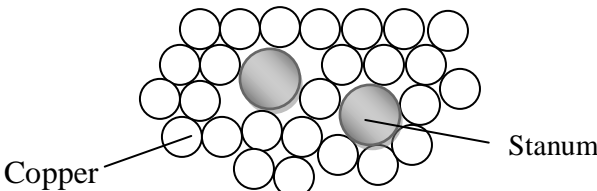
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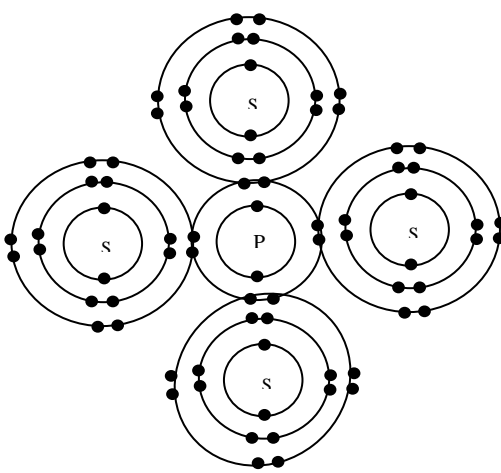
Peraturan Pemarkahan ini mengandungi **12** halaman bercetak

**SKEMA JAWAPAN KERTAS KIMIA 2 (4541/2)  
PPPA(2) SPM 2010**

**MARKING SCHEME OF PAPER 2 (4541/2)  
PPPA(2) SPM 2010**

**SECTION A**

Question			Description	Marks											
1	(a)	(i)	Silicon dioxide//silica	1	....1										
		(b)	Telescope mirror//lenses//optical fibres// laboratory apparatus <i>Accept <b>any</b> suitable answer</i> X - Lead glass	1 1	....2										
		(c)	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Borosilicate glass</th> <th style="width: 50%;">Sodalime glass</th> </tr> </thead> <tbody> <tr> <td>Does not crack easily with sudden change in temperature</td> <td>Crack easily with sudden change in temperature</td> </tr> <tr> <td>Does not break easily</td> <td>Breaks easily</td> </tr> <tr> <td>Heat resistant</td> <td>Less heat resistant</td> </tr> <tr> <td>More resistant to chemical reactions</td> <td>Less resistant to chemical reactions</td> </tr> </tbody> </table> <p>Choose <b>any one</b> of the following pairs</p>	Borosilicate glass	Sodalime glass	Does not crack easily with sudden change in temperature	Crack easily with sudden change in temperature	Does not break easily	Breaks easily	Heat resistant	Less heat resistant	More resistant to chemical reactions	Less resistant to chemical reactions	1	.....1
Borosilicate glass	Sodalime glass														
Does not crack easily with sudden change in temperature	Crack easily with sudden change in temperature														
Does not break easily	Breaks easily														
Heat resistant	Less heat resistant														
More resistant to chemical reactions	Less resistant to chemical reactions														
	(d)	(i)	Stanum / tin	1	.....1										
		(ii)	 <p>-Diagram show 2 different size of atoms - label</p>	1 1	.....2										
		(iii)	1. The present of Q / foreign atom disrupts the orderly layered arrangement of pure/copper atoms 2. more difficult for layers of pure/copper atoms to slide over each other	1 1	.....2										
	(e)		$  \begin{array}{c}  \text{H} \quad \text{CH}_3 \\    \quad   \\  \text{C} = \text{C} \\    \quad   \\  \text{H} \quad \text{H}  \end{array}  $	1	.....1										
				<b>10</b>											

Question			Description	Marks	
2	(a)	(i)	$S^-$	1	
		(ii)	Different atoms of the same element which have same number of proton but different number of neutron//same proton number but different nucleon number	1	
		(iii)	2.8.7	1	.....3
	(b)	(i)	Period 4	1	
		(ii)	V atom have four shells filled with electrons	1	.....2
	(c)	(i)	$PS_4$	1	
		(ii)	 <p>1 st mark: diagram showing sharing of electron between one P atom and 4 S atom 2 nd mark: correct number of shell and number of electron in each shell</p>	1	.....3
	(d)	(i)	V	1	
		(ii)	$2V + 2H_2O \rightarrow 2VOH + H_2$	1	.....2
				<b>10</b>	

Question			Description	Marks		
3	(a)	(i)	Chemical compound that can conduct electricity in molten or aqueous state	1	.....1	
		(b)	To allow the movement of ions through it	1	.....1	
		(ii)	$\text{Cu}^{2+} + 2\text{e} \rightarrow \text{Cu}$	1	.....1	
		(iii)	1. The intensity of the blue color of copper(II) sulphate decreases// the blue color decolourises	1	.....3	
			2. Copper(II) ions receive electrons /discharged to form copper atom	1		
			3. The concentration of copper(II) sulphate solution decreases	1		
		(c)	(i)	$\text{Na}^+, \text{H}^+, \text{Cl}^-, \text{OH}^-$	1	.....1
			(ii)	Hydrogen gas	1	.....1
			(iii)	1. $\text{H}^+$ and $\text{Na}^+$ ions move to the cathode 2. $\text{H}^+$ ions are selectively discharged because it is less electropositive than $\text{Na}^+$ 3. $\text{H}^+$ ions receive electrons to form hydrogen molecules	1 1 1	.....3 Max 2
					<b>10</b>	

Question			Description	Marks		
4	(a)	(i)	Sulphuric acid	1		
			(ii)	Neutralization	1	
			(iii)	To make sure all acid / hydrogen ions has reacted	1	.....3
		(b)	(i)	X : Silver nitrate	1	
			(ii)	$\text{Ag}^+ + \text{Cl}^- \rightarrow \text{AgCl}$	1	
			(iii)	White precipitate // beaker gets hot / becomes hot	1	.....3
		(c)	(i)	$\text{PbCO}_3 \rightarrow \text{PbO} + \text{CO}_2$	1	
			(ii)	Brown when hot, yellow when cold	1	
			(iii)	1. Mole of $\text{PbCO}_3 = \frac{13.35}{267}$ = 0.05 2. Volume of $\text{CO}_2 = (0.05)(24)$ = $1.2 \text{ dm}^3$ or $1200 \text{ cm}^3$	1 1	.....4
					<b>10</b>	

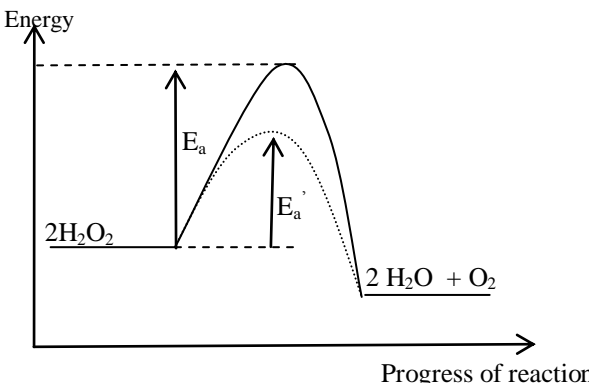
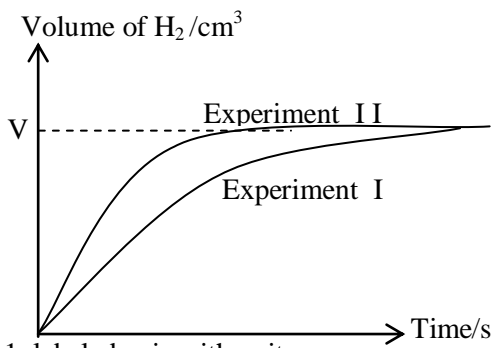
Question		Description	Marks	
5	(a)	Heat change/heat energy released when 1 mol of propanol burn completely in excess oxygen	1	.....1
	(b)	$\text{C}_3\text{H}_7\text{OH} + 9/2\text{O}_2 \longrightarrow 3\text{CO}_2 + 4\text{H}_2\text{O} /$ $2\text{C}_3\text{H}_7\text{OH} + 9\text{O}_2 \longrightarrow 6\text{CO}_2 + 8\text{H}_2\text{O}$	1	.....1
	(c) (i)	The heat energy given out during combustion by propanol , Q $= mc\theta$ $= 500 (4.2)(30)$ $= 63000 \text{ J}$	1	.....1
	(ii)	No. of mole of propanol = $1.8 / 60$ $= 0.03$	1	.....1
	(iii)	Heat of combustion of propanol $= \frac{mc\theta}{n} \text{ Jmol}^{-1}$  $= \frac{-6300}{0.03} \text{ kJoule/mol}$  $= -2100 \text{ kJ/mol}$	1	.....1
	(d)	<p style="text-align: center;">Energy</p> <p style="text-align: center;"> <math>\text{C}_3\text{H}_7\text{OH} + 9/2\text{O}_2</math>  <math>\Delta H = -2100 \text{ kJ mol}^{-1}</math>  <math>3\text{CO}_2 + 4\text{H}_2\text{O}</math> </p> <p>1. Label of energy with two different energy levels            2. Energy level for exothermic reaction with correct position of reactants and products</p>	1 1	.....2
	(e)	The number of carbon atom per molecule butanol is bigger/higher than propanol Butanol produce more carbon dioxide and water molecules than propanol// more heat energy is released during formation of bonds	1 1	.....2
	(f)	Use wind shield / stir water continuously / weigh the spirit lamp immediately	1	.....1
			<b>10</b>	

Question			Description	Marks	
6	(a)	(i)	Orange to green solution	1	
		(ii)	+6 to +3	1	.....2
	(b)	(i)	Oxidation	1	
		(ii)	$\text{Fe}^{2+} \rightarrow \text{Fe}^{3+} + e$	1	.....2
	(c)	(i)	$\text{Cr}_2\text{O}_7^{2-} + 14\text{H}^+ + 6e^- \rightarrow 2\text{Cr}^{3+} + 7\text{H}_2\text{O}$	1	
		(ii)	1. Iron(II) sulphate solution // $\text{Fe}^{2+}$ / Iron(II) ion  2. Oxidation number for iron in iron(II) ion increases from +2 to +3 / Iron(II) ions, $\text{Fe}^{2+}$ releases electron to form Iron(III) ions $\text{Fe}^{3+}$	1  1	.....3
	(d)	(i)	Chlorine	1	
		(ii)	Add in a few drops 1,1,1-trichloroethane / tetrachloromethane and shake brown layer / orange layer is formed	1 1	.....3
				<b>10</b>	

**SECTION B**

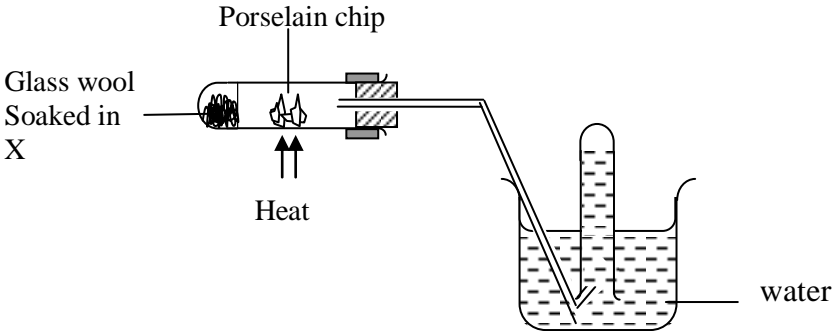
Question			Description	Marks		
7	(a)		Temperature : 450 – 550 ° C Pressure : 200 – 300 atm Catalyst : Powdered iron// Iron filling	1 1 1	.....3	
		(b)	(i)	$2\text{H}_2\text{O}_2 \xrightarrow{\text{Fe}^{2+}} 2\text{H}_2\text{O} + \text{O}_2$	1	.....1
		(ii)	1. Manganese (IV) oxide powder 2. A catalyst provide an alternative path 3. with a lower activation energy 4. Frequency of effective collision between hydrogen peroxide molecules increases 5. As a result rate of reaction will increase	1 1 1 1 1	.....5	



	(iii)	 <p>1. Axis 2. Curve without catalyst, <math>E_a</math> 3. Curve with catalyst, <math>E_a</math></p>	1 1 1	.....3
(c)	(i)	<p><u>Graph :</u></p>  <p>1. labeled axis with unit 2. Correct curves for both experiments 3. Correct maximum volume</p>	1 1 1	.....3
	(ii)	<p>1. The rate of reaction in experiment II is higher than experiment I 2. The temperature in experiment II is higher than experiment I 3. At higher temperature particles move faster// Kinetic energy of particles in experiment II is higher than experiment I 4. The frequency of collision between zinc atoms and hydrogen ions in experiment II higher than experiment I 5. The frequency of effective collision between zinc atoms and hydrogen ions in experiment II higher than experiment I</p>	1 1 1 1 1	.....5
				<b>20</b>

Question			Description	Marks	
8	(a)	(i)	Cleaning agent A – soap	1	.....4
			Cleaning agent B – detergent	1	
			Part X – soluble in grease , insoluble in water	1	
			Part Y – soluble in water , insoluble in grease	1	
		(ii)	1. Soap anion consists of hydrophilic and hydrophobic.	1	.....6 <b>Max 5</b>
		2. Hydrophilic dissolves in water.	1		
		3. Hydrophobic dissolves// penetrates in oils/grease.	1		
		4. Soap reduces surface tension of water.	1		
		5. Mechanical agitation during scrubbing helps pull the oily stains free and break the oily stains into small droplets// Hydrophobic emulsify oil or grease.	1		
		6. During rinsing, soap will remove the grease	1		
		(iii)	1. Hard water contains Mg <sup>2+</sup> ion and Ca <sup>2+</sup> ions	1	.....6
		2. In Expt 1, soap anions reacts with Ca <sup>2+</sup> ion and Mg <sup>2+</sup> ion to form insoluble salt//precipitate/scum	1		
		3. No foam// amount soap anion available for cleansing is reduced	1		
		4. In Expt II, detergent anion react with Ca <sup>2+</sup> ions and Mg <sup>2+</sup> ion to form soluble salt/ no precipitate/no scum	1		
		5. foam is formed	1		
		6. detergent is more effective than soap	1		
	(b)	(i)	1.Prevent food from being spoilt	1	.....1
		(ii)	1. Sodium chloride is used in salted fish	1	.....4
		2. Sodium chloride remove water from the cell of microorganism and retards the growth of microorganism	1		
		3. Sodium nitrate is used in sausage/burger/luncheon meat	1		
		4 .Sodium nitrate prevent or slow down the growth of microorganisms	1		
					<b>20</b>

**SECTION C**

Question			Description			Marks																					
9	(a)	(i)	<table border="1"> <thead> <tr> <th></th> <th>C</th> <th>H</th> <th>O</th> </tr> </thead> <tbody> <tr> <td>Mass(g)</td> <td>52.2</td> <td>13.0</td> <td>34.8 g</td> </tr> <tr> <td>No of mole</td> <td>52.2/ 12</td> <td>13.0/1</td> <td>34.8/16</td> </tr> <tr> <td></td> <td>= 4.35</td> <td>=13.0</td> <td>=2.175</td> </tr> <tr> <td>Simplest mole ratio</td> <td>2</td> <td>6</td> <td>1</td> </tr> </tbody> </table> <p>Empirical formula of R is <math>C_2H_6O</math>  Molecular formula of R is <math>(C_2H_6O)_n</math>  Relative molecular mass R = <math>[(2 \times 12) + (1 \times 6) + (1 \times 16)]n</math>  <math>46 = 46n</math>  <math>n = 1</math></p> <p>Molecular formula of X is <math>C_2H_6O</math> // <math>C_2H_5OH</math></p>		C	H	O	Mass(g)	52.2	13.0	34.8 g	No of mole	52.2/ 12	13.0/1	34.8/16		= 4.35	=13.0	=2.175	Simplest mole ratio	2	6	1			1	
			C	H	O																						
Mass(g)	52.2	13.0	34.8 g																								
No of mole	52.2/ 12	13.0/1	34.8/16																								
	= 4.35	=13.0	=2.175																								
Simplest mole ratio	2	6	1																								
		(ii)	$  \begin{array}{c}  H \quad H \\    \quad   \\  H - C - C - OH \\    \quad   \\  H \quad H  \end{array}  $	1	.....6																						
	(b)	(i)	 <p>1.(functional set up of apparatus, gas is collected by water displacement method)</p>	1																							

		<p>2. Label: heat, glass wool soaked in X, water, porcelain chips</p> <p>3. The porcelain chips are heated strongly / heated until it becomes red hot</p> <p>4. Heat X</p> <p>5. The gas released is collected in the test tube.</p> <p>6. Add a few drops of bromine water into the test tube containing the gas.</p> <p>7. Brown colour of bromine water turns colourless.</p> <p>8. The product is ethene</p> <p>9. Chemical equation: <math>C_2H_5OH \rightarrow C_2H_4 + H_2O</math></p>	1	
			1	
			1	
			1	
			1	
			1	
			1	.....:9
	(ii)	<p>Example:</p> <p>1. carboxylic acid</p> <p>2. reacts with reactive metal to produced salt and hydrogen</p> <p>3. Equation: <math>Mg + 2CH_3COOH \rightarrow (CH_3COO)_2Mg + H_2</math></p> <p>4. reacts with metal carbonate to produced salt, water and carbon dioxide</p> <p>5. Equation: <math>CaCO_3 + 2CH_3COOH \rightarrow (CH_3COO)_2Ca + H_2O + CO_2</math></p> <p>For point 2-5 accept any other suitable answers</p>	1	
			1	
			1	
			1	.....5
				<b>20</b>

Question			Description	Marks	
10	(a)	(i)	Acid A : Hydrochloric acid // nitric acid // sulphuric acid [Accept any strong acid] Acid B : Ethanoic acid. [Accept any weak acid]	1	.....2
		(ii)	1. pH value of acid A is lower than pH value of acid B 2. Acid A ionises completely in water to produce a higher concentration of hydrogen ions. 3. Acid B ionises partially in water to produce a lower concentration of hydrogen ions. 4. The concentration of hydrogen ions in acid A is higher than that in acid B.	1 1 1 1	
	(b)	(i)	Solvent X : Water Solvent Y : Benzene (accept any other suitable organic solvent)	1 1	.....2
		(ii)	In Beaker I 1. Ethanoic acid ionises in water to form hydrogen ion 2. Hydrogen ion in water react with calcium carbonate to produce carbon dioxide gas // $\text{CO}_3^{2-} + 2\text{H}^+ \rightarrow \text{H}_2\text{O} + \text{CO}_2$ 3. Ethanoic acid does not ionises in Beaker II // Ethanoic acid exists as molecules in Beaker II // Hydrogen ions are not present in Beaker II to react with calcium carbonate in Beaker II.	1 1 1	.....3
	(c)	(i)	Standard solution is the solution with known concentration.	1	.....1

		<p>(ii) <u>Preparation of 250 cm<sup>3</sup> of 1 mol dm<sup>-3</sup> of sodium hydroxide solution</u></p> <p>Materials : solid sodium hydroxide, distilled water //</p> <p>Apparatus : Electronic balance, beaker, 250 cm<sup>3</sup> volumetric flask, filter funnel, glass rod</p> <p>[Accept from labelled diagram / description]</p> <p><u>Calculation :</u></p> $\begin{aligned} \text{No. of moles of NaOH} &= \frac{1 \times 250}{1000} \\ &= 0.25 \text{ mol} \end{aligned}$ $\begin{aligned} \text{RFM of NaOH} &= 23 + 16 + 1 = 40 \\ \text{Mass of NaOH} &= 0.25 \times 40 \\ &= 10 \text{ g} \end{aligned}$ <p><u>Procedure :</u></p> <ol style="list-style-type: none"> <li>1. Weigh 10 g of solid sodium hydroxide and dissolve in 100 cm<sup>3</sup> of distilled water in a beaker.</li> <li>2. Stir the solution using a glass rod.</li> <li>3. Pour the solution into 250 cm<sup>3</sup> volumetric flask using a filter funnel.</li> <li>4. Rinse the beaker, filter funnel with distilled water and transfer the solution into volumetric flask</li> <li>5. Add distilled water drop by drop into the volumetric flask until reaches the graduation mark.</li> <li>6. Stopper the volumetric flask and shake the volumetric flask.</li> </ol>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>	<p>.....11</p> <p><b>Max 10</b></p>
			<p><b>20</b></p>	

SULIT

PROGRAM PENINGKATAN PRESTASI AKADEMIK  
SIJIL PELAJARAN MALAYSIA 2010

4541/3

Kimia  
Kertas 3

**SKEMA JAWAPAN  
PEPERIKSAAN PERCUBAAN  
SIJIL PELAJARAN MALAYSIA 2010**



**KIMIA**

*Kertas 3*

**PERATURAN PEMARKAHAN**

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**UNTUK KEGUNAAN PEMERIKSA SAHAJA**

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Peraturan Pemarkahan ini mengandungi **10** halaman bercetak

**SKEMA JAWAPAN KERTAS KIMIA 3 (4541/3)  
PPPA(2) SPM 2010**

**MARKING SCHEME OF PAPER 3 (4541/3)  
PPPA(2) SPM 2010**

Question	Rubric	Score
1 (a)	[Able to state three variables correctly] <b>Sample answer:</b> Manipulated variable: Different /types of metals in contact with iron Responding variable: The intensity of pink and blue colouration// intensity of blue colouration // rusting of iron Constant variable: Iron nails//temperature of jelly solution	3
	[Able to state any 2 variables correctly ]	2
	[Able to state any 1 variable correctly ]	1
	[No response or wrong response]	0

Question	Rubric	Score
1 (b)	[Able to state the relationship correctly between the manipulated variable and the responding variable ] <b>Sample answer:</b> When a more/less electropositive metal in contact with iron, the metal inhibits/speeds up rusting.	3
	[Able to state the relationship incorrectly between the manipulated variable and the responding variable] <b>Sample answer:</b> The more/less electropositive metal inhibits/speeds up rusting //The rusting of iron is inhibits/speeds up, when a more/less electropositive metal in contact with iron//	2
	[Able to state an idea of hypothesis] <b>Sample answer:</b> The electropositivity of metals affect the rusting of iron	1
	[No response given or wrong response]	0



Question	Rubric	Score										
1(c)	[Able to state the inference based on the observation correctly]	3										
	<b>Sample answer:</b>											
	<table border="1"> <thead> <tr> <th>Test tube</th> <th>A</th> <th>B</th> <th>C</th> <th>D</th> </tr> </thead> <tbody> <tr> <td>Inferences</td> <td>The iron nail does not rust// Iron(II) ion is not present</td> <td>The iron nail does not rust // Iron(II) ion is not present</td> <td>The iron nail rust a lot // Iron(II) ion present</td> <td>The iron nail rust a little// Iron(II) ion present</td> </tr> </tbody> </table>		Test tube	A	B	C	D	Inferences	The iron nail does not rust// Iron(II) ion is not present	The iron nail does not rust // Iron(II) ion is not present	The iron nail rust a lot // Iron(II) ion present	The iron nail rust a little// Iron(II) ion present
	Test tube		A	B	C	D						
	Inferences		The iron nail does not rust// Iron(II) ion is not present	The iron nail does not rust // Iron(II) ion is not present	The iron nail rust a lot // Iron(II) ion present	The iron nail rust a little// Iron(II) ion present						
[Able to state any <b>three</b> or <b>two</b> inferences correctly]	2											
[Able to state any <b>one</b> inference correctly]	1											
[No response given or wrong response]	0											

Question	Rubric	Score
1(d)	[Able to state the operational definition for rusting correctly ]	3
	<b>Sample answer:</b> Rusting of iron is the formation of blue colouration when iron is in contact with less electropositive metals or without contact with any metals	
	[Able to state the operational definition in correctly]	2
	<b>Sample answer:</b> Rusting of iron is the formation of blue colouration when iron is in contact with different metals	
	[Able to state an idea ]	1
<b>Sample answer:</b> Rusting of iron is the formation of blue colouration		
[ No response or wrong response]	0	

Question	Rubric	Score
1(e)	[Able to compare the intensity of blue colour and relate the intensity of blue colour with concentration of $Fe^{2+}$ accurately] <b>Sample answer:</b> The intensity of blue colouration after three days is higher. The concentration of iron(II) ions is higher	3
	[Able to compare the intensity of blue colour and relate the intensity of blue colour with concentration of $Fe^{2+}$ correctly] <b>Sample answer:</b> The intensity of blue colouration after three days is higher. The number iron(II) ions is higher	2
	[Able to state an idea of the intensity of blue colour and relate the intensity of blue colour with concentration of $Fe^{2+}$ correctly] <b>Sample answer:</b> The intensity of blue colouration after three days is higher //The number iron(II) ions after three days is higher	1
	No response or wrong response	0

Question	Rubric	Score
1(f)(i)	[Able to arrange all the 4 metals according to ascending order of electropositivity correctly] <b>Sample answer:</b> R, Iron, Q, P	3
	[Able to arrange all the 3 metals according to ascending order of electropositivity correctly] <b>Sample answer:</b> <u>R, Q, Iron, P</u> // Iron <u>R, Q, P</u> // <u>R, Iron, P, Q</u>	2
	[Able to arrange all the metals but according to descending order of electropositivity correctly] <b>Sample answer:</b> P, Q, Iron, R	1
	[ No response or wrong response]	0

Question	Rubric	Score
1(f)(ii)	[Able to predict the metals which cause the intensity of blue colour very high accurately] <b>Sample answer:</b> Copper/silver	3
	[Able to predict the metals which cause the intensity of blue colour very high correctly] <b>Sample answer:</b> Lead	2
	[Able to predict the metal below iron in the electrochemical series of metals ] <b>Sample answer:</b> Tin	1
	[No response or wrong response]	0

Question	Rubric	Score
1(g)	[Able to make the classification of electropositive metals and less electropositive metals than iron accurately] <b>Sample answer:</b> More electropositive metals : Magnesium, zinc Less electropositive metals : Lead, copper	3
	[Able to make the classification of one more electropositive metals <b>and</b> one less electropositive metal]	2
	[Able to make the classification of more electropositive metals less electropositive metals inversely] <b>Sample answer:</b> Less reactive metals : Magnesium, zinc More reactive metals : Lead, copper	1
	[No response or wrong response]	0

Question	Rubric	Score
1(h)(i)	[Able to state all the correct observations] <b>Sample answer:</b> (i) At negative terminal: electrode becomes thinner (ii) At positive terminal: electrode becomes thicker// brown solid deposited (iii) At copper(II) sulphate solution: intensity of blue solution decreases// blue solution turns pale blue	3
	[Able to state <b>any two</b> correct observations]	2
	[Able to state <b>any one</b> correct observation]	1
	[No response or wrong response]	0

Question	Rubric	Score
1(h)(ii)	[Able to state all the voltmeter readings <b>accurately with correct unit and one decimal point</b> ] <b>Sample answer:</b> Q and Iron : 1.4 V P and Iron : 2.2 V R and Iron : 3.4 V	3
	[Able to state all the voltmeter readings <b>accurately without unit</b> ] <b>Sample answer:</b> Q and Iron : 1.4 P and Iron : 2.2 R and Iron : 3.4	2
	[Able to state at least two readings correctly without unit]	1
	[No response or wrong response]	0

Question	Rubric	Score								
1(h)(iii)	[Able to construct a table to record the voltmeter reading for each pair of metals that contain:] 1. Correct titles with unit 2. Readings  <b>Sample answer:</b> <table border="1" style="margin-left: 40px;"> <thead> <tr> <th>Pairs of metals</th> <th>Voltage / V</th> </tr> </thead> <tbody> <tr> <td>Q and Iron</td> <td>1.4</td> </tr> <tr> <td>P and Iron</td> <td>2.2</td> </tr> <tr> <td>R and Iron</td> <td>3.4</td> </tr> </tbody> </table>	Pairs of metals	Voltage / V	Q and Iron	1.4	P and Iron	2.2	R and Iron	3.4	3
	Pairs of metals	Voltage / V								
	Q and Iron	1.4								
	P and Iron	2.2								
R and Iron	3.4									
[Able to construct a less accurate table that contains] 1. Titles without unit 2. Readings	2									
[Able to construct a table with at least one title / reading]	1									
[No response or wrong response]	0									

Question	Rubric	Score
2(a)	[Able to state the problem statement correctly]  <b>Sample answer:</b> How does temperature effect the rate of reaction between sulphuric acid and sodium thiosulphate solution ?	3
	[Able to state the problem statement less accurately]  <b>Sample answer:</b> How does temperature effect the reaction between sulphuric acid and sodium thiosulphate solution ? // To investigate the effect of temperature on the rate of reaction between sulphuric acid and sodium thiosulphate solution	2
	[Able to give an idea of the problem statement]  <b>Sample answer:</b> Temperature effect the rate of reaction	1
	[No response or wrong response]	0

Question	Rubric	Score
2(b)	[Able to state the three variables correctly] <b>Sample answer:</b>  <b>Manipulated variable</b> Temperature of sodium thiosulphate solution <b>Responding variable</b> Time taken for the mark 'X' to disappear from sight// rate of reaction <b>Constant variable</b> Volume and concentration of sulphuric acid sodium thiosulphate solution // size of conical flask.	3
	[Able to state any two variables correctly]	2
	[Able to state any one variable correctly]	1
	[No response or wrong response]	0

Question	Rubric	Score
2(c)	[Able to state the relationship correctly between the manipulated variable and the responding variable with direction] <b>Sample answer:</b> The higher the temperature of sodium thiosulphate solution the higher the rate of reaction/time taken for the mark 'X' to disappear from sight	3
	[Able to state the relationship between the manipulated variable and the responding variable with direction] <b>Sample answer:</b> The higher the temperature of sodium thiosulphate solution the faster the rate of reaction/time taken for the mark 'X' to disappear from sight //The higher the temperature the higher the rate of reaction	2
	[Able to state the idea of hypothesis] <b>Sample answer:</b> Different temperature different rate of reaction	1
	No response or wrong response	0

Question	Rubric	Score
2(d)	[Able to give complete list of substances and apparatus] <b>Sample answer:</b>  <b>Substances</b> Sodium thiosulphate solution [0.1 - 0.5] mol dm <sup>-3</sup> , sulphuric acid [0.2 – 1.0] mol dm <sup>-3</sup> <b>Apparatus</b> Conical flask [150 – 250] cm <sup>3</sup> , measuring cylinder, thermometer, Bunsen burner, filter paper/white paper, tripod stand, wire gauze, stopwatch	3
	[Able to give a list of substances and apparatus but less complete] <b>Sample answer:</b>  <b>Substances</b> Sodium thiosulphate solution, sulphuric acid <b>Apparatus</b> Conical flask, thermometer, stopwatch	2
	[Able to give at least one substance and at least one apparatus]	1
	[No response or wrong response]	0

Question	Rubric	Score
2(e)	[Able to list all the steps correctly] <b>Sample answer:</b>  1. 50 cm <sup>3</sup> of sodium thiosulphate solution is poured into a conical flask. 2. The temperature of the solution is recorded. 3. The conical flask is placed on top of a piece of white paper with a mark 'X' at the centre. 4. 5 cm <sup>3</sup> of sulphuric acid is added into the conical flask and the stopwatch is started immediately. 5. Swirl the conical flask and record the time taken for the mark 'X' to disappear from sight. 6. Repeat steps 1 to 5 by heating the sodium thiosulphate solution at different temperatures.	3
	[Able to list down steps 1, 4, 5 and 6]	2
	[Able to list steps 1, 4 and 5]	1
	[No response or wrong response]	0

Question	Rubric	Score								
2(f)	<p>[Able to tabulate the data with the following aspects]</p> <ol style="list-style-type: none"> <li>1. Correct titles</li> <li>2. List of minimum three temperature</li> </ol> <p><b>Sample answer:</b></p> <table border="1" data-bbox="443 465 1262 618"> <thead> <tr> <th>Temperature /°C</th> <th>Time / s</th> </tr> </thead> <tbody> <tr> <td>30</td> <td></td> </tr> <tr> <td>35</td> <td></td> </tr> <tr> <td>40</td> <td></td> </tr> </tbody> </table>	Temperature /°C	Time / s	30		35		40		2
Temperature /°C	Time / s									
30										
35										
40										
	<p>[Able to construct table with at least one title incomplete list of temperature]</p> <p><b>Sample answer:</b></p> <table border="1" data-bbox="443 797 1262 875"> <thead> <tr> <th>Temperature</th> <th>Time</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> </tr> </tbody> </table>	Temperature	Time			1				
Temperature	Time									
	[No response or wrong response or empty table]	0								

**END OF MARKING SCHEME**  
**SKEMA JAWAPAN TAMAT**