

MODUL
PERKEMBANGAN PEMBELAJARAN
SPM 2019

Skem a MPP3

KIMIA

MPP3 2019 SIJIL PELAJARAN MALAYSIA 4541/2 CHEMISTRY Paper 2

Section A

1	(a)		Saponification <i>Safonifikasi</i>		1
	(b)		Sodium hydroxide <i>Natrium hidroksida</i>		1
	(c)		To reduce solubility of soap <i>Untuk mengurangkan keterlarutan sabun</i>		1
	(d)	(i)	Mg ²⁺ and Ca ²⁺	1+1	..2
		<i>m</i>	-soap anion react with ion Mg ²⁺ / Ca ²⁺ -produced scum / insoluble salt <i>-anion sabun bertindakbalas dengan ion Mg²⁺ / Ca²⁺ -menghasilkan kekat/ qaram tak tedarutkan.</i>	1 1	..2
		(Si)	Detergent/Defergen <i>Detergent does not Form a scum / Detergent tidak membentuk kekat</i>	1	
			TOTAL		9

2	(a)		Horizontal rows in periodic table <i>Baris mendatar di dalam jadual berkala</i>		1
	(b)		3		1
	<c)		White <i>putih</i>		1
	(d)		Acidic property: Oxide of T <i>TOksida</i> Amphoteric property: Oxide of R R <i>Oksida</i>	1 1	...2
	(e)	(i)	Correct formulae of reactant and products Balanced equation 4Na + Oz + -» 2Na ₂ O	1 1	...2
		(ii)	Ionic compound <i>Sebatian ion</i>		1
		(iii)	0.1 mol		1
			TOTAL		9

- (a) (i) formula that show the actual number of atom of each element in a compound//
formula yang menunjukkan bilangan sebenar atom setiap unsur dalam sebatian
 (10) C_2H_6
 (iii) *Reactants/bah an tindak balas : propene/propena/* C_3H_6 *and Oxygen*
toksigen O_2
Products/has// tindak balas:And/c/an
Carbon dioxide/ karbon dioksida/ CO_2
and/dan water/ a/r/ H_2O

Number of mole/ Bilangan mol:

1 mol of propene/ C_3H_6 *reacts with 5 mol of oxygen/* O_2 *to produce 3 mol of carbon dioxide/* CO_2 *and 4 mol of water/* H_2O *1 mol propena/* C_3H_6 *bertindakbalas dengan 5 mol oksigen/* O_2 *menghasilkan 3 mol karbon dtoksida/* CO_2 *dan 4 mol air/* H_2O

(b) (i)

	M	Oksigen
Jisim /g	$44.75-39.25 = 5.50$	$47.95-44.75 = 3.20$
Bil mol /mol	$5.50/55 = 0.1$	$3.2/16 = 0.2$
// Nisbah	$0.1/0.1 = 1$	$0.2/0.1 = 2$

Formula Empirik : MO_2

- (ii) $2H_a + MO_2 \rightarrow 2H_2O + M$ **1+1**

Dry hydrogen gas is flowed several minutes into the combustion tube before M oxide is heated//
 During the process of cooling the hydrogen gas should continue to flow//
 The process of heating, cooling and weighing are repeated until the constant mass is obtain

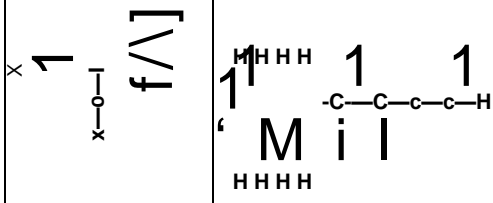
gas hidrogen kering dialirkan beberapa minit ke dalam tiub pembakaran sebelum oksida M dtpanaskan//
 Semasa proses penyejukan gas hidrogen perlu terus dialirkan//
 proses pemanasan, penyejukan dan penimbangan diulangi sehingga mendapat jisim yang tetap.

TOTAL

10

4	(a)		$\text{Pb}(\text{NO}_3)_2$		1
	(b)	(i)	Oxygen and nitrogen dioxide // oksigen dan nitrogen dioksida		1
		(ii)	$2\text{Pb}(\text{NO}_3)_2 \rightarrow 2\text{PbO} + 4\text{NO}_2 + \text{O}_2$	1+1	.2
		(iii)	No. of moles of $\text{Pb}(\text{NO}_3)_2 = 33\text{g} / 10.1 \text{ g mol}^{-1}$ Mass of $\text{PbO} = 0.1 \times 223 \text{ g mol}^{-1} = 22.3\text{g}$	1 1	...2
	(c)	(i)	lead(II) carbonate // Plumbum (II) karbonat		1
		(ii)	Precipitation / double decomposition reaction // Tindak balas pemendakan / penguraian ganda dua.		1
		(iii)	$\text{Pb}(\text{NO}_3)_2 + \text{Na}_2\text{CO}_3 \rightarrow \text{PbCO}_3 + 2\text{NaNO}_3$	1 + 1	...2
			TOTAL		10

5	(a)	(0)	the change in the quantity of reactant or products per unit time <i>perubahan dalam kuantiti bahan tindak balas atau basil tindak balas per unit masa</i>		1
		(ii)	The volume of CO ₂ released <i>fsipadu CO₂ dibebaskan</i> // mass of CaCO ₃ <i>jisim CaCO₃</i>		1
		(iii)	All HCl react completely <i>Semua HCl telah habis bertindakbalas</i>		1
	(b)		CaCO ₃ + 2HCl → CaCl ₂ + CO ₂ + H ₂ O Correct formulae of reactant and products Balanced equation	1 1	...2
	(c)	(i)	No of mole of HCl: 40 x 0.5 1000 // 0.02 mol 2 mol HCl → 1 mol CO ₂ // 0.02 mol HCl → 0.01 mol CO ₂ Volume of gas = 0.01 x 24 // 0.24 dm ³	1 1 1	3
		(ii)	Average rate of reaction = 0.667 cm ³ s ⁻¹ <i>Kadar tindak balas purata = 240</i> 360 // 0.667 cm ³		1
		(Hi)	Flow the gas into lime water Lime water turns cloudy <i>Alirkan gas ke dalam air kapur Air kapur menjadi keruh</i>	1 1	2
				TOTAL	11

6	(a)		Alcohol alkohol		1
	(b)	(i)	Acidified potassium manganate (VII) solution <i>Larutan kalium manganat (VII) berasid</i> Acidified potassium dichromate(VI) solution. <i>Larutan kalium dikromat(VI) berasid.</i>		1
		(ii)	$C_2H_5OH + 2[O] \rightarrow CH_3COOH + H_2O$	1+1	..2
		(iii)	Put Mg strip/ suitable metal into the test tube that contained compound V solution. Colourless bubble gas produced.// <i>Masukkan kepingan Mg/ logam yang sesuai ke dalam tabung uji yang berisi larutan sebatian Y.</i> <i>Getembung gas tidak berwarna terhasil //</i> Put CaCO ₃ into the test tube that contained compound Y solution. Effervescent occurred. <i>Masukkan CaCO₃ ke dalam tabung uji yang berisi larutan sebatian Y. Pembukaan beriak.</i>	1 1	..2
		(iv)	Compound Y : Ethanoic acid/ <i>asid etanoik</i>		1
	(c)	(i)	Esterification/ <i>pengesteran</i>		1
		(ii)		1+1	
		(iii)	Compound 2: Buthyl ethanoate/ <i>Butil etanoat</i>		
			TOTAL		11

7	(a)	Glacial ethanoic acid <i>Asid etanoik glasial</i>	Ethanoic acid + water <i>Asid etanoik + air</i>	1+1	...4
		Molecules <i>Molekul-molekul</i>	Molecules and ions/ ion <i>Molekul-molekul dan ion-ion /ion</i>		
		Not show the property of acid <i>Tidak menunjukkan sifat asid</i>	Show the property of acid <i>Menunjukkan sifat asid</i>	1	
		Hydrogen ions do not exist <i>Ion hidrogen tidak wujud</i>	Hydrogen ions exist <i>Ion hidrogen wujud</i>	1	
(b)		$2\text{NaOH} + \text{H}_2\text{SO}_4 \rightarrow \text{Na}_2\text{SO}_4 + 2\text{H}_2\text{O}$		1+1	...5
		$25 \times 0.1 \times = 1 \text{ Mb} \times 25 \times 2$		1+1	
		$\text{Mb} = 0.2 \text{ mol dm}^3$		1	
(c)	(!)	1. P = Ethanoic acid / <i>Asid etanoik</i> 2. Q = Hydrochloric acid / <i>asid hidroklorik</i>		1	...5
				1	
		P	Q	1	
		Weak acid <i>H asid lemah</i> // ionised partially in water <i>t</i> <i>mengion separa dalam air</i>	Strong acid <i>H asid kuat</i> it ionised completely in water // <i>mengion lengkap dalam air</i>		
		Produce lower concentration of H ⁺ ions // <i>kepekatan ion H* rendah</i>	higher concentration of H ⁺ ions // <i>kepekatan ion hi* tinggi</i>	1	
		concentration of H ⁺ higher pH value lower <i>kepekatan ion hi* tinggi nilai pH rendah</i>		1	
		1			
	(!)	Hydrogen // hidrogen		1	...6
		Collect the gas into the test tube		1	
		Place the lighted wooden splinter in the mouth of the test tube		1	
		Produce pop sound		1	
		Kumpul gas ke dalam tabung uji. Masukkan kayu uji menyata ke dalam mulut tabung uji. Bunyi pop terhasil.			
$2\text{HCl} + \text{Mg} \rightarrow \text{MgCl}_2 + \text{H}_2$ [<i>Balance chemical equation</i>] [<i>Correct formula of reactant and product</i>]		1			
		1			
TOTAL					20

8	(a)	(i)	Zinc - +2 Femm = +3	1 1 2
		00	Zink chloride Ferum (III) oxide	1 1 2
	(b)	0)	Reaction I - Not redox reaction [suitable chemical equation of neutralisation] [show oxidation number of elements] -No change in oxidation number of elements - Tindak balas I - Bukan tindakbalas redoks [persamaan kimia bagi peneutralan yang sesuai] [tunjuk nombor pengoksidaan bagi setiap unsur] -tiada perubahan nombor pengoksidaan bagi setiap unsur	1 1 1....3
		(ii)	Reaction II -Redox reaction [suitable chemical equation of displacement of metal [Show oxidation number of elements] -Have a change in oxidation number Tindak balas II -Tindakbalas redoks [persamaan kimia bagi penyesaran logam yang sesuai] [Tunjuk nombor pengoksidaan bagi setiap unsur] - terdapat perubahan nombor pengoksidaan	1 1 13
	(c)	(i)	P -Cu//Sn//Pb Q- Mg//Zn//Al	1 1 2
		(ii)	Set 1 ion Fe^{2+} are produced -Iron is more electropositive than P// iron loses electron to formed Fe^{2+} $Fe \rightarrow Fe^{2+} + 2e$ - Iron is oxidised Set 2 -OH ⁻ ion is present. - Fe is less electropositive than Q // Q loses electron to formed ion Q $Q \rightarrow Q^{2+} + 2e$ - Q is oxidised Set 1 ion Fe^{2+} terbentuk -Fe lebih elektropositif berbanding P// Fe kehilangan electron membentuk ion Fe^{2+} $Fe \rightarrow Fe^{2+} + 2e$ -Fe dioksidakan Set 2 ion OH ⁻ hadir. -Fe kurang elektropositif berbanding Q, maka Q kehilangan electron membentuk ion Q $Q \rightarrow Q^{2+} + 2e$ -Q dioksidakan.	1 1 1 1 1 1 1 1 1....8

				TOTAL
				20

9	(a)	<p>Sample answer 11 Conloh iawaoan</p> <p>NaCl/ Sodium chloride// <i>natrium klorida</i> $2\text{Cl}^- \rightarrow \text{Cl}_2 + 2\text{e}^-$</p> <p>Oxygen <i>li oksigen</i></p> <p>The position of OH⁻ ion lower than Cl⁻ in the electrochemical series// <i>Kedudukan ion OH⁻ di bawah ion Cl⁻ dalam siri elektrokimia</i></p>	1 1 1 1	...A
	(b)	<p>Sample answer <i>it</i> Contoh iawaoan</p> <p>X : zinc <i>it zink</i></p> <p>Y : Copper <i>11 kuprum</i></p> <p>Z: Silver // <i>argentum</i></p> <p>Set 1: Reaction occurred because X / zinc more electropositive than Y /copper// <i>Tindak balas bertaku kerana X / zink lebih elektropositif daripada Y / kuprum</i></p> <p>Set II: Reaction occurred because Y / copper more electropositive than Z /silver// <i>Tindak balas berlaku kerana Y / copper lebih elektropositif daripada Z / argentum</i></p> <p>Set III: Reaction does not occurred because Z less electropositive than X// <i>Tindak balas tidak berlaku kerana Z kurang elektropositif daripada X</i></p>	1 1 1 1 1	...6

	(C)	Sample answer <i>It Contoh jawoan</i>		
		1. Copper <i>H kuprum</i>		
		2. Material and apparatus <i>!! bahan dan radas:</i> Copper(II)sulphate solution <i>// aru/an kuprum(II) sulfat</i> , pure copper plate <i>// kepingan kuprum tulen</i> , impure copper plate <i>// kepingan kuprum tak tulen</i> , beaker <i>// bikar</i> , battery <i>// a feri</i> , connecting wire <i>// wayar penyambung</i>	1 1	
		3. [functional diagram <i>// Rajah berfungsi</i>]		
		4. [Labelled <i>// dilabel</i>]		
		5. Copper (II) sulphate solution is poured into a beaker <i>// Larutan kuprum(II) sulfat di tuang ke dalam sebuah bikar</i> ,	1 1	
		6. A pure copper plate and impure copper plate are used as cathode and anode respectively. <i>Kepingan kuprum tulen dan kepingan kuprum tak tulen masing-masing digunakan sebagai katod dan anod.</i>	1 1	
		7. Both plates are immersed in the solution <i>// kedua-dua kepingan di celup dalam larutan</i>		
		8. The circuit is completed <i>// Litar dilengkapkan</i> <i>// The switch is turned on</i> <i>H Suis dipasang</i>	1	
		9. Anode <i>// Anod</i> : $\text{Cu} - * \text{Cu}^{2+} + 2\text{e}$		
		10. Cathode <i>// Katod</i> : $\text{Cu}^{2+} + 2\text{e} - * \text{Cu}$	1	
			1 1	
				..10
		TOTAL		20

10	(a)		<p>M = Zinc / Zink [metal above Pb in ECS] No of mol of Pb = $0.5 \times 100 \div 1000 = 0.05$</p> <p>Heat produced = $0.05 \times 112 \times 1000 \text{ J}$ $m c \theta = 5600 \text{ J}$ $\theta = 13.33 \text{ }^\circ\text{C}$</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p>	...4
	(b)	(i)	<p>Acid Q = Hydrochloric acid/ Nitric acid <i>Asid Q = Asid hidroklorik/asid nitric</i></p> <p>Acid P = Ethanoic acid <i>Asid P = Asid etanoik</i></p> <p>Heat of neutralisation in set II is higher than set I. <i>Haba peneutralan bagi set II lebih tinggi daripada set I</i></p> <p>Acid Q is a strong acid whereas Acid P is a weak acid <i>Asid Q ialah asid kuat manakala asid P ialah asid lemah</i></p> <p>Acid Q dissociates completely in water whereas Acid P dissociates partially in water. <i>Asid Q bercerai lengkap dalam air manakala asid P bercerai separa dalam air.</i></p> <p>Some of heat released is used to dissociate the molecules of acid P completely. <i>Sebahagian haba yang dibebaskan digunakan untuk penceraian molekul asid P dengan lengkap.</i></p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>	...6
	(b)	(ii)	<p>Procedure: Prosedur</p> <p>1. Measure 50 cm^3 of 1.0 mol dm^{-3} potassium hydroxide and pour into polystyrene cup. <i>1, Sukat 50 cm^3 larutan kalium hidroksida 1.0 mol dm^{-3} dan dituang ke dalam cawan polisterin.</i></p> <p>2. Measure 50 cm^3 of 1.0 mol dm^{-3} hydrochloric acid and pour into polystyrene cup. <i>2. Sukat 50 cm^3 larutan asid hidroklorik 1.0 mol dm^{-3}</i></p>	<p>1</p> <p>1</p>	

		<p><i>dan dituang ke dalam cawan polisterin.</i></p> <p>3. Measure the initial temperature of the two solutions and recorded.</p> <p><i>S. Sukat suhu awal bagi kedua-dua larutan dan direkod.</i></p> <p>4. Pour the hydrochloric acid into the sodium hydroxide solution.</p> <p><i>4. Tuang asid hidroklorik kedalam larutan kalium hidroksida</i></p> <p>5. The mixture is stirred and the highest temperature is recorded</p> <p><i>5. larutan campuran dikacau dan suhu tertinggi direkod</i></p> <p>Chemical equation: $\text{KOH} + \text{HCl} \rightarrow \text{KCl} + \text{H}_2\text{O}$</p> <p>Calculation: Heat change = $mc\theta$ $= (50+50)(4.2)\theta$ $= 420(T_a - T_i)$ No of mol $\text{H}^+/\text{OH}^- = \frac{MV}{1000}$ $= \frac{1.0(50)}{1000}$</p> <p>Heat of neutralisation = $420(T_2 - T_i) \text{ Jmol}^{-1}$ Haba peneutralan 0.1 $= -420n\theta \text{ kJmol}^{-1} \times 0.1 \times 1000$</p>	<p>1</p> <p>1</p> <p>1</p> <p>1+1</p> <p>1</p> <p>1</p> <p>1</p>	<p>..10</p>
		TOTAL		20