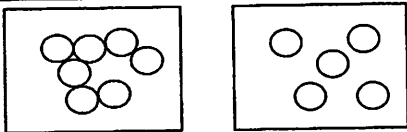


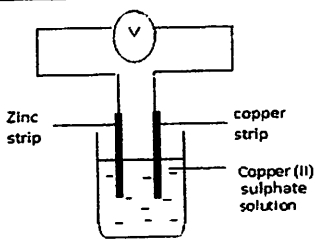
PEPERIKSAAN AKHIR TAHUN TINGKATAN 4 2010
4541/2 CHEMISTRY Paper 2

SECTION A

1	(a) (i)	Isotopes are atoms of the <u>same element</u> with the <u>same number of protons</u> but <u>different number of neutrons</u> / <u>same proton number</u> but <u>different nucleon number</u> .	1
	(ii)	$\begin{array}{c} 12 \\ \text{C} \\ 6 \end{array} / \begin{array}{c} 14 \\ \text{C} \\ 6 \end{array} \quad \text{Any one}$ [Correct nucleon number and proton number] [Correct representation]	1 1
	(b) (i)	Proton	1
	(ii)	1	1
	(c) (i)	 Water Steam	1 1
	(ii)	Boiling [a : evaporation]	1
	(iii)	Heat energy to kinetic energy	1
TOTAL			9

2	(a)	a (chemical) formula that shows the simplest ratio of atoms of element in a compound / molecule r : a chemical formula is the simplest	1
	(b)	Hydrochloric acid/sulphuric acid/nitric acid/ <i>any suitable acid</i> Zinc/Magnesium/aluminium/	1 1
	(c)	The air in the combustion tube must be displaced before lighting the hydrogen gas// The heating, cooling and weighing is repeated until a constant mass is obtained	1
	(d) (i)	Mass of M = 44.75 – 39.25 // 5.5 g Mass of Oxygen = 47.95 – 44.75 // 3.2 g	1
	(ii)	Number of mole of M = 5.5÷55 // 0.1 Number of mole of oxygen = 3.2÷16 // 0.2	1
	(iii)	Empirical formula is MO ₂	1
	(e)	MO ₂ + 2H ₂ → M + 2H ₂ O <i>Formulae of reactants and products correct</i> <i>Balanced</i>	1 1
TOTAL			9

3	(a)	Period	1
	(b)	Cl	1
	(c)	2	1
	(d) (i)	sodium chloride	1
	(ii)	$2\text{Na} + \text{Cl}_2 \rightarrow 2\text{NaCl}$ Formula of reactant and product correct Balanced	1 1
	(e)	The proton number // number of proton of chlorine more than sodium The forces of attraction of nucleus towards the electron stronger in chlorine atom	1 1
	(f) (i)	Fe	1
	(ii)	Used as catalyst // form complex ion	1
TOTAL			10

4	(a)(i)	Greenish-yellow/pale yellow gas produced	1
	(ii)	Place a moist blue litmus paper into the test tube Moist blue litmus paper turn red and bleach/white	1 1
	(b) (i)	Oxygen	1
	(ii)	$4\text{OH}^- \rightarrow 2\text{H}_2\text{O} + \text{O}_2 + 4\text{e}^-$ Formula of reactant and product correct Balanced	1 1
	(c)(i)	 <p>1. <i>Functional diagram</i> - Connecting wire and the solution 2. <i>Label</i> - Zinc strip , copper strip and copper(II) sulphate</p>	1 1
	(ii)	Zinc to copper	1
	(iii)	Blue solution becomes paler /fader /turn to colourless	1
TOTAL			10

5	(a)	An acid that dissociates / ionises completely in water to form a high concentration of hydrogen ions	1 1
	(b)	Pipette/burette	1
	(c)	Pink to colourless	1
	(d) (i)	Acid : Sulphuric acid // H ₂ SO ₄ Alkali : Sodium/potassium hydroxide // HCl // HNO ₃	1 1
	(ii)	$\frac{0.1 \times 10}{M_b \times 25} = \frac{1}{2}$ $M_b = 0.08 \text{ mol dm}^{-3}$	1
			1
	(e) (i)	20 cm ³ // twice the volume of acid H ₂ X	1
	(ii)	Hydrochloric acid is a monoprotic acid whereas H ₂ X acid is a diprotic acid. So, the hydrochloric acid used has half the number of hydrogen ions compared to H ₂ X acid.	1
			1
TOTAL			11

6	(a)	Zinc nitrates, Zn(NO ₃) ₂	1
	(b) (i)	residue E = Zinc oxide / ZnO	1
			1
	(ii)	acid G = nitric acid / HNO ₃	1
	(c) (i)	Colourless gas release // gas turn lime water cloudy/milky/chalky // The residue is yellow when hot and white when cold	1
			1
	(ii)	ZnCO ₃ → ZnO + CO ₂	1
	(iii)	Number of mole of ZnCO ₃ = 0.05 mol ZnCO ₃ : mol CO ₂ = 1 : 1 // 0.05 : 0.05 Volume = 0.05 X 24 // 1.2 dm ³ // 1200 cm ³	1
			1
			1
(d)	Pour dilute sulphuric acid follow by iron(II) sulphate solution Drop/Slowly/carefully add concentrated sulphuric acid Brown ring is formed	1	
		1	
		1	
TOTAL			11

SECTION B

7	(a)	$2\text{SO}_2 + \text{O}_2 \rightarrow 2\text{SO}_3$ Formula of reactant and product correct Balanced	1 1	....2
	(b)	catalyst : vanadium (V) oxide Temperature : 450 – 550°C Pressure : 1 atmospheric	1 1 1	....3
	(c)	Sulfur dioxide/toxic waste dissolves in rain water/water to form acid rain/Sulfur dioxide dissolves in water to form sulphurous acid// $\text{SO}_2 + \text{H}_2\text{O} \rightarrow \text{H}_2\text{SO}_3$ Acid rain lower the pH of water Causing death of plants / aquatic creatures/ fish Causing damage to building / vehicles	1 1 1 1 1	....5
	(d)(i)	Alloy is mixture of two or more elements with a certain fixed composition in which the major components is metal	1	
	(ii)	Steel Iron + carbon	1 1	
	(iii)	Alloy is harder/ stronger Alloy resistant to corrosion	1 1	....5
	(e)(i)	silica/ SiO_2	1	
	(ii)	fused glass Soda lime glass Borosilicate glass Lead crystal glass	1 1 1 1	....5
			TOTAL	20

8	(a)(i)	X : 2.8.1 Y : 2.8.7 Group 1 Because one valence electron Period 3 Because three shells occupied with electrons	1 1 1 1 1 1	....6
	(a)(ii)	Ionic Atom X release one electron to form X ⁺ ion Atom Y receive one electron to form Y ⁻ ion X ⁺ and Y ⁻ held together by electrostatic force	1 1 1 1	....4
	(b)(i)	Melting point copper(II) chloride higher than tetrachloromethane ions are held together by strong electrostatic forces A lot of energy is needed to break the bonds Or Melting point tetrachloromethane lower than copper(II) chloride weak intermolecular attraction forces A small of energy is required to overcome the forces	1 1 1 1 1 1	....3
	(b)(ii)	Copper (II)chloride contain ions Ions are free to move Tetrachloromethane do not have ions // exist as molecule	1 1 1	....3
	(c)(i)	Helium Not reactive // Not flammable	1 1	....2
	(c)(ii)	2Fe + 3Cl ₂ → 2FeCl ₃ <i>Formula of reactant and product correct</i> <i>Balanced</i>	1 1	....2
			TOTAL	20

SECTION C

9 (a)	1. Solution X : Copper (II) sulphate / Copper (II) chloride / Copper (II) nitrate 2. Gas P : Oxygen 3. Metal Q : Copper <i>Explanation</i> 4. OH ⁻ and SO ₄ ⁻² move to anode 5. OH ⁻ selected to discharged 6. $4\text{OH}^- \rightarrow 2\text{H}_2\text{O} + \text{O}_2 + 4\text{e}^-$ <i>Explanation</i> 7. Cu ²⁺ and H ⁺ move to cathode 8. Cu ²⁺ selected to discharged 9. $\text{Cu}^{2+} + 2\text{e}^- \rightarrow \text{Cu}$	1 1 1 1 1 1 1 1 1	..9
(b)	1. [50 -200] cm ³ dilute copper (II) sulphate solution is poured into a beaker 2. An iron ring is cleaned using sandpaper 3. Iron ring is connected to negative terminal of battery 4. Copper metal is connected to terminal positive of battery 5. Iron ring and copper metal is immersed into copper (II) sulphate solution. 6. The circuit is complete using connecting wires about 10 – 30 minutes. 7. Using a small current / iron ring turned steadily. 8. A brown metal deposited at iron ring	1 1 1 1 1 1 1	..8
(c)(i)	W, Y, Z, X	1	..1
(c)(ii)	1. Voltage value : 0.3 V 2. Metal X	1 1	..2
TOTAL			..20

10	(a) (i)	Add distilled water and stir the mixture Filter the mixture	1 12											
	(ii)	<table border="1"> <thead> <tr> <th></th> <th>Copper(II) sulphate</th> <th>Copper(II) carbonate</th> </tr> </thead> <tbody> <tr> <td>Colour</td> <td>Blue</td> <td>Green</td> </tr> <tr> <td>Solubility</td> <td>Soluble in water</td> <td>Insoluble in water</td> </tr> <tr> <td>Action of heat</td> <td>Not decomposed by heat // decomposed by strongly heated</td> <td>Decompose by heat to form copper oxide and carbon dioxide gas</td> </tr> </tbody> </table>		Copper(II) sulphate	Copper(II) carbonate	Colour	Blue	Green	Solubility	Soluble in water	Insoluble in water	Action of heat	Not decomposed by heat // decomposed by strongly heated	Decompose by heat to form copper oxide and carbon dioxide gas	1+1 1+1 1+1
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Action of heat	Not decomposed by heat // decomposed by strongly heated	Decompose by heat to form copper oxide and carbon dioxide gas													
	(iii)	Reactants : Copper(II) nitrate/sulphate/chloride solution Sodium/potassium carbonate solution Pour Copper(II) nitrate/sulphate/chloride solution into a beaker Add Sodium/potassium carbonate solution Stir the mixture and filter the mixture Rinse the salt with distilled water Dry the copper(II) carbonate/salt with filter paper.	1 1 1 1 1 16											
	(b)(i)	Lead(II) nitrate Yellow precipitate is lead(II) iodide showing lead(II) ion Brown gas is nitrogen dioxide gas, colourless gas is oxygen gas showing nitrate salt	1 1 13											
	(ii)	Brown when hot yellow when cold	1 12											
	(iii)	$Pb^{2+} + 2I^{-} \rightarrow PbI_2$ Formulae of reactants and product correct Balanced	1 12											
			TOTAL	...20											