



**MODUL PINTAS
TINGKATAN 5**

4541/2

**CHEMISTRY
Kertas 2**

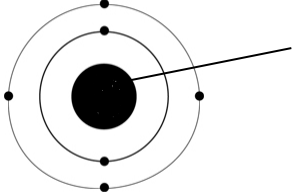
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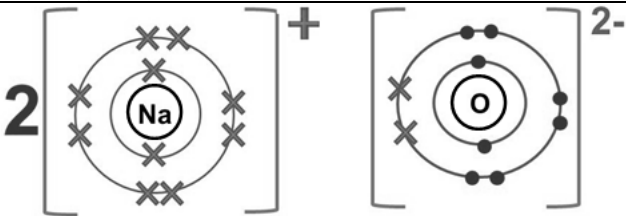
**PERATURAN PEMARKAHAN
CHEMISTRY K2
4541/2**

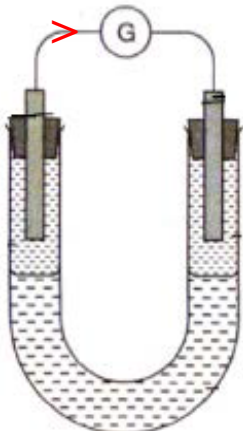
Section A
Bahagian A

Question <i>Soalan</i>			Answer <i>Jawapan</i>	Marks <i>Markah</i>
1.	(a)	(i)	Saponification <i>Saponifikasi</i>	1
		(ii)	To precipitate the soap // To reduce the solubility of soap in water <i>Untuk memendakkan sabun // Untuk mengurangkan keterlarutan sabun dalam air</i>	1
		(iii)	$3 \text{CH}_3(\text{CH}_2)_{14} \text{---} \overset{\text{O}}{\parallel} \text{C} \text{---} \text{ONa}$	1
		(iv)	Concentrated potassium hydroxide solution <i>Larutan kalium hidroksida pekat</i>	1
	(b)		1. Cleaning agent Y 2. It does not form scum in hard water <i>1. Agen pembersih Y</i> <i>2. Ia tidak membentuk kekat dalam air liat</i>	2
	(c)	(i)	Prevent oxidation <i>Menghalang pengoksidaan</i>	1
		(ii)	Cause headache / falling hair <i>Menyebabkan sakit kepala / rambut gugur</i>	1
		(iii)	Prevent food from being spoilt by preventing or slow down the growth of microorganisms <i>Mengelakkan makanan daripada rosak dengan menghalang atau memperlambatkan pertumbuhan mikroorganisma</i>	1
			TOTAL / JUMLAH	9

Question <i>Soalan</i>		Answer <i>Jawapan</i>	Marks <i>Markah</i>
2.	(a)	1. Diffusion 2. Particles in matter are in motion 3. The particles of the stinky odour move randomly from an area of high concentration to an area of low concentration 1. <i>Resapan</i> 2. <i>Zarah-zarah jirim sentiasa bergerak</i> 3. <i>Zarah-zarah bagi bau busuk bergerak dengan rawak dari kawasan yang berkepekatan tinggi ke kawasan yang berkepekatan rendah</i>	3
	(b)	 <ul style="list-style-type: none"> • Number of shells and electrons - 1 <i>Bilangan petala dan elektron – 1</i> • Label nucleus - 1 <i>Label nukleus - 1</i> 	2
	(c)	(i) Molecules <i>Molekul</i>	1
		(ii) 80°C	1
		(iii) The heat energy absorbed is used to overcome forces of attraction between the molecules so that the solid turns to liquid <i>Tenaga haba yang diserap digunakan untuk mengatasi daya tarikan antara molekul-molekul supaya pepejal berubah menjadi cecair</i>	1
		(iv) T ₂ min	1
TOTAL / <i>JUMLAH</i>			9

Question Soalan			Answer Jawapan	Marks Markah									
3.	(a)	(i)	A formula that shows the simplest whole number ratio of atoms of each element in a compound <i>Formula yang menunjukkan nisbah nombor bulat teringkas bagi bilangan atom setiap unsur yang terdapat dalam sebatian</i>	1									
		(ii)	Turns from blue to pink <i>Bertukar dari biru kepada merah jambu</i>	1									
	(b)	(i)	1. Metal T: 8 g 2. Oxygen: 2 g <i>1. Logam T: 8 g 2. Oksigen: 2 g</i>	2									
		(ii)	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Element <i>Unsur</i></th> <th>Metal T <i>Logam T</i></th> <th>Oxygen <i>Oksigen</i></th> </tr> </thead> <tbody> <tr> <td>Number of moles <i>Bilangan mol</i></td> <td>8/64 = 0.125 mol</td> <td>2/16 = 0.125 mol</td> </tr> <tr> <td>Ratio <i>Nisbah</i></td> <td>1</td> <td>1</td> </tr> </tbody> </table> <ul style="list-style-type: none"> • Number of moles – 1 <i>Bilangan mol - 1</i> • Ratio – 1 <i>Nisbah - 1</i> 	Element <i>Unsur</i>	Metal T <i>Logam T</i>	Oxygen <i>Oksigen</i>	Number of moles <i>Bilangan mol</i>	8/64 = 0.125 mol	2/16 = 0.125 mol	Ratio <i>Nisbah</i>	1	1	2
Element <i>Unsur</i>	Metal T <i>Logam T</i>	Oxygen <i>Oksigen</i>											
Number of moles <i>Bilangan mol</i>	8/64 = 0.125 mol	2/16 = 0.125 mol											
Ratio <i>Nisbah</i>	1	1											
		(iii)	TO	1									
	(c)	(i)	To prevent hot metal T from reacting with oxygen to form metal oxide again <i>Untuk mengelakkan logam T panas daripada bertindak balas dengan oksigen membentuk oksida logam semula</i>	1									
		(ii)	The process of heating, cooling and weighing are repeated until a constant mass is obtained <i>Proses pemanasan, penyejukan dan penimbangan diulangi beberapa kali sehingga jisim tetap diperoleh</i>	1									
	(d)		Zinc is more reactive than hydrogen <i>Zink adalah lebih reaktif daripada hidrogen</i>	1									
TOTAL / JUMLAH				10									

Question Soalan			Answer Jawapan	Marks Markah
4.	(a)	(i)	Group 1 <i>Kumpulan 1</i>	1
		(ii)	Both of the atoms of elements R and S have one valence electron <i>Kedua-dua atom unsur R dan S mempunyai satu elektron valens</i>	1
	(b)	(i)	$2R + 2H_2O \rightarrow 2ROH + H_2$ <ul style="list-style-type: none"> • Correct chemical formulae of reactants and products – 1 <i>Formula kimia bagi bahan dan hasil tindak balas yang betul – 1</i> • Balanced chemical equation – 1 <i>Persamaan kimia seimbang – 1</i> 	2
		(ii)	Element S <i>Unsur S</i>	1
		(iii)	<ol style="list-style-type: none"> 1. The valence electron of atom S is further away from the nucleus compared to atom R 2. The attractive forces between proton in the nucleus to the valence electron of atom S is weaker than atom R 3. It is easier for atom S to release the valence electron compared to atom R <ol style="list-style-type: none"> 1. <i>Elektron valens atom S lebih jauh daripada nukleus berbanding dengan atom R</i> 2. <i>Daya tarikan antara proton dalam nukleus kepada elektron valens bagi atom S lebih lemah berbanding dengan atom R</i> 3. <i>Atom S lebih mudah untuk melepaskan elektron valens berbanding dengan atom R</i> 	3
	(c)		 <ul style="list-style-type: none"> • Number of shells and electrons - 1 <i>Bilangan petala dan elektron – 1</i> • Charge of ions - 1 <i>Cas bagi ion-ion - 1</i> 	2
TOTAL / JUMLAH				10

Question Soalan		Answer Jawapan	Marks Markah
5.	(a)		1
	(b)	To allow the movement of ions and complete the electrical circuit <i>Untuk membenarkan pergerakan ion-ion dan melengkapkan litar elektrik</i>	1
	(c) (i)	$2\text{I}^- \rightarrow \text{I}_2 + 2\text{e}^-$	1
	(ii)	1. Add a few drops of starch solution 2. The solution changes colour from brown to dark blue 1. <i>Tambah beberapa titik kanji</i> 2. <i>Warna larutan bertukar dari perang ke biru tua</i>	2
	(iii)	Increase from -1 to 0 <i>Bertambah daripada -1 kepada 0</i>	1
	(d) (i)	The purple colour solution changes to colourless. <i>Larutan warna ungu bertukar ke tanpa warna.</i>	1
	(ii)	Oxidising agent <i>Agen pengoksidaan</i>	1
	(iii)	$\text{MnO}_4^- + 8\text{H}^+ + 5\text{e}^- \rightarrow \text{Mn}^{2+} + 4\text{H}_2\text{O}$	1
	(iv)	Decrease from +7 to +2 <i>Berkurang daripada +7 kepada +2</i>	1
	(e)	Acidified potassium dichromate(VI) solution // Chlorine water // Bromine water <i>Larutan kalium dikromat(VI) berasid // Air klorin // Air bromin</i>	1
TOTAL / JUMLAH			11

Question Soalan		Answer Jawapan	Marks Markah
6.	(a)	Heat released when 1 mole of lead(II) sulphate is precipitated from the aqueous solution of the lead(II) ions and sulphate ions <i>Haba yang dibebaskan apabila 1 mol plumbum(II) sulfat termendak dari larutan akueus yang mengandungi ion plumbum(II) dan ion sulfat</i>	1
	(b)	White precipitate is formed <i>Pepejal putih terbentuk</i>	1
	(c)	$\text{Pb}^{2+} + \text{SO}_4^{2-} \rightarrow \text{PbSO}_4$	1
	(d) (i)	$H = (50+50)(4.2)(6)$ $= 2520 \text{ J}$	1
	(ii)	<ol style="list-style-type: none"> 1. Number of moles of $\text{Pb}^{2+} / \text{SO}_4^{2-}$ ions = $(1.0)(50/1000)$ $= 0.05 \text{ mol}$ 2. $1 \text{ mol Pb}^{2+} : 1 \text{ mol PbSO}_4$ $0.05 \text{ mol Pb}^{2+} : 0.05 \text{ mol PbSO}_4$ 3. $\Delta H = -2520/0.05$ $= -50400 \text{ J mol}^{-1}$ $= -50.4 \text{ kJ mol}^{-1}$ <ol style="list-style-type: none"> 1. <i>Bilangan mol ion $\text{Pb}^{2+} / \text{SO}_4^{2-} = (1.0)(50/1000)$ $= 0.05 \text{ mol}$</i> 2. <i>1 mol $\text{Pb}^{2+} : 1 \text{ mol PbSO}_4$ $0.05 \text{ mol Pb}^{2+} : 0.05 \text{ mol PbSO}_4$</i> 3. <i>$\Delta H = -2520/0.05$ $= -50400 \text{ J mol}^{-1}$ $= -50.4 \text{ kJ mol}^{-1}$</i> 	3
	(e)	<p>Energy Tenaga</p> <p style="text-align: center;">$\Delta H = -50.4 \text{ kJ mol}^{-1}$</p> <p style="text-align: center;">PbSO_4</p> <ul style="list-style-type: none"> • Energy level diagram of exothermic - 1 <i>Gambar rajah aras tenaga bagi eksotermik - 1</i> • Label - 1 <i>Label - 1</i> 	2
	(f) (i)	6°C	1
	(ii)	The precipitation of lead(II) sulphate only involves Pb^{2+} ions and SO_4^{2-} ions <i>Pemendakan plumbum(II) sulfat hanya melibatkan ion Pb^{2+} dan ion SO_4^{2-}</i>	1
TOTAL / JUMLAH			11

Question Soalan		Answer Jawapan	Marks Markah
7.	(a)	1. $(CH_2)_n = 42 // [12+2(1)]n = 42$ $n = 3$ 2. Molecular formula of alkene P = C_3H_6 3. Propene 1. $(CH_2)_n = 42 // [12+2(1)]n = 42$ $n = 3$ 2. Formula molekul bagi alkena P = C_3H_6 3. Propena	3
	(b) (i)	1. Temperature: 300 °C 2. Pressure: 60 atm 3. Catalyst: Phosphoric acid 4. $C_3H_6 + H_2O \rightarrow C_3H_7OH$ <ul style="list-style-type: none"> • Correct chemical formulae of reactants and products – 1 • Balanced chemical equation – 1 1. Suhu: 300 °C 2. Tekanan: 60 atm 3. Mangkin: Phosphoric acid 4. $C_3H_6 + H_2O \rightarrow C_3H_7OH$ <ul style="list-style-type: none"> • Formula kimia bagi bahan dan hasil tindak balas yang betul – 1 • Persamaan kimia seimbang – 1 	5
	(ii)	1. $C_3H_7OH + 9/2O_2 \rightarrow 3CO_2 + 4H_2O$ 2. Number of moles of $CO_2 = (7200/1000) \div 24$ $= 0.3 \text{ mol}$ 3. 3 mol CO_2 : 1 mol C_3H_7OH 0.3 mol CO_2 : 0.1 mol C_3H_7OH Number of moles of $C_3H_7OH = 0.1 \text{ mol}$ 1. $C_3H_7OH + 9/2O_2 \rightarrow 3CO_2 + 4H_2O$ 2. Bilangan mol $CO_2 = (7200/1000) \div 24$ $= 0.3 \text{ mol}$ 3. 3 mol CO_2 : 1 mol C_3H_7OH 0.3 mol CO_2 : 0.1 mol C_3H_7OH Bilangan mol $C_3H_7OH = 0.1 \text{ mol}$	3
	(c) (i)	Compound R = propanoic acid / C_2H_5COOH <i>Sebatian R = asid propanoik / C_2H_5COOH</i>	1
	(ii)	1. Bacteria from the air enter latex 2. Activity of bacteria in the latex produce lactic acid that contains hydrogen ions 3. Positively charged hydrogen ions from the acid neutralises the negative charges on the surface of the protein membrane 4. The neutral particles collide with each other causing the membrane to break 5. The rubber polymers are freed and they coagulate by combining together to form large lump of rubber polymer 1. Bakteria dalam udara masuk ke dalam lateks 2. Aktiviti bakteria di dalam lateks menghasilkan asid laktik yang mengandungi ion hidrogen 3. Ion hidrogen bercas positif daripada asid meneutralkan cas-cas negatif	5

		<p>pada permukaan membrane protein</p> <p>4. Zarah-zarah neutral ini berlanggar di antara satu sama lain menyebabkan membrane pecah</p> <p>5. Polimer getah terbebas dan bergumpal dengan bergabung untuk membentuk gumpalan getah yang besar</p>	
	(d)	(i) Propyl propanoate <i>Propil propanoat</i>	1
		(ii) <div style="text-align: center;"> </div>	1
		(iii) Fruity smell <i>Berbau buah-buahan</i>	1
		TOTAL / JUMLAH	20

Question Soalan		Answer Jawapan	Marks Markah
8.	(a)	<p>Anode:</p> <ol style="list-style-type: none"> 1. Iodide ions 2. The concentration of iodide ions is higher than hydroxide ions 3. $2I^- \rightarrow I_2 + 2e$ 4. The colourless solution around anode turn brown 5. Iodine <p>Cathode:</p> <ol style="list-style-type: none"> 6. Hydrogen ions 7. The position of hydrogen ion is lower than potassium ion in the electrochemical series 8. $2H^+ + 2e \rightarrow H_2$ 9. The colourless gas bubbles are released 10. Hydrogen <p>Anod:</p> <ol style="list-style-type: none"> 1. <i>Ion iodida</i> 2. <i>Kepekatan ion iodida lebih tinggi daripada ion hidroksida</i> 3. $2I^- \rightarrow I_2 + 2e$ 4. <i>Larutan yang tidak berwarna di sekeliling anod bertukar menjadi perang</i> 5. <i>Iodine</i> <p>Katod:</p> <ol style="list-style-type: none"> 6. <i>Ion hidrogen</i> 7. <i>Kedudukan ion hidrogen lebih rendah daripada ion kalium dalam siri elektrokimia</i> 8. $2H^+ + 2e \rightarrow H_2$ 9. <i>Gelembung gas tidak berwarna dibebaskan</i> 10. <i>Hidrogen</i> 	10
	(b)	(i) <ol style="list-style-type: none"> 1. Positive terminal: Copper 2. $2H^+ + 2e \rightarrow H_2$ 3. Negative terminal: Magnesium 4. $Mg \rightarrow Mg^{2+} + 2e$ 5. $2H^+ + Mg \rightarrow H_2 + Mg^{2+}$ <ol style="list-style-type: none"> 1. <i>Terminal positif: Kuprum</i> 2. $2H^+ + 2e \rightarrow H_2$ 3. <i>Terminal negatif: Magenesium</i> 4. $Mg \rightarrow Mg^{2+} + 2e$ 5. $2H^+ + Mg \rightarrow H_2 + Mg^{2+}$ 	5
		(ii) <ol style="list-style-type: none"> 1. Mg, X, Y, Cu 2. Potential difference: 1.3 V 3. Show calculation to get 1.3 V 4. Positive terminal: Copper 5. The position of copper is lower than metal X in the electrochemical series / Copper is less electropositive than metal X <ol style="list-style-type: none"> 1. <i>Mg, X, Y, Cu</i> 2. <i>Beza keupayaan: 1.3 V</i> 3. Tunjuk pengiraan mendapat 1.3 V 	5

			<i>4. Terminal positif: Kuprum</i> <i>5. Kedudukan kuprum lebih rendah daripada logam X dalam siri elektrokimia / Kuprum kurang elektropositif berbanding dengan logam X</i>	
			TOTAL / JUMLAH	20

Question <i>Soalan</i>			Answer <i>Jawapan</i>	Marks <i>Markah</i>
9.	(a)	(i)	1. X: Copper(II) carbonate 2. Y: Copper(II) oxide 3. Z: Copper(II) nitrate <i>1. X: Kuprum(II) karbonat</i> <i>2. Y: Kuprum(II) oksida</i> <i>3. Z: Kuprum(II) nitrat</i>	3
		(ii)	Cation: 1. Sodium hydroxide solution / Ammonia solution is added to 2 cm ³ solution Z until excess 2. Blue precipitate insoluble in excess sodium hydroxide solution / Blue precipitate soluble in excess ammonia solution, copper(II) ions present Anion: 3. 2 cm ³ of dilute sulphuric acid is added to 2 cm ³ solution Z followed by 2 cm ³ of iron(II) sulphate solution, the mixture is shaken 4. The test tube is slanted and held with a test tube holder, a few drops of concentrated sulphuric acid are added along the wall of the test tube and is held upright 5. A brown ring is formed between two layers to confirm the presence of nitrate ions <i>Kation:</i> <i>1. Larutan natrium hidroksida / Larutan ammonia ditambah kepada 2 cm³ larutan Z sehingga berlebihan</i> <i>2. Mendakan biru tidak larut dalam larutan natrium hidroksida berlebihan / Mendakan biru larut dalam larutan ammonia berlebihan, ion-ion kuprum(II) hadir</i> <i>Anion:</i> <i>3. 2 cm³ asid sulfurik cair ditambah kepada 2 cm³ larutan Z diikuti dengan 2 cm³ larutan ferum(II) sulfat, campuran digoncang</i> <i>4. Tabung uji dicondongkan dan dipegang dengan pemegang tabung uji, beberapa titis asid sulfurik pekat dititiskan melalui dinding tabung uji dan ditegakkan</i> <i>5. Cincin perang terbentuk antara dua lapisan mengesahkan kehadiran ion nitrat</i>	5
		(iii)	$\text{CO}_2 + \text{Ca(OH)}_2 \rightarrow \text{CaCO}_3 + \text{H}_2\text{O}$ <ul style="list-style-type: none"> • Correct chemical formulae of reactants and products – 1 <i>Formula kimia bagi bahan dan hasil tindak balas yang betul – 1</i> • Balanced chemical equation – 1 <i>Persamaan kimia seimbang – 1</i> 	2
	(b)		1. Materials: Lead(II) nitrate solution, potassium iodide / sodium iodide solution, distilled water, filter paper 2. Apparatus: Measuring cylinder, beaker, glass rod, filter funnel Procedures: 3. Measure and pour 50-100 cm ³ of 1 mol dm ⁻³ lead(II) nitrate solution into a beaker 4. Measure and pour 50-100 cm ³ of 1 mol dm ⁻³ potassium iodide solution into another beaker 5. Mix both solution and stir the mixture with glass rod	10

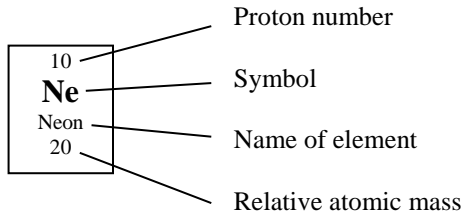
		<p>6. Filter the mixture and rinse the precipitate with distilled water. The residue is lead(II) iodide salt</p> <p>7. Press the precipitate between filter papers to dry it</p> <p>8. Observation: Yellow precipitate is formed</p> <p>9. $Pb(NO_3)_2 + 2KI \rightarrow PbI_2 + 2KNO_3$</p> <ul style="list-style-type: none"> • Correct chemical formulae of reactants and products – 1 • Balanced chemical equation – 1 <p>1. <i>Bahan: Larutan plumbum(II) nitrat, larutan kalium iodida / natrium iodida, air suling, kertas turas</i></p> <p>2. <i>Radas: Silinder penyukat, bikar, rod kaca, corong turas</i></p> <p><i>Prosedur:</i></p> <p>3. <i>Sukat dan tuang 50-100 cm³ larutan plumbum(II) nitrat 1 mol dm⁻³ ke dalam bikar</i></p> <p>4. <i>Sukat dan tuang 50-100 cm³ larutan kalium iodida 1 mol dm⁻³ ke dalam bikar yang lain</i></p> <p>5. <i>Campur dan kacaukan campuran menggunakan rod kaca</i></p> <p>6. <i>Turas campuran dan bilas mendakan itu menggunakan air suling. Baki ialah plumbum(II) iodida</i></p> <p>7. <i>Takankan mendakan antara kertas turas untuk mengeringkannya</i></p> <p>8. <i>Pemerhatian: Mendakan kuning terbentuk</i></p> <p>9. $Pb(NO_3)_2 + 2KI \rightarrow PbI_2 + 2KNO_3$</p> <ul style="list-style-type: none"> • <i>Formula kimia bagi bahan dan hasil tindak balas yang betul – 1</i> • <i>Persamaan kimia seimbang – 1</i> 	
		TOTAL / JUMLAH	20

Question Soalan		Answer Jawapan	Marks Markah
10	(a)	<ol style="list-style-type: none"> The lower temperature in the refrigerator slows down the activity of the bacteria The bacteria produces less toxin The rate of decomposition of food is lower <ol style="list-style-type: none"> <i>Suhu yang lebih rendah dalam peti sejuk memperlahankan aktiviti bakteria</i> <i>Bakteria menghasilkan kurang toksin</i> <i>Kadar penguraian makanan lebih rendah</i> 	3
	(b)	<p>(i) $\text{Zn} + 2\text{H}^+ \rightarrow \text{Zn}^{2+} + \text{H}_2$</p> <ul style="list-style-type: none"> Correct chemical formulae of reactants and products – 1 <i>Formula kimia bagi bahan dan hasil tindak balas yang betul – 1</i> Balanced ionic equation – 1 <i>Persamaan ion seimbang – 1</i> 	2
		<p>(ii)</p> <ol style="list-style-type: none"> The rate of reaction for set II is higher than set I Concentration of hydrogen ions in set II is higher than set I The number of hydrogen ions per unit volume in set II is higher than set I Frequency of collisions between zinc atoms and hydrogen ions in set II is higher than set I Frequency of effective collisions between zinc atoms and hydrogen ions in set II is higher than set I <ol style="list-style-type: none"> <i>Kadar tindak balas bagi set II lebih tinggi daripada set I</i> <i>Kepekatan ion hidrogen dalam set II lebih tinggi daripada set I</i> <i>Bilangan ion hidrogen dalam satu unit isi padu dalam set II lebih tinggi daripada set I</i> <i>Frekuensi perlanggaran di antara atom zink dan ion hidrogen dalam set II lebih tinggi daripada set I</i> <i>Frekuensi perlanggaran berkesan di antara atom zink dan ion hidrogen dalam set II lebih tinggi daripada set I</i> 	5
		<ol style="list-style-type: none"> A basin is filled with water until half full A burette full with water is inverted into the basin It is then clamped vertically using retort stand 5 g of granulated zinc is weighed and put into the conical flask 50 cm³ of 0.2 mol dm⁻³ hydrochloric acid is measured and poured into the conical flask 1 cm³ of 1.0 mol dm⁻³ copper(II) sulphate solution is measured and poured into the conical flask The conical flask is closed immediately with a stopper fitted with delivery tube A stop watch is started immediately The volume of gas released is recorded for every 30 seconds Steps 1 to 9 are repeated without adding copper(II) sulphate solution <ol style="list-style-type: none"> <i>Sebuah besen diisi dengan air sehingga separuh penuh</i> <i>Sebuah buret yang telah diisi dengan air diterbalikkan dalam besen tersebut</i> <i>Buret tersebut kemudiannya diapitkan menegak menggunakan kaki retort</i> 	10

		<ol style="list-style-type: none"> 4. 5 g butiran zink ditimbang dan dimasukkan ke dalam kelalang kon 5. 50 cm³ asid hidroklorik 0.2 mol dm⁻³ disukat dan dituang ke dalam kelalang kon 6. 1 cm³ larutan kuprum(II) sulfat 1.0 mol dm⁻³ disukat dan dituang ke dalam kelalang kon 7. Kelalang kon ditutup dengan serta merta menggunakan penyumbat bersama salur penghantar 8. Jam randik dimulakan serta merta 9. Isi padu gas yang dibebaskan direkod setiap 30 saat 10. Langkah 1 hingga 9 diulangi tanpa menambah larutan kuprum(II) sulfat 		
			TOTAL / JUMLAH	20

END OF ANSWER PAPER
JAWAPAN TAMAT

																2 He Helium 4	
3 Li Lithium 7	4 Be Beryllium 9											5 B Boron 11	6 C Carbon 12	7 N Nitrogen 14	8 O Oxygen 16	9 F Fluorine 19	10 Ne Neon 20
11 Na Sodium 23	12 Mg Magnesium 24											13 Al Aluminium 27	14 Si Silicon 28	15 P Phosphorus 31	16 S Sulphur 32	17 Cl Chlorine 35	18 Ar Argon 40
19 K Potassium 39	20 Ca Calcium 40	21 Sc Scandium 45	22 Ti Titanium 48	23 V Vanadium 51	24 Cr Chromium 52	25 Mn Manganese 55	26 Fe Iron 56	27 Co Cobalt 59	28 Ni Nickel 59	29 Cu Copper 64	30 Zn Zinc 65	31 Ga Gallium 70	32 Ge Germanium 73	33 As Arsenic 75	34 Se Selenium 79	35 Br Bromine 80	36 Kr Krypton 84
37 Rb Rubidium 86	38 Sr Strontium 88	39 Y Yttrium 89	40 Zr Zirconium 91	41 Nb Niobium 93	42 Mo Molybdenum 96	43 Tc Technetium 98	44 Ru Ruthenium 101	45 Rh Rhodium 103	46 Pd Palladium 106	47 Ag Silver 108	48 Cd Cadmium 112	49 In Indium 115	50 Sn Tin 119	51 Sb Antimony 122	52 Te Tellurium 128	53 I Iodine 127	54 Xe Xenon 131
55 Cs Caesium 133	56 Ba Barium 137	57 La Lanthanum 139	72 Hf Hafnium 179	73 Ta Tantalum 181	74 W Tungsten 184	75 Re Rhenium 186	76 Os Osmium 190	77 Ir Iridium 192	78 Pt Platinum 195	79 Au Gold 197	80 Hg Mercury 201	81 Tl Thallium 204	82 Pb Lead 207	83 Bi Bismuth 209	84 Po Polonium 210	85 At Astatine 210	86 Rn Radon 222
87 Fr Francium 223	88 Ra Radium 226	89 Ac Actinium 227	104 Unq Unnilquadium 257	105 Unp Unnilpentium 260	106 Unh Unnilhexium 263	107 Uns Unnilseptium 262	108 Uno Unniloctium 265	109 Une Unnilennium 266									



58 Ce Cerium 140	59 Pr Praseodymium 141	60 Nd Neodymium 144	61 Pm Promethium 147	62 Sm Samarium 150	63 Eu Europium 152	64 Gd Gadolinium 157	65 Tb Terbium 167	66 Dy Dyprosium 163	67 Ho Holmium 165	68 Er Erbium 167	69 Tm Thulium 169	70 Yb Ytterbium 173	71 Lu Lutetium 175
90 Th Thorium 232	91 Pa Protactinium 231	92 U Uranium 238	93 Np Neptunium 237	94 Pu Plutonium 244	95 Am Americium 243	96 Cm Curium 247	97 Bk Berkelium 247	98 Cf Californium 249	99 Es Einsteinium 254	100 Fm Fermium 253	101 Md Mendelevium 256	102 No Nobelium 254	103 Lr Lawrencium 257