SKEMA JAWAPAN KIMIA KERTAS 2

BAHAGIAN A

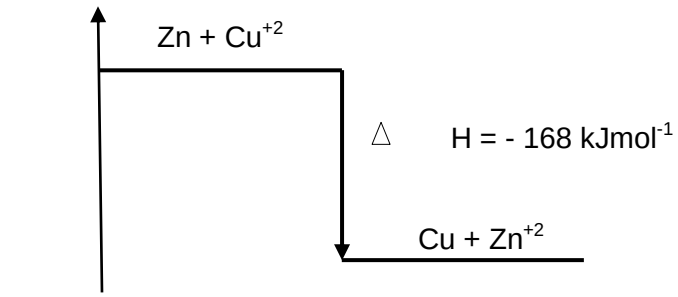
NO			ANSWER	SUB MARK	TOTAL MARK
1	(a)	(i)	The number of proton in an atom	1	1
		(ii)	1. Proton 2. Neutron 3. Electron [any two]	1 1 1	max 2
		(iii)	$^{24}_{12}\mathbf{R}$	1	1
	(b)	(i)	2.8.1	1	1
		(ii)	Group 1 Period 3	1 1	2
		(iii)	Group 1 because atom S has one valence electron Period 3 because atom S has three shells occupied with electron *adp atom	1 1	2
			TOTAL		9

NO			ANSWER	SUB MARK	TOTAL MARK
2	(a)	(i)	Cleaning agent Y	1	1
		(ii)	Saponification // alkaline hydrolysis	1	1
	(b)		$CH_3(CH_2)_{11}OSO_3Na \rightarrow CH_3(CH_2)_{11}OSO_3^- + Na^+$	1	1
	(c)		Cleaning agent Z does not form scum // Cleaning agent Z reacts with Mg^{2+}/ Ca^{2+}, forming soluble salt.	1	1
	(d)	(i)	Preservative	1	1
		(ii)	Stabiliser // Thickener	1	1
		(iii)	To preserve the food // To prevent the growth of microorganism // to make the tomato sauce last longer// To prevent food spoilage	1	1
		(iv)	-should be used: Food additive improve the taste/ texture/ appearance of food//preserve food OR -shouldn't be used: It may cause health problem	1 1 1 1	2
			TOTAL	**9**	**9**

NO			ANSWER	SUB MARK	TOTAL MARK
3	(a)	(i)	Electrolytic cell	1	1
		(ii)	Electrical energy to chemical energy	1	1
	(b)		To allow the movement of ions	1	1
	(c)		$Zn \rightarrow Zn^{2+} + 2e$	1	1
	(d)	(i)	The blue solution turns to pale blue in cell A in cell B the blue solution remains unchanged.	1 1	2
		(ii)	1. The concentration of Cu^{2+} ion decreases in Cell A 2. The concentration of Cu^{2+} ion in Cell B remain unchanged	1 1	2
	(e)	(i)	Replace the Zn electrode with Mg electrode	1	1
		(ii)	The distance between Mg and Cu in electrochemical series is further.	1	1
			TOTAL		**10**

NO			ANSWER	SUB MARK	TOTAL MARK
4	(a)		The increase/change in volume of hydrogen gas per unit time	1	1
	(b)		$Zn + 2HNO_3 \rightarrow Zn(NO_3)_2 + H_2$ Correct formula of reactants and products Balanced equations	 1 1	 2
	(c)		Experiment I: Average Rate of reaction= $\frac{22}{2 \times 60}$ =0.183 $cm^3 s^{-1}$	 1	 1
	(d)		Number of moles of HNO_3 = $\frac{0.1 \times 20}{1000}$ = 0.002 mol 2 mol of HNO_3 produce 1 mol of H_2 // 0.002 mol of HNO_3 produce 0.001 mol of H_2 Maximum volume of H_2 = 0.001 x 24 000 // 24 cm^3	1 1 1	 3
	(e)	(i)	Temperature	1	1
		(ii)	At normal body temperature, The rate of metabolism is high// insufficient oxygen supply to organs At low temperature surgery, The rate of metabolisme reduced/low// organs do not require much oxygen supply	 1 1	 2
			TOTAL		10

NO			ANSWER	SUB MARK	TOTAL MARK
5	(a)	(i)	1. Mass of NaOH used 2. Volume of NaOH solution r: volume of water	1 1	2
		(ii)	Place the volumetric flask on a flat plane and put a piece of white paper behind the volumetric flask while the eye is straight to the graduation mark.	1	1
		(iii)	1. No of mol = MV/1000 = (0.1) (1000) / 1000 // 0.1 2. Mass = No of mol X RMM = 0.1 X 40 g // = 4 g	1 1	2
	(b)	(i)	Ammonia ionised partially in water to produce low concentration of hydroxide ion	1	1
		(ii)	Tetrachlorometane // chloroform	1	1
		(iii)	Exist as molecule // No free moving ion	1	1
		(iv)	$\frac{MaVa}{MbVb} = \frac{1}{2}$ Ma = ½ X $\frac{(0.1)\ (15)}{25}$ moldm^{-3} // = 0.03 moldm^{-3}	1 1	2
		(v)	sebagai baja	1	1
			TOTAL		11

NO			ANSWER	SUB MARK	TOTAL MARK
6	(a)		Exothermic reaction *Tindak balas eksotermik*	1	1
	(b)		To reduce heat loses to the surrounding // as the insulator *Untuk mengurangkan kehilangan haba ke persekitaran // sebagai penebat haba*	1	1
	(c)		$Zn + CuSO_4 \longrightarrow Cu + ZnSO_4$ 1. Correct chemical formula of reactants and products 2. Balanced equation	 1 1	 2
	(d)	(i)	H = 50 x 4.2 x 8 // 1680 J	1	1
		(ii)	No. of mol = 0.2 x 50 /1000 // 0.01 mol	1	1
		(iii)	Heat of displacement, $\triangle$ H = 1680 /0.01 = - 168 $kJmol^{-1}$	1	1
	(e)		Energy/*Tenaga*  1. Two different energy levels with correct sign of $\triangle$ H 2. Correct chemical / ionic equation	 1 1	 2
	(f)		Heat of displacement is more than 168 $kJmol^{-1}$. Because magnesium metal is more electropositive than zinc metal in electrochemical series. *Nilai haba penyesaran lebih besar daripada* 168 $kJmol^{-1}$. *Kerana logam magnesium lebih elektropositif daripada logam zink dalam siri elektrokimia.*	1 1	 2
			TOTAL	11	11

BAHAGIAN B

<table>
<tr><th>Question No</th><th></th><th></th><th>Mark Scheme</th><th>Sub Mark</th><th>Total Mark</th></tr>
<tr><td>7</td><td>(a)</td><td>(i)</td><td>Alcohol : Methanol

Carboxylic asid: Propanoic acid

$C_2H_5COOH + CH_3OH \rightarrow C_2H_5COOCH_3 + H_2O$</td><td>1

1

2</td><td>

4</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>Mol ester = $\frac{1.32}{88}$ = 0.15

Mass alcohol = 0.15 x 32 = 4.8 g</td><td>1

1</td><td>

2</td></tr>
<tr><td></td><td>(b)</td><td></td><td>Empirical formula
<table><tr><th>Unsur</th><th>Carbon</th><th>Hydrogen</th></tr><tr><td>Mass</td><td>85.71</td><td>14.29</td></tr><tr><td>No. of mol</td><td>$\frac{85.71}{12}$ = 7.14</td><td>$\frac{14.29}{1}$ = 14.29</td></tr><tr><td>Mol ratio</td><td>$\frac{7.14}{7.14}$ = 1</td><td>$\frac{14.29}{7.14}$ = 2</td></tr></table>Empirical formula of P = CH_2

[CH_2]n = 56
[14]n = 56
n = 4

Molecular formula of P = C_4H_8</td><td>1

1

1

1

1</td><td>

5</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>Name of compound P: butene

Homologous series: alkene</td><td>1

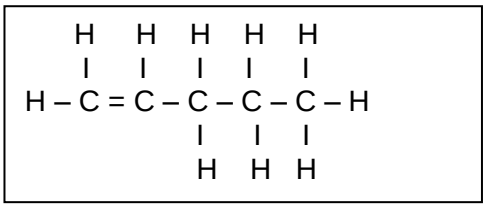
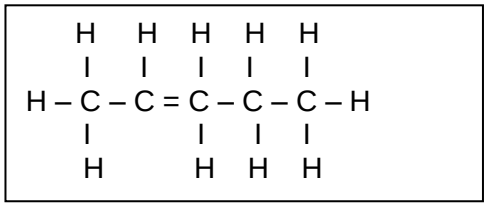
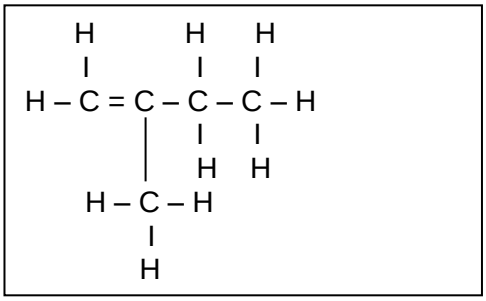
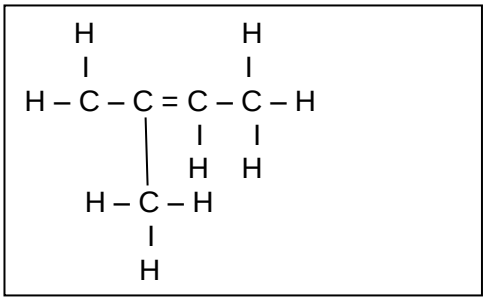
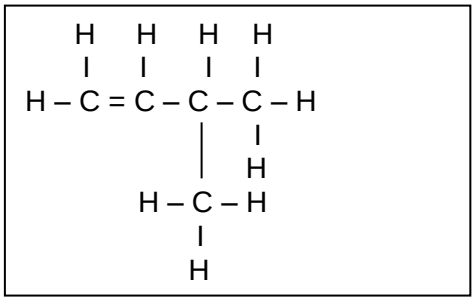
1</td><td>

2</td></tr>
<tr><td></td><td>(c)</td><td>(i)</td><td><u>Compound R</u> :
Name: Pentene
Fuctional group: Double bond between carbon atoms

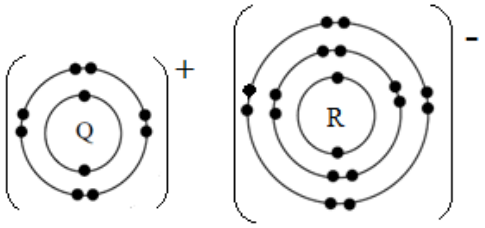
<u>Compound S</u> :
Name: Pentanoic acid
Fuctional group: Carboxyl group</td><td>
1
1

1
1</td><td>

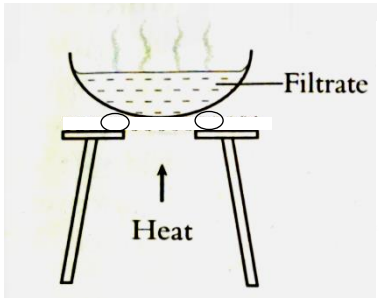
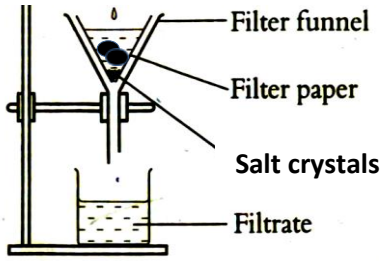
4</td></tr>
</table>

		(ii)		1	
				1	
				1	
				1	
				1	
			Any three	**Max 3**	3
			Total		**20**

NO			ANSWER	SUB MARK	TOTAL MARKS
8	(a)	(i)	Q_2O PO_2	1 1	2
		(ii)	$4Q + O_2 \rightarrow 2Q_2O$ 1. Correct formula of reactant and product 2. Balanced chemical equation	 1 1	 2
		(iii)	Number of mole of Q used = $\frac{\text{mass of Q}}{\text{Molar mass of Q}}$ $= \frac{9.2}{23}$ = 0.4 mol 4 mol of Q produce 2 mol of Q_2O 0.4 mol of Q produce 0.2 mol Q_2O Molar mass of Q_2O = 23x2 + 16 = 62 g mol^{-1} Maximum mass of Q_2O = number of mole of Q_2O x molar mass of Q_2O = 0.2 x 62 = 12.4 g	 1 1 1	 3
	(b)		S has archived stable octet electron arrangement of 2.8.8. S telah mencapai susunan elektron oktet.2.8.8. S does not receive, release or share electrons with other atoms. S tidak menerima, melepaskan ataupun berkongsi elektron dengan atom yang lain R has electron arrangement of 2.8.7 R mempunyai susunan elektron 2.8.7 One atom R share one pair of electron with another atom R to achieve stable octet electron arrangement. *Satu atom R akan berkongsi satu pasang elektron dengan satu atom R yang lain untuk mencapai susunan elektron oktet yang stabil*	1 1 1 1	 **4**
	(c)	(i)	- Q and R *Q dan R* - Q with electron arrangement of 2.8.1 *Q dengan susunan elektron 2.8.1* - R with electron arrangement of 2.8.7 *R dengan susunan elektron 2.8.7* - Atom of Q will release one valence electron to achieve stable electron arrangement *Atom Q akan melepaskan satu elektron valens untuk mencapai susunan elektron stabil* - Positive ion Q^+ is formed // $Q \rightarrow Q^+ + e$ *Ion positif Q^+ terbentuk // $Q \rightarrow Q^+ + e$*	1 1 1 1 1	

			- Atom of R will receive one electron from atom Q to achieve stable electron arrangement *Atom R akan menerima satu elektron daripada atom Q untuk mencapai susunan elektron stabil* - Negative ion R^- is formed // $R + e \rightarrow R^-$ *Ion negative R^-terbentuk // $R + e \rightarrow R^-$* - An ionic compound with formula QR is formed. *Satu sebatian ionik dengan formula QR terbentuk*  1. Correct nucleus and charge for each ion 2. Correct number of electrons in each shell	1 1 1 1 1	**Max 8**
		(ii)	Molten or aqueous state, ion Q^+ and R^- are able to move freely. Manakala dalam keadaan leburan dan akueus, ion Q^+ and R^- dapat bergerak bebas. In solid state, ion Q^+ and R^- are held in fixed position by strong electrostatic forces. //there are no mobile ion *Dalam keadaan pepejal, ion Q^+ and R^- adalah diikat pada kedudukan yang tetap oleh daya elektrostatik yang kuat //tiada ion yang bergerak bebas*	1 1	**2**
			TOTAL		20

BAHAGIAN C

Question *Soalan*	Answer: *Jawapan*	SUB Marks	TOTAL MARK
9(a)(i)	Sample answer: Soluble sulphate salts : potassium sulphate // zinc sulphate // any soluble sulphate salt *Garam sulfat terlarutkan: kalium sulfat // zink sulfat // mana-mana garam sulfat terlarutkan* Insoluble sulphate salts : Lead(II) sulphate //Barium sulphate // Calcium sulphate *Garam sulfat tak terlarutkan: Plumbum(II) sulfat // Barium sulfat // Kalsium sulfat*	1 1	2
(ii)	Name of reactants to prepare potassium sulphate: Potassium hydroxide and sulphuric acid *Nama bahan tindak balas untuk menyediakan kalium sulfat :* *Kalium hidroksida dan asid sulfurik*	1 + 1	2
(iii)	  - salt solution is poured into an evaporating dish - the solution is heated gently until saturated - cool - filter and dry between two filter paper. *-larutan garam dituangkan ke dalam mangkuk penyejat* *-larutan dipanaskan perlahan-lahan sehingga tepu* *- sejukkan* *- turas dan keringkan antara dua helai kertas turas*	1 + 1 1 1 1 1	6
b(i)	cation test : Fe^{3+} ion - pour 2 cm^3 of solution in the test tube - add 2 cm^3 of sodium hydroxide solution into the test tube - brown precipitate is formed shows the presence iron (III) ion *Ujian kation : ion : Fe^{3+}* - *Tuang 2 cm^3 larutan ke tabung uji* - *Tambah 2 cm^3 larutan natrium hidroksida ke dalam tabung uji itu* - *Mendakan perang terbentuk menunjukkan kehadiran ion ferum (III).*	1 1 1	3

(ii)	anion test : NO_3^- ion -pour 2 cm^3 of solution in the test tube -add 2 cm^3 of dilute sulphuric acid into the test tube -add 2 cm^3 of iron (II) sulphate solution -drop slowly concentrated sulphuric acid into a slanted test tube -brown ring is formed shows the presence of nitrate ion Ujian Anion: Ion NO_3^- - *Tuang 2 cm^3 larutan ke tabung uji* - *Tambah 2 cm^3 asid hidroklorik cair ke dalam tabung uji itu* - *Tambah 2 cm^3 larutan ferum(II) sulfat* - *Titiskan perlahan-lahan asid sulfurik pekat ke dalam tabung uji yang dicondongkan* - *Cincin perang terbentuk menunjukkan kehadiran ion nitrat*	1 1 1 1 1	Max 4
(iii)	anion test : Cl^- ion - pour 2 cm^3 of solution in the test tube - add 2 cm^3 nitric acid into the test tube - add 2 cm^3 silver nitrate solution - white precipitate shows the presence of chloride ion. Ujian Anion : Cl^- ion - *Tuang 2 cm^3 larutan ke tabung uji* - *Tambah 2 cm^3 asid nitrik cair ke dalam tabung uji itu* - *Tambah 2 cm^3 larutan argentum nitrat* - *Mendakan putih terbentuk menunjukkan kehadiran ion klorida*	1 1 1 1	Max 3
	TOTAL		20

NO			ANSWER	SUB MARK	TOTAL MARK
10	(a)		Sample answer: HCl + NaOH → NaCl + H_2O +1 -1 +1 -2 +1 +1 -1 +1 -2 1 Correct formulae of reactants and products 2 Balanced equation 3 [state the changes in the oxidation numbers of each element] 4 Oxidation number of all elements in the compound remain unchanged	1 1 1 1 …	4
	(b)	(i)	Sample answer: X: copper Y: magnesium / aluminium Z: iron / tin / lead	1 1 1	
		(ii)	Carbon is less reactive than Y // Carbon cannot displace Y from oxide of metal Y. Carbon is more reactive than X and Z // Carbon is able to displace the metal X or metal Z from respective oxide of metal. The further the distance between metal and carbon in reactivity series, the brighter the flame or glow produced.	1 1 1	Any 2
			X, Z, carbon, Y	1	6
	(c)		More electropositive metal: Mg/ Al/ Zn Less electropositive metal: Sn/ Pb/ Cu Procedure: 1. [more electropositive metal] strip, [less electropositive metal] strip and iron nails are cleaned with sandpaper. 2. One iron nail is coiled with [more electropositive metal] strip whereas another iron nail is coiled with [less electropositive metal] strip. 3. Pour the mixture of hot jelly solution and a few drops of potassium hexacyanoferrate(III) solution into two separate test tubes until half full. 4. Both iron nails that are coiled with different metal strips are placed into separate test tubes. 5. Put both test tubes in a test tube rack and leave for a few days/ [1 – 3 days] Results:✓✓	1 1 1 1 1 1 1	
				1+1 1+1	Max: 10
			TOTAL		20

Test tube	Observation	Inference
Iron nail coiled with [less electropositive metal] strip	Blue colour is produced	Fe^{2+} present // iron rusts
Iron nail coiled with [more electropositive metal] strip	No blue colour can be seen	Fe^{2+} absent // iron does not rust