



**MODUL PINTAS
TINGKATAN 5**

4541/2

**KIMIA
Kertas 2**

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

Dua jam tiga puluh minit

PERATURAN PEMARKAHAN

KIMIA K2

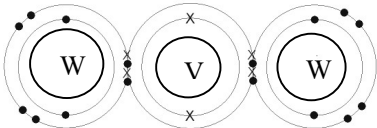
4541/2

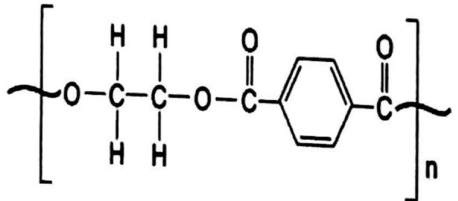
Bahagian A
Section A

Soalan <i>Question</i>		Jawapan <i>Answer</i>	Markah <i>Marks</i>
1.	(a)	Jumlah bilangan proton dan neutron yang terdapat dalam suatu atom. <i>The total number of protons and neutrons in the atom.</i>	1
	(b)	Proton	1
	(c)	(i) $^{23}_{11}\text{Na}$	1
		(ii) 2.6	1
		(iii) Na_2O	1
		JUMLAH / <i>TOTAL</i>	5

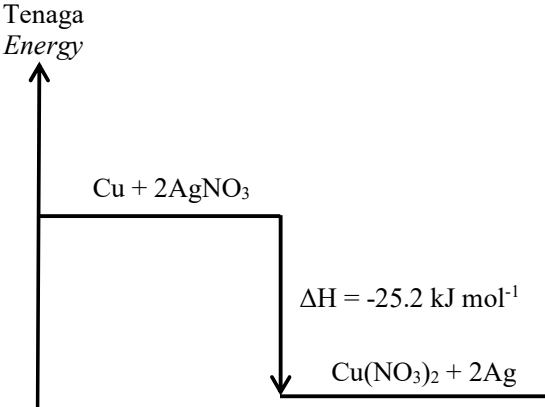
Soalan <i>Question</i>			Jawapan <i>Answer</i>	Markah <i>Marks</i>
2.	(a)	(i)	Stanum <i>Tin</i>	1
		(ii)	<ul style="list-style-type: none"> •Atom stanum yang berlainan saiz mengganggu susunan teratur atom kuprum. •<i>Tin atoms of different sizes disrupted the orderly arrangement of copper atoms.</i> 	1
			<ul style="list-style-type: none"> •Lapisan atom dalam gangsa sukar menggelongsor di atas satu sama lain apabila daya dikenakan. •<i>The layer of atoms in bronze is difficult to slide over one another when force is applied.</i> 	1
	(b)		<ul style="list-style-type: none"> •Kaca P •<i>Glass P</i> •Kaca P lebih tahan haba apabila dipanaskan pada suhu yang tinggi. •<i>Glass P is more resistance to heat when heated to high temperature.</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)	(i) <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Atom <i>Atom</i></th> <th>C</th> <th>H</th> <th>O</th> </tr> </thead> <tbody> <tr> <td>Jisim (%) <i>Mass (%)</i></td> <td>48.65</td> <td>8.11</td> <td>43.24</td> </tr> <tr> <td>Bilangan mol, mol <i>Number of moles, mol</i></td> <td>$\frac{48.65}{12}$ = 4.0542</td> <td>$\frac{8.11}{1}$ = 8.11</td> <td>$\frac{43.24}{16}$ = 2.7025</td> </tr> <tr> <td>Nisbah mol teringkas <i>Simplest ratio of moles</i></td> <td>$\frac{4.0542}{2.7025}$ = 1.5 = 3</td> <td>$\frac{8.11}{2.7025}$ = 3 = 6</td> <td>$\frac{2.7025}{2.7025}$ = 1 = 2</td> </tr> <tr> <td>Formula empirik <i>Empirical formula</i></td> <td colspan="3" style="text-align: center;">C₃H₆O₂</td> </tr> </tbody> </table>	Atom <i>Atom</i>	C	H	O	Jisim (%) <i>Mass (%)</i>	48.65	8.11	43.24	Bilangan mol, mol <i>Number of moles, mol</i>	$\frac{48.65}{12}$ = 4.0542	$\frac{8.11}{1}$ = 8.11	$\frac{43.24}{16}$ = 2.7025	Nisbah mol teringkas <i>Simplest ratio of moles</i>	$\frac{4.0542}{2.7025}$ = 1.5 = 3	$\frac{8.11}{2.7025}$ = 3 = 6	$\frac{2.7025}{2.7025}$ = 1 = 2	Formula empirik <i>Empirical formula</i>	C ₃ H ₆ O ₂			1 1 1
Atom <i>Atom</i>	C	H	O																				
Jisim (%) <i>Mass (%)</i>	48.65	8.11	43.24																				
Bilangan mol, mol <i>Number of moles, mol</i>	$\frac{48.65}{12}$ = 4.0542	$\frac{8.11}{1}$ = 8.11	$\frac{43.24}{16}$ = 2.7025																				
Nisbah mol teringkas <i>Simplest ratio of moles</i>	$\frac{4.0542}{2.7025}$ = 1.5 = 3	$\frac{8.11}{2.7025}$ = 3 = 6	$\frac{2.7025}{2.7025}$ = 1 = 2																				
Formula empirik <i>Empirical formula</i>	C ₃ H ₆ O ₂																						
		(ii) <p>(C₃H₆O₂)_n = 148 [3(12) + 6(1) + 2(16)]_n = 148 74n = 148 n = 2 Formula molekul X = C₆H₁₂O₄ <i>Molecular Formula X = C₆H₁₂O₄</i></p>	1 1																				
		JUMLAH / <i>TOTAL</i>	6																				

Soalan <i>Question</i>			Jawapan <i>Answer</i>	Markah <i>Marks</i>
4.	(a)	(i)	Kovalen <i>Covalent</i>	1
		(ii)	 <ul style="list-style-type: none"> •Tunjuk nukleus dan bilangan elektron yang betul •<i>Show nucleus and correct number of electrons</i> •Pasangan elektron berkongsi yang betul •<i>The correct sharing electron pair</i> 	1 1
	(b)	(i)	$2Y + X_2 \rightarrow 2YX$	1
		(ii)	Bilangan mol Y = $\frac{0.23}{23} = 0.01$ mol <i>Number of moles Y</i> 2 mol Y : 2 mol YX Jisim YX = $0.01 \times 58.5 = 0.585$ g <i>Mass YX</i>	1 1 1
JUMLAH / <i>TOTAL</i>				7

Soalan <i>Question</i>			Jawapan <i>Answer</i>	Markah <i>Marks</i>
5.	(a)	(i)	X: Getah tak ter Vulkan <i>Unvulcanised rubber</i> Y: Getah ter Vulkan <i>Vulcanised rubber</i>	1 1
		(ii)	<ul style="list-style-type: none"> •Pempvulkanan •<i>Vulcanisation</i> •Sulfur dipanaskan bersama dengan getah asli / Jalur getah direndam dengan larutan disulfur diklorida dalam metilbenzena untuk beberapa jam dan kemudian dikeringkan. •<i>Sulphur is heated together with natural rubber / Rubber stripe is soaked in disulphur dichloride solution in methylbenzene for a few hours and then dried.</i> 	1 1
		(iii)	Getah Y lebih kenyal / lebih keras / lebih tahan suhu yang tinggi daripada getah X <i>Rubber Y is more elastic / more harder / more resistant to high heat than rubber X</i>	1
(b)	(i)	Pempolimeran kondensasi <i>Condensation polymerisation</i>	1	
		(ii)	 <ul style="list-style-type: none"> •Melukis formula struktur polimer dengan betul •<i>Draw the structural formula of the polymer correctly</i> •Menulis [] dan n •<i>Write [] and n</i> 	1 1
JUMLAH / <i>TOTAL</i>				8

Soalan <i>Question</i>			Jawapan <i>Answer</i>	Markah <i>Marks</i>
6.	(a)	(i)	Kosmetik ialah bahan atau produk yang digunakan secara luaran untuk membersihkan, melindungi atau mencantikkan penampilan seseorang. <i>Cosmetics are materials or products that are used externally to cleanse, protect or enhance one's appearances.</i>	1
		(ii)	Pewarna / air / pengawet / pelembab / pewangi / pengemulsi / pemekat (pilih mana-mana dua) <i>Dyes / water / preservatives / moisturisers / fragrances / emulsifiers / thickeners (choose any two)</i>	1 + 1
	(b)	(i)	Kulit merengsa / kerosakan ginjal / pengurangan pigmentasi mengakibatkan pendedahan kulit kepada sinaran UV / kulit menjadi hipersensitif (pilih mana-mana dua) <i>Skin irritation / kidney damage / reduction of pigmentation results in skin exposure to UV rays / skin becomes hypersensitive (choose any two)</i>	1 + 1
		(ii)	Guna kosmetik buatan sendiri yang mengandungi bahan semula jadi / baca label dan faham kandungan sesuatu kosmetik sebelum menggunakannya <i>Use homemade cosmetics that contain natural ingredients / read the label and understand the content of a cosmetic before using it</i>	1
	(c)	(i)	Asid benzoik menghalang sos cili daripada rosak dengan memperlambatkan pertumbuhan mikroorganisma. <i>Benzoic acid prevents chilli sauces from being spoilt by slowing down the growth of microorganism.</i>	1
		(ii)	Keguguran rambut / pening kepala <i>Falling hair / headache</i>	1
		(iii)	Melambatkan pengoksidaan lemak dalam makanan. <i>Slow down the oxidation of fats in food.</i>	1
			JUMLAH / TOTAL	9

Soalan <i>Question</i>		Jawapan <i>Answer</i>	Markah <i>Marks</i>
7.	(a)	Haba yang dibebaskan apabila 1 mol argentum disesarkan daripada larutan argentum nitrat oleh kuprum. <i>Heat released when 1 mol of silver is displaced from silver nitrate solution by copper.</i>	1
	(b)	$\text{Cu} + 2\text{Ag}^+ \rightarrow \text{Cu}^{2+} + 2\text{Ag}$	1
	(c) (i)	1260 J / 1.26 kJ	1
	(ii)	0.05 mol	1
	(iii)	$\frac{1260}{0.05}$ = - 25.2 kJ mol ⁻¹	1
	(d)	 <p>•Paksi tenaga dan aras tenaga yang betul •Correct energy axis and energy level •Label bahan tindak balas, hasil tindak balas dan ΔH yang betul •Correct label of reactants, products and ΔH</p>	1 1
	(e) (i)	Haba penyesaran argentum oleh zink lebih tinggi daripada 25.2 kJ mol ⁻¹ . <i>Heat of displacement of silver by zinc is more than 25.2 kJ mol⁻¹.</i>	1
	(ii)	Zink lebih elektropositif daripada kuprum. <i>Zinc is more electropositive than copper.</i>	1
JUMLAH / TOTAL			10

Soalan <i>Question</i>			Jawapan <i>Answer</i>	Markah <i>Marks</i>
8.	(a)	(i)	Air <i>Water</i>	1
		(ii)	Molekul HCl mengion dalam air untuk menghasilkan ion hidrogen dan ion klorida yang bebas bergerak. <i>HCl molecules ionize in water to produce free moving hydrogen ions and chloride ions.</i>	1
	(b)	(i)	$H_2SO_4 + 2KOH \rightarrow K_2SO_4 + 2H_2O$ •Formula kimia bahan dan hasil tindak balas yang betul • <i>Correct chemical formula of reactants and products</i> •Persamaan kimia yang seimbang • <i>Balanced chemical equation</i>	1 1
		(ii)	Bilangan mol KOH = $\frac{(0.1)(50)}{1000} = 0.005 \text{ mol}$ <i>Number of moles KOH</i> 1 mol H ₂ SO ₄ : 2 mol KOH 0.0025 mol H ₂ SO ₄ : 0.005 mol KOH Kemolaran H ₂ SO ₄ = $\frac{(0.0025)(1000)}{25} = 0.1 \text{ mol dm}^{-3}$ <i>Molarity H₂SO₄</i>	1 1 1
		(iii)	•Tambah 2 cm ³ asid hidroklorik cair ke dalam tabung uji yang mengandungi 2 cm ³ larutan garam. • <i>Add 2 cm³ of dilute hydrochloric acid into the test tube containing 2 cm³ of salt solution.</i> •Tambah larutan barium klorida ke dalam tabung uji. • <i>Add barium chloride solution into the test tube.</i> •Mendakan putih terbentuk mengesahkan kehadiran ion SO ₄ ²⁻ . • <i>White precipitate formed confirms the present of SO₄²⁻ ions.</i>	1 1 1
			JUMLAH / <i>TOTAL</i>	10

Bahagian B
Section B

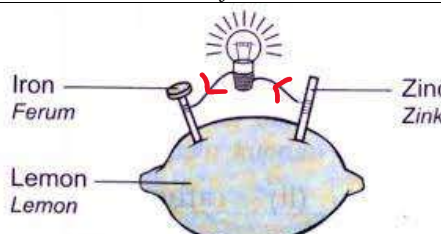
Soalan <i>Question</i>			Jawapan <i>Answer</i>	Markah <i>Marks</i>
9.	(a)	(i)	P1: Perubahan kuantiti bahan tindak balas / hasil tindak balas per unit masa. <i>Change of quantity of reactants / products per unit of time.</i>	1
		(ii)	P1: Jenis A <i>Type A</i> P2: Saiz potongan ayam lebih kecil / Jumlah luas permukaan yang terdedah lebih besar <i>The size of the chicken pieces is smaller / Larger total exposed surface area</i> P3: Kadar tindak balas tinggi / Masa untuk memanggang ayam lebih cepat <i>Rate of reaction is high / Time to roast the chicken is faster</i>	1 1 1
	(b)	(i)	P1: Magnesium / Zink <i>Magnesium / Zinc</i> P2: Asid hidroklorik / Asid nitrik <i>Hydrochloric acid / Nitric acid</i> $Mg + 2HCl \rightarrow MgCl_2 + H_2$ / $Mg + 2HNO_3 \rightarrow Mg(NO_3)_2 + H_2$ $Zn + 2HCl \rightarrow ZnCl_2 + H_2$ / $Zn + 2HNO_3 \rightarrow Zn(NO_3)_2 + H_2$ P3: Formula kimia bahan dan hasil tindak balas yang betul <i>Correct chemical formula of reactants and products</i> P4: Persamaan kimia yang seimbang <i>Balanced chemical equation</i>	1 1 1 1
		(ii)	P1: Eksperimen I = $3 \text{ cm}^3 \text{ s}^{-1}$ <i>Experiment I</i> P2: Eksperimen II = $1.5 \text{ cm}^3 \text{ s}^{-1}$ <i>Experiment II</i>	1 1
		(iii)	P1: Kadar tindak balas Eksperimen I lebih tinggi daripada Eksperimen II. <i>Rate of reaction of Experiment I is higher than Experiment II.</i> P2: Kepekatan asid HX dalam Eksperimen I lebih tinggi daripada Eksperimen II. <i>The concentration of HX acid in Experiment I is higher than Experiment II.</i> P3: Bilangan ion H^+ per unit isi padu dalam Eksperimen I lebih tinggi daripada Eksperimen II. <i>The number of H^+ ions per unit volume in Experiment I is higher than Experiment II.</i> P4: Frekuensi perlanggaran antara atom R dan ion H^+ dalam Eksperimen I lebih tinggi daripada Eksperimen II. <i>Frequency of collision between atom R and H^+ ions in Experiment I is higher than Experiment II.</i> P5: Frekuensi perlanggaran berkesan antara atom R dan ion H^+ dalam Eksperimen I lebih tinggi daripada Eksperimen II. <i>Frequency of effective collision between atom R and H^+ ions in Experiment I is higher than Experiment II.</i>	1 1 1 1 1
		(iv)	P1: Kuprum(II) sulfat / $CuSO_4$ <i>Copper(II) sulphate / $CuSO_4$</i> P2: Ia bertindak sebagai mangkin. <i>It acts as a catalyst.</i> P3: Mangkin menyediakan satu laluan alternatif dengan tenaga pengaktifan yang lebih rendah. <i>Catalyst provides an alternative pathway with the lower activation energy.</i> P4: Lebih banyak zarah berlanggar dapat mencapai tenaga pengaktifan yang lebih rendah. <i>More colliding particles can achieve the lower activation energy.</i>	1 1 1 1

			P5: Frekuensi pelanggaran berkesan antara atom R dan ion H ⁺ meningkat. <i>Frequency of effective collision between atom R and H⁺ ions increases.</i>	1
			JUMLAH / <i>TOTAL</i>	20

Soalan <i>Question</i>		Jawapan <i>Answer</i>	Markah <i>Marks</i>
10.	(a)	(i) P1: Molekul yang mempunyai formula molekul yang sama tetapi formula struktur yang berbeza. <i>Molecules that have the same molecular formula but different structural formula.</i>	1
		(ii) P1: $\begin{array}{cccc} \text{H} & \text{H} & \text{H} & \text{H} \\ & & & \\ \text{H}-\text{C} & -\text{C} & =\text{C} & -\text{C}-\text{H} \\ & & & \\ \text{H} & & & \text{H} \end{array}$ P2: But-2-ena <i>But-2-ene</i> P3: $\begin{array}{ccc} & \text{H} & \\ & & \\ \text{H} & -\text{C} & -\text{H} \\ & & \\ \text{H} & & \text{H} \\ & & \\ \text{H}-\text{C} & =\text{C} & -\text{C}-\text{H} \\ & & \\ & & \text{H} \end{array}$ P4: 2-metilpropena <i>2-methylpropene</i>	1 1 1
		(iii) P1: $\text{C}_4\text{H}_8 + 6\text{O}_2 \rightarrow 4\text{CO}_2 + 4\text{H}_2\text{O}$ P1: Formula kimia bahan dan hasil tindak balas yang betul <i>Correct chemical formula of reactants and products</i> P2: Persamaan kimia yang seimbang <i>Balanced chemical equation</i> P3: $\frac{1.2}{24} = 0.05 \text{ mol}$ P4: 1 mol C_4H_8 : 6 mol O_2 0.05 mol C_4H_8 : 0.3 mol O_2 P5: $0.3 \times 24 = 7.2 \text{ dm}^3 / 7200 \text{ cm}^3$	1 1 1 1 1
	(b)	P1: Proses I - Pendehidratan <i>Process I - Dehydration</i> P2: Proses II - Penghidrogenan <i>Process II - Hydrogenation</i> P3: Proses III - Pengoksidaan <i>Process III - Oxidation</i> P4: Proses IV - Pengesteran <i>Process IV - Esterification</i> P5: Sebatian P - Alkena <i>Compound P - Alkenes</i> P6: Sebatian Q - Alkana <i>Compound Q - Alkanes</i> P7: Sebatian R - Asid karboksilik <i>Compound R - Carboxylic acid</i> P8: Sebatian S - Ester <i>Compound S - Ester</i> P9: Sebatian P <i>Compound P</i> $\begin{array}{ccc} & & \text{H} \\ & & \\ \text{H} & & \text{C}-\text{H} \\ & \diagdown & \\ & \text{C} & =\text{C}-\text{C}-\text{H} \\ & / & \\ & \text{H} & \\ & & \text{H} \end{array}$	1 1 1 1 1 1 1 1 1

		<p>P10: Sebatian S Compound S</p>	1
		JUMLAH / TOTAL	20

Bahagian C
Section C

Soalan <i>Question</i>		Jawapan <i>Answer</i>	Markah <i>Marks</i>	
11.	(a)	<p>P1: Tindak balas yang melibatkan pengoksidaan dan penurunan yang berlaku serentak. <i>Reaction which involves oxidation and reduction that occurs simultaneously.</i></p> <p>P2: Sel I - Sel kimia <i>Cell I - Voltaic cell</i></p> <p>P3: Sel II - Sel elektrolisis <i>Cell II - Electrolytic cell</i></p>	1 1 1	
	(b)	(i)	<p>P1: $Zn Zn^{2+} Cu^{2+} Cu$</p> <p>P2: $E^0_{sel} = E^0_{katod} - E^0_{anod}$ $E^0_{cell} = E^0_{cathode} - E^0_{anode}$ $= +0.34 - (-0.76)$ $= +1.10 V$</p>	1 1 1
		(ii)	<p>P1: Ion kuprum(II) / Ion Cu^{2+} <i>Copper(II) ion / Cu^{2+} ion</i></p> <p>P2: Ion kuprum(II) menerima 2 elektron untuk membentuk atom kuprum. <i>Copper(II) ions gain 2 electrons to form copper atom.</i></p>	1 1
	(c)	<p>P1: Terminal positif - Y <i>Positive terminal - Y</i></p> <p>P2: Terminal negatif - Z <i>Negative terminal - Z</i></p> <p>P3: Pemerhatian pada Y - Gelembung gas tidak berwarna terbebas <i>Observation at Y - Colourless gas bubbles are released</i></p> <p>P4: Pemerhatian pada Z - Pepejal perang terbentuk <i>Observation at Z - Brown solid is formed</i></p>	1 1 1 1	
	(d)	 <p>P1: Gambar rajah berfungsi <i>Functional diagram</i> P2: Gambar rajah berlabel <i>Labelled diagram</i></p> <p>P3: Arah aliran elektron yang betul <i>Correct direction of electron flow</i></p> <p>P4: $Zn \rightarrow Zn^{2+} + 2e^-$</p> <p>P5: $Fe^{2+} + 2e^- \rightarrow Fe$</p> <p>P6: $Zn + Fe^{2+} \rightarrow Zn^{2+} + Fe$</p> <p>P7: Agen pengoksidaan - Fe^{2+} <i>Oxidising agent - Fe^{2+}</i></p> <p>P8: Agen penurunan - Zn <i>Reducing agent - Zn</i></p>	1 1 1 1 1 1 1 1	
JUMLAH / TOTAL			20	