

**MODUL PINTAS  
TINGKATAN 5**

**4541/2**

**KIMIA  
Kertas 2**

$2\frac{1}{2}$  jam

**Dua jam tiga puluh minit**

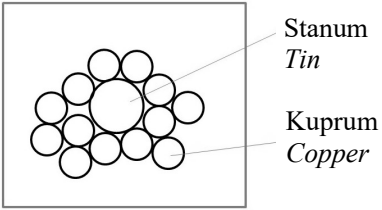
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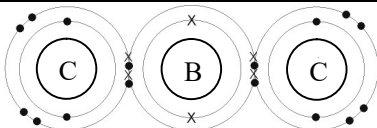
**PERATURAN PEMARKAHAN  
KIMIA K2  
4541/2**

**Bahagian A**  
**Section A**

Soalan <i>Question</i>		Jawapan <i>Answer</i>	Markah <i>Marks</i>
1.	(a)	Nombor nukleon <i>Nucleon number</i>	1
	(b)	${}^{16}_8\text{Y}$	1
	(c)	<ul style="list-style-type: none"> <li>• W dan X</li> <li>• Atom W dan X mempunyai bilangan proton yang sama tetapi bilangan neutron yang berbeza</li> <li>• <i>W and X</i></li> <li>• <i>Atoms W and X have the same number of protons but different number of neutrons</i></li> </ul>	1 1
	(d)	2.4	1
		JUMLAH / <i>TOTAL</i>	5

Soalan <i>Question</i>		Jawapan <i>Answer</i>	Markah <i>Marks</i>
2.	(a)	Stanum <i>Tin</i>	1
	(b)	 <ul style="list-style-type: none"> <li>• 2 jenis atom <i>2 types of atom</i></li> <li>• Label atom <i>Label the atoms</i></li> </ul>	1 1
	(c)	Permukaan gangsa lebih berkilat daripada kuprum tulen. <i>The surface of bronze is more shiny compared to pure copper.</i>	1
	(d)	Loyang <i>Brass</i>	1
JUMLAH / <i>TOTAL</i>			5

Soalan <i>Question</i>		Jawapan <i>Answer</i>			Markah <i>Marks</i>
3.	(a)	Formula kimia yang menunjukkan nisbah teringkas bagi bilangan atom setiap unsur yang terdapat dalam sebatian. <i>Chemical formula that shows the simplest ratio of number of atoms of each element in a compound.</i>			1
	(b)	Atom <i>Atom</i>	Kuprum <i>Copper</i>	Oksigen <i>Oxygen</i>	1  1  1  1
		Jisim, g <i>Mass, g</i>	147.95 - 135.15 = 12.8	151.15 - 147.95 = 3.2	
		Bilangan mol, mol <i>Number of moles, mol</i>	$\frac{12.8}{64}$ = 0.2	$\frac{3.2}{16}$ = 0.2	
		Nisbah mol teringkas <i>Simplest ratio of moles</i>	1	1	
		Formula empirik <i>Empirical formula</i>	CuO		
	(c)	Magnesium adalah lebih reaktif daripada hidrogen. <i>Magnesium is more reactive than hydrogen.</i>			1
				JUMLAH / <i>TOTAL</i>	6

Soalan <i>Question</i>			Jawapan <i>Answer</i>	Markah <i>Marks</i>
4.	(a)	(i)	E	1
		(ii)	<ul style="list-style-type: none"> <li>Elektron valens atom E lebih jauh dari nukleus berbanding dengan atom A</li> <li>Daya tarikan antara nukleus kepada elektron valens atom E lebih lemah berbanding dengan atom A // Atom E lebih mudah untuk melepaskan elektron valens berbanding dengan atom A</li> <li><i>The valence electron of atom E is further away from the nucleus compared to atom A</i></li> <li><i>The attractive forces between nucleus to the valence electron of atom E is weaker than atom A // Atom E easier to release the valence electron compared to atom A</i></li> </ul>	1 1
	(b)	(i)	 <ul style="list-style-type: none"> <li>Tunjuk nukleus dan bilangan elektron yang betul <i>Show nucleus and correct number of electrons</i></li> <li>Pasangan elektron berkongsi yang betul <i>The correct sharing electron pair</i></li> </ul>	1 1
		(ii)	Ia tidak boleh mengkonduksi elektrik dalam semua keadaan. <i>It cannot conduct electricity in all states.</i>	1
	(c)		Membentuk ion berwarna // Mempunyai lebih daripada satu nombor pengoksidaan // Membentuk ion kompleks <i>Form coloured ions // Have more than one oxidation number // Form complex ion</i>	1
JUMLAH / <i>TOTAL</i>				7

Soalan <i>Question</i>			Jawapan <i>Answer</i>	Markah <i>Marks</i>
5.	(a)	(i)	<ul style="list-style-type: none"> <li>• Kuprum</li> <li>• Nilai keupayaan elektrod piawai, <math>E^\circ</math> bagi kuprum adalah lebih positif daripada zink</li> <li>• <i>Copper</i></li> <li>• <i>Standard electrode potential value, <math>E^\circ</math> of copper is more positive than zinc</i></li> </ul>	1 1
		(ii)	$Zn + Cu^{2+} \rightarrow Zn^{2+} + Cu$	1
		(iii)	$E^\circ_{sel} = +0.34 - (-0.76) = +1.10 \text{ V}$ $E^\circ_{cell}$	1
	(b)	(i)	Klorin <i>Chlorine</i>	1
		(ii)	<ul style="list-style-type: none"> <li>• Kepekatan ion klorida adalah lebih tinggi daripada ion hidroksida</li> <li>• Dua ion klorida membebaskan dua elektron untuk membentuk molekul klorin</li> <li>• <i>Concentration of chloride ions is higher than hydroxide ions</i></li> <li>• <i>Two chloride ions release two electrons to form chlorine molecule</i></li> </ul>	1 1
		(iii)	$Cu^{2+} + 2e^- \rightarrow Cu$	1
JUMLAH / <i>TOTAL</i>				8

Soalan <i>Question</i>		Jawapan <i>Answer</i>	Markah <i>Marks</i>
6.	(a)	Haba yang dibebaskan apabila 1 mol argentum klorida termendak daripada larutan akueus yang mengandungi ion argentum, Ag <sup>+</sup> dan ion klorida, Cl <sup>-</sup> . <i>Heat released when 1 mole of silver chloride is precipitated from the aqueous solution of silver ions, Ag<sup>+</sup> and chloride ions, Cl<sup>-</sup>.</i>	1
	(b)	Mendakan putih terbentuk. <i>White precipitate is formed.</i>	1
	(c)	(i) $H = (50+50)(4.2)(3)$ $= 1260 \text{ J}$	1
		(ii) <ul style="list-style-type: none"> <li>• Bilangan mol Ag<sup>+</sup>/Cl<sup>-</sup> = <math>\frac{0.5 \times 50}{1000}</math> <math>= 0.025 \text{ mol}</math></li> <li>• 1 mol Ag<sup>+</sup>/Cl<sup>-</sup> : 1 mol AgCl 0.025 mol Ag<sup>+</sup>/Cl<sup>-</sup> : 0.025 mol AgCl</li> <li>• <math>\Delta H = \frac{1.26}{0.025}</math> <math>= -50.4 \text{ kJ mol}^{-1}</math></li> </ul>	1 1 1
	(d)	Eksotermik <i>Exothermic</i>	1
	(e)	<ul style="list-style-type: none"> <li>• 3 °C</li> <li>• Pemendakan argentum klorida hanya melibatkan ion argentum dan ion klorida sahaja</li> <li>• 3 °C</li> <li>• <i>The precipitation of silver chloride only involved silver ions and chloride ions</i></li> </ul>	1 1
		JUMLAH / <i>TOTAL</i>	9

Soalan <i>Question</i>		Jawapan <i>Answer</i>	Markah <i>Marks</i>
7.	(a)	$\text{CaCO}_3 + 2\text{H}^+ \rightarrow \text{Ca}^{2+} + \text{CO}_2 + \text{H}_2\text{O}$	1
	(b)	(i) Kadar tindak balas bagi Set I adalah lebih tinggi daripada Set II. <i>The rate of reaction in Set I is higher than Set II.</i>	1
		(ii) <ul style="list-style-type: none"> <li>• Saiz kalsium karbonat dalam Set I lebih kecil daripada Set II</li> <li>• Jumlah luas permukaan kalsium karbonat yang terdedah kepada perlanggaran dalam Set I lebih besar daripada Set II</li> <li>• Frekuensi perlanggaran antara kalsium karbonat dan ion hidrogen dalam Set I lebih tinggi dari Set II</li> <li>• Frekuensi perlanggaran berkesan antara kalsium karbonat dan ion hidrogen dalam Set I lebih tinggi dari Set II</li> <li>• <i>The size of calcium carbonate in Set I is smaller than Set II</i></li> <li>• <i>The total surface area exposed to collision of calcium carbonate in Set I is larger than Set II</i></li> <li>• <i>The frequency of collision between calcium carbonate and hydrogen ions in Set I is higher than Set II</i></li> <li>• <i>The frequency of effective collision between calcium carbonate and hydrogen ions in Set I is higher than Set II</i></li> </ul>	1 1 1 1
	(c)	<p>Isi padu gas karbon dioksida / <math>\text{cm}^3</math> <i>Volume of carbon dioxide gas / <math>\text{cm}^3</math></i></p> <p>Label paksi dan graf <i>Label of axis and graph</i></p> <p>Bentuk graf yang betul <i>Correct shape of graph</i></p>	1 1
	(d)	<ul style="list-style-type: none"> <li>• Ya</li> <li>• Bilangan mol ion hidrogen adalah dua kali ganda dalam asid sulfurik</li> <li>• <i>Yes</i></li> <li>• <i>The number of hydrogen ions are double in sulphuric acid</i></li> </ul>	1 1
JUMLAH / <i>TOTAL</i>			10



Soalan <i>Question</i>			Jawapan <i>Answer</i>	Markah <i>Marks</i>
8.	(a)	(i)	Saponifikasi <i>Saponification</i>	1
		(ii)	$3 \text{CH}_3(\text{CH}_2)_{14} \overset{\text{O}}{\parallel} \text{C} - \text{ONa}$	1
		(iii)	<ul style="list-style-type: none"> <li>Jisim molar sabun = <math>16(12) + 31(1) + 2(16) + 23 = 278</math> <i>Molar mass of soap</i></li> <li>Jisim sabun = <math>0.05 \times 278 = 13.9 \text{ g}</math> <i>Mass of soap</i></li> </ul>	1 1
			(iv)	Kalium hidroksida <i>Potassium hydroxide</i>
	(b)	(i)	<ul style="list-style-type: none"> <li>Agen pencuci A</li> <li>Tidak membentuk kekat dalam air liat</li> <li><i>Cleaning agent A</i></li> <li><i>Does not form scum in hard water</i></li> </ul>	1 1
		(ii)	<ul style="list-style-type: none"> <li>Isi padu air liat yang sama dituangkan ke dalam dua tabung didih</li> <li>Sabun dan detergen masing-masing ditambahkan ke dalam setiap tabung didih itu dan digoncangkan</li> <li>Mendakan tak terlarutkan / kekat akan diperhatikan dalam campuran sabun dan air liat, manakala tiada mendakan terbentuk dalam campuran detergen dan air liat</li> </ul>	1 1 1
			<ul style="list-style-type: none"> <li><i>Equal volumes of hard water is poured into two boiling tubes</i></li> <li><i>Soap and detergent are added into each of the boiling tubes respectively and shaken</i></li> <li><i>Insoluble precipitate / scum will be observed in the mixture of soap and hard water, while no precipitate is formed in the mixture of detergent and hard water</i></li> </ul>	
				JUMLAH / <i>TOTAL</i>

**Bahagian B**  
**Section B**

Soalan <i>Question</i>			Jawapan <i>Answer</i>	Markah <i>Marks</i>
9.	(a)	(i)	P1: Larutan P - Asid hidroklorik <i>Solution P - Hydrochloric acid</i>	1
			P2: Larutan Q - Asid etanoik <i>Solution Q - Ethanoic acid</i>	1
			P3: Larutan Q / Asid etanoik mempunyai nilai pH yang lebih tinggi <i>Solution Q / Ethanoic acid has higher pH value</i>	1
			P4: Asid etanoik adalah asid lemah <i>Ethanoic acid is a weak acid</i>	1
			P5: Asid etanoik mengion separa dalam air untuk menghasilkan kepekatan ion hidrogen yang rendah <i>Ethanoic acid ionises partially in water to produce low concentration of hydrogen ions</i>	1
		(ii)	P1: Formula bahan dan hasil tindak balas yang betul <i>Correct formula of reactants and products</i>	1 + 1
			P2: Persamaan yang seimbang <i>Balanced equation</i>	
			P3: Bilangan mol larutan P <i>Number of moles of solution P</i>	
			P4: Nisbah mol <i>Mole ratio</i>	
			P5: Jisim kuprum(II) klorida dengan unit yang betul <i>Mass of copper(II) chloride with correct unit</i>	
			$\text{CuO} + 2\text{HCl} \rightarrow \text{CuCl}_2 + \text{H}_2\text{O}$	
			Bilangan mol, HCl = $\frac{100 \times 0.1}{1000}$ <i>Number of moles</i> = 0.01 mol	1
			2 mol HCl : 1 mol CuCl <sub>2</sub> 0.01 mol HCl : 0.005 mol CuCl <sub>2</sub>	1
			Jisim, CuCl <sub>2</sub> = $0.005 \times 135$ <i>Mass</i> = 0.675 g	1
(b)	(i)	V: Karbon dioksida <i>Carbon dioxide</i>	1	
		W: Zink karbonat <i>Zinc carbonate</i>	1	
		Y: Zink nitrat <i>Zinc nitrate</i>	1	
		Z: Zink oksida <i>Zinc oxide</i>	1	
		(ii)	P1: Tuangkan 2 cm <sup>3</sup> larutan Y ke dalam tabung uji A dan B <i>Pour 2 cm<sup>3</sup> solution Y into test tubes A and B</i>	1
			P2: Tambah larutan ammonia sehingga berlebihan ke dalam tabung uji A dan goncangkan <i>Add ammonia solution until excess into the test tube A and shake</i>	1
			P3: Mendakan putih terbentuk dan larut dalam larutan ammonia berlebihan <i>White precipitate is formed and dissolve in excess ammonia solution</i>	1
			P4: Tambah 2 cm <sup>3</sup> asid sulfurik cair diikuti dengan 2 cm <sup>3</sup> larutan ferum(II) sulfat ke dalam tabung uji B <i>Add 2 cm<sup>3</sup> dilute sulphuric acid followed by 2 cm<sup>3</sup> iron(II) sulphate solution into the test tube B</i>	1
			P5: Tambah asid sulfurik pekat mengalir perlahan melalui dinding tabung uji	1

			<i>Add concentrated sulphuric acid flow slowly through the wall of the test tube</i> <b>P6: Cincin perang terbentuk</b> <i>Brown ring is formed</i>	1
			<b>JUMLAH / TOTAL</b>	20

Soalan <i>Question</i>			Jawapan <i>Answer</i>	Markah <i>Marks</i>
10.	(a)	(i)	Polimer semula jadi <i>Natural polymer</i> Kanji // Protein // Kapas <i>Starch // Protein // Cotton</i>	1
			Polimer sintetik <i>Synthetic polymer</i> Nilon // Polietena // Polistirena // Polivinil klorida (PVC) <i>Nylon // Polyethene // Polystyrene // Polyvinyl chloride (PVC)</i>	1
		(ii)	P1: Formula bahan dan hasil tindak balas yang betul <i>Correct formula of reactants and products</i>	1
			P2: Persamaan yang seimbang <i>Balanced equation</i>	1
			$n \text{C}_6\text{H}_{16}\text{N}_2 + n \text{C}_{10}\text{H}_{16}\text{Cl}_2\text{O}_2 \rightarrow (\text{C}_{16}\text{H}_{30}\text{N}_2\text{O}_2)_n + n \text{HCl}$	
	(b)	(i)	P1: Formula struktur monomer getah yang betul <i>Correct structural formula of natural rubber monomer</i>	1
			$\begin{array}{ccccccc} & \text{H} & \text{CH}_3 & \text{H} & \text{H} & & \\ &   &   &   &   & & \\ \text{H} & - \text{C} & = \text{C} & - \text{C} & = \text{C} & - \text{H} & \\ & & & \text{Isoprene} & & & \end{array}$	1
			P2: 2-metilbut-1,3-diena <i>2-methylbut-1,3-diene</i>	1
			P3, P4, P5 Mana-mana tiga ciri-ciri <i>Any three characteristics</i> Lembut // Kenyal // Penebat haba // Mudah dioksidakan // Tidak tahan haba <i>Soft // Elastic // Heat insulator // Easily oxidised // Not heat resistant</i>	1 1 1
		(ii)	P1: Bakteria dalam udara menghasilkan asid laktik <i>Bacteria in the air produces lactic acid</i>	1
			P2: Asid laktik mengandungi ion H <sup>+</sup> <i>Lactic acid contains H<sup>+</sup> ions</i>	1
			P3: Ion-ion hidrogen meneutralkan cas-cas negatif pada membran protein <i>Hydrogen ions neutralise the negative charges on the protein membrane</i>	1
			P4: Zarah-zarah getah berlanggar antara satu sama lain menyebabkan membran protein pecah <i>The latex particles collide each other cause the protein membrane to break up</i>	1
			P5: Polimer getah bergabung antara satu sama lain dan menyebabkan lateks menggumpal <i>The rubber polymers combine each other and cause the latex to coagulate</i>	1
			P6: Tambah larutan ammonia ke dalam lateks <i>Add ammonia solution into the latex</i>	1
			P7: Ion hidroksida daripada larutan ammonia akan meneutralkan asid yang dihasilkan oleh bakteria <i>The hydroxide ions from ammonia solution will neutralise the acid produced by bacteria</i>	1
			P8: Membran protein getah kekal bercas negatif dan menolak antara satu sama lain <i>Protein membrane of latex remains negative charged and repel each other</i>	1
		(iii)	P1: Getah asli adalah lembut dan tidak tahan haba <i>Natural rubber is soft and not heat resistant</i>	1
			P2: Getah asli menjadi melekit pada suhu yang tinggi <i>Natural rubber becomes sticky at high temperature</i>	1

			P3: Pemvulkanan <i>Vulcanisation</i>	1
			JUMLAH / <i>TOTAL</i>	20

**Bahagian C**  
**Section C**

Soalan <i>Question</i>	Jawapan <i>Answer</i>	Markah <i>Marks</i>
11. (a)	$\begin{array}{cccc} \text{H} & \text{H} & \text{H} & \text{H} \\   &   &   &   \\ \text{H}-\text{C}-\text{C}=\text{C}-\text{C}-\text{H} \\   & & &   \\ \text{H} & & & \text{H} \end{array}$	1
	<p>But-2-ena <i>But-2-ene</i></p>	1
	$\begin{array}{cccc} & \text{H} & & \\ &   & & \\ \text{H}-\text{C}-\text{H} & & & \\   &   &   & \\ \text{H}-\text{C}=\text{C}-\text{C}-\text{H} \\ & &   & \\ & & \text{H} & \end{array}$	1
	<p>2-metilpropena <i>2-methylpropene</i></p>	1
(b) (i)	P1: Tindak balas I - Pengoksidaan <i>Reaction I - Oxidation</i>	1
	P2: Tindak balas II - Pendehidratan <i>Reaction II - Dehydration</i>	1
	P3: Tindak balas III - Pengesteran <i>Reaction III - Esterification</i>	1
	P4: Sebatian X - Etanol <i>Compound X - Ethanol</i>	1
	P5: Siri homolog - Alkohol <i>Homologous series - Alcohol</i>	1
	P6: Formula molekul - C <sub>2</sub> H <sub>5</sub> OH // C <sub>2</sub> H <sub>6</sub> O <i>Molecular formula</i>	1
	Susunan radas Tindak balas II <i>Apparatus set-up Reaction II</i>	
	P7: Gambar rajah berfungsi <i>Functional diagram</i>	1
P8: Label bahan <i>Labelled of materials</i>	1	
	<p>Wul kaca direndam dengan etanol, C<sub>2</sub>H<sub>5</sub>OH</p>	

		Prosedur: <i>Procedures:</i>	
		P1: Tuang 2 cm <sup>3</sup> asid etanoik glasial ke dalam tabung didih. <i>Pour 2 cm<sup>3</sup> glacial ethanoic acid into a boiling tube.</i>	1
		P2: Tambah 4 cm <sup>3</sup> etanol ke dalam asid etanoik glasial. <i>Add 4 cm<sup>3</sup> ethanol into glacial ethanoic acid.</i>	1
		P3: Tambah lima titis asid sulfurik pekat pada campuran dengan penitis dan goncang tabung didih. <i>Add five drops of concentrated sulphuric acid into the mixture using dropper and shake the boiling tube.</i>	1
		P4: Panaskan campuran dengan perlahan dengan nyalaan kecil sehingga mendidih selama dua hingga tiga minit <i>Heat the mixture slowly with small flame until it is boiled for two to three minutes</i>	1
	(ii)	P5: Tuang kandungan tabung didih ke dalam bikar yang berisi air separuh penuh <i>Pour the content of boiling tube into beaker with half filled with water</i>	1
		P6: Rekodkan pemerhatian <i>Record the observation</i>	1
		Persamaan kimia: <i>Chemical equation:</i>	
		P7: Formula bahan tindak balas dan hasil tindak balas yang betul <i>Correct formula of reactants and products</i>	1
		P8: Persamaan yang seimbang <i>Balanced equation</i>	1
		$C_2H_5OH + CH_3COOH \rightarrow CH_3COOC_2H_5 + H_2O$	
		JUMLAH / TOTAL	20

**JAWAPAN TAMAT**  
**END OF ANSWER PAPER**