



KEMENTERIAN  
PENDIDIKAN  
MALAYSIA  
Jabatan Pendidikan Negeri Terengganu



# PERATURAN PEMARKAHAN

# MPP 3

KIMIA

DISEDIAKAN OLEH PANEL AKRAM NEGERI TERENGGANU



**JABATAN PENDIDIKAN NEGERI  
TERENGGANU**

**Mark Sheet Paper 1 MPP 3**

**CHEMISTRY SPM 2021**

1	C	21	D
2	B	22	D
3	C	23	C
4	B	24	A
5	D	25	D
6	D	26	C
7	A	27	B
8	D	28	B
9	B	29	A
10	C	30	A
11	D	31	A
12	A	32	C
13	D	33	B
14	C	34	C
15	C	35	C
16	B	36	C
17	C	37	B
18	A	38	B
19	A	39	A
20	B	40	C

**MPP3 – PEPERIKSAAN PERCUBAAN TAHUN 2021**  
**SIJIL PELAJARAN MALAYSIA**  
**4541/ 2 CHEMISTRY/ KIMIA**  
**PAPER/ KERTAS 2**

Question Number		Mark Scheme	Sub marks	Total Marks
1	(a)	X: getah tak ter Vulkan <i>Unvulcanised rubber</i> Y: getah ter Vulkan <i>Vulcanised rubber</i>	1	2
	(b)	Tayar // Tapak kasut <i>Tyre // shoes soles</i> (mana-mana produk yang sesuai) ( <i>any suitable products</i> )	1	
	(c)	Penvulkanan <i>Vulcanisation</i>	1	1
	(d)	Getah Y lebih kenyal daripada getah X// lebih keras// lebih tahan suhu yang tinggi <i>Rubber Y more elastic than rubber X // more hardness//</i> <i>resistant to high heat</i>	1	1
<b>TOTAL</b>				<b>5</b>

Question Number		Mark Scheme	Sub marks	Total Marks
2	(a)	Mengikut tertib nombor proton unsur secara menaik <i>According to ascending proton numbers of the elements</i>	1	1
	(b)	D dan F <i>D and F</i>	1	1
	(c)	2.6	1	1
	(d)	Bilangan proton atom E lebih banyak daripada atom D // cas positif dalam nukleus atom E lebih banyak daripada atom D Daya tarikan nukleus terhadap elektron atom E lebih kuat  <i>The number of proton of atom E is more than atom D //</i> <i>positive charge in nucleus of atom E is more than atom D</i> <i>The attraction force of nucleus towards electron of atom</i> <i>E is stronger</i>	1	2
			1	
<b>TOTAL</b>				<b>5</b>

Question Number		Mark Scheme	Sub marks	Total Marks
3	(a)	Formula kimia yang menunjukkan nisbah teringkas bagi atom setiap unsur dalam satu sebatian <i>Chemical formula that shows simplest ratio of atom of element in the compound.</i>	1	1
	(b)	CH <sub>2</sub>	1	1
	(c)	(i) $2 \text{Zn}(\text{NO}_3)_2 \rightarrow 2 \text{ZnO} + 4\text{NO}_2 + \text{O}_2$ 1. Formula kimia bahan dan hasil <i>Chemical formulae of reactant and product</i> 2. Persamaan kimia yang seimbang <i>Balance chemical equation</i>	1 1	2
	(d)	(ii) $2 \text{ mol Zn}(\text{NO}_3)_2 \rightarrow 4 \text{ mol gas NO}_2 //$ $1 \text{ mol Zn}(\text{NO}_3)_2 \rightarrow 2 \text{ mol gas NO}_2$  Isipada gas NO <sub>2</sub> = 2 x 24 dm <sup>3</sup> // 48 dm <sup>3</sup> (unit yang betul)  $2 \text{ mole Zn}(\text{NO}_3)_2 \rightarrow 4 \text{ mole gas NO}_2 //$ $1 \text{ mole Zn}(\text{NO}_3)_2 \rightarrow 2 \text{ mol gas NO}_2$ $\text{Volume of gas NO}_2 = 2 \times 24 \text{ dm}^3 // 48 \text{ dm}^3$	1 1	2
<b>TOTAL</b>				<b>6</b>

Question Number		Mark Scheme	Sub marks	Total Marks
4	(a)	(i) Agen pencuci A <i>Cleansing agent A</i>	1	1
		(ii) Saponifikasi <i>Saponification</i>	1	1
		(iii) $\text{CH}_3(\text{CH}_2)_{14}\text{COOH} + \text{NaOH} \rightarrow \text{CH}_3(\text{CH}_2)_{14}\text{COONa} + \text{H}_2\text{O}$ 1. Formula kimia bahan dan hasil <i>Chemical formulae of reactant and product</i> 2. Persamaan kimia yang seimbang <i>Balance chemical equation</i>	1 1	2
	(b)	Situasi I Air liat mengandungi ion Ca <sup>2+</sup> / Mg <sup>2+</sup> Anion sabun bertindak balas dengan ion Ca <sup>2+</sup> / Mg <sup>2+</sup> membentuk kekat/ mendakan/ garam tak terlarutkan  Situation I Hard water contains Ca <sup>2+</sup> / Mg <sup>2+</sup> ion Anion of soap reacts with Ca <sup>2+</sup> / Mg <sup>2+</sup> ion to produce scum/ precipitate/ insoluble salt	1 1 1	3
<b>TOTAL</b>				<b>7</b>

Question Number			Mark Scheme	Sub marks	Total Marks
5	(a)	(i)	Ikatan ion <i>Ionic bond</i>	1	1
		(ii)	Ion Na <sup>+</sup> : atom natrium melepaskan satu elektron Ion Cl <sup>-</sup> : atom klorin menerima satu elektron  <i>Na<sup>+</sup> ion : sodium atom release one electron Cl<sup>-</sup> ion : chlorine atom accept one electron</i>	1 1	2
	(b)	(i)	Tidak mengkonduksikan elektrik dalam semua keadaan// Tidak larut dalam air //larut dalam pelarut organik// Takat lebur dan takat didih rendah  <i>Cannot conduct electric in all state// insoluble in water// soluble in organic solvent// Low melting and boiling point</i>	1	1
		(ii)	..... <b>2</b> NH <sub>3</sub> + CO <sub>2</sub> → (NH <sub>2</sub> ) <sub>2</sub> CO + ..... <b>H<sub>2</sub>O</b>	1+1	2
		(iii)	Bilangan mol X = $\frac{24}{24}$ // 1 <i>Number of mole of X</i>	1	
			Jisim urea = 1 × 60 g // 60 g (unit yang betul) <i>Mass of urea</i>	1	2
<b>TOTAL</b>					<b>8</b>

Question Number			Mark Scheme	Sub marks	Total Marks
6	(a)	(i)	Hitam <i>Black</i>	1	1
		(ii)	HNO <sub>3</sub> // asid nitrik HNO <sub>3</sub> // <i>Nitric acid</i>	1	1
	(b)	2Cu(NO <sub>3</sub> ) <sub>2</sub> → 2CuO + 4NO <sub>2</sub> + O <sub>2</sub>  1. Formula kimia bahan dan hasil <i>Chemical formulae of reactant and product</i> 2. Persamaan kimia yang seimbang <i>Balance chemical equation</i>	1 1	2	
	(c)	Mendakan biru terbentuk. Larut dalam larutan ammonia berlebihan membentuk larutan biru tua.  <i>Blue precipitate formed. Dissolves in excess ammonia solution and dark blue solution formed</i>	1 1	2	

(d)	Tambah 2 cm <sup>3</sup> asid sulfurik cair diikuti dengan 2 cm <sup>3</sup> larutan ferum(II) sulfat ke dalam tabung uji yang mengandungi larutan Z Perlahan-lahan tambahkan asid sulfurik pekat melalui dinding tabung uji. Gelang perang terbentuk.	1 1 1	3
	<i>Add 2 cm<sup>3</sup> dilute sulphuric acid followed by 2 cm<sup>3</sup> iron(II) sulphate solution into a test tube containing Z solution. Slowly add concentrated sulphuric acid along the wall of the test tube. Brown ring is formed</i>		
<b>TOTAL</b>			<b>9</b>

Question Number			Mark Scheme	Sub marks	Total Marks
7	(a)	(i)	Alkohol <i>Alcohol</i>	1	1
		(ii)	Etanol <i>Ethanol</i>	1	1
		(iii)	$C_2H_5OH + 3O_2 \rightarrow 2CO_2 + 3H_2O$  1. Formula kimia bahan dan hasil <i>Chemical formulae of reactant and product</i> 2. Persamaan kimia yang seimbang <i>Balance chemical equation</i>	1 1	2
	(b)	(i)	Pengesteran <i>Esterification</i>	1	1
		(ii)	Asid butanoic <i>Butanoic acid</i>	1	1
		(iii)	$C_3H_7OH + C_3H_7COOH \rightarrow C_3H_7COOC_3H_7 + H_2O$  1. Formula kimia bahan dan hasil <i>Chemical formulae of reactant and product</i> 2. Persamaan kimia yang seimbang <i>Balance chemical equation</i>	1 1	2
	(c)		1. Mudah meruap sebabkan tangan cepat kering 2. Mudah di bawa kemana sahaja.  <i>1. Easy volatile caused hand dry easier 2. Travel friendly// Easy to bring anywhere</i>	1 1	2
<b>TOTAL</b>					<b>10</b>

Question Number		Mark Scheme	Sub marks	Total Marks
8	(a)	Perubahan haba apabila satu mol air terbentuk daripada tindakbalas peneutralan antara asid nitrik dan natrium hidroksida. <i>Heat change when one mole of water is formed from the reaction between nitric acid and sodium hydroxide.</i>	1	1
	(b)	Cawan plastik // cawan kaca // cawan kertas <i>plastic cup // glass cup // paper cup</i>	1	1
	(c) (i)	$Q = (25+25) \times 4.2 \times 6 \text{ J} // 1260 \text{ J} // 1.26 \text{ kJ}$	1	1
	(ii)	Bilangan mol = $\frac{1.0 \times 25}{1000} // 0.025$ <i>Number of mole</i> $\Delta H = \frac{1260}{0.025} // \frac{1.26}{0.025} // 50400 // 50.4$ $= - 50.4 \text{ kJ mol}^{-1}$ (tanda '-' dan unit yang betul)	1 1 1	3
	(d) (i)	Sama // $50.4 \text{ kJ mol}^{-1}$ <i>Same // <math>50.4 \text{ kJ mol}^{-1}</math></i>	1	1
	(ii)	Haba peneutralan adalah haba yang dibebaskan bagi pembentukan satu mol air. <i>Heat of neutralisation is the heat released for the formation of one mole of water.</i>	1	1
	(e)	<p>Tenaga / Energy</p> <p>1. Label tenaga dan anak panah kebawah dan dua aras tenaga untuk tindak balas eksotermik 2. Persamaan ion dan <math>\Delta H</math></p> <p><i>1. Energy labelled with arrow downward and two energy levels for exothermic reaction 2. Ionic equation and <math>\Delta H</math></i></p>	1 1	2
<b>TOTAL</b>				<b>10</b>

Question Number		Mark Scheme	Sub marks	Total Marks
9	(a)	Situasi A Saiz// Jumlah luas permukaan// Saiz daging // Jumlah luas permukaan daging  <i>Situation A</i> <i>Size // Total surface area// Size of meat// Total surface area of meat</i>	1 1	2
	(b)	(i) Perubahan kuantiti bahan tindak balas / hasil tindak balas per unit masa. <i>Changes in quantity of reactants/ product per unit time</i>  Karbon dioksida <i>Carbon dioxide</i>	1 1	2
		(ii) $\text{CaCO}_3 + 2\text{HCl} \rightarrow \text{CaCl}_2 + \text{CO}_2 + \text{H}_2\text{O}$ 1. Formula kimia bahan dan hasil <i>Chemical formulae of reactant and product</i> 2. Persamaan kimia yang seimbang <i>Balance chemical equation</i>  Bilangan mol HCl = $\frac{30 \times 0.5}{1000}$ // 0.015 <i>Number of moles of HCl</i>  $2 \text{ mol HCl} \rightarrow 1 \text{ mol CO}_2$ // $0.015 \text{ mol HCl} \rightarrow 0.0075 \text{ mol CO}_2$  Isipadu $\text{CO}_2 = 0.0075 \times 24 \text{ dm}^3$ // $0.18 \text{ dm}^3$ <i>Volume of CO}_2</i> <b>(unit yang betul)</b>	1 1 1 1 1	5
		(iii) Kadar tindak balas purata = $\frac{50 \text{ cm}^3 \text{ s}^{-1}}{30}$ // $1.67 \text{ cm}^3 \text{ s}^{-1}$ <i>Average rate of reaction</i> <b>(unit yang betul)</b>	1	1
		(iv) <u>Experiment I and Experiment II</u>  Kadar tindak balas Eksperimen II lebih tinggi daripada Eksperimen I Suhu dalam Eksperimen II lebih tinggi daripada Eksperimen I Tenaga kinetik zarah bagi eksperimen II lebih tinggi dalam Eksperimen I. Frekuensi perlanggaran di antara kalsium karbonat dan ion hidrogen dalam Eksperimen II lebih tinggi Frekuensi perlanggaran berkesan dalam Eksperimen II lebih tinggi.	1 1 1 1 1	







Set II			
Mentol menyala <i>Bulb lights up</i>	Mentol tidak menyala <i>Bulb does not lights up</i>	1	
Ion bergerak bebas hadir <i>Free moving ion present</i>	Tiada ion bergerak bebas hadir// HCl wujud sebagai molekul <i>No free moving ion present// HCl exist as molecule</i>	1	
Boleh mengkonduksi elektrik <i>Can conduct electricity</i>	Tidak boleh mengkonduksi elektrik <i>Cannot conduct electricity</i>	1	8
<b>TOTAL</b>			<b>20</b>

Question Number	Mark Scheme		Sub marks	Total Marks
11 (a)	(i)	Tindak balas kimia yang melibatkan pengoksidaan dan penurunan berlaku serentak <i>A chemical reaction where oxidation and reduction occur simultaneously</i>	1	1
	(ii)	1. Gambarajah berfungsi / <i>Functional diagram</i> 2. Label gambarajah / <i>Labeled diagram</i> 3. Arah pengaliran elektron / <i>The direction of electron flow</i>	1 1 1	
		<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: left;"> <p>Elektrod karbon <i>Carbon electrode</i></p> <p>Larutan kalium iodida <i>Potassium iodide solution</i></p> </div> <div style="text-align: center;"> </div> <div style="text-align: right;"> <p>Air bromin <i>Bromine water</i></p> <p>Asid sulfurik <i>Sulphuric acid</i></p> </div> </div>		
		4. Setengah persamaan pengoksidaan: $2I^- \rightarrow I_2 + 2e^-$ <i>Half equation for oxidation</i>	1	
		5. Setengah persamaan penurunan: $Br_2 + 2e^- \rightarrow 2Br^-$ <i>Half equation for reduction</i>	1	5

(b)	Tertib menaik kekuatan agen pengoksidaan <i>Ascending order of the strength of oxidising agents</i> $Zn^{2+}, X^{2+}, Cu^{2+}$		1		
	<b>Atau/ Or</b> Tertib menaik kekuatan agen penurunan <i>Ascending order of the strength of reducing agents</i> $Cu, X, Zn$				
	Set I				
	Nilai $E^{\circ}$ X lebih negatif daripada nilai $E^{\circ}$ Cu <i><math>E^{\circ}</math> value of X is more negative than <math>E^{\circ}</math> value of Cu</i>	Nilai $E^{\circ}$ ion $Cu^{2+}$ lebih positif daripada nilai $E^{\circ}$ ion $X^{2+}$ <i><math>E^{\circ}</math> value of <math>Cu^{2+}</math> ion is more positive than <math>E^{\circ}</math> value of <math>X^{2+}</math></i>			1
	Atom X lebih mudah membuang elektron // X ialah agen penurunan yang lebih kuat <i>Atom X is easier to release electron // X is stronger reducing agent</i>	Ion $Cu^{2+}$ lebih mudah menerima elektron // Ion $Cu^{2+}$ ialah agen pengoksidaan yang lebih kuat <i><math>Cu^{2+}</math> ion is easier to receive electron // <math>Cu^{2+}</math> ion is stronger oxidising agent</i>			1
	Tindak balas berlaku. <i>Reaction occur</i>				1
	Set II				
	Nilai $E^{\circ}$ X kurang negatif daripada nilai $E^{\circ}$ Zn <i><math>E^{\circ}</math> value of X is less negative than <math>E^{\circ}</math> value of Zn</i>	Nilai $E^{\circ}$ ion $Zn^{2+}$ lebih negatif daripada nilai $E^{\circ}$ ion $X^{2+}$ <i><math>E^{\circ}</math> value of <math>Zn^{2+}</math> ion is more negative than <math>E^{\circ}</math> value of <math>X^{2+}</math></i>			1
	Atom X lebih sukar membuang elektron // X ialah agen penurunan yang lebih lemah <i>Atom X is harder to release electron // X is weaker reducing agent</i>	Ion $Zn^{2+}$ lebih sukar menerima elektron // Ion $Zn^{2+}$ ialah agen pengoksidaan yang lebih lemah <i><math>Zn^{2+}</math> ion is harder to receive electron // <math>Zn^{2+}</math> ion is weaker oxidising agent</i>			1
	Tindak balas tidak berlaku. <i>Reaction is not occur</i>				1

	(c)	(i)	<p>1. Tuang larutan <b>asid hidroklorik</b> <math>1.0 \text{ mol dm}^{-3}</math> /pekat ke dalam bikar/ sel elektrolisis sehingga separuh penuh. <b>[mana-mana larutan garam klorida yang larut]</b> r: ammonium klorida, Kuprum(II) klorida</p> <p>2. Celup elektrod karbon ke dalam bikar// Penuhi dua tabung uji dengan asid hidroklorik dan telangkupkan ke atas elektrod karbon dalam sel elektrolisis</p> <p>3. Sambung elektrod karbon pada suis dan bateri dengan wayar penyambung</p> <p>4. Ulang Langkah 1- 3 menggunakan asid hidroklorik <math>0.001 \text{ mol dm}^{-3}</math> /cair</p> <p>1. <i>Pour half full of beaker/ electrolytic cell with hydrochloric acid <math>1.0 \text{ mol dm}^{-3}</math> /concentrated [any soluble chloride salt solution ] r: <math>\text{NH}_4\text{Cl}</math> and <math>\text{CuCl}_2</math></i></p> <p>2. <i>Dip carbon electrodes into the beaker// Fill two test tubes with hydrochloric acid and invert on top of the carbon electrodes in the electrolytic cell</i></p> <p>3. <i>Connect the carbon electrode to the switch and battery with connecting wire</i></p> <p>4. <i>Repeat step 1- 3 using <math>0.001 \text{ mol dm}^{-3}</math> dilute hydrochloric acid</i></p>	1	4								
				1									
			1										
			1										
		(ii)	<table border="1"> <thead> <tr> <th>Set I</th> <th>Set II</th> </tr> </thead> <tbody> <tr> <td>Gas klorin dibebaskan <i>Chlorine gas is released</i></td> <td>Gas oksigen dibebaskan <i>Oxygen gas is released</i></td> </tr> <tr> <td>Ion klorida/ Ion <math>\text{Cl}^-</math> dinyahcas <i>Chloride ion/ <math>\text{Cl}^-</math> ion is discharged</i></td> <td>Ion hidroksida/ Ion <math>\text{OH}^-</math> dinyahcas <i>Hydroxide ion/ <math>\text{OH}^-</math> ion is discharged</i></td> </tr> <tr> <td>Kepekatan ion klorida lebih tinggi daripada ion hidroksida  <i>The concentration of chloride ion is higher than hydroxide ion</i></td> <td>Nilai <math>E^\circ</math> ion hidroksida lebih negative/ kurang positif daripada nilai <math>E^\circ</math> ion klorida  <i><math>E^\circ</math> value of hydroxide ion is more negative/ less positive than <math>E^\circ</math> value of chloride ion</i></td> </tr> </tbody> </table>	Set I	Set II	Gas klorin dibebaskan <i>Chlorine gas is released</i>	Gas oksigen dibebaskan <i>Oxygen gas is released</i>	Ion klorida/ Ion $\text{Cl}^-$ dinyahcas <i>Chloride ion/ <math>\text{Cl}^-</math> ion is discharged</i>	Ion hidroksida/ Ion $\text{OH}^-$ dinyahcas <i>Hydroxide ion/ <math>\text{OH}^-</math> ion is discharged</i>	Kepekatan ion klorida lebih tinggi daripada ion hidroksida  <i>The concentration of chloride ion is higher than hydroxide ion</i>	Nilai $E^\circ$ ion hidroksida lebih negative/ kurang positif daripada nilai $E^\circ$ ion klorida  <i><math>E^\circ</math> value of hydroxide ion is more negative/ less positive than <math>E^\circ</math> value of chloride ion</i>	1	3
Set I	Set II												
Gas klorin dibebaskan <i>Chlorine gas is released</i>	Gas oksigen dibebaskan <i>Oxygen gas is released</i>												
Ion klorida/ Ion $\text{Cl}^-$ dinyahcas <i>Chloride ion/ <math>\text{Cl}^-</math> ion is discharged</i>	Ion hidroksida/ Ion $\text{OH}^-$ dinyahcas <i>Hydroxide ion/ <math>\text{OH}^-</math> ion is discharged</i>												
Kepekatan ion klorida lebih tinggi daripada ion hidroksida  <i>The concentration of chloride ion is higher than hydroxide ion</i>	Nilai $E^\circ$ ion hidroksida lebih negative/ kurang positif daripada nilai $E^\circ$ ion klorida  <i><math>E^\circ</math> value of hydroxide ion is more negative/ less positive than <math>E^\circ</math> value of chloride ion</i>												
			1										
			1										
			<b>TOTAL</b>	<b>20</b>									

**PERATURAN PEMARKAHAN TAMAT**  
**END OF MARKING SCHEMES**