



CHEMISTRY SPM 2017

[illegible]

BK3 - PEPERIKSAAN PERCUBAAN 2017
SIJIL PELAJARAN MALAYSIA
4541/2 CHEMISTRY
Paper 2

Section I / Bahagian A

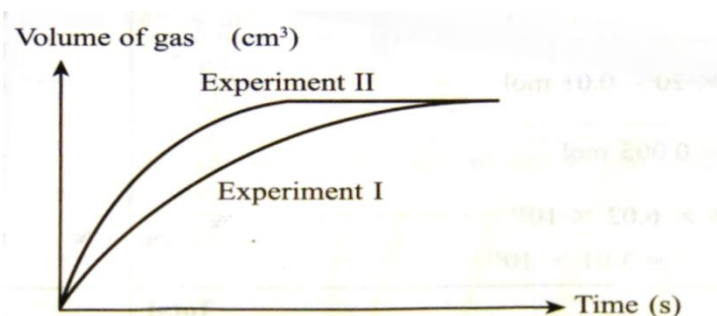
1	(a)	(i)	Group 17 // <i>Kumpulan 17</i>		1
		(ii)	Halogen		1
	(b)		2.8		1
	(c)		NaQ // NaCl		1
	(d)	(i)	P		1
		(ii)	Atomic size of P is smaller than Q. The force of attraction between nucleus toward electrons in atom P is stronger. The ability of atom P to attract electron is higher. <i>Saiz atom P lebih kecil daripada atom Q.</i> <i>Daya tarikan antara nukleus terhadap elektron dalam atom P lebih kuat.</i> <i>Keupayaan atom P menarik elektron lebih kuat</i>	1 1 1	...3
	(e)		Bromine // Iodine <i>Bromin // Iodin</i>		1
			https://cikguadura.wordpress.com/	TOTAL	9

2	(a)	(i)	Hard water is water that contains Ca^{2+} and Mg^{2+} . <i>Air liat ialah air yang mengandungi ion Ca^{2+} dan Mg^{2+}</i>		1
		(ii)	Detergent <i>Detergen</i>		1
		(iii)	Hydrophobic part dissolves in grease while hydrophilic part dissolves in water. Scrubbing/rubbing/agitating loosen and break the grease into smaller droplets. <i>Bahagian hidrofobik larut dalam gris manakala bahagian hidrofilik larut dalam air. Gosokan/kocakan akan melonggarkan dan memecahkan gris kepada titisan-titisan kecil dan tertanggal daripada permukaan kain.</i>	1 1	...2
	(b)	(i)	X : Sugar Y : Vinegar <i>X : Gula Y : Cuka</i>	1 1	...2
		(ii)	Aspartame // Stevia <i>Aspartam // Stevia</i>		1
	(d)	(i)	Paracetamol Aspirin is not suitable because it is acidic. <i>Parasetamol Aspirin tidak sesuai kerana berasid.</i>	1 1	...2
			TOTAL		9

3	(a)	(i)	Formula that shows the actual number of atom of each element in a compound. <i>Formula yang menunjukkan bilangan atom yang sebenar bagi setiap unsur dalam sesuatu sebatian.</i>		1
		(ii)	Carbon, Hydrogen and Oxygen. <i>Karbon, Hidrogen dan Oksigen.</i>		1
		(iii)	$2(1) + 12 + 2(16) // 46 \text{ g mol}^{-1}$		1
		(iv)	1. <u>Reactants / Bahan tindak balas</u> : Magnesium and ethanoic acid // Mg and CH₃COOH <i>Magnesium dan asid etanoik // Mg dan CH₃COOH</i> 2. <u>Products / Hasil tindak balas</u> : Magnesium ethanoate and hydrogen // (CH₃COO)₂Mg and H₂ <i>Magnesium etanoat dan hidrogen // (CH₃COO)₂Mg dan H₂</i> 3. <u>Quantitative aspect / Aspek kuantitatif</u> : 1 mol of magnesium reacts with 2 mol of ethanoic acid to form 1 mol magnesium ethanoate and 1 mol of hydrogen. <i>1 mol magnesium bertindak balas dengan 2 mol asid etanoik menghasilkan 1 mol magnesium etanoat dan 1 mol hidrogen.</i> 4. <u>Qualitative aspect / Aspek kualitatif</u> : Magnesium solid reacts with ethanoic acid aqueous solution to form magnesium ethanoate aqueous solution and hydrogen gas. <i>Pepejal magnesium bertindak balas dengan larutan akues asid etanoik menghasilkan larutan akues magnesium etanoat dan gas hidrogen.</i> [Any three // Mana-mana tiga]		...3

	(b)	(i)	$\text{MgCO}_3 + \text{H}_2\text{SO}_4 \rightarrow \text{MgSO}_4 + \text{CO}_2 + \text{H}_2\text{O}$		1
			1. <u>Number of mole of H_2SO_4 / Bil. mol H_2SO_4</u> $\frac{2.0 \times 5}{1000} // 0.01 \text{ mol}$	1	
			2. <u>Ratio of mole / Nisbah mol</u> $\text{H}_2\text{SO}_4 : \text{CO}_2$ $1 : 1$ $0.01 : 0.01$	1	
			3. <u>Volume of CO_2 / Isipadu CO_2</u> $0.01 \times 24 // 0.24 \text{ dm}^3 // 240 \text{ cm}^3$	1	...3
			TOTAL		9

4	(a)	<u>Sample answer:</u> Phenolphthalein // Methyl orange Fenolftalein // Metil jingga		1						
	(b)	<u>Sample answer:</u> Pink to colourless // Yellow to orange. Merah jambu ke tanpa warna // Kuning ke jingga		1						
	(c)	Neutralisation <i>peneutralan</i>		1						
	(d)	HCl + NaOH → NaCl + H ₂ O [Chemical formula / <i>Formula kimia</i>] [Balanced / <i>Seimbang</i>]	1 1	...2						
	(e)	$\frac{0.4 \times V}{0.5 \times 25} = \frac{1}{1}$ V = 31.25 cm ³	1 1	...2						
	(f) (i)	Hydrogen ion <i>Ion hidrogen</i>		1						
	(ii)	<table><tr><th>Experiment I <i>Eksperimen I</i></th><th>Experiment II <i>Eksperimen II</i></th></tr><tr><td>Shows the acidic property <i>Menunjukkan sifat asid</i></td><td>Not shows the acidic property <i>Tidak menunjukkan sifat asid</i></td></tr><tr><td>Hydrogen ion exists <i>Ion hidrogen / H⁺ wujud</i></td><td>Hydrogen ion does not exist // Exists as molecules <i>Ion hidrogen / H⁺ tidak wujud // Wujud sebagai molekul</i></td></tr></table>	Experiment I <i>Eksperimen I</i>	Experiment II <i>Eksperimen II</i>	Shows the acidic property <i>Menunjukkan sifat asid</i>	Not shows the acidic property <i>Tidak menunjukkan sifat asid</i>	Hydrogen ion exists <i>Ion hidrogen / H⁺ wujud</i>	Hydrogen ion does not exist // Exists as molecules <i>Ion hidrogen / H⁺ tidak wujud // Wujud sebagai molekul</i>	1 1	...2
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		https://cikguadura.wordpress.com/	TOTAL	10						

5	(a)	(i)	Hydrogen gas <i>Gas hidrogen</i>		1
		(ii)	Place a lighted splinter into the test tube. 'Pop' sound produced. <i>Masukkan kayu uji menyala ke dalam tabung uji.</i> <i>Bunyi 'pop' terhasil.</i>	1 1	2
	(b)	(i)	<u>Experiment / Eksperimen I</u> $\frac{35}{140} = 0.25 \text{ cm}^3 \text{ s}^{-1}$ <u>Experiment / Eksperimen II</u> $\frac{35}{120} = 0.29 \text{ cm}^3 \text{ s}^{-1}$	1 1	2
		(ii)	Rate of reaction for Experiment II is higher than Experiment I. <i>Kadar tindak balas Eksperimen II lebih tinggi daripada Eksperimen I.</i>		1
		(iii)	In Experiment II, total surface area of zinc is bigger. Frequency of collision between zinc atom and hydrogen ion is higher. Frequency of effective collision particles [between zinc atoms and hydrogen ions] is higher. <i>Dalam Eksperimen II, jumlah luas permukaan zink lebih besar.</i> <i>Frekuensi perlanggaran antara atom zink dan ion hidrogen lebih tinggi</i> <i>Frekuensi perlanggaran berkesan antara zarah-zarah [atom zink dan ion hidrogen] lebih tinggi.</i>	1 1 1	...3
	(c)		1. Both of axes are labelled and with correct units. 2. Correct shape of graph and label the curve correctly 	1 1	2
			TOTAL		11

6	(a)	(i)	Heat released when one mole of a substance is completely burnt in excess oxygen. <i>Haba yang dibebaskan apabila satu mol bahan terbakar dengan lengkap dalam oksigen yang berlebihan.</i>		1
		(ii)	Number of moles of ethanol = $\frac{142.78 - 141.86}{46}$ // 0.02 <i>Bilangan mol etanol</i> Heat released = $200 \times 4.2 \times 30$ // 25200 J <i>Haba dibebaskan</i> Heat of combustion, $\Delta H = -1260 \text{ kJ mol}^{-1}$ <i>Haba pembakaran</i>	1 1 1	...3
	(b)	(i)	Hydrochloric acid is a strong acid / dissociates completely in water whereas ethanoic acid is a weak acid / dissociates partially in water. Some of heat released is used to dissociate ethanoic acid completely. <i>Asid hidroklorik ialah asid kuat / bercerai lengkap dalam air manakala asid etanoik ialah asid lemah / bercerai separa dalam air.</i> <i>Sebahagian haba yang dibebaskan digunakan untuk penceraian asid etanoik dengan lengkap.</i>	1 1	...2
		(ii)	Heat released = $0.1 \times 57300 \text{ J}$ // 5730 J <i>Haba dibebaskan</i> Temperature change = $\frac{5730}{100 \times 4.2}$ // 13.6 °C <i>Perubahan suhu</i>		
	(c)	(iii)	Energy Tenaga 1. Axis arrow labelled with energy and two energy levels <i>Paksi berlabel tenaga dan dua aras tenaga</i> 2. Correct formula of reactants and products <i>Formula bahan dan hasil tindak balas betul</i> 3. The value of $\Delta H = -53.7 \text{ kJ mol}^{-1}$ <i>Nilai ΔH</i>		
			TOTAL		11

Section / Bahagian B

7	(a)		Method I : Magnesium and sulphuric acid <i>Kaedah I : Magnesium dan asid sulfurik</i>	2	...4
			Method II : Magnesium oxide and sulphuric acid <i>Kaedah II: Magnesium oksida dan asid sulfurik</i>	2	
	(b)	(i)	Salt X : Copper(II) carbonate <i>Garam X : Kuprum(II) karbonat</i>	1	...5
			Solid Y : Copper(II) oxide <i>Pepejal Y : Kuprum(II) oksida</i>	1	
			Gas Z : Carbon dioxide <i>Gas Z : Karbon dioksida</i>	1	
			Chemical test for Gas Z: 1. Flow the gas into lime water 2. Lime water turns cloudy	1 1	
			<i>Ujian kimia untuk Gas Z:</i> 1. <i>Alirkan gas ke dalam air kapur</i> 2. <i>Air kapur menjadi keruh</i>		
		(ii)	Copper(II) nitrate <i>Kuprum(II) nitrat</i>	1	...6
			<u>Test for cation</u> (Cu^{2+}): 1. Add sodium hydroxide solution 2. Blue precipitate formed.	1 1	
			<u>Ujian kation</u> (Cu^{2+}): 1. <i>Tambahkan larutan natrium hidroksida.</i> 2. <i>Mendakan biru terbentuk.</i>		
			<u>Test for anion</u> (NO_3^-) 1. Add sulphuric acid followed by of iron(II) sulphate solution. 2. Add slowly and carefully concentrated sulphuric. 3. Brown ring is formed.	1 1 1	
			<u>Ujian anion</u> (NO_3^-) 1. <i>Tambahkan asid sulfurik cair diikuti dengan larutan ferum(II) sulfat.</i> 2. <i>Tambahkan perlahan-lahan dan berhati-hati asid sulfurik pekat</i> 3. <i>Cincin perang terbentuk.</i>		

8	(a)	Ethanol // <i>Etanol</i> Butanoic acid // <i>Asid butanoik</i> $\text{C}_3\text{H}_7\text{COOH} + \text{C}_2\text{H}_5\text{OH} \rightarrow \text{C}_3\text{H}_7\text{COOC}_2\text{H}_5 + \text{H}_2\text{O}$ Mol of ethyl butanoate = $\frac{1.16}{116}$ // 0.01 mol Mass of ethanol = 0.01×46 // 0.46 g	1 1 2 1 1	...6																		
	(b) (i)	<table><tr><td>Compound X // Propane <i>Sebatian X // Propana</i></td><td>Compound W // Propene <i>Sebatian W // Propena</i></td></tr><tr><td>Saturated hydrocarbon <i>Hidrokarbon tepu</i></td><td>Unsaturated hydrocarbon <i>Hidrokarbon tidak tepu</i></td></tr><tr><td>Contains single covalent bond <i>Mengandungi ikatan kovalen tunggal</i></td><td>Contains double covalent bond <i>Mengandungi ikatan kovalen ganda dua</i></td></tr><tr><td colspan="2">Same physical properties <i>Sifat-sifat fizik yang sama</i></td></tr><tr><td colspan="2">Weak inter molecular forces <i>Daya antara molekul yang lemah</i></td></tr><tr><td>Not react with bromine water <i>Tidak bertindak balas dengan air bromin</i></td><td>React with bromine water <i>Bertindak balas dengan air bromin</i></td></tr><tr><td>Saturated hydrocarbon <i>Hidrokarbon tepu</i></td><td>Unsaturated hydrocarbon <i>Hidrokarbon tidak tepu</i></td></tr><tr><td>Less soot <i>Kurang jelaga</i></td><td>More soot <i>Lebih jelaga</i></td></tr><tr><td>Percentage of carbon by mass is lower than W <i>Peratus karbon mengikut jisim lebih rendah</i></td><td>Percentage of carbon by mass is higher than X <i>Peratus karbon mengikut jisim lebih tinggi</i></td></tr></table>	Compound X // Propane <i>Sebatian X // Propana</i>	Compound W // Propene <i>Sebatian W // Propena</i>	Saturated hydrocarbon <i>Hidrokarbon tepu</i>	Unsaturated hydrocarbon <i>Hidrokarbon tidak tepu</i>	Contains single covalent bond <i>Mengandungi ikatan kovalen tunggal</i>	Contains double covalent bond <i>Mengandungi ikatan kovalen ganda dua</i>	Same physical properties <i>Sifat-sifat fizik yang sama</i>		Weak inter molecular forces <i>Daya antara molekul yang lemah</i>		Not react with bromine water <i>Tidak bertindak balas dengan air bromin</i>	React with bromine water <i>Bertindak balas dengan air bromin</i>	Saturated hydrocarbon <i>Hidrokarbon tepu</i>	Unsaturated hydrocarbon <i>Hidrokarbon tidak tepu</i>	Less soot <i>Kurang jelaga</i>	More soot <i>Lebih jelaga</i>	Percentage of carbon by mass is lower than W <i>Peratus karbon mengikut jisim lebih rendah</i>	Percentage of carbon by mass is higher than X <i>Peratus karbon mengikut jisim lebih tinggi</i>	1 1 1 1 1 1 1 1	...8
Compound X // Propane <i>Sebatian X // Propana</i>	Compound W // Propene <i>Sebatian W // Propena</i>																					
Saturated hydrocarbon <i>Hidrokarbon tepu</i>	Unsaturated hydrocarbon <i>Hidrokarbon tidak tepu</i>																					
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	(ii)	H H H H H H H H H H H H H H																				

Section / Bahagian C

9	(a)	- Experiment I: Zinc displaced Cu from CuSO₄ solution. - Experiment II: Ag cannot displace Cu from CuSO₄ solution. - Zn is more electropositive than Cu // Position of Zn is higher than Cu in the Electrochemical Series // Ag is less electropositive than Cu / Position of Cu is higher than Ag in the Electrochemical Series. - Chemical Equation: $\text{Zn} + \text{Cu}^{2+} \rightarrow \text{Zn}^{2+} + \text{Cu}$	1	
	(b)	X : Carbon // Copper X : <i>Karbon // Kuprum</i> Y : Copper Y : <i>Kuprum</i> <u>Sample Answer :</u> <u>Set I :</u> - Ions move to the anode; SO₄²⁻, OH⁻. - Ion selected to be discharged; OH⁻. - Position of OH⁻ ion is lower than SO₄²⁻ ion in the Electrochemical Series. - Half equation; $4\text{OH}^- \rightarrow 2\text{H}_2\text{O} + \text{O}_2 + 4\text{e}^-$ // Oxygen gas produced 1. <i>Ion-ion bergerak ke anod; SO₄²⁻, OH⁻.</i> 2. <i>Ion yang dipilih untuk dinyahcas; OH⁻.</i> 3. <i>Kedudukan ion OH⁻ di bawah ion SO₄²⁻ dalam Siri Elektrokimia.</i> 4. <i>Setengah persamaan; $4\text{OH}^- \rightarrow 2\text{H}_2\text{O} + \text{O}_2 + 4\text{e}^-$ // Gas oksigen terhasil</i> OR / ATAU <u>Set II :</u> - Ions move to anode; SO₄²⁻, OH⁻. - No ion selected to be discharged because non-inert electrode (Cu) is used. - Copper atom ionises to form copper(II) ion. - Half equation; $\text{Cu}^{2+} + 2\text{e}^- \rightarrow \text{Cu}$ // Copper(II) ion formed 1. <i>Ion-ion bergerak ke anod; SO₄²⁻, OH⁻.</i> 2. <i>Tiada ion dipilih untuk dinyahcas kerana elektrod tidak lengai digunakan digunakan.</i> 3. <i>Atom kuprum mengion.</i> 4. <i>Setengah persamaan; $\text{Cu} \rightarrow \text{Cu}^{2+} + 2\text{e}^-$ // Ion kuprum(II) terhasil.</i>	1	...4

10	(a)	Reaction II // <i>Tindak balas II</i> Oxidation number of magnesium increases from 0 to +2, magnesium undergoes oxidation. <i>Nombor pengoksidaan magnesium bertambah daripada 0 kepada +2, magnesium mengalami pengoksidaan.</i> Oxidation number of hydrogen decreases from +1 to 0, hydrogen undergoes reduction. <i>Nombor pengoksidaan hidrogen berkurang daripada +1 kepada 0, hidrogen mengalami penurunan.</i> No change in oxidation number for each element in Reaction I. <i>Tiada perubahan nombor pengoksidaan setiap unsur dalam Tindak balas I.</i>	1 1 1 1	...4
	(b)	<u>Sample Answer :</u> Substance P : Bromine water <i>Bahan P : Air bromin</i> Substance Q : Zinc <i>Bahan Q : Zink</i> Fe²⁺ ion loses electron and oxidised to Fe³⁺ ion. <i>Ion Fe²⁺ kehilangan elektron dan dioksidakan kepada ion Fe³⁺.</i> Bromine molecule gains electron and is reduced to bromide ion/ Br⁻. <i>Molekul bromin menerima elektron dan diturunkan kepada ion bromida/ Br⁻.</i> Zinc atom loses electron and oxidised to zinc ion/ Zn²⁺. <i>Atom zink kehilangan elektron dan dioksidakan kepada ion zink/ Zn²⁺.</i> Fe³⁺ ion accept electron and reduced to Fe²⁺ ion. <i>Ion Fe³⁺ menerima elektron dan diturunkan kepada ion Fe²⁺.</i>	1 1 1 1 1 1	...6

	(c)	<u>Sample answer :</u> Diagram / Rajah 1. [Set up of apparatus must be functional] [Susunan radas berfungsi] 2. [Label of electrolytes and electrodes] [Elektrolit dan elektrod dilabel] Procedure / Prosedur 3. Fill the U-tube half full with sulphuric acid. <i>Isikan tiub-U separuh penuh dengan asid sulfurik.</i> 4. [Using a dropper] fill one arm of the U-tube with acidified potassium manganate(VII) solution and the other arm with iron(II) sulphate solution. [Dengan menggunakan penitis] isi satu lengan tiub-U dengan larutan kalium manganat (VII) berasid dan lengan satu lagi dengan larutan ferum(II) sulfat. 5. Dipped a carbon rod into each arm and connect the carbon rods to the galvanometer using wires // Complete the circuit. <i>Celupkan rod karbon ke dalam setiap lengan dan sambungkan rod karbon kepada galvanometer menggunakan wayar // Lengkapkan litar.</i> Observation / Pemerhatian 6. Galvanometer needle is deflected <i>Jarum galvanometer terpesong.</i> 7. The purple solution becomes colourless <i>Larutan ungu menjadi tanpa warna</i> 8. The pale green solution turns brown/yellow <i>Larutan hijau pucat bertukar perang / kuning</i> Half equation Setengah persamaan 9. $\text{MnO}_4^- + 8\text{H}^+ + 5\text{e} \longrightarrow \text{Mn}^{2+} + 4\text{H}_2\text{O}$ 10. $\text{Fe}^{2+} \longrightarrow \text{Fe}^{3+} + \text{e}$	1 1 1 1 1 1 1 1 1 1 1	
		https://cikguadura.wordpress.com/	TOTAL	20

END OF MARKING SCHEME

BAHAN KECEMERLANGAN (BK3) – PEP. PERCUBAAN SPM 2017
4541/3 KIMIA
KERTAS 3

Question	Rubric	Score
1(a)	Able to record the pH value accurately with one decimal place . <u>Answer :</u> Set I : 9.0 Set II : 8.7 Set III : 8.5 Set IV : 8.0	3
	Able to record any three pH value accurately with one decimal place // Able to record all pH value correctly <u>Sample answer :</u> Set I : 9 // 9.00 Set II : 8.68 Set III : 8.53 Set IV : 8.01	2
	Able to record any two pH value correctly	1
	No response or wrong response	0

<https://cikguadura.wordpress.com/>

Question	Rubric	Score										
1(b)	Able to construct a table to record the data that contain: 1. Correct heading 2. Correct pH value // ecf from 1(a) 3. Unit <u>Sample answer:</u> <table><tr><th>Set // Concentration Set// Kepekatan (mol dm⁻³)</th><th>pH value Nilai pH</th></tr><tr><td>I // 0.1</td><td>9.0</td></tr><tr><td>II // 0.01</td><td>8.7</td></tr><tr><td>III // 0.001</td><td>8.5</td></tr><tr><td>IV // 0.0001</td><td>8.0</td></tr></table>	Set // Concentration Set// Kepekatan (mol dm ⁻³)	pH value Nilai pH	I // 0.1	9.0	II // 0.01	8.7	III // 0.001	8.5	IV // 0.0001	8.0	3
	Set // Concentration Set// Kepekatan (mol dm ⁻³)	pH value Nilai pH										
	I // 0.1	9.0										
	II // 0.01	8.7										
	III // 0.001	8.5										
IV // 0.0001	8.0											
Able to construct a less accurate table that contains: 1. Titles 2. pH value	2											
Able to construct a table with at least one title / pH value	1											
No response or wrong response	0											

Question	Rubric	Score
1(c)	Able to calculate the number of moles with correct unit <u>Answer:</u> Number of moles of hydrogen ion = $MV/1000$ <i>Bilangan mol ion hidrogen</i> $= \frac{0.01 \times 50}{1000}$ $= 0.0005 \text{ mol}$	3
	Able to calculate the number of moles without unit/wrong unit	2
	Able to show an idea of calculation <u>Sample answer:</u> 0.01×50	1
	No response or wrong response	0

Question	Rubric	Score
1(d)	Able to state the relationship correctly <u>Sample answers:</u> The higher/lower the concentration of hydroxide ion , the higher /lower the pH value // The higher/lower the pH value, the higher/lower the concentration of hydroxide ion <i>Semakin tinggi/rendah kepekatan ion hidroksida, semakin tinggi/rendah nilai pH //</i> <i>Semakin tinggi/rendah nilai pH, semakin tinggi/rendah kepekatan ion hidroksida</i>	3
	Able to state the relationship less accurately. <u>Sample answer:</u> The higher/lower the concentration, the higher/lower the pH value // The higher/lower the pH value, the higher/lower the concentration <i>Semakin tinggi/rendah kepekatan, semakin tinggi/rendah nilai pH //</i> <i>Semakin tinggi/rendah nilai pH, semakin tinggi/rendah kepekatan</i>	2
	Able to give an idea of relationship <u>Sample answer:</u> Different concentration, different pH value // Concentration affect the pH value <i>Kepekatan berbeza, nilai pH berbeza//</i> <i>Kepekatan mempengaruhi nilai pH</i>	1
	No response given / wrong response	0

Question	Rubric	Score
1(e)	Able to predict the pH value correctly <u>Sample answer:</u> $[9.0 < \text{pH value} \leq 14.0]$ $[9.0 < \text{nilai pH} \leq 14.0]$	3
	Able to predict the pH value less accurately <u>Sample answer:</u> Higher than 9.0 but less than 14 <i>Lebih tinggi dari 9.0 tetapi kurang dari 14</i>	2
	Able to state an idea of pH value of alkali <u>Sample answer:</u> $[7.0 < \text{pH value} \leq 9.0]$ // Higher than 9.0 // Lower than 14.0 $[7.0 < \text{nilai pH} \leq 9.0]$ // Lebih tinggi dari 9.0 // Kurang dari 14.0	1
	No response given / wrong response	0

Question	Rubric	Score								
2(a)	Able to state two observations correctly	3								
	<u>Sample answer:</u>									
	<table><tr><th>Experiment</th><th>Observation / <i>Pemerhatian</i></th></tr><tr><td>Experiment I</td><td>Copper(II) sulphate dissolves// Blue solution formed. <i>Kuprum(II) sulfat larut // Larutan biru terhasil</i></td></tr><tr><td>Experiment II</td><td>Zinc carbonate does not dissolve/ remains unchanged // No change. <i>Zink karbonat tidak larut/ kekal sama // Tiada perubahan</i></td></tr><tr><td>Experiment III</td><td>Lead(II) nitrate dissolves // Colourless solution formed. <i>Plumbum(II) nitrat larut // Larutan tidak berwarna terhasil</i></td></tr></table>		Experiment	Observation / <i>Pemerhatian</i>	Experiment I	Copper(II) sulphate dissolves// Blue solution formed. <i>Kuprum(II) sulfat larut // Larutan biru terhasil</i>	Experiment II	Zinc carbonate does not dissolve/ remains unchanged // No change. <i>Zink karbonat tidak larut/ kekal sama // Tiada perubahan</i>	Experiment III	Lead(II) nitrate dissolves // Colourless solution formed. <i>Plumbum(II) nitrat larut // Larutan tidak berwarna terhasil</i>
	Experiment		Observation / <i>Pemerhatian</i>							
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	Experiment III	Lead(II) nitrate dissolves // Colourless solution formed. <i>Plumbum(II) nitrat larut // Larutan tidak berwarna terhasil</i>								
Able to state any 2 observations correctly.	2									
Able to state any 1 observation correctly.	1									
No response given or wrong response	0									

Question	Rubric	Score								
2(b)	Able to state an inference correctly <u>Sample answer:</u> <table><tr><td><i>Observation/Pemerhatian</i></td><td><i>Inference/Inferen</i></td></tr><tr><td>Copper(II) sulphate dissolves</td><td>Copper(II) sulphate is a soluble salt Kuprum(II) sulfat adalah garam terlarutkan</td></tr></table> Or /atau <table><tr><td><i>Observation/Pemerhatian</i></td><td><i>Inference/Inferen</i></td></tr><tr><td>Blue solution is formed</td><td>Solution formed contains copper(II) ions Larutan mengandungi ion kuprum(II)</td></tr></table>	<i>Observation/Pemerhatian</i>	<i>Inference/Inferen</i>	Copper(II) sulphate dissolves	Copper(II) sulphate is a soluble salt Kuprum(II) sulfat adalah garam terlarutkan	<i>Observation/Pemerhatian</i>	<i>Inference/Inferen</i>	Blue solution is formed	Solution formed contains copper(II) ions Larutan mengandungi ion kuprum(II)	3
	<i>Observation/Pemerhatian</i>	<i>Inference/Inferen</i>								
	Copper(II) sulphate dissolves	Copper(II) sulphate is a soluble salt Kuprum(II) sulfat adalah garam terlarutkan								
	<i>Observation/Pemerhatian</i>	<i>Inference/Inferen</i>								
	Blue solution is formed	Solution formed contains copper(II) ions Larutan mengandungi ion kuprum(II)								
Able to state an inference less correctly <u>Sample answer:</u> The solution contains ion <i>Larutan mengandungi ion</i>	2									
Able to state an idea of inference <u>Sample answer:</u> Reaction occurs // Copper(II) sulphate is a salt <i>Tindak balas berlaku // Kuprum(II) sulfat adalah garam.</i>	1									
No response given or wrong response	0									

Question	Rubric	Score
2(c)	Able to state all variables correctly <u>Sample answer :</u> Manipulated variable : Copper(II) sulphate, zinc carbonate and lead(II) nitrate // Type of salts Responding variable : Solubility of salt // Formation of solution Constant variable : Water // Temperature of water // Type of solvent <i>Pemboleh ubah manipulasi : Kuprum(II) sulfat, zink karbonat dan plumbum(II) nitrat // Jenis garam</i> <i>Pemboleh ubah bergerak balas : Keterlarutan garam // Pembentukan larutan</i> <i>Pemboleh ubah dimalarkan: Air // Suhu air // Jenis pelarut</i>	3
	Able to state any two variables correctly	
	Able to state any one variable correctly	
	No response or wrong response	
		0

Question	Rubric	Score
2 (d)	Able to give the hypothesis correctly <u>Sample answer :</u> Copper(II) sulphate and lead(II) nitrate soluble in water while zinc carbonate does not soluble in water // Some salts are soluble in water while some salts are insoluble in water <i>Kuprum(II) sulfat dan plumbum(II) nitrat larut di dalam air manakala zink karbonat tidak larut di dalam air //</i> <i>Sesetengah garam larut di dalam air manakala sesetengah garam tidak larut dalam air</i>	3
	Able to give the hypothesis almost correct <u>Sample answer :</u> Copper(II) sulphate and lead(II) nitrate soluble in water // Zinc carbonate does not soluble in water Some salts are soluble in water // Some salts are insoluble in water <i>Kuprum(II) sulfat dan plumbum(II) nitrat larut di dalam air //</i> <i>Zink karbonat tidak larut di dalam air //</i> <i>Sesetengah garam larut di dalam air // Sesetengah garam tidak larut dalam air</i>	2
	Able to state an idea of the hypothesis <u>Sample answer :</u> Solubility of salt depends on type of salts // Type of salts affect the solubility of salt <i>Keterlarutan garam bergantung kepada jenis garam //</i> <i>Jenis garam mempengaruhi keterlarutan garam</i>	1
	No response or wrong response	0

Question	Rubric	Score
2 (e)	Able to state the correct operational definition 1. <i>what should be done and</i> 2. <i>what should be observed</i> <u>Sample answer :</u> When a salt is added/put into water, it dissolves When a salt is added/put into water, a solution formed <i>Apabila garam dimasukkan ke dalam air, garam larut</i> <i>Apabila garam dimasukkan ke dalam air, larutan terhasil</i>	3
	Able to state the operational definition almost correctly <u>Sample answer:</u> Salt dissolves // Solution formed <i>Garam larut // Larutan terhasil</i>	2
	Able to state any idea of soluble salt <u>Sample answer:</u> Reaction occur <i>Tindak balas</i>	1
	No response given or wrong response	0

Question	Rubric	Score				
2 (f)	Able to classify all the salts correctly	3				
	<u>Sample answer:</u>					
	<table><tr><th>Soluble salts <i>Garam terlarutkan</i></th><th>Insoluble salts <i>Garam tak terlarutkan</i></th></tr><tr><td>Ammonium carbonate/ $(\text{NH}_4)_2\text{CO}_3$ Magnesium nitrate/ $\text{Mg}(\text{NO}_3)_2$ <i>Ammonium karbonat/ $(\text{NH}_4)_2\text{CO}_3$</i> <i>Magnesium nitrat/ $\text{Mg}(\text{NO}_3)_2$</i></td><td>Calcium sulphate/ CaSO_4 Silver chloride/ AgCl <i>Kalsium sulfat/ CaSO_4</i> <i>Argentum klorida/ AgCl</i></td></tr></table>		Soluble salts <i>Garam terlarutkan</i>	Insoluble salts <i>Garam tak terlarutkan</i>	Ammonium carbonate/ $(\text{NH}_4)_2\text{CO}_3$ Magnesium nitrate/ $\text{Mg}(\text{NO}_3)_2$ <i>Ammonium karbonat/ $(\text{NH}_4)_2\text{CO}_3$</i> <i>Magnesium nitrat/ $\text{Mg}(\text{NO}_3)_2$</i>	Calcium sulphate/ CaSO_4 Silver chloride/ AgCl <i>Kalsium sulfat/ CaSO_4</i> <i>Argentum klorida/ AgCl</i>
	Soluble salts <i>Garam terlarutkan</i>		Insoluble salts <i>Garam tak terlarutkan</i>			
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Able to classify any three salts correctly	2					
Able to classify any two salts correctly or give opposite answers/wrong heading	1					
No response given / wrong response	0					

Question	Rubric	Score
3(a)	Able to state the problem statement correctly <u>Sample answer:</u> How does the effectiveness of the cleansing action of soap and detergent in hard water different? <i>Adakah keberkesanan tindakan pencucian sabun dan detergen dalam air liat berbeza ?</i>	3
	Able to state the problem statement less accurately <u>Sample answer:</u> Does the effectiveness of cleansing action of soap and detergent are different?// To investigate/ compare the effectiveness of soap and detergent in hard water <i>Adakah keberkesanan tindakan pencucian sabun dan detergen berbeza// Untuk menyiasat/ membanding keberkesanan sabun dan detergen dalam air liat.</i>	2
	Able to give an idea of the problem statement. <u>Sample answer:</u> Does soap/detergent is more effective? To investigate/ compare the effectiveness of soap and detergent <i>Adakah sabun/detergen lebih berkesan ? Untuk menyiasat/membanding keberkesanan sabun dan detergen</i>	1
	No response or wrong response	0

Question	Rubric	Score
3(b)	Able to state the three variables correctly <u>Sample answer:</u> Manipulated variable: Soap and detergent // Type of cleaning agent <i>Sabun dan detergen // Jenis agen pencuci</i> Responding variable: Effectiveness of cleansing action // Ability to remove the oily stains on cloth <i>Keberkesanan tindakan pencucian // Keupayaan untuk singkir kotoran berminyak pada pakaian</i> Constant variable: Cloth with oily stains // Hard water// Type of water <i>Pakaian dengan kotoran berminyak // Air liat // Jenis air</i>	3
	Able to state any two variables correctly	2
	Able to state any one variable correctly	1
	No response or wrong response	0

Question	Rubric	Score
3(c)	Able to state the relationship correctly between the manipulated variable and the responding variable with direction <u>Sample answer:</u> Detergent is more effective than soap in cleansing action in hard water. <i>Tindakan pencucian detergen lebih berkesan berbanding sabun dalam air liat.</i>	3
	Able to state the relationship less correctly between the manipulated variable and the responding variable with direction <u>Sample answer:</u> Detergent is more effective than soap <i>Detergen lebih berkesan berbanding sabun</i>	2
	Able to state the idea of hypothesis <u>Sample answer:</u> Different cleansing agent have different effectiveness// Detergent/Soap is more effective <i>Agen pencuci berbeza mempunyai keberkesanan berbeza// Detergen/ Sabun lebih berkesan</i>	1
	No response or wrong response	0

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Question	Rubric	Score
3(d)	Able to list all of substances and apparatus completely <u>Sample answer:</u> Substances Soap, detergent, hard water, 2 pieces of cloths with oily stains Apparatus Beaker/Basin, glass rod Bahan <i>Sabun, detergen, air liat, 2 cebis kain dengan kotoran berminyak</i> Radas <i>Bikar/besen, rod kaca</i>	3
	Able to list materials and apparatus <u>Sample answer:</u> Substances Soap, detergent, hard water, pieces of cloths with oily stains Apparatus Beaker/Basin, glass rod Bahan <i>Sabun/ detergen, air liat, cebisan kain dengan kotoran berminyak</i> Radas <i>Bikar/Besen, rod kaca</i>	2
	Able to list the minimum substance and apparatus <u>Sample answer:</u> Substances Soap / detergent, pieces of cloths Apparatus [Any suitable container] Bahan <i>Sabun/ detergen, cebisan kain</i> Radas [<i>Sebarang bekas yang sesuai</i>]	1
	No response or wrong response	0

Question	Rubric	Score
3(e)	Able to list all the steps correctly <u>Sample answer:</u> Measure and pour [50 - 100] cm³ of hard water into a beaker. <i>Sukat dan tuang [50-100] cm³ air liat ke dalam bikar.</i> Add soap into the beaker and stir the mixture. <i>Tambah sabun ke dalam bikar dan kacau campuran.</i> Immerse a piece of cloth stained with oil in the mixture. <i>Rendam cebisan kain dengan kotoran berminyak ke dalam campuran</i> Stir the mixture. <i>Kacau campuran</i> Record the observation. <i>Rekod pemerhatian</i> Repeat step 1 to 5 by replacing soap with detergent. <i>Ulang langkah 1 hingga 5 dengan menggantikan sabun dengan detergen.</i>	3
	Able to list down steps 2, 3, 4 and 6	2
	Able to list down steps 2 and 3	1
	No response or wrong response	0

Question	Rubric	Score						
3(f)	Able to tabulate the data with the following aspects 1. Correct titles 2. Complete list of elements <u>Sample answer:</u> <table><tr><th>Type of cleaning agent <i>Jenis agen pencuci</i></th><th>Observation <i>Pemerhatian</i></th></tr><tr><td>Soap <i>Sabun</i></td><td></td></tr><tr><td>Detergent <i>Detergen</i></td><td></td></tr></table>	Type of cleaning agent <i>Jenis agen pencuci</i>	Observation <i>Pemerhatian</i>	Soap <i>Sabun</i>		Detergent <i>Detergen</i>		2
	Type of cleaning agent <i>Jenis agen pencuci</i>	Observation <i>Pemerhatian</i>						
	Soap <i>Sabun</i>							
Detergent <i>Detergen</i>								
	Able to construct a table with 1. At least one title 2. Incomplete list of elements <u>Sample answer:</u> <table><tr><th>Type of cleaning agent <i>Jenis agen pencuci</i></th><td></td></tr><tr><td>Soap <i>Sabun</i></td><td></td></tr></table>	Type of cleaning agent <i>Jenis agen pencuci</i>		Soap <i>Sabun</i>		1		
Type of cleaning agent <i>Jenis agen pencuci</i>								
Soap <i>Sabun</i>								
	No response or wrong response	0						

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END OF MARKING SCHEME