



**PENTAKSIRAN DIAGNOSTIK AKADEMIK
SEKOLAH BERASRAMA PENUH 2017**

PEPERIKSAAN PERCUBAAN SIJIL PELAJARAN

MALAYSIA

CHEMISTRY

Kertas 1, 2, 3

Ogos 2017

4541/1,2, 3

**MARKING SCHEME
PAPER 1, 2 & 3**

MARKING SCHEME CHEMISTRY PAPER 1

| NO | ANSWER | NO | ANSWER |
|-----------|---------------|-----------|---------------|
| 1 | D | 26 | C |
| 2 | A | 27 | B |
| 3 | C | 28 | D |
| 4 | B | 29 | C |
| 5 | A | 30 | A |
| 6 | B | 31 | C |
| 7 | D | 32 | B |
| 8 | D | 33 | D |
| 9 | B | 34 | B |
| 10 | A | 35 | D |
| 11 | A | 36 | C |
| 12 | B | 37 | B |
| 13 | D | 38 | D |
| 14 | A | 39 | C |
| 15 | C | 40 | C |
| 16 | D | 41 | A |
| 17 | A | 42 | D |
| 18 | D | 43 | A |
| 19 | A | 44 | B |
| 20 | B | 45 | D |
| 21 | C | 46 | C |
| 22 | B | 47 | B |
| 23 | B | 48 | A |
| 24 | A | 49 | A |
| 25 | C | 50 | C |

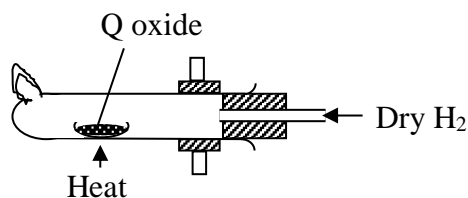
MARKING SCHEME FOR CHEMISTRY PAPER 2

SECTION A

| No | | | Rubric | Mark | Total marks |
|--------------|-----|-------|--|-------------|-------------|
| 1 | (a) | (i) | [Able to state the type of particle in copper(II) sulphate correctly] Answer : Ion | 1 | 1 |
| | | (ii) | [Able to state the observation in the experiment correctly] Sample answer : Blue colour spread upward to the agar after one day <i>Warna biru merebak ke seluruh agar-agar selepas beberapa hari</i> | 1 | 1 |
| | | (iii) | [Able to explain the observation using kinetic theory correctly] Sample answer: 1. Copper(II) sulphate consist of tiny and discrete ion <i>Kuprum(II) sulfat terdiri daripada ion yang kecil dan diskrit</i> 2. which are in motion <i>yang sentiasa bergerak</i> 3. Ions move in the spaces between the particles of agar <i>// ions move from higher concentration region to lower concentration region</i> <i>Ion bergerak ke dalam ruangan antara zarah agar // ion bergerak daripada kawasan berkepekatan tinggi ke kawasan berkepekatan rendah</i> | 1 1 1 | 3 |
| | (b) | (i) | [Able to state the number of proton correctly] Answer: 6 | 1 | 1 |
| | | (ii) | [Able to state the term used correctly] Answer : Isotopes | 1 | 1 |
| | | (iii) | [Able to represent atom carbon-13 in form of A_ZX Answer: ${}^{13}_6C$ | 1 | 1 |
| | | (iv) | [Able to state the carbon isotope used to estimate the age of fossil correctly] Answer : Carbon-14 <i>Karbon-14</i> | 1 | 1 |
| TOTAL | | | | | 9 |

| No | | Rubric | Mark | Total marks |
|--------------|-----|---|--------|-------------|
| 2 | (a) | <p>[Able to state the type of substance to make chair P and Q correctly]</p> <p>Sample answer: P : polymer // polypropene P : <i>polimer // polipropena</i> Q : alloy // stainless steel Q : <i>aloi // keluli nirkarat / keluli tahan karat</i></p> | 1 1 | 2 |
| | (b) | (i) <p>[Able to draw structural formula of monomer of polypropene correctly]</p> <p>Answer :</p> $ \begin{array}{c} \text{H} \quad \text{CH}_3 \\ \quad \\ \text{C} = \text{C} \\ \quad \\ \text{H} \quad \text{H} \end{array} $ | 1 | 1 |
| | | (ii) <p>[Able to give two reasons correctly]</p> <p>Sample answer : P1 : Does not rust <i>Tidak berkarat</i> P2 : Stronger <i>Lebih kuat</i></p> | 1 1 | 2 |
| | (b) | (i) <p>[Able to state the medicine that can replace medicine P and give a suitable suggestion correctly]</p> <p>Sample answer : P1 : Medicine P is acidic// can cause internal bleeding <i>Ubat P berasid// boleh menyebabkan pendarahan dalaman</i> P2 : Can replace with paracetamol <i>Boleh digantikan dengan parasetamol</i></p> | 1 1 | 2 |
| | | (ii) <p>[Able to give correct action and a reason correctly]</p> <p>Sample answer : P1 : Must take full course <i>Perlu diambil sepenuhnya</i> P2 : To make sure all bacteria are killed <i>Untuk memastikan semua bakteria dihapuskan</i></p> | 1 1 | 2 |
| TOTAL | | | | 9 |

| No | Rubric | | Mark | Total marks |
|----|--------|---|------------|-------------|
| 3 | (a) | [Able to state the meaning of empirical formula correctly] Answer : Empirical formula is the formula that shows the simplest whole number ratio of atoms for each element in a compound. <i>Formula empirik adalah formula yang menunjukkan nisbah teringkas bilangan atom setiap unsur bagi suatu sebatian.</i> | 1 | 1 |
| | (b) | (i) [Able to state one example of metal which is higher than hydrogen in the reactivity series correctly] Sample answer : Magnesium/Mg//Zinc/Zn//Aluminium/Al <i>Magnesium/ Mg// Zink/ Zn// Aluminium/ Al</i> | 1 | 1 |
| | | (ii) [Able to explain why the metal is chosen correctly] Sample answer : Magnesium/Zinc/Aluminium is a reactive metal / <i>Magnesium/ zink/ aluminium adalah logam reaktif</i> | 1 | 1 |
| | | (iii) [Able to explain how to determine that the reaction is completed correctly] Answer : Repeat heating, cooling and weighing until a constant mass is obtained <i>Ulang pemanasan, penyejukan dan penimbangan sehingga jisim tetap diperolehi.</i> | 1 | 1 |
| | (c) | (i) [Able to draw a functional diagram and label the apparatus set-up correctly] Answer : 1. Functional diagram <i>Gambarajah berfungsi</i> 2. Label – dry hydrogen gas, Q oxide, heat <i>Label – gas hidrogen kering, oksida Q, panaskan</i> | 1 1 | 2 |

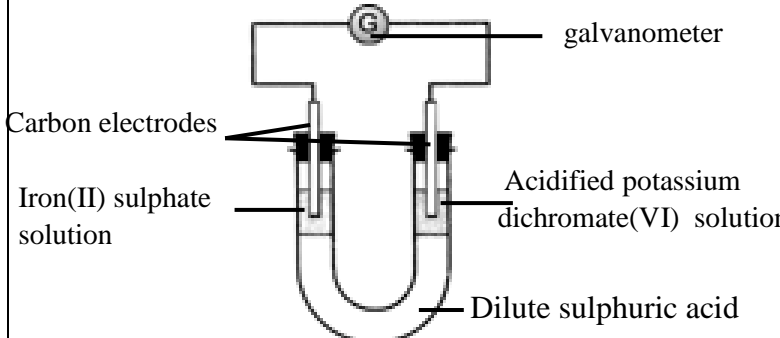


| No | | Rubric | Marks | Total Marks | | | | | | | | | | | | | | | |
|--|--------------------|---|-------------------------|-------------|---|------------------------------|------|------|--|--------------------|--------------------|--|---|---|---|----|--|---------------------|---|
| | (ii) | [Able to determine the empirical formula of Q oxide correctly] Sample answer : <table border="1" style="margin-left: 20px;"> <tr> <td>Element <i>Unsur</i></td> <td>Q</td> <td>O</td> </tr> <tr> <td>Mass (g) <i>Jisim (g)</i></td> <td>1.28</td> <td>0.32</td> </tr> <tr> <td>No of moles of atoms <i>Bil. mol atom</i></td> <td>1.28/64 // 0.02</td> <td>0.32/16 // 0.02</td> </tr> <tr> <td>Simplest mole ratio <i>Nisbah mol teringkas</i></td> <td>1</td> <td>1</td> </tr> <tr> <td>Empirical formula <i>Formula empirik</i></td> <td colspan="2">QO</td> </tr> </table> | Element <i>Unsur</i> | Q | O | Mass (g) <i>Jisim (g)</i> | 1.28 | 0.32 | No of moles of atoms <i>Bil. mol atom</i> | 1.28/64 // 0.02 | 0.32/16 // 0.02 | Simplest mole ratio <i>Nisbah mol teringkas</i> | 1 | 1 | Empirical formula <i>Formula empirik</i> | QO | | 1 1 1 | 3 |
| Element <i>Unsur</i> | Q | O | | | | | | | | | | | | | | | | | |
| Mass (g) <i>Jisim (g)</i> | 1.28 | 0.32 | | | | | | | | | | | | | | | | | |
| No of moles of atoms <i>Bil. mol atom</i> | 1.28/64 // 0.02 | 0.32/16 // 0.02 | | | | | | | | | | | | | | | | | |
| Simplest mole ratio <i>Nisbah mol teringkas</i> | 1 | 1 | | | | | | | | | | | | | | | | | |
| Empirical formula <i>Formula empirik</i> | QO | | | | | | | | | | | | | | | | | | |
| | (iii) | [Able to write a balanced chemical equation correctly] Answer : $QO + H_2 \rightarrow Q + H_2O$ | 1 | 1 | | | | | | | | | | | | | | | |
| TOTAL | | | | 10 | | | | | | | | | | | | | | | |

| No | | Rubric | Mark | Total marks |
|----|-----|--|------------|-------------|
| 4 | (a) | (i) [Able to state the substance X correctly] Answer : Ammonia / NH ₃ | 1 | 1 |
| | | (ii) [Able to state one physical properties of ammonia correctly] Answer : Low melting and boiling points // soluble in water // conduct electricity in aqueous solution <i>Takat lebur dan takat didih rendah// larut dalam air// mengkonduksi elektrik dalam larutan akueus</i> | 1 | 1 |
| | (b) | [Able to give a reason why ammonium chloride is suitable as fertiliser correctly] Answer : Soluble in water // high percentage of nitrogen <i>Larut dalam air// peratus nitrogen tinggi</i> | 1 | 1 |
| | (c) | (i) [Able to name two substances that can be used to produce ammonium chloride correctly] Answer : P1 : Ammonia solution/ ammonium hydroxide <i>Larutan ammonia / ammonium hidroksida</i> P2 : Hydrochloric acid <i>Asid hidroklorik</i> | 1 1 | 2 |

| | | | | | |
|--------------|-----|------|--|------------|-----------|
| | | (ii) | [Able to name the reaction occur correctly] Answer : Neutralisation <i>Peneutralan</i> | 1 | 1 |
| | (d) | (i) | [Able to write the both formula of anion and cation present in ammonium chloride correctly] Answer : NH_4^+ and Cl^- | 1+1 | 2 |
| | | (ii) | [Able to describe the chemical test to identify ammonium ion correctly] Sample answer : P1 : Add Nessler reagent into the test tube containing ammonium chloride solution. <i>Tambahkan reagen Nessler ke dalam tabung uji yang mengandung larutan ammonium klorida</i> P2 : Brown precipitate is formed <i>Mendakan perang terbentuk</i> | 1 1 | 2 |
| TOTAL | | | | | 10 |

| No | | | Rubric | Mark | Total marks |
|----|-----|------|---|--------|-------------|
| 5 | (a) | (i) | [Able to state the colour change of iron(II) sulphate solution correctly] Answer : Green to brown <i>Hijau kepada perang</i> | 1 | 1 |
| | | (ii) | [Able to state the type of reaction correctly] Answer : Oxidation <i>Pengoksidaan</i> | 1 | 1 |
| | (b) | | [Able to show the steps to calculate the oxidation number of chromium correctly] Answer : P1 : $2(x) + 7(-2) = -2$ P2 : +6 | 1 1 | 2 |
| | (c) | (i) | [Able to state the reducing agent in the reaction correctly] Sample answer : Iron(II) sulphate // FeSO_4 // Fe^{2+} ion <i>Ferum(II) sulfat // FeSO_4 // ion Fe^{2+}</i> | 1 | 1 |

| | | | | |
|--------------|------|--|---|-----------|
| | (ii) | <p>[Able to explain the answer based on transferring of electrons correctly]</p> <p>Sample answer :</p> <p>P1 : iron(II) ion loses/releases electron to form iron(III) ion <i>Ion ferum(II) kehilangan/ membebaskan elektron membentuk ion ferum(III)</i></p> <p>P2 : Iron(II) ion is oxidized <i>Ion ferum(II) dioksidakan</i></p> | 1 | |
| | | | 1 | 2 |
| (d) | (i) | <p>[Able to draw a labelled diagram to show the apparatus set-up to investigate the transfer of electrons at a distance correctly]</p> <p>Sample answer:</p> <ol style="list-style-type: none"> 1. Functional diagram <i>Gambarajah berfungsi</i> 2. Correct label <i>Label dengan betul</i> | 1 | |
| | | | 1 | 2 |
| | |  <p>galvanometer</p> <p>Carbon electrodes</p> <p>Iron(II) sulphate solution</p> <p>Acidified potassium dichromate(VI) solution</p> <p>Dilute sulphuric acid</p> | | |
| | (ii) | <p>[Able to explain why there is no deflection of galvanometer needle correctly]</p> <p>Sample answer:</p> <p>P1 : Insoluble salt/ Iron(II) carbonate is formed <i>Garam tak terlarutkan/ Ferum(II) karbonat terbentuk</i></p> <p>P2 : ions cannot move between the two solutions // incomplete circuit <i>ion tidak dapat melalui antara dua larutan // litar tidak lengkap</i></p> | 1 | |
| | | | 1 | 2 |
| TOTAL | | | | 11 |

| No | | Rubric | Mark | Total marks |
|----|-----|--|-------------|-------------|
| 6 | (a) | <p>[Able to explain why polystyrene cup is used in the experiment correctly]</p> <p>Sample answer : Polystyrene cup reduce heat loss to surroundings// polystyrene cup is a good insulator <i>Cawan polistirena dapat mengurangkan haba terbebas ke persekitaran// cawan polistirena ialah penebat haba yang baik</i></p> | 1 | 1 |
| | (b) | <p>[Able to state one observation besides the temperature change correctly]</p> <p>Sample answer : 1. Zinc powder dissolves <i>Serbuk zink larut</i> 2. Intensity of blue colour of copper(II) sulphate decreases <i>Keamatan warna biru kuprum(II) sulfat berkurang</i> 3. Brown solid formed <i>Pepejal perang terbentuk</i> [any one answer]</p> | 1 | 1 |
| | (c) | <p>[Able to show the steps to obtained the heat of displacement of copper by zinc correctly]</p> <p>1. No of moles of CuSO₄ 2. Heat change 3. Heat of displacement with negative sign and correct unit</p> <p>Sample answer : 1. No of moles of CuSO₄ <i>Bil. mol CuSO₄</i> $= 100(0.1)/1000$ $= 0.01 \text{ mol}$ 2. Heat released $= 100(4.2)(5)$ <i>Haba dibebaskan</i> $= 2100 \text{ J} / 2.1 \text{ kJ}$ 3. Heat of displacement, $\Delta H = 2.1 \text{ kJ}/0.01$ <i>Haba penyesanan, ΔH</i> $= - 210 \text{ kJ mol}^{-1} //$ $- 210\,000 \text{ J mol}^{-1}$</p> | 1 1 1 | 3 |
| | (d) | <p>[Able to compare the total energy absorbed to break the bonds in the reactants and the total energy released during formation of bonds in the products during reaction correctly]</p> | | |

| | | | | |
|--------------|-----|--|--------|-----------|
| | | <p>Answer :</p> <p>The total energy absorbed to break the bonds in the reactants is lower than the total energy released during formation of bonds in the products</p> <p><i>Jumlah tenaga diserap untuk memutuskan ikatan dalam bahan tindak balas lebih rendah daripada jumlah dibebaskan semasa pembentukan ikatan dalam hasil tindak balas</i></p> | 1 | 1 |
| | (e) | (i) <p>[Able to choose the correct polystyrene cup]</p> <p>Answer :</p> <p>Polystyrene cup P</p> <p><i>Cawan polistirena P</i></p> | 1 | 1 |
| | | (ii) <p>[Able to explain why the polystyrene cup is chosen]</p> <p>Sample answer :</p> <p>1. The surface area of the solution exposed is smaller <i>Luas permukaan larutan terdedah lebih kecil</i></p> <p>2. Less heat energy lost/ released to surrounding <i>Sedikit tenaga haba hilang/ terbebas ke persekitaran</i></p> | 1 1 | 2 |
| | (f) | <p>[Able to state one metal that is higher than zinc in ECS and able to explain why the metal is chosen correctly]</p> <p>Sample answer :</p> <p>1. Aluminium/ Al // Magnesium/ Mg</p> <p>2. Distance between aluminium and copper/ magnesium and copper is further than zinc and copper in electrochemical series // Aluminium/ Magnesium is higher than zinc in electrochemical series// Aluminium/ Magnesium is more electropositive than zinc <i>Jarak antara magnesium dan kuprum/ aluminium dan kuprum lebih jauh daripada zink dan kuprum dalam siri elektrokimia// Aluminium/ magnesium lebih tinggi daripada zink dalam siri Elektrokimia Aluminium/ magnesium lebih elektropositif daripada zink</i></p> | 1 1 | 2 |
| TOTAL | | | | 11 |

SECTION B

| No | | | Rubric | Mark | Total marks |
|----|-----|-------|---|-----------------------|-------------|
| 7 | (a) | (i) | [Able to state the basic used by Henry Moseley to develop the Periodic Table of Elements correctly] Answer: Elements are arranged based on increasing in proton number. <i>Unsur-unsur disusun berdasarkan pertambahan nombor proton</i> | 1 | 1 |
| | | (ii) | [Able to arrange the elements correctly] Answer: P, Q, R, S | 1 | 1 |
| | | (iii) | [Able to determine and explain the position of element R correctly] Sample answer: P1: Electron arrangement of atom R is 2.8.5 <i>Susunan elektron atom R adalah 2.8.5</i> P2: Atom R has three shells occupied with electrons <i>Atom R mempunyai tiga petala berisi elektron</i> P3: R is located in Period 3 <i>R terletak dalam Kala 3</i> P4: Atom R has five valence electrons <i>Atom R mempunyai lima elektron valens</i> P5: R is located in Group 15 <i>R terletak dalam Kumpulan 15</i> | 1 1 1 1 1 | 5 |
| | (b) | (i) | [Able to suggest substance P correctly] Sample answer: P1: Substance P is soda lime/ calcium oxide <i>Bahan P ialah soda kapur/ kalsium oksida</i> | 1 | 1 |
| | | (ii) | [Able to write the balance chemical equation correctly] 1. Correct chemical formula for reactant and product. <i>Formula kimia yang betul bagi bahan dan hasil tindak balas.</i> 2. Balanced chemical equation. <i>Persamaan kimia seimbang.</i> Sample answer: $2 \text{ Fe} + 3 \text{ Y}_2 \longrightarrow 2 \text{ FeY}_3$ | 1 1 | 2 |

| | | | | |
|--------------|-------|---|-----------------------|-----------|
| | (iii) | <p>[Able to compare and explain the reactivity of Y_2 and Z_2 with hot iron wool correctly]</p> <p>Sample answer:</p> <p>P1: Y_2 is more reactive than Z_2 <i>Y_2 lebih reaktif dari Z_2</i></p> <p>P2: Atomic size of Y is smaller than Z <i>Saiz atom Y lebih kecil daripada Z</i></p> <p>P3: Distance between nucleus and valence electron of atom Y is nearer <i>Jarak antara nukleus dan elektron valens bagi atom Y lebih dekat</i></p> <p>P4: Force of attraction between nucleus and electron of atom Y is stronger <i>Daya tarikan antara nukleus dan elektron bagi atom Y lebih kuat</i></p> <p>P5: Easier for atom Y to attract/ receive electron <i>Lebih mudah bagi atom Y untuk menarik/menerima elektron</i></p> | 1 1 1 1 1 | 5 |
| | (iv) | <p>[Able to to explain the the differences of melting and boiling points of compound A and B correctly]</p> <p>Sample answer:</p> <p>P1: Melting and boiling points of compound A is higher <i>Takat lebur dan takat didih sebatian A lebih tinggi</i></p> <p>P2: There are strong electrostatic force between ions in compound A. <i>Terdapat daya tarikan elektrostatik yang kuat antara ion dalam sebatian A</i></p> <p>P3: More heat needed to overcome the strong force of attraction. <i>Lebih banyak haba diperlukan untuk mengatasi daya tarikan yang kuat</i></p> <p>P4: There are weak Van der Waals force between molecules in compound B // There are weak intermolecular force of attraction in compound B. <i>Terdapat daya tarikan Van der Waals yang lemah antara molekul dalam sebatian B // terdapat daya tarikan antara molekul yang lemah dalam sebatian B</i></p> <p>P5: Less/ little heat needed to overcome the weak force of attraction. <i>Kurang/ sedikit haba diperlukan untuk mengatasi daya tarikan yang lemah</i></p> | 1 1 1 1 1 | 5 |
| TOTAL | | | | 20 |

| No | | Rubric | | Mark | Total marks |
|----|-----|--------|---|---------------------|-------------|
| 8 | (a) | (i) | [Able to write the molecular formula of the gas correctly] Answer: P1: C ₂ H ₄ | 1 | |
| | | (ii) | [Able to state the colour change on bromine water and explain the answer correctly] Sample answer: P2 : Brown to colourless <i>Perang kepada tidak berwarna</i> P3 : The gas produced is an unsaturated hydrocarbon // consists of carbon-carbon double bond . <i>Gas yang terhasil adalah hidrokarbon tak tepu// mengandungi ikatan ganda dua antara atom-atom karbon.</i> P4 : It can react with bromine water/ undergoes addition reaction with bromine water <i>Ia boleh bertindak balas dengan air bromin/ menjalankan tindak balas penambahan dengan air bromin.</i> | 1 1 1 | 4 |
| | (b) | (i) | [Able to write the chemical equation for the complete combustion of propane correctly] 1. Correct formula of reactants and products <i>Formula bahan dan hasil tindak balas yang betul</i> 2. Balanced equation <i>Persamaan seimbang</i> Answer : C ₃ H ₈ + 5O ₂ → 3CO ₂ + 4H ₂ O | 1 1 | 2 |
| | | (ii) | [Able to show the steps to calculate the volume of carbon dioxide gas correctly] 1. Number of moles 2. Ratio of moles 3. Volume of gas with unit Sample answer : P1 : Number of moles of propane = 2.2 ÷ 44 = 0.05 mol <i>Bilangan mol propana</i> | 1 1 1 | 3 |

| | | <p>P2 : 1 mol of C₃H₈ / propane : 3 mol of CO₂ /carbon dioxide 0.05 mol of C₃H₈ / propane : 0.15 mol of CO₂ /carbon dioxide P3 : Volume of CO₂ = 0.15 × 24 dm³ = 3.6 dm³ <i>Isi padu CO₂</i></p> | | | | | | | | | | | | | | |
|-----------------------------|--|---|-----------------------------|--|---|---|-----------------------------|---|---|--------------------------------|---|---|----------------------------|--|-------------------|---|
| (c) | (i) | <p>[Able to state the homologues series and the functional group for compounds P, Q and R correctly] Sample answer:</p> <table border="1"> <thead> <tr> <th>Compound <i>Sebatian</i></th> <th>Homologous series <i>Siri homolog</i></th> <th>Functional group <i>Kumpulan berfungsi</i></th> </tr> </thead> <tbody> <tr> <td>P</td> <td>P1: Alkena <i>Alkena</i></td> <td>Carbon-carbon double bond <i>Ikatan ganda dua antara atom-atom karbon // C=C</i></td> </tr> <tr> <td>Q</td> <td>P2 : Alcohol <i>Alkohol</i></td> <td>Hydroxyl group <i>Hidroksil // -OH</i></td> </tr> <tr> <td>R</td> <td>P3 : Ester <i>Ester</i></td> <td>Carboxylate <i>karboksilat // -COO-</i></td> </tr> </tbody> </table> | Compound <i>Sebatian</i> | Homologous series <i>Siri homolog</i> | Functional group <i>Kumpulan berfungsi</i> | P | P1: Alkena <i>Alkena</i> | Carbon-carbon double bond <i>Ikatan ganda dua antara atom-atom karbon // C=C</i> | Q | P2 : Alcohol <i>Alkohol</i> | Hydroxyl group <i>Hidroksil // -OH</i> | R | P3 : Ester <i>Ester</i> | Carboxylate <i>karboksilat // -COO-</i> | 1+1 1+1 1+1 | 6 |
| Compound <i>Sebatian</i> | Homologous series <i>Siri homolog</i> | Functional group <i>Kumpulan berfungsi</i> | | | | | | | | | | | | | | |
| P | P1: Alkena <i>Alkena</i> | Carbon-carbon double bond <i>Ikatan ganda dua antara atom-atom karbon // C=C</i> | | | | | | | | | | | | | | |
| Q | P2 : Alcohol <i>Alkohol</i> | Hydroxyl group <i>Hidroksil // -OH</i> | | | | | | | | | | | | | | |
| R | P3 : Ester <i>Ester</i> | Carboxylate <i>karboksilat // -COO-</i> | | | | | | | | | | | | | | |
| | (ii) | <p>[Able to draw two isomers of compound Q correctly] Sample answer :</p> <pre> H H H H H H H H H - C - C - C - C - H H - C - C - C - C - H O H H H H O H H H H H H - C - H H H H - C - C - C - H O H H H H - C - H H H H - C - C - C - H H O H H </pre> <p>Any two correct structural formulae</p> | 1+1 | 2 | | | | | | | | | | | | |

| | | | | | | |
|--|-------|---|---|---|---|-----------|
| | (iii) | <p>[Able to write the chemical equation for the conversion of compound Q to compound R and name the ester formed correctly]</p> <p>1. Correct formula of reactants and products <i>Formula bahan dan hasil tindak balas yang betul</i></p> <p>2. Balanced equation <i>Persamaan seimbang</i></p> <p>3. Name compound R <i>Nama sebatian R</i></p> <p>Answer : $\text{CH}_3\text{COOH} + \text{C}_4\text{H}_9\text{OH} \rightarrow \text{CH}_3\text{COOC}_4\text{H}_9 + \text{H}_2\text{O}$ Butyl ethanoate <i>Butil etanoat</i></p> | 1 | 1 | 1 | 3 |
| | | TOTAL | | | | 20 |

BAHAGIAN C

| No. | Rubric | | Mark | Total mark |
|-----|--------|--|------------------------------------|------------|
| 9. | (a) | <p>[Able to suggest acid X and acid Y correctly]</p> <p>Sample answer: Acid X : Hydrochloric acid/HCl// nitric acid/HNO₃ <i>Asid hidroklorik/HCl // acid nitric/HNO₃</i> Acid Y : Sulphuric acid/H₂SO₄ <i>Asid sulfurik/H₂SO₄</i></p> <p>[Able to write a balanced chemical equation for the reaction between acid X and excess zinc correctly]</p> <p>P1:Correct chemical formula for reactants and products P2:Balance chemical equation</p> <p>Sample answer: $2\text{HCl} + \text{Zn} \rightarrow \text{ZnCl}_2 + \text{H}_2$ $2\text{HNO}_3 + \text{Zn} \rightarrow \text{Zn}(\text{NO}_3)_2 + \text{H}_2$</p> | 1 1 1 1 | 4 |
| | (b) | <p>(i) [Able to compare the rate of reaction between Experiment I and Experiment II correctly]</p> <p>P1:Rate of reaction in Experiment II is higher <i>Kadar tindak balas Eksperimen II lebih tinggi</i></p> <p>P2:Rate of reaction in Experiment III is higher <i>Kadar tindak balas Eksperimen III lebih tinggi</i></p> <p>(ii) [Able to explain the differences of rate based on the collision theory correctly]</p> <p>Sample answer: <u>Experiment I and Experiment II</u> P3: Concentration of hydrogen ions/ H⁺ in Experiment II is double <i>Kepekatan ion hidrogen/ H⁺ dalam Eksperimen II dua kali ganda</i></p> <p>P4:Number of hydrogen ion/H⁺ per unit volume is higher <i>Bilangan ion hidrogen/ H⁺ per unit isipadu lebih tinggi</i></p> <p>P5:Frequency of collision between zinc atom and hydrogen ions /H⁺ is higher <i>Frekuensi perlanggaran antara atom zink dan ion hidrogen/ H⁺ lebih tinggi</i></p> <p>P6:Frequency of effective collision is higher <i>Frekuensi perlanggaran berkesan lebih tinggi.</i></p> | 1 1 1 1 1 1 | 6 |

| | | | | | |
|--|--|--|--|---|-----------|
| | | | P8: Conclusion: The presence of MnO ₂ increases the rate of reaction <i>Kesimpulan: Kehadiran MnO₂ meningkatkan kadar tindak balas.</i> | 1 | |
| | | | P9: Correct chemical formula of reactants and products <i>Formula kimia bahan dan hasil tindak balas yang betul</i> | 1 | |
| | | | P10: Balanced equation <i>Persamaan seimbang</i> | 1 | 10 |
| | | | Chemical equation/ <i>persamaan kimia:</i> $2\text{H}_2\text{O}_2 \rightarrow 2\text{H}_2\text{O} + \text{O}_2$ | | |
| | | | TOTAL | | 20 |

| No | | Rubric | Mark | Total marks | |
|----|-----|---|---|----------------|---|
| 10 | (a) | <p>[Able to write half equation at electrode X and Y correctly]</p> <p>1. Correct chemical formula for reactant and product. <i>Formula kimia yang betul bagi bahan dan hasil tindak balas.</i></p> <p>2. Balanced chemical equation. <i>Persamaan kimia seimbang.</i></p> <p>Answer: P1: Electrode X: $2\text{H}^+ + 2\text{e} \rightarrow \text{H}_2$ P2: Electrode Y: $2\text{Cl}^- \rightarrow \text{Cl}_2 + 2\text{e}$</p> <p>[Able to explain the difference in observation at both electrode X and Y correctly]</p> <p>Sample answer: P3: Hydrogen gas is produced at electrode X but chlorine gas is produced at electrode Y <i>Gas hidrogen dihasilkan di elektrod X tetapi gas klorin dihasilkan di elektrod Y</i></p> <p>P4: Hydrogen ion /H⁺ is selectively discharged at electrode X but chloride ion/Cl⁻ is selectively discharged at electrode Y// <i>Ion hidrogen/H⁺ terpilih untuk dinyahcas di elektrod X tetapi ion klorida/Cl⁻ terpilih untuk dinyahcas di elektrod Y//</i></p> <p>Hydrogen gas is neutral but chlorine gas is acidic /bleaching agent // <i>gas hidrogen adalah neutral tetapi gas klorin berasid/ agen peluntur</i></p> | <p>1+1 1+1</p> <p>1</p> <p>1</p> | 6 | |
| | (b) | (i) | <p>[Able to state the product at the anode and cathode correctly]</p> <p>Answer : P1: Anode : oxygen // oksigen P2: Cathode : aluminium</p> | <p>1 1</p> | 2 |

| | | | | |
|--|-------|--|--|-----------|
| | (ii) | <p>[Able to state the name of substance X and give the function of substance X correctly]</p> <p>Sample answer: P1:Cryolite // <i>kriolit</i> P2: Lower the melting point of aluminium oxide // <i>merendahkan takat lebur aluminium oksida</i></p> | 1 1 | 2 |
| | (iii) | <p>[Able to name metal S and describe laboratory experiment to electroplate metal S on iron spoon correctly]</p> <p>Sample answer: P1: Metal S is silver / copper / aurum <i>Logam S adalah argentum/ kuprum /emas</i> P2: Clean iron spoon with sand paper <i>Bersihkan sudu besi dengan kertas pasir</i> P3: Fill half of a beaker with silver nitrate solution <i>Isikan separuh bikar dengan larutan argentum nitrat</i> P4: Dip iron spoon and silver plate into the silver nitrate solution <i>Celupkan sudu besi dan kepingan argentum ke dalam larutan argentum nitrat</i> P5: Connect iron spoon to the negative terminal and silver plate to the positive terminal of battery. <i>Sambungkan sudu besi kepada terminal negative dan kepingan argentum kepada terminal positif bateri</i> P6: Turn on the switch // complete the circuit <i>Hidupkan suis // lengkapkan litar</i> P7. Half equation at Anode : $Ag \rightarrow Ag^+ + e$ <i>Setengah persamaan di anod : $Ag \rightarrow Ag^+ + e$</i> P8. Half equation at cathode: $Ag^+ + e \rightarrow Ag$ <i>Setengah persamaan di katod : $Ag^+ + e \rightarrow Ag$</i> P9. Observation at anode: silver becomes thinner <i>Pemerhatian di anod : argentum semakin menipis</i> P10. Observation at cathode : grey solid is deposited <i>Pemerhatian di katod: pepejal kelabu terendap</i></p> | 1 1 1 1 1 1 1 1 1 1 | 10 |
| | | TOTAL | | 20 |

MARKING SCHEME FOR CHEMISTRY PAPER 3

| Question | Rubric | Score | | | | | | | | | | |
|---|---|------------------------------------|-------------------------------|--|--|--|---|---|---|---|--|---|
| 1(a) | <p><i>Able to state all the observations and inferences correctly</i></p> <p><u>Sample answers:</u></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Observations <i>Pemerhatian</i></th> <th style="text-align: center;">Inferences <i>inferens</i></th> </tr> </thead> <tbody> <tr> <td style="vertical-align: top;">1. Magnesium electrode become thinner <i>Elektrod magnesium semakin tebal</i></td> <td style="vertical-align: top;">Magnesium atom ionised to magnesium ions // Magnesium atom oxidised/corrode <i>Atom magnesium mengion kepada ion magnesium //</i> <i>Atom magnesium mengalami pengoksidaan/terkakis</i></td> </tr> <tr> <td style="vertical-align: top;">2. Copper electrode become thicker <i>Elektrod kuprum semakin tebal</i></td> <td style="vertical-align: top;">Copper atom is formed// Copper(II) ion reduced <i>Atom kuprum terhasil//</i> <i>Ion kuprum(II) mengalami penurunan</i></td> </tr> <tr> <td style="vertical-align: top;">3. Dark blue solution become light blue // The intensity of blue solution decrease <i>Larutan biru tua menjadi biru muda //</i> <i>Keamatan warna biru larutan berkurangan</i></td> <td style="vertical-align: top;">Copper(II) ions is discharged to copper atom // Concentration of copper(II) ion decreases <i>Ion kuprum(II) dinyahcas menjadi atom kuprum //</i> <i>Kepekatan ion kuprum(II) berkurangan</i></td> </tr> <tr> <td colspan="2" style="text-align: center;"># Marks for inference given when observation is correct</td> </tr> </tbody> </table> | Observations <i>Pemerhatian</i> | Inferences <i>inferens</i> | 1. Magnesium electrode become thinner <i>Elektrod magnesium semakin tebal</i> | Magnesium atom ionised to magnesium ions // Magnesium atom oxidised/corrode <i>Atom magnesium mengion kepada ion magnesium //</i> <i>Atom magnesium mengalami pengoksidaan/terkakis</i> | 2. Copper electrode become thicker <i>Elektrod kuprum semakin tebal</i> | Copper atom is formed// Copper(II) ion reduced <i>Atom kuprum terhasil//</i> <i>Ion kuprum(II) mengalami penurunan</i> | 3. Dark blue solution become light blue // The intensity of blue solution decrease <i>Larutan biru tua menjadi biru muda //</i> <i>Keamatan warna biru larutan berkurangan</i> | Copper(II) ions is discharged to copper atom // Concentration of copper(II) ion decreases <i>Ion kuprum(II) dinyahcas menjadi atom kuprum //</i> <i>Kepekatan ion kuprum(II) berkurangan</i> | # Marks for inference given when observation is correct | | 6 |
| Observations <i>Pemerhatian</i> | Inferences <i>inferens</i> | | | | | | | | | | | |
| 1. Magnesium electrode become thinner <i>Elektrod magnesium semakin tebal</i> | Magnesium atom ionised to magnesium ions // Magnesium atom oxidised/corrode <i>Atom magnesium mengion kepada ion magnesium //</i> <i>Atom magnesium mengalami pengoksidaan/terkakis</i> | | | | | | | | | | | |
| 2. Copper electrode become thicker <i>Elektrod kuprum semakin tebal</i> | Copper atom is formed// Copper(II) ion reduced <i>Atom kuprum terhasil//</i> <i>Ion kuprum(II) mengalami penurunan</i> | | | | | | | | | | | |
| 3. Dark blue solution become light blue // The intensity of blue solution decrease <i>Larutan biru tua menjadi biru muda //</i> <i>Keamatan warna biru larutan berkurangan</i> | Copper(II) ions is discharged to copper atom // Concentration of copper(II) ion decreases <i>Ion kuprum(II) dinyahcas menjadi atom kuprum //</i> <i>Kepekatan ion kuprum(II) berkurangan</i> | | | | | | | | | | | |
| # Marks for inference given when observation is correct | | | | | | | | | | | | |
| | <i>Able to state all 3 observations + 2 corresponding inferences correctly</i> | 5 | | | | | | | | | | |
| | <i>Able to state 2 observations + 2 corresponding inferences correctly //</i> <i>Able to state 3 observations + 1 corresponding inferences correctly</i> | 4 | | | | | | | | | | |
| | <i>Able to state 2 observations + 1 corresponding inferences correctly //</i> <i>Able to state 3 observations correctly</i> | 3 | | | | | | | | | | |
| | <i>Able to state 1 observation + 1 corresponding inference correctly //</i> <i>Able to state 2 observations correctly</i> | 2 | | | | | | | | | | |
| | <i>Able to state 1 observation correctly</i> | 1 | | | | | | | | | | |
| | <i>No response or wrong response</i> | 0 | | | | | | | | | | |

| Question | Rubric | Score |
|----------|--|-------|
| 1(b) | <p><i>Able to state all the voltmeter readings accurately with unit and two decimal places correctly</i></p> <p>Magnesium and copper : 2.70 V P and copper : 0.80 V Q and copper : 1.10 V R and copper : 0.50 V</p> | 3 |
| | <p><i>Able to state all the voltmeter readings accurately without unit or correct reading with unit.</i></p> <p>Magnesium and copper : 2.70 / 2.7 V P and copper : 0.80 / 0.8 V Q and copper : 1.10 / 1.1 V R and copper : 0.50 / 0.5 V</p> | 2 |
| | <i>Able to state any 2 readings correctly without unit</i> | 1 |
| | <i>No response or wrong response</i> | 0 |

| Question | Rubric | Score | | | | | | | | | | |
|----------------------|---|-----------------|-------------|----------------------|------|--------------|------|--------------|------|--------------|------|---|
| 1(c) | <p><i>Able to construct a table to record the voltmeter reading for each pair of metals with unit accurately</i></p> <p><u>Sample answer:</u></p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Pairs of metals</th> <th>Voltage / V</th> </tr> </thead> <tbody> <tr> <td>Magnesium and copper</td> <td>2.70</td> </tr> <tr> <td>P and copper</td> <td>0.80</td> </tr> <tr> <td>Q and copper</td> <td>1.10</td> </tr> <tr> <td>R and copper</td> <td>0.50</td> </tr> </tbody> </table> | Pairs of metals | Voltage / V | Magnesium and copper | 2.70 | P and copper | 0.80 | Q and copper | 1.10 | R and copper | 0.50 | 3 |
| Pairs of metals | Voltage / V | | | | | | | | | | | |
| Magnesium and copper | 2.70 | | | | | | | | | | | |
| P and copper | 0.80 | | | | | | | | | | | |
| Q and copper | 1.10 | | | | | | | | | | | |
| R and copper | 0.50 | | | | | | | | | | | |
| | <p><i>Able to construct a table to record the voltmeter reading without unit for each pair of metals</i></p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Pairs of metals</th> <th>Voltage</th> </tr> </thead> <tbody> <tr> <td>Magnesium and copper</td> <td>2.7</td> </tr> <tr> <td>P and copper</td> <td>0.8</td> </tr> <tr> <td>Q and copper</td> <td>1.1</td> </tr> <tr> <td>R and copper</td> <td>0.4</td> </tr> </tbody> </table> | Pairs of metals | Voltage | Magnesium and copper | 2.7 | P and copper | 0.8 | Q and copper | 1.1 | R and copper | 0.4 | 2 |
| Pairs of metals | Voltage | | | | | | | | | | | |
| Magnesium and copper | 2.7 | | | | | | | | | | | |
| P and copper | 0.8 | | | | | | | | | | | |
| Q and copper | 1.1 | | | | | | | | | | | |
| R and copper | 0.4 | | | | | | | | | | | |
| | <i>Able to construct a table to record any 2 voltmeter readings without unit.</i> | 1 | | | | | | | | | | |
| | <i>No response or wrong response</i> | 0 | | | | | | | | | | |

| Question | Rubric | Score |
|----------|--|-------|
| 1(d) | <i>Able to arrange all the metals in ascending order in electrochemical series</i> Sample answer: Copper, R, P, Q, Magnesium | 3 |
| | <i>Able to arrange any four metals in correct ascending order</i> | 2 |
| | <i>Able to arrange any three metals in correct ascending order// Able to arrange all the metals in descending order</i> | 1 |
| | <i>No response or wrong response</i> | 0 |

| Question | Rubric | Score | | | | | | | | |
|----------------------|--|----------|--|----------------------|--|---------------------|---|-------------------|--|---|
| 1(e) | <i>Able to state all the three variables and corresponding action to be taken correctly</i> Sample answer: <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 30%;">Variable</th> <th></th> </tr> </thead> <tbody> <tr> <td>Manipulated variable</td> <td>Pair of metals // Metal as negative terminal <i>Pasangan logam //</i> <i>Logam sebagai terminal negatif</i></td> </tr> <tr> <td>Responding variable</td> <td>Voltmeter reading // Potential difference <i>Bacaan voltmeter //</i> <i>Beza keupayaan</i></td> </tr> <tr> <td>Constant variable</td> <td>Copper as positive terminal // Volume and concentration of copper(II) nitrate solution <i>Kuprum sebagai terminal positif //</i> <i>Isipadu dan kepekatan larutan kuprum(II) nitrat</i></td> </tr> </tbody> </table> | Variable | | Manipulated variable | Pair of metals // Metal as negative terminal <i>Pasangan logam //</i> <i>Logam sebagai terminal negatif</i> | Responding variable | Voltmeter reading // Potential difference <i>Bacaan voltmeter //</i> <i>Beza keupayaan</i> | Constant variable | Copper as positive terminal // Volume and concentration of copper(II) nitrate solution <i>Kuprum sebagai terminal positif //</i> <i>Isipadu dan kepekatan larutan kuprum(II) nitrat</i> | 3 |
| Variable | | | | | | | | | | |
| Manipulated variable | Pair of metals // Metal as negative terminal <i>Pasangan logam //</i> <i>Logam sebagai terminal negatif</i> | | | | | | | | | |
| Responding variable | Voltmeter reading // Potential difference <i>Bacaan voltmeter //</i> <i>Beza keupayaan</i> | | | | | | | | | |
| Constant variable | Copper as positive terminal // Volume and concentration of copper(II) nitrate solution <i>Kuprum sebagai terminal positif //</i> <i>Isipadu dan kepekatan larutan kuprum(II) nitrat</i> | | | | | | | | | |
| | <i>Able to state 2 variable correctly</i> | 2 | | | | | | | | |
| | <i>Able to state 1 variable correctly</i> | 1 | | | | | | | | |
| | <i>No response or wrong response</i> | 0 | | | | | | | | |

| Question | Rubric | Score |
|----------|---|-------|
| 1(f) | <p><i>Able to state the relationship between the manipulated variable and the responding variable with direction.</i></p> <p><u>Sample answer:</u> The further the distance between two metals in the electrochemical series the higher/larger the voltage // The further the distance between pair of metals in the electrochemical series the higher/larger the voltage. <i>Semakin jauh jarak antara dua logam dalam siri elektrokimia semakin tinggi/besar voltan //</i> <i>Semakin jauh jarak antara pasangan logam dalam siri elektrokimia semakin tinggi/besar voltan //</i></p> | 3 |
| | <p><i>Able to state the relationship between the manipulated variable and responding variable.</i></p> <p><u>Sample answer:</u> The further the distance between two metals, the higher/larger/bigger the voltage.// The further the distance between two metals in reactivity series, the higher/larger/bigger the voltage. <i>Semakin jauh jarak antara dua logam, semakin tinggi/besar voltan //</i> <i>Semakin jauh jarak antara dua logam dalam siri kereaktifan, semakin tinggi/besar voltan</i></p> | 2 |
| | <p><i>Able to state the idea of hypothesis</i></p> <p><u>Sample answer:</u> Different pair of metals have different voltage. <i>Pasangan logam yang berbeza mempunyai voltan yang berbeza</i></p> | 1 |
| | <i>No response or wrong response</i> | 0 |

| Question | Rubric | Score |
|----------|---|-------|
| 1(g) | <p><i>Able to state the operational definition for the potential difference accurately</i></p> <p>What should be observed : voltmeter reading <i>Apa yang diperhatikan : bacaan voltmeter</i></p> <p>What should be done : two different metals connected to voltmeter using wire are dipped in an electrolyte <i>Apa yang dibuat : dua logam berbeza disambungkan kepada voltmeter dengan wayar dicelupkan ke dalam elektrolit</i></p> <p><u>Sample answer:</u> The potential difference is the voltmeter reading when two different metals connected to voltmeter using wire are dipped in an electrolyte // The potential difference is the voltmeter reading when two different metals connected to voltmeter using wire are dipped in the copper(II) nitrate solution. Beza keupayaan adalah bacaan voltmeter apabila <i>dua logam berbeza disambungkan kepada voltmeter dengan wayar dicelupkan ke dalam elektrolit//</i> Beza keupayaan adalah bacaan voltmeter apabila <i>dua logam berbeza disambungkan kepada voltmeter dengan wayar dicelupkan ke dalam larutan kuprum(II) nitrat.</i></p> | 3 |
| | <p><i>Able to state the operational definition for the potential difference correctly</i></p> <p><u>Sample answer:</u> The potential difference is the voltmeter reading when two metals are used. <i>Beza keupayaan adalah bacaan voltmeter apabila dua logam digunakan.</i></p> | 2 |
| | <p><i>Able to state an idea for the potential difference</i></p> <p><u>Sample answer:</u> Different metals shows different voltmeter reading <i>Logam yang berlainan menunjukkan bacaan voltmeter</i></p> | 1 |
| | <i>No response or wrong response</i> | 0 |

| Question | Rubric | Score |
|----------|--|-------|
| 1(h) | <p><i>Able to state the relationship between the changes of the mass of copper strip with the time in experiment I correctly</i></p> <p>Sample answer:</p> <p>The longer the time taken, the mass of copper strip increases. <i>Semakin lama masa diambil, jisim kepingan kuprum bertambah</i></p> | 3 |
| | <p><i>Able to state the relationship between the changes of the mass of copper strip with the time in experiment I less correctly</i></p> <p><u>Sample answer:</u> When the time becomes longer, the copper strip becomes thicker. <i>Apabila masa semakin panjang, kepingan kuprum semakin tebal.</i></p> | 2 |
| | <p><i>Able to state an idea for the relationship</i></p> <p><u>Sample answer:</u> When the time become longer, the mass of copper strip decreases. <i>Apabila masa semakin panjang, jisim kepingan kuprum berkurang</i></p> | 1 |
| | <i>No response or wrong response</i> | 0 |

| Question | Rubric | Score |
|----------|---|-------|
| 1(i) | <p><i>Able to predict the positive terminal, the voltage value and the observation at copper strip correctly</i></p> <p><u>Sample answer:</u></p> <p>(i) Positive terminal : silver <i>Terminal positif : argentum</i></p> <p>(ii) Voltage : less than 2.7 V <i>Nilai voltan : kurang daripada 2.7 V</i></p> <p>(iii) Observation at copper strip : copper strip become thinner // Mass of copper strip decreases <i>Pemerhatian di kepingan kuprum : kepingan kuprum menipis // Jisim kepingan kuprum berkurang</i></p> | 3 |
| | <i>Able to predict any two answers correctly</i> | 2 |
| | <i>Able to predict any one answer correctly</i> | 1 |
| | <i>No response or wrong response</i> | 0 |

| Question | Rubric | Score | | | | |
|----------|--|---------|---|--------|---|---|
| 1(j) | <p><i>Able to classify the cations and anions in copper(II) nitrate solution correctly</i></p> <p><u>Sample answer:</u></p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tbody> <tr> <td>Cations</td> <td>Copper(II) ion, hydrogen ion // Cu^{2+}, H^+</td> </tr> <tr> <td>Anions</td> <td>Sulphate ion, hydroxide ion // SO_4^{2-}, OH^-</td> </tr> </tbody> </table> | Cations | Copper(II) ion, hydrogen ion // Cu^{2+} , H^+ | Anions | Sulphate ion, hydroxide ion // SO_4^{2-} , OH^- | 3 |
| Cations | Copper(II) ion, hydrogen ion // Cu^{2+} , H^+ | | | | | |
| Anions | Sulphate ion, hydroxide ion // SO_4^{2-} , OH^- | | | | | |
| | <i>Able to classify one cation and one anion correctly</i> | 2 | | | | |
| | <i>Able to classify one cation or one anion correctly</i> | 1 | | | | |
| | <i>No response or wrong response</i> | 0 | | | | |

| Question | Rubric | Score |
|----------|--|-------|
| 2 (a) | <p>Able to state the problem statement correctly</p> <p>Sample answer :</p> <p>How does the effectiveness of the cleansing action of soap and detergent in hard water different? //</p> <p>Is the cleansing action of detergent is more effective than soap in hard water?//</p> <p>How does the effectiveness of soap and detergent in hard water different?</p> <p><i>Bagaimanakah keberkesanan tindakan pembersihan sabun dan detergen dalam air liat berbeza?//</i></p> <p><i>Adakah tindakan pencucian detergen lebih berkesan daripada sabun dalam air liat?//</i></p> <p><i>Bagaimanakah keberkesanan sabun dan detergen dalam air liat berbeza?</i></p> | 3 |
| | <p>Able to state the problem statement</p> <p>Sample answer:</p> <p>How does the effectiveness of soap and detergent different?</p> <p><i>Bagaimana keberkesanan sabun dan detergen berbeza?</i></p> | 2 |
| | <p>Able to give an idea of the problem</p> <p>Sample answer:</p> <p>To differentiate soap and detergent</p> <p><i>Untuk membezakan sabun dan detergen</i></p> | 1 |
| | Wrong response or no response | 0 |

| Question | Rubric | Score |
|----------|---|----------|
| 2 (b) | <p>Able to state the variables correctly</p> <p>Sample answer :</p> <p>Manipulated variable : Soap and detergent // Type of cleaning agent <i>Sabun dan detergen //</i> <i>Jenis agen pencuci</i></p> <p>Responding variable : Effectiveness of cleaning agent // Ability to remove the oily stains on cloth <i>Keberkesanan agen pencucian //</i> <i>Kebolehan menanggalkan kotoran berminyak di atas kain</i></p> <p>Fixed variable : Cloths with oily stain // Concentration of magnesium sulphate solution // Hard water // Number of oily stain drops <i>Kain dengan kotoran berminyak //</i> <i>Kepekatan larutan magnesium sulfat //</i> <i>Air liat//</i> <i>Bilangan titis kotoran berminyak</i></p> | 3 |
| | Able to state any two variables correctly | 2 |
| | Able to state any one variable correctly | 1 |
| | Wrong response or no response | 0 |

| Question | Rubric | Score |
|----------|---|----------|
| 2 (c) | <p>Able to state the hypothesis accurately with direction</p> <p>Sample answer : Detergent is more effective than soap as cleaning agent in hard water.// Detergent can remove the oily stains on cloth in hard water but soap cannot. <i>Detergen lebih berkesan daripada sabun sebagai agen pencuci dalam air liat.// Detergen boleh menanggalkan kotoran berminyak atas kain dalam air liat tetapi sabun tidak boleh.</i></p> | 3 |
| | <p>Able to state the hypothesis correctly</p> <p>Sample answer: Detergent is more effective than soap as cleaning agent.// Detergent can remove the oily stains on cloth but soap cannot. <i>Detergen lebih berkesan daripada sabun sebagai agen pencuci.// Detergen boleh menanggalkan kotoran berminyak atas kain tetapi sabun tidak boleh.</i></p> | 2 |
| | <p>Able to give an idea of the hypothesis</p> <p>Sample answer: Detergent is more effective// <i>Detergen lebih berkesan</i></p> | 1 |
| | Wrong response or no response | 0 |

| Question | Rubric | Score |
|----------|---|----------|
| 2 (d) | <p>Able to list all materials and apparatus completely</p> <p>Sample answer :</p> <p>Materials : Soap and detergent, 1.0 mol dm⁻³ magnesium sulphate solution , 2 pieces of clothes stained with oil</p> <p><i>Bahan : Sabun dan detergen, larutan magnesium sulfat 1.0 mol dm⁻³, 2 keping kain dengan kotoran berminyak</i></p> <p>Apparatus : Beaker, glass rod <i>Radas : Bikar, rod kaca</i></p> | 3 |
| | <p>Able to list materials and apparatus less correctly</p> <p>Sample answer:</p> <p>Materials : Soap and detergent, hard water / magnesium sulphate solution, Pieces of clothes stained with oil</p> <p>Apparatus : [Any suitable container] [Sebarang bekas yang sesuai]</p> | 2 |
| | <p>Able to list the minimum materials and apparatus</p> <p>Sample answer:</p> <p>Materials : [Any type of soap], [Any type of detergent], [Any type of hard water]</p> <p><i>Bahan : [sebarang jenis sabun], [sebarang jenis detergen] [sebarang jenis air liat]</i></p> <p>Apparatus : [any container] <i>Radas : [sebarang bekas]</i></p> | 1 |
| | Wrong response or no response | 0 |

| Question | Rubric | Score |
|----------|---|----------|
| 2 (e) | Able to state procedures of the experiment completely Sample Answer : 1. Measure and pour [50 - 200] cm ³ of 1.0 mol dm ⁻³ magnesium sulphate solution into a beaker. <i>Sukat dan tuang [50 – 200] cm³ larutan magnesium sulfat ke dalam bikar.</i> 2. Add soap into the beaker. <i>Tambah sabun ke dalam bikar dan kacau campuran</i> 3. Immerse a piece of cloth stained with oil in the solution. <i>Rendamkan secebis pakaian dengan kotoran berminyak</i> 4. Stir with glass rod / rub the cloth. <i>Kacau dengan rod kaca / gosokkan pakaian</i> 5. Record the observation. <i>Catatkan pemerhatian.</i> 6. Repeat steps 1 – 5 by using detergent. <i>Ulangi langkah 1 – 5 dengan menggunakan detergen.</i> | 3 |
| | Able to state steps 1, 2, 3, 5 | 2 |
| | Able to state steps 1,2,3 | 1 |
| | Wrong response or no response | 0 |

| Question | Rubric | Score | | | | | | |
|--|--|------------------------|-------------|------|----------|-----------|--|----------|
| 2 (f) | Able to tabulate the data completely Sample Answer : <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Type of cleaning agent</th> <th style="width: 50%;">Observation</th> </tr> </thead> <tbody> <tr> <td>Soap</td> <td></td> </tr> <tr> <td>Detergent</td> <td></td> </tr> </tbody> </table> | Type of cleaning agent | Observation | Soap | | Detergent | | 2 |
| | Type of cleaning agent | Observation | | | | | | |
| | Soap | | | | | | | |
| Detergent | | | | | | | | |
| Able to construct a table with correct heading Sample answer : <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Type of cleaning agent</th> <th style="width: 50%;">Observation</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> </tr> </tbody> </table> | Type of cleaning agent | Observation | | | 1 | | | |
| Type of cleaning agent | Observation | | | | | | | |
| | | | | | | | | |
| Wrong response or no response | 0 | | | | | | | |

**END OF MARKING SCHEME
PERATURAN PEMARKAHAN TAMAT**