



MAJLIS PENGETUA SEKOLAH MALAYSIA
NEGERI SEMBILAN

PROGRAM PENINGKATAN AKADEMIK TINGKATAN 5
SEKOLAH-SEKOLAH MENENGAH NEGERI SEMBILAN
2020

CHEMISTRY 4541

PERATURAN PEMARKAHAN

KERTAS 1, 2 DAN 3

UNTUK KEGUNAAN PEMERIKSA SAHAJA

AMARAN

Peraturan pemarkahan ini **SULIT** dan **Hak Cipta MPSM NSDK**.
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MAJLIS PENGETUA SEKOLAH MENENGAH MALAYSIA
CAWANGAN NEGERI SEMBILAN

PEPERIKSAAN PERCUBAAN BERSAMA
SUJIL PELAJARAN MALAYSIA 2020
CHEMISTRY KERTAS 1

No	Key
1	A
2	D
3	C
4	A
5	D

No	Key
6	D
7	A
8	A
9	B
10	C

No	Key
11	A
12	D
13	B
14	D
15	C

No	Key
16	B
17	D
18	D
19	C
20	C

No	Key
21	D
22	B
23	A
24	B
25	D

No	Key
26	B
27	C
28	D
29	D
30	C

No	Key
31	B
32	B
33	A
34	A
35	A

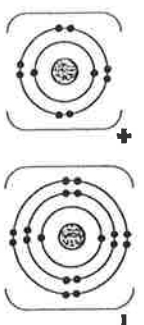
No	Key
36	C
37	C
38	B
39	B
40	A

No	Key
41	D
42	B
43	C
44	C
45	B

No	Key
46	A
47	C
48	B
49	C
50	A

A	12
B	13
C	13
D	12

MS CHEMISTRY PAPER 2
PP KIMIA KERTAS 2

No	Rubric	Mark	Σ marks
1(a)	<i>Able to state the tem represented by the number '11' in element P correctly</i> Answer: Nucleon number Nombor nukleon	1	1
1(b)	<i>Able to write the electron arrangement of the atom of element S correctly</i> Answer: 2.8.2	1	1
1(b)	<i>Able to state the valence electron of element S correctly</i> (ii) Answer: 2	1	1
1(c)	<i>Able to write the formula of the compound formed correctly</i> (i) Answer: QT ₄	1	1
1(c)	<i>Able to state the type of bond formed in the compound correctly</i> (ii) Answer: Covalent bond Ikatan kovalen	1	1
1(d)	<i>Able to draw the electron arrangement of compound formed correctly</i> (i) Sample answer: 	1+1	2
1(d)	<i>Able to explain why the compound has high melting point correctly</i> (ii) Sample answer: - There are strong electrostatic forces between ions - Terdapat daya elektrostatik yang kuat antara ion - More heat is needed to overcome the forces between ions - Lebih banyak banyak diperlukan untuk mengatasi daya antara ion	1	2
Total		9	9

No	Rubric	Mark	Σ marks
2(a)	<i>Able to state the proton number of fluorine atom</i> (i) Answer: 9	1	1
2(a)	<i>Able to identify the group of fluorine in the Periodic Table of Elements</i> (ii) Answer: 17	1	1
2(a)	<i>Able to state the name of the group in (a)(ii)</i> (iii) Answer: Halogen	1	1
2(b)	<i>Able to state more reactive element and able to explain the reactivity of element</i> Sample answer: 1. Fluorine Fluorin 2. The size of fluorine atom is smaller // The distance between nucleus and valence electron in fluorine atom is nearer. Saiz atom fluorin lebih kecil // Jarak antara nukleus dan elektron valens dalam atom fluorin lebih dekat. 3. The forces of attraction between nucleus and valence electron in fluorine atom is stronger. Daya tarikan antara nukleus dan elektron valens dalam atom fluorin lebih kuat.	1	3
2(c)	<i>Able to calculate the mass of iron reacted correctly</i> 1. Number of moles of iron(III) chloride produced Bilangan mol ferrum(III) klorida terhasil 2. Mole ratio Nisbah mol 3. Mass of iron with correct unit Jisim ferum dengan unit yang betul Sample answer: 1. $\frac{65}{162.5}$ // 0.04 mol 2. 2 mole Fe produces 2 mole FeCl ₃ // 0.04 mole Fe produces 0.04 mole FeCl ₃ 2 mol Fe menghasilkan 2 mol FeCl ₃ // 0.04 mol Fe menghasilkan 0.04 mol FeCl ₃ 3. Mass of Fe = (0.04 x 56) g // 2.24 g Jisim Fe = (0.04 x 56) g // 2.24 g	1	3
Total		9	9

No	Rubric	Mark	Σ marks															
3(a)	<p>Able to state the meaning of empirical formula correctly</p> <p><u>Answer:</u> Chemical formula that shows the simplest ratio of number of atoms of each element in the compound <i>Formula yang menunjukkan nisbah teringan bilangan atom setiap unsur dalam satu sebatian</i></p>	1	1															
3(b) (i)	<p>Able to name one of the chemical to prepare hydrogen gas correctly</p> <p><u>Sample answer:</u> Sulphuric acid // zinc // [any suitable acid] // [any reactive metal except sodium and potassium] <i>Asid sulfurik // zink // [sebarang asid yang sesuai] // [sebarang logam reaktif kecuali natrium dan kalium]</i></p> <p>[Reject: formula]</p>	1	1															
3(c)	<p>Able to explain the method used to ensure the air in the combustion tube is completely removed before heating correctly</p> <p><u>Sample answer:</u> 1. Collect the gas in a test tube and placed a lighted wooden splinter at the mouth of the test tube <i>Mengumpul gas di dalam tabung uji dan diletakkan kayu uji menyala di mulut tabung uji</i> 2. No "pop" sound produced <i>Tiada bunyi "pop" dihasilkan</i></p>	1	2															
3(d)	<p>Able to determine the empirical formula of L oxide correctly</p> <p><u>Sample answers:</u></p> <table border="1"> <thead> <tr> <th>Element Unsur</th> <th>L</th> <th>O</th> </tr> </thead> <tbody> <tr> <td>Mass Jisim, g</td> <td>49.68</td> <td>3.84</td> </tr> <tr> <td>Number of mol Bil mol</td> <td>0.24</td> <td>0.24</td> </tr> <tr> <td>Nisbah mol</td> <td>1</td> <td>1</td> </tr> <tr> <td>Empirical formula Formula empirik</td> <td colspan="2">LO</td> </tr> </tbody> </table>	Element Unsur	L	O	Mass Jisim, g	49.68	3.84	Number of mol Bil mol	0.24	0.24	Nisbah mol	1	1	Empirical formula Formula empirik	LO		1	3
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3(e)	<p>Able to give reason why this method is not suitable to determine the empirical formula of magnesium oxide correctly.</p> <p><u>Answer:</u> Magnesium is more reactive than hydrogen <i>Magnesium lebih reaktif daripada hidrogen</i></p>	1	1
3(f)	<p>Able to determine molecular formula correctly</p> <p><u>Sample answer:</u> 1. $n(C_3H_4O_3) = 176 // n(88) = 176 // n = 2$ 2. Molecular formula of ascorbic acid is $C_6H_8O_6$ <i>Formula molekul asid askorbik adalah $C_6H_8O_6$</i></p>	1	2
Total		10	10

No	Rubric	Mark	Σ marks
4(a)	<p>Able to write chemical formula for sodium hydroxide and state its colour at aqueous state correctly</p> <p><u>Answer:</u> Chemical formula: NaOH [reject: name] Colour: Colourless // Tidak berwarna</p>	1	2
4(b)	<p>Able to name salt X and compound Y correctly</p> <p><u>Answer:</u> Salt X: Sodium chloride // Natrium klorida Compound Y: Water // Air [reject: formula]</p>	1	2
4(c) (i)	<p>Able to write chemical equation for the reaction between salt X and silver nitrate correctly</p> <p>1. Correct formulae of reactants and products <i>Bahan tindak balas dan hasil tindak balas yang betul</i> 2. Balance chemical equation <i>Persamaan seimbang</i></p> <p><u>Answer:</u> $NaCl + AgNO_3 \rightarrow AgCl + NaNO_3$</p>	1	2

No	Rubric	Mark	Σ marks
4(c)	<i>Able to name white precipitate Z and Reaction II correctly</i>		
(ii)	<p>Answer:</p> <p>1. White precipitate Z = silver chloride Mendakan putih Z = argenium klorida</p> <p>2. Reaction II = double decomposition Tindak balas II = pemendakan ganda dua</p>	1	2
4(c)	<i>Able to calculate mass of precipitate Z correctly</i>		
(iii)	<p>1. Mol ratio Nisbah mol</p> <p>2. Mass of precipitate Z with correct unit Jisim mendakan Z dengan unit yang betul</p> <p>Sample answer:</p> <p>1. 1 mol NaCl produces 1 mol AgCl 1 mol NaCl menghasilkan 1 mol AgCl // 0.5 mol NaCl produces 0.5 mol AgCl 0.5 mol NaCl menghasilkan 0.5 mol AgCl</p> <p>2. Mass of AgCl / precipitate Z Jisim AgCl / mendakan Z = $0.5 \times 143.5 \text{ g mol}^{-1}$ = 71.75 g</p>	1 1	2
Total			10
No	Rubric	Mark	Σ marks
5(d)	<i>Able to state the meaning of rate of reaction correctly</i>		
	<p>Answer:</p> <p>Changes in the quantity of reactants or products per unit time Perubahan kuantiti bahan atau hasil tindak balas per unit masa</p>	1	1
5(b)	<i>Able to write the chemical formula for calcium carbonate correctly</i>		
	<p>Answer:</p> <p>CaCO₃</p>	1	1

No	Rubric	Mark	Σ marks
5(c)	<i>Able to calculate the number of mole of hydrochloric acid correctly</i>		
(i)	<p>Answer:</p> <p>Mol = $(1.0)/(0.05)$ //0.05</p>	1	1
5(c)	<i>Able to calculate the number of mole of calcium carbonate correctly</i>		
(ii)	<p>Answer:</p> <p>Mol = $\frac{4}{100}$ //0.04</p>	1	1
5(d)	<i>Able to name the reactant which determine the quantity of products produced at the end of the reaction correctly</i>		
	<p>Answer:</p> <p>Hydrochloric acid Asid hidroklorik</p>	1	1
5(e)	<i>Able to state one factor that affect the rate of reaction in this experiment apart from temperature correctly</i>		
	<p>Sample answer:</p> <p>Size of calcium carbonate/CaCO₃ // concentration of acid/ hydrochloric acid/HCl Saiz kalsium karbonat/ CaCO₃ // kepekatan asid/asid hidroklorik/HCl</p>	1	1
5(f)	<i>Able to explain how the factor mentioned in 5(e) increases the rate of reaction by referring to the collision theory correctly</i>		
	<p>Sample answer:</p> <p>Size of calcium carbonate: 1. Smaller size of calcium carbonate/CaCO₃ has larger total surface area Saiz kalsium karbonat/ CaCO₃ yang lebih kecil mempunyai jumlah luas permukaan yang lebih besar</p> <p>2. Higher frequency of collision between hydrogen ion/H⁺ and calcium carbonate/ CaCO₃ Frekuensi pelanggaran antara ion hidrogen/H⁺ dan kalsium karbonat/ CaCO₃ lebih tinggi</p> <p>3. Higher frequency of effective collision between particles Frekuensi pelanggaran berkesan antara zarah lebih tinggi</p>	1	1
OR			

No	Rubric	Mark	Σ marks
	<p>Concentration of acid</p> <ol style="list-style-type: none"> Higher concentration of acid/ hydrochloric acid/ HCl has higher number of particles/H⁺ per unit volume <i>Kepekatan asid/ asid hidroklorik/ HCl yang lebih tinggi mempunyai bilangan zarah/ H⁺ per unit isi padu yang lebih tinggi</i> Higher frequency of collision between hydrogen ion/H⁺ and calcium carbonate/ CaCO₃ <i>Frekuensi pelanggaran antara ion hidrogen/H⁺ dan kalsium karbonat/ CaCO₃ lebih tinggi</i> Higher frequency of effective collision between particles <i>Frekuensi pelanggaran berkesan antara zarah lebih tinggi</i> 	1 1 1	3
5(g)	<p>Able to sketch and label the graph of mass of calcium carbonate against time for both sets of experiment on the same axes correctly</p> <p>Answer:</p> <ol style="list-style-type: none"> Correct curve for both sets Correct label <p>Mass of calcium carbonate, g <i>Jisim kalsium karbonat, g</i></p>	1 1	2
Total		11	

No	Rubric	Mark	Σ marks
6(b)	<p>Able to state and explain the observation if tetrachloromethane is used correctly</p> <p>Sample answer:</p> <ol style="list-style-type: none"> The needles of galvanometer does not deflect. <i>Jarum galvanometer tidak terpesong</i> No free moving ions // Consist of neutral molecule <i>Tiada ion bebas bergerak // Menganangti molekul neutral</i> 	1 1	2
6(c)	<p>Able to write the half equation for the reaction occur at electrode X correctly</p> <p>Answer: $Br_2 + 2e \rightarrow 2Br^-$</p>	1	1
6(d)	<p>(i) Able to explain the process occur at electrode Y in term of transfer of electron correctly</p> <p>Sample answer:</p> <ol style="list-style-type: none"> Oxidation <i>Pengoksidaan</i> Iron(II) ion/Fe²⁺ release one electron <i>Ion ferum(II)/Fe²⁺ membebaskan satu elektron</i> to form iron(III) ion/ Fe³⁺ <i>membentuk ion ferum(III)/ Fe³⁺</i> 	1 1 1	3
6(d)	<p>(ii) Able to describe briefly method used to identify the presence of ion produced correctly</p> <p>Sample answers:</p> <ol style="list-style-type: none"> Add NaOH solution until excess <i>Tambah larutan NaOH sehingga berlebihan</i> Brown precipitate is formed <i>Mendakan perang terbentuk</i> 	1 1	2
6(e)	<p>Able to draw the set-up of the apparatus correctly</p> <ol style="list-style-type: none"> Functional diagram Label: FeSO₄ and bromine water <p>Sample answer:</p>	1 1	2
Total		11	

No	Rubric	Mark	Σ marks															
7(a)	<i>Able to state the factors that determine formation of the products at electrodes P and Q correctly</i> Sample answers: 1. Electrode P: The concentration of ions / solution / electrolyte <i>Elektrod P: Kepekatan ion / Larutan / elektrolit</i> 2. Electrode Q: The position of ions in electrochemical series <i>Elektrod Q: Kedudukan ion dalam siri elektrokimia</i>	1 1	2															
7(b)	<i>Able to explain the reactions at electrodes P and Q correctly</i> Sample answers: <table border="1"> <thead> <tr> <th>Electrode / Elektrod</th> <th>P</th> <th>Q</th> </tr> </thead> <tbody> <tr> <td>Ions that attracted / Ion-ion yang tertarik</td> <td>Cl^-, OH^-</td> <td>Cu^{2+}, H^+</td> </tr> <tr> <td>Name of ions discharged / Nama ion dibebaskan</td> <td>Chloride ion / Ion klorida</td> <td>Copper(II) ion / Ion kuprum(II)</td> </tr> <tr> <td>Half-equation / Setengah persamaan</td> <td>$2\text{Cl}^- \rightarrow \text{Cl}_2 + 2e^-$</td> <td>$\text{Cu}^{2+} + 2e^- \rightarrow \text{Cu}$</td> </tr> <tr> <td>Observation / Pemerhatian</td> <td>Greenish yellow bubble gas is released / Gelombang gas hijau kekuningan terbebas</td> <td>Brown solid is formed / Pepejal perang terbentuk</td> </tr> </tbody> </table>	Electrode / Elektrod	P	Q	Ions that attracted / Ion-ion yang tertarik	Cl^- , OH^-	Cu^{2+} , H^+	Name of ions discharged / Nama ion dibebaskan	Chloride ion / Ion klorida	Copper(II) ion / Ion kuprum(II)	Half-equation / Setengah persamaan	$2\text{Cl}^- \rightarrow \text{Cl}_2 + 2e^-$	$\text{Cu}^{2+} + 2e^- \rightarrow \text{Cu}$	Observation / Pemerhatian	Greenish yellow bubble gas is released / Gelombang gas hijau kekuningan terbebas	Brown solid is formed / Pepejal perang terbentuk	1+1 1+1 2+2 1+1	10
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7(c)	<i>Able to arrange the metals in descending order in an electrochemical series</i> Answer: W, X, Y, Cu	1	1															
7(c)	<i>Able to determine the positive terminal and the value of the potential difference for the pair of metals Y and copper and explain the answer correctly</i> Sample answers: 1. Positive terminal: Copper / Cu <i>Terminal positif: Kuprum / Cu</i> 2. Potential difference: 1.3 V <i>Beza keupayaan: 1.3 V</i> 3. Explanation: Y is more electropositive than Cu <i>Penerangan: Y lebih elektropositif daripada Cu</i>	1 1 1	3															

No	Rubric	Mark	Σ marks
7(d)	<i>Able to state the positive terminal and the negative terminal of this cell and suggest solutions R and S correctly</i> Sample answers: 1. Positive terminal: silver / Ag <i>Terminal positif: Argentum</i> 2. Negative terminal: Copper / Cu <i>Terminal negatif: Kuprum</i> 3. Solution R: Silver nitrate <i>Larutan R: Argentum nitrat</i> 4. Solution S: Copper(II) nitrate <i>Larutan S: Kuprum(II) nitrat</i>	1 1 1 1	4
Total			20
8(a)	<i>Able to suggest monoprotic acid X and acid Y correctly</i> Sample answers: 1. Acid X = Ethanoic acid/ CH_3COOH <i>Asid X = asid etanoik/ CH_3COOH</i> 2. Acid Y = Hydrochloric acid/ HCl / Nitric acid/ HNO_3 <i>Asid Y = asid hidroklorik/ HCl / asid nitrik / HNO_3</i>	1 1	2
	<i>Able to calculate the temperature change for Set I correctly and able to draw the energy level diagram for the reaction involved correctly</i> 3. Number of mol <i>Bilangan mol</i> 4. Value of heat change/H with correct unit <i>Nilai perubahan haba/H dengan unit yang betul</i> 5. Substitute formula with value correctly <i>Gantikan formula dengan nilai yang betul</i> 6. Value of temperature change = 6.3°C <i>Nilai perubahan suhu = 6.3°C</i> 7. Energy level diagram with correct label (energy) <i>Gambar rajah aras tenaga dengan label yang betul</i> 8. Correct parallel line with value of heat of reaction <i>Garis selari yang betul dengan nilai haba tindak balas</i> 9. Correct and balance chemical equation <i>Persamaan kimia yang betul dan seimbang</i>	1 1 1 1 1 1	9

No	Rubric	Mark	Σ marks
	<p>Sample answer:</p> <ol style="list-style-type: none"> Mol = $(1.0)(0.05)$ // 0.05 H = 53.7×0.05 kJ // 53700 x 0.05 J // 2.685 kJ // 2685 J $\theta = \frac{2685}{(100)(4.2)}$ // $\frac{2685}{420}$ = 6.3°C <p>Energy</p> <p style="text-align: center;">$\text{CH}_3\text{COOH} + \text{NaOH}$</p> <p style="text-align: center;">$\Delta H = -53.7 \text{ kJ mol}^{-1}$</p> <p style="text-align: center;">$\text{CH}_3\text{COONa} + \text{H}_2\text{O}$</p>		
8(b)	<p><i>Able to compare and explain the difference in the values of heat of neutralisation for the two sets of experiment correctly</i></p> <p>Sample answer:</p> <ol style="list-style-type: none"> Set II has higher heat of neutralisation Set II mempunyai haba peneutralan yang lebih tinggi Acid in set I is a weak acid Asid dalam set I adalah asid lemah Which ionises partially in water to form hydrogen ion/H⁺ Yang mengion separa dalam air bagi membentuk ion hidrogen/ H⁺ Acid in set II is strong acid Asid dalam set II adalah asid kuat Which ionises completely in water to form hydrogen ion/H⁺ Yang mengion dengan lengkap dalam air bagi membentuk ion hidrogen/ H⁺ Some of the heat released in Set II is absorbed by acid molecule to complete ionisation of acid Sebahagian haba yang dibebaskan dalam set II diserap oleh molekul asid bagi melengkapkan pengionan asid 	1 1 1 1 1 1	6

No	Rubric	Mark	Σ marks
8(c)	<p><i>Able to predict the value of heat change and explain correctly</i></p> <p>Sample answer:</p> <ol style="list-style-type: none"> The value is double / twice (reject: higher) Nilai adalah dua kali ganda (reject: lebih tinggi) Acid Y is a monoprotic acid Asid Y adalah asid monobas Sulphuric acid/H₂SO₄ is a diprotic acid Asid sulfurik/H₂SO₄ adalah asid dwibas Sulphuric acid/ H₂SO₄ has double/twice mol hydrogen ion/ H⁺ per molecule // Concentration of hydrogen ion/H⁺ in sulphuric acid/H₂SO₄ is double/ twice Asid sulfurik mempunyai dua kali ganda bilangan mol ion hidrogen/H⁺ per molekul // Kepekatan ion hidrogen/H⁺ dalam asid sulfurik/H₂SO₄ adalah dua kali ganda Sulphuric acid/ H₂SO₄ produces 2 mol /double mol/ twice mol of water Asid sulfurik / H₂SO₄ menghasilkan 2 mol/bilangan mol air dua kali ganda 	1 1 1 1 1	5
Total			20

No	Rubric	Mark	Σ marks
9(a) (1)	Able to identify polymer A. <u>Answer:</u> Polyvinyl chloride / PVC Polivinil klorida / PVC Able to draw the structural formula of the monomer in polymer A. <u>Sample answer:</u> $\begin{array}{c} \text{H} & & \text{H} \\ & & \\ \text{C} & = & \text{C} \\ & & \\ \text{H} & & \text{Cl} \end{array}$	1	1
9(a) (ii)	Able to name the structural formula of the monomer in polymer A. <u>Answer:</u> Chloroethene / Vinyl chloride Kloroetena / Vinil klorida	1	3
9(b)	Able to explain why improper disposal of the products of polymer A such as burning and burying pollutes the environment <u>Sample answer:</u> 1. Burning of polymer A/Polyvinyl chloride produces toxic/poisonous gas. <i>Pembakaran polimer A/Polivinil klorida menghasilkan gas beracun/beracun.</i> 2. Polymer A/Polyvinyl chloride is non-biodegradable. <i>Polimer A/Polivinil klorida tak terbiodegradasi</i>	1	2
	Able to explain difference of hardness between alloy X and iron. <u>Sample answer:</u> 1. Alloy X is harder than iron <i>Alloy X lebih keras daripada besi</i> 2. The presence of foreign / carbon atom <i>Kehadiran atom asing / karbon</i> 3. Disrupts the orderly arrangement of iron atom. <i>Mengganggu ketertibon susunan atom besi</i> 4. Makes the layer of atom more difficult to slide over when force is applied <i>Mengjadikan lapisan atom lebih sukar menggesel/gesor apabila daya dikenakan</i>	1	1

No	Rubric	Mark	Σ marks
9(c)	Able to name alloy X correctly <u>Answer:</u> Steel // Keluli	1	5
	Able to state an example for strong alkali and fat <u>Sample answer:</u> 1. Strong alkali / Alkali kuat: Sodium hydroxide // potassium hydroxide // NaOH // KOH <i>Natrium hidroksida // kalium hidroksida // NaOH // KOH</i> 2. Fat / Lemak: [any suitable vegetable oil or animal fat] <i>[sebarang minyak sayuran atau lemak haiwan]</i> Examples: palm oil / chicken fat <i>Contoh: minyak sawit / lemak ayam</i>	1	1
	Able to describe an experiment to prepare soap 3. Materials: [Strong alkali], [fat], sodium chloride, distilled water. Apparatus: beaker, glass rod, measuring cylinder, wire gauze, tripod stand, Bunsen burner, filter paper. <i>Bahan: [alkali kuat], [lemak], natrium klorida, air suling, Radas: bikar, rod kaca, silinder penyukat, kasa dawai, tungku kaki tiga, penamun Bunsen, kertas turas.</i> 4. Measure and pour [5-10] cm ³ of palm oil into a beaker. <i>Sukat dan tuang [5-10] cm³ minyak sawit ke dalam satu bikar.</i> 5. Measure and pour [20 – 40] cm ³ of [2 – 5] mol dm ⁻³ sodium hydroxide solution into the beaker. <i>Sukat dan tuang [20 – 40] cm³ [2 – 5] mol dm⁻³ larutan natrium hidroksida ke dalam bikar tersebut.</i> 6. Heat the mixture until it boils. <i>Panaskan campuran sehingga ia mendidih.</i> 7. Stir the mixture constantly for about 10 minutes. <i>Kacau campuran berterusan untuk 10 minit.</i> 8. Add [50-100] cm ³ distilled water and one spatula of sodium chloride into the beaker. <i>Tambah [50-100] cm³ air suling dan satu spatula natrium klorida ke dalam bikar.</i> 9. The mixture is boiled again for 5 minutes and cooled to room temperature. <i>Campuran dididihkan semula untuk 5 minit dan disejukkan ke suhu bilik.</i> 10. Filter and dry the product. <i>Turas dan keringkan hasil.</i>	1	10
	Total	20	20

No	Rubric	Mark	Σ marks																								
10(a)	<p>Able to state an alcohol and a carboxylic acid required to be used for preparing the ester correctly</p> <p><u>Answer:</u> 1. Alcohol: Methanol // Metanol 2. Carboxylic acid: Butanoic acid // Asid butanoik</p> <p>Able to write the chemical equation for the reaction correctly</p> <p>3. Correct formulae of reactants and products 4. Balance chemical equation</p> <p>Sample answer: $\text{CH}_3\text{OH} + \text{C}_3\text{H}_7\text{COOH} \rightarrow \text{C}_3\text{H}_7\text{COOCH}_3 + \text{H}_2\text{O}$</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p>	4																								
10(b) (i)	<p>Able to write molecular formula of compound J, L and M and name Reaction I, II and III correctly</p> <p>Sample answer:</p> <table border="1"> <thead> <tr> <th>Compound</th> <th>J</th> <th>L</th> <th>M</th> </tr> </thead> <tbody> <tr> <td>Molecular formula</td> <td>$\text{C}_2\text{H}_5\text{OH}$ //</td> <td>CH_3COOH //</td> <td>C_2H_6 //</td> </tr> <tr> <td>Formula molekul</td> <td>$\text{C}_3\text{H}_7\text{OH}$</td> <td>$\text{C}_2\text{H}_5\text{COOH}$</td> <td>$\text{C}_3\text{H}_8$</td> </tr> </tbody> </table> <p>[Note: Number of carbon atom for compound J, L and M must be the same]</p> <table border="1"> <thead> <tr> <th>Reaction</th> <th>I</th> <th>II</th> <th>III</th> </tr> </thead> <tbody> <tr> <td>Name of reaction</td> <td>Dehydration</td> <td>Oxidation</td> <td>Hydrogenation //</td> </tr> <tr> <td>Nama tindak balas</td> <td>Pendehidratan</td> <td>Pengoksidaan</td> <td>Addition of hydrogen // Penambahan hidrogen</td> </tr> </tbody> </table>	Compound	J	L	M	Molecular formula	$\text{C}_2\text{H}_5\text{OH}$ //	CH_3COOH //	C_2H_6 //	Formula molekul	$\text{C}_3\text{H}_7\text{OH}$	$\text{C}_2\text{H}_5\text{COOH}$	C_3H_8	Reaction	I	II	III	Name of reaction	Dehydration	Oxidation	Hydrogenation //	Nama tindak balas	Pendehidratan	Pengoksidaan	Addition of hydrogen // Penambahan hidrogen	<p>1+1+1</p> <p>1+1+1</p>	6
Compound	J	L	M																								
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10(b) (ii)	<p>Able to describe an experiment to prepare compound K correctly</p> <p>Sample answer: 1. Apparatus and materials: <i>Radas dan bahan:</i> Boiling tube, Bunsen burner, porcelain chips, basin, test tube, delivery tube, [ethanol/propanol/compound J], glass wool, water <i>Tabung didih, penemu Bunsen, serpihan porselin, besen, tabung uji, satu penghantar, [etanol/propanol/sebatian J], wul kaca, air.</i></p>	1																									

No	Rubric	Mark	Σ marks
	<p>Procedure:</p> <p>2. Put small quantity of glass wool in boiling tube. <i>Letakkan sedikit wul kaca di dalam tabung didih</i></p> <p>3. Add [2-5] cm³ of [ethanol/propanol/compound J] <i>Tambahkan [2-5] cm³, [etanol/propanol/sebatian J],</i></p> <p>4. Clamp the boiling tube horizontally <i>Apitkan tabung didih secara mendatar</i></p> <p>5. Place porcelain chips in the middle of boiling tube <i>Tempatkan serpihan porselin di tengah tabung didih</i></p> <p>6. Close the boiling tube with stopper fitted with delivery tube <i>Tutupkan tabung didih dengan penutup yang disambungkan dengan satu penghantar</i></p> <p>7. Heat the porcelain chips strongly <i>Panaskan serpihan porselin dengan kuat</i></p> <p>8. Warm [ethanol/propanol/ compound J] gently <i>Hangatkan [etanol/propanol/sebatian J] dengan perlahan</i></p> <p>9. Collect the gas produced in a test tube <i>Kumpulkan gas yang terhasil di dalam tabung uji</i></p> <p>Chemical equation: 10. Correct reactants and products <i>Bahan tindak balas dan hasil tindak balas yang betul</i></p> <p>$\text{C}_2\text{H}_5\text{OH} \rightarrow \text{C}_2\text{H}_4 + \text{H}_2\text{O}$ // $\text{C}_3\text{H}_7\text{OH} \rightarrow \text{C}_3\text{H}_6 + \text{H}_2\text{O}$</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>	10
	Total	20	

**MS CHEMISTRY PAPER 3
PP KIMIA KERTAS 3**

Question	Rubric	Score																
1(a)	<p><i>Able to record all the initial and highest temperature readings correctly</i></p> <p>Criteria: 1. with one decimal place and 2. unit</p> <p>Answers:</p> <table border="1"> <thead> <tr> <th>Set</th> <th>Initial Awal</th> <th>Highest Tertinggi</th> </tr> </thead> <tbody> <tr> <td>I</td> <td>28.0°C</td> <td>63.0°C</td> </tr> <tr> <td>II</td> <td>28.0°C</td> <td>53.0°C</td> </tr> <tr> <td>III</td> <td>28.0°C</td> <td>49.0°C</td> </tr> </tbody> </table>	Set	Initial Awal	Highest Tertinggi	I	28.0°C	63.0°C	II	28.0°C	53.0°C	III	28.0°C	49.0°C	3				
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	<p><i>Able to record one initial and one highest temperature readings</i></p>	1																
	<p><i>No response or wrong response</i></p>	0																
Question	Rubric	Score																
1(b)	<p><i>Able to construct a table with the following aspects:</i></p> <ol style="list-style-type: none"> Correct headings Correct initial and highest temperature readings [eef 1(a)] Correct change of temperature <p>Sample answer:</p> <table border="1"> <thead> <tr> <th>Set</th> <th>Initial temperature(°C) // Suhu awal (°C)</th> <th>Highest temperature(°C) // Suhu tertinggi (°C)</th> <th>Temperature change(°C) // Perubahan suhu (°C)</th> </tr> </thead> <tbody> <tr> <td>I</td> <td>28.0</td> <td>63.0</td> <td>35.0</td> </tr> <tr> <td>II</td> <td>28.0</td> <td>53.0</td> <td>25.0</td> </tr> <tr> <td>III</td> <td>28.0</td> <td>49.0</td> <td>21.0</td> </tr> </tbody> </table>	Set	Initial temperature(°C) // Suhu awal (°C)	Highest temperature(°C) // Suhu tertinggi (°C)	Temperature change(°C) // Perubahan suhu (°C)	I	28.0	63.0	35.0	II	28.0	53.0	25.0	III	28.0	49.0	21.0	3
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	<p><i>Able to construct a table with the following aspects:</i></p> <ol style="list-style-type: none"> Headings Initial and highest temperature readings [eef 1(a)] 	1																
	<p><i>No response or wrong response or empty table</i></p>	0																

Question	Rubric	Score
1(c)	<p><i>Able to state the relationship correctly</i></p> <p>Sample answer: The further position of metal from copper in electrochemical series, the more heat is released Semakin jauh kedudukan logam dari kuprum dalam siri elektrokimia semakin banyak haba dibebaskan</p>	3
	<p><i>Able to state the relationship</i></p> <p>Sample answer: The further position of metal from copper, the more heat is released Semakin jauh kedudukan logam dari kuprum, semakin banyak haba dibebaskan</p>	2
	<p><i>Able to state the idea of the relationship</i></p> <p>Sample answer: Different metals released different heat Logam yang berbeza membebaskan haba yang berbeza</p>	1
	<p><i>No response or wrong response</i></p>	0
Question	Rubric	Score
1(d)	<p><i>Able to state all the variables correctly</i></p> <p>Sample answers: MV: Type of metal // Magnesium, metal P, lead Jenis logam// Magnesium, logam P, plumbum</p> <p>RV: The highest temperature // Heat of displacement// Heat released // Heat change Suhu tertinggi // Haba peryesaran // Haba dibebaskan // Perubahan haba</p> <p>FV: Copper(II) nitrate solution // Concentration & volume of copper(II) nitrate solution // Type of metals in powder form // Plastic cup Larutan kuprum(II) nitrat // Kepekatan dan isi padu larutan kuprum(II) nitrat // Jenis logam dalam bentuk serbuk // Cawan plastik</p>	3
	<p><i>Able to state any two variables correctly</i></p>	2
	<p><i>Able to state any one variable correctly</i></p>	1
	<p><i>No response or wrong response</i></p>	0

Question	Rubric	Score
1(e)	<p>Able to state the hypothesis correctly</p> <p>Criteria: 1. MV followed by RV 2. Direction</p> <p>Sample answer: The further the distance of [metal with copper/two metals] in electrochemical series, the higher the heat of displacement <i>Semakin jauh antara [logam dengan kuprum/dua logam] dalam siri elektrokimia, semakin tinggi haba penyesaran</i></p> <p>Able to state the hypothesis</p> <p>Sample answer: The heat of displacement increases when the electropositivity of metals increases <i>Haba penyesaran meningkat apabila keelektropositifan logam meningkat</i></p> <p>Able to state the idea of hypothesis</p> <p>Sample answer: The different type of metal affects the heat of displacement <i>Logam berlainan mempengaruhi haba penyesaran</i></p> <p>No response or wrong response</p>	3 2 1 0
1(f)(i)	<p>Able to state the observation correctly</p> <p>Sample answer: Highest temperature reading in set I is the highest followed by set II and III // Temperature change in set I is the highest followed by set II and III <i>Bacaan suhu tertinggi dalam set I adalah paling tinggi diikuti set II dan set III</i> // Perubahan suhu dalam set I adalah paling tinggi diikuti set II dan set III</p> <p>Able to state the observation</p> <p>Sample answer: Highest temperature reading in set I is high <i>Bacaan suhu tertinggi dalam set I adalah tinggi</i></p> <p>Have idea to state the observation</p> <p>Sample answer: Different temperature <i>Suhu berbeza</i></p> <p>No response or wrong response</p>	3 2 1 0

Question	Rubric	Score
1(f)(ii)	<p>Able to state the inference correctly</p> <p>Sample answer: The position of magnesium from copper in electrochemical series is the furthest followed by metal P and lead <i>Kedudukan magnesium dari kuprum dalam siri elektrokimia adalah paling jauh diikuti logam P dan plumbum</i></p> <p>Able to state the inference</p> <p>Sample answer: Magnesium is more electropositive than copper <i>Magnesium lebih elektropositif daripada kuprum</i></p> <p>Have idea to state inference</p> <p>Sample answer: Magnesium is reactive <i>Magnesium reaktif</i></p> <p>No response or wrong response</p>	3 2 1 0
1(g)	<p>Able to predict the reading of highest temperature and give reason correctly Range [more than 53 °C and less than 63 °C]</p> <p>Sample answer: 55 °C Zinc is below magnesium but above metal P in electrochemical series <i>Zink di bawah magnesium tetapi di atas logam P dalam siri elektrokimia</i></p> <p>Able to predict the reading of highest temperature and give reason</p> <p>Sample answer: 55 Zinc is below magnesium but above metal P <i>Zink di bawah magnesium tetapi di atas logam P</i></p> <p>Able to predict the reading of highest temperature</p> <p>Sample answer: 55 <i>No response or wrong response</i></p>	3 2 1 0

Question	Rubric	Score
	<i>Able to state the operational definition correctly</i>	
	Criteria: 1. State what must be done 2. State observation 3. State 1 mol of metal displaced	
	Sample answer: Temperature increased when one mole of copper is displaced from copper(II) nitrate solution when a more electropositive metal is added <i>Suhu meningkat apabila 1 mol kuprum disasarkan dari larutan kuprum(II) nitrat apabila logam yang lebih elektropositif ditambah</i>	3
1(b)	<i>Able to state the operational definition</i>	
	Criteria: 1. State what must be done 2. State observation	
	Sample answer: Temperature increased when other metal is added <i>Suhu bertambah bila logam lain ditambah</i>	2
	<i>Able to state the idea of the operational definition</i>	
	Sample answer: Temperature increased <i>Suhu bertambah</i>	1
	<i>No response or wrong response</i>	0
	Rubric	Score
	<i>Able to suggest a reasonable method</i>	
	Sample answer: Close the plastic cup with [any heat insulator material] <i>Tutup cawan plastik dengan [sebarang bahan penambat haba]</i>	3
	<i>Able to suggest a method</i>	
	Sample answer: Wrap the plastic cup with [any heat insulator material] // <i>Bungkus cawan plastik dengan [sebarang bahan penambat haba]</i>	2
1(i)	<i>Have an idea to suggest a method</i>	
	Sample answer: Do not place plastic cup under fan <i>Trick tidak meletak cawan plastik di bawah kipas</i>	1
	<i>No response or wrong response</i>	0

Question	Rubric	Score						
	<i>Able to classify all the substances into exothermic reactions and endothermic reactions correctly</i>							
	Sample answer:							
	<table border="1"> <thead> <tr> <th>Exothermic <i>Eksotermik</i></th> <th>Endothermic <i>Endotermik</i></th> </tr> </thead> <tbody> <tr> <td>Sodium hydroxide <i>Natrium hidroksida</i></td> <td>Ammonium nitrate <i>Amonium nitrat</i></td> </tr> <tr> <td>Anhydrous copper(II) sulphate <i>Kuprum(II) sulfat kon tang</i></td> <td>Ammonium chloride <i>Amonium klorida</i></td> </tr> </tbody> </table>	Exothermic <i>Eksotermik</i>	Endothermic <i>Endotermik</i>	Sodium hydroxide <i>Natrium hidroksida</i>	Ammonium nitrate <i>Amonium nitrat</i>	Anhydrous copper(II) sulphate <i>Kuprum(II) sulfat kon tang</i>	Ammonium chloride <i>Amonium klorida</i>	3
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Anhydrous copper(II) sulphate <i>Kuprum(II) sulfat kon tang</i>	Ammonium chloride <i>Amonium klorida</i>							
1(f)	<i>Able to classify three substances into exothermic reactions and endothermic reactions correctly</i>							
	<i>Able to classify two substances into exothermic reactions and endothermic reactions correctly</i>							
	<i>No response or wrong response</i>	0						
	Rubric	Score						
	<i>Able to state the problem statement of the experiment correctly</i>							
	Sample answer: Does the presence of water in alkali shows the property of alkali? <i>Adakah kehadiran air dalam alkali menunjukkan sifat alkali?</i>	3						
	<i>Able to state the problem statement of the experiment</i>							
	Sample answer: Does water gives property of alkali <i>Adakah air memberikan sifat alkali</i>	2						
2(d)	<i>Able to give an idea of the problem statement</i>							
	Sample answer: Alkaline property in water <i>Sifat alkali dalam air</i>	1						
	<i>No response or wrong response</i>	0						

Question	Rubric	Score
2(b)	<i>Able to state all the variables correctly</i>	3
	Sample answer: Manipulated variable : Presence of water <i>Pemboleh ubah dimanipulasi : Kehadiran air</i>	
	Responding variable: Alkaline property // Red litmus paper turns blue <i>Pemboleh ubah bergerak balas: Sifat alkali // Kertas litmus merah bertukar ke biru</i>	
	Fixed variable <i>Pemboleh ubah dimatarkan : Jenis alkali</i>	
	<i>Able to state any two variables correctly</i>	
<i>Able to state any one variable correctly</i>	2	
<i>No response or wrong response</i>	1	
	0	

Question	Rubric	Score
2(c)	<i>Able to state a relationship between the <u>MV</u> and the <u>RV</u> with direction correctly</i>	3
	Sample answer: The presence of water in alkali shows alkaline property <i>Kehadiran air dalam alkali menunjukkan sifat alkali</i>	
	<i>Able to state a relationship between the <u>MV</u> and the <u>RV</u></i>	
	Sample answer: Presence of water shows alkaline property <i>Kehadiran air menunjukkan sifat alkali</i>	
	<i>Able to state an idea of hypothesis</i>	
Sample answer: Alkaline property <i>Sifat alkali</i>	2	
<i>No response or wrong response</i>	1	
	0	

Question	Rubric	Score
2(d)	<i>Able to give complete list of substances and apparatus</i>	3
	Sample answer: 3 substances: Water, red litmus paper and [named alkali in solid form or gas; $\text{NaOH}_{(s)}$ / $\text{Ba}(\text{OH})_{2(s)}$ / $\text{Ca}(\text{OH})_{2(s)}$ / $\text{Na}_2\text{O}_{(s)}$ / $\text{K}_2\text{O}_{(s)}$ / $\text{NH}_3_{(g)}$] <i>Air, kertas litmus merah dan [alkali dinamakan dalam bentuk pepejal atau gas; $\text{NaOH}_{(p)}$/$\text{Ba}(\text{OH})_{2(p)}$/$\text{Ca}(\text{OH})_{2(p)}$/$\text{Na}_2\text{O}_{(p)}$/$\text{K}_2\text{O}_{(p)}$ / $\text{NH}_3_{(g)}$]</i>	
	1 apparatus: Test tube/Tabung uji/ [any suitable container], Stopper [if gas is used] <i>Tabung uji [mana-mana bekas yang sesuai], Penyumbat [jika gas digunakan]</i>	
	[can refer to labelled diagram or procedure] <i>[boleh rujuk rajah berlabel atau prosedur]</i>	
	<i>Able to give 2 substances and 1 apparatus</i>	
Sample answer: $\text{NaOH}_{(s)}$, red litmus paper, [any suitable container] $\text{NaOH}_{(p)}$, kertas litmus merah, [mana-mana bekas yang sesuai]	2	
<i>Able to give 2 substances</i>	1	
Sample answer: $\text{NaOH}_{(s)}$, red litmus paper $\text{NaOH}_{(p)}$, kertas litmus merah		
<i>No response or wrong response</i>		
	0	

Question	Rubric	Score
2(e)	<i>Able to write the procedure correctly</i>	3
	Sample answer: 1. Put some sodium hydroxide solid into two separate test tubes <i>Letak sedikit pepejal natrium hidroksida ke dalam dua tabung uji berlainan.</i>	
	2. Add water into one of the test tube and shake <i>Tambah air ke dalam salah satu tabung uji dan goncang.</i>	
	3. Put a piece of (dry) red litmus paper into each test tube <i>Letak sekeping kertas litmus merah (kering) ke dalam setiap tabung uji.</i>	
	4. Record the observations <i>Rekod pemerhatian</i>	
<i>No response or wrong response</i>	0	

Question	Rubric	Score
	<i>Able to write the procedure</i>	
	<p>Sample answer:</p> <ol style="list-style-type: none"> Put some sodium hydroxide solid into two separate test tubes Letak sedikit pepejal natrium hidrokksida ke dalam dua tabung uji berlainan. Add water into one of the test tube and shake Tambah air ke dalam salah satu tabung uji dan goncang. Put a piece of (dry) red litmus paper into each test tube Letak sekeping kertas litmus merah (kering) ke dalam setiap tabung uji. 	2
	<i>Have an idea to write procedure</i>	
	<ol style="list-style-type: none"> Put litmus paper on sodium hydroxide Letak kertas litmus pada natrium hidrokksida 	1
	<i>No response or wrong response</i>	0

Question	Rubric	Score												
	<i>Able to construct a table with the following criteria:</i>													
	<ol style="list-style-type: none"> Correct headings State manipulated variable 													
	<table border="1"> <thead> <tr> <th>Presence of water in alkali</th> <th>Observation</th> </tr> </thead> <tbody> <tr> <td><i>Kehadiran air dalam alkali</i></td> <td><i>Pemerhatian</i></td> </tr> <tr> <td>NaOH_(s)</td> <td></td> </tr> <tr> <td>NaOH_(l)</td> <td></td> </tr> <tr> <td>NaOH_(aq)</td> <td></td> </tr> <tr> <td>NaOH_(ad)</td> <td></td> </tr> </tbody> </table>	Presence of water in alkali	Observation	<i>Kehadiran air dalam alkali</i>	<i>Pemerhatian</i>	NaOH _(s)		NaOH _(l)		NaOH _(aq)		NaOH _(ad)		2
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END OF MARKING SCHEME
PERATURAN PERMARKAHAN TAMAT