

**Peraturan Permarkahan
CHEMISTRY 4541
Kertas 2
Ogos
2011**



**BAHAGIAN PENGURUSAN
SEKOLAH BERASRAMA PENUH DAN SEKOLAH KECEMERLANGAN
KEMENTERIAN PELAJARAN MALAYSIA**

PERATURAN PERMARKAHAN

**PEPERIKSAAN PERCUBAAN
SIJIL PELAJARAN MALAYSIA 2011**

**CHEMISTRY
TRIAL
2011
MARKING SCHEME**

PAPER 2

MARKING SCHEME FOR CHEMISTRY PAPER 2

No.	Answer	Mark
1. (a) (i)	Zinc	1
(ii)	1. The presence of X/zinc atoms disrupts the orderly arrangements of copper atoms 2. This reduce the layers of atoms from sliding over one another easily	1 1
(iii)	Steel	1
(b)(i)	Silicon dioxide/silica /sand	1
(ii)	Heat resistant/can withstand with high temperature	1
(c) (i)	$ \begin{array}{cc} \text{H} & \text{Cl} \\ & \\ \text{C} & = & \text{C} \\ & \\ \text{H} & \text{H} \end{array} $	1
(ii)	Polyvinyl chloride/ polychloroethene	1
(iii)	polymerization	1
	TOTAL	9

No	Answer	Mark				
2(a)	Horizontal row of elements in the Periodic Table of Elements	1				
(b)	Atoms have 3 shells occupied with electron	1				
(c)(i)	1. Correct formulae of reactants and products 2. Balanced equation $\text{Cl}_2 + \text{H}_2\text{O} \rightarrow \text{HCl} + \text{HOCl}$	1 1				
(ii)	<table><tr><td>Sodium</td><td>Red litmus paper blue</td></tr><tr><td>Chlorine</td><td>Blue litmus paper red</td></tr></table>	Sodium	Red litmus paper blue	Chlorine	Blue litmus paper red	2
Sodium	Red litmus paper blue					
Chlorine	Blue litmus paper red					

No.	Answer	Mark
(d)(i)	1. Atomic size decrease	1
(ii)	1. Proton number / number of proton / nuclei charge increase 2 Nuclei attraction on valence electron is stronger	2
TOTAL		9

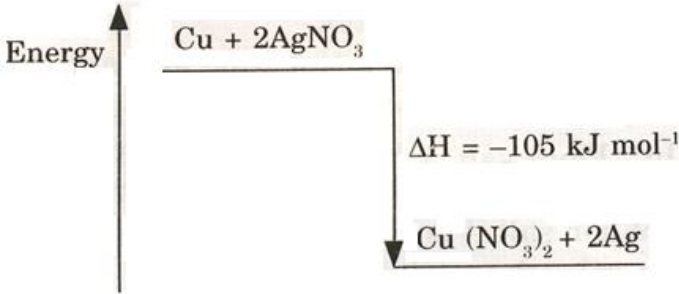
No.	Answer	Mark
3 (a)	Oxidation	1
(b)(i)	To allow the movement / flow of ions	1
(ii)	Potassium nitrate solution [any suitable substance]	1
(c)	From copper electrode to silver electrode	1
(d)	Intensity of blue colour solution increase Because the concentration /number of Cu^{2+} increase	1 1
(e)	$\text{Cu} \longrightarrow \text{Cu}^{2+} + 2\text{e}$ Formula of reactant and product Balanced	1 1
(f)(i)	Increase	1
(ii)	The distance between zinc and silver is further than copper and silver in electrochemical series	1
TOTAL		10

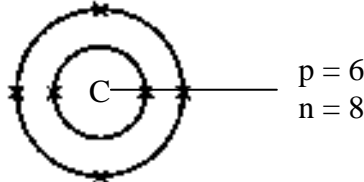
No.	Answer	Mark
4. (a)	A chemical formula that shows the simplest ratio of atom of element in a compound.	1
(b)	Number of mole = $\frac{\text{Mass}}{\text{Relative atomic mass}}$	1
(c)(i)	Num. of mole of copper = $\frac{2.56}{64} / 0.04$	2
(ii)	Num. of mole of oxygen = $\frac{0.64}{16} / 0.04$	
(d)	CuO	1
(e)(i)	Magnesium and hydrochloric acid / Zinc and sulphuric acid	1
(ii)	$\text{CuO} + \text{H}_2 \rightarrow \text{Cu} + \text{H}_2\text{O}$	2
(iii)	Black powder change to brown	1
(iv)	Water	1
	TOTAL	10

No.	Answer	Mark
5(a)(i)	Temperature	1
(ii)	Num. of mole = $\frac{0.24}{24} \text{ mol} / 0.01 \text{ mol}$ Volume of $\text{H}_2 = 0.01 \times 24 \text{ dm}^3 / 0.24 \text{ dm}^3 / 240 \text{ cm}^3$	2
(b)	Average rate of reaction in experiment I = $\frac{240}{50} \text{ cm}^3 \text{ s}^{-1} / 4.8 \text{ cm}^3 \text{ s}^{-1}$ Average rate of reaction in experiment II = $\frac{240}{20} \text{ cm}^3 \text{ s}^{-1} / 12 \text{ cm}^3 \text{ s}^{-1}$	2
(c)(i)	Rate of reaction of experiment II is higher than experiment I	1

No.	Answer	Mark
(c)(ii)	<ul style="list-style-type: none"> -The temperature of reaction for experiment II is higher than experiment I. -The kinetic energy of the particles of reactants for experiment II is higher than experiment I. -The frequency of effective collisions increases. 	3
(d)		2
	TOTAL	11

No.	Answer	Mark
6(a)	To reduce the heat loss to the surroundings	1
(b)(i)	A shiny grey solid is formed / A colourless solution turns blue.	1
(ii)	Silver metal is formed / Copper(II) ions formed.	1
(iii)	Copper Oxidation number increase from 0 to +2	2

No.	Answer	Mark
(c)(i)	Num. of mole = $\frac{0.5 \times 100}{1000} / 0.05 \text{ mol.}$ Heat energy released = $0.05 \times 105 \text{ kJ} / 5.25 \text{ kJ} / 5250 \text{ J}$	2
(ii)	$\theta = \frac{5250}{100 \times 4.2} / 12.5 \text{ }^{\circ}\text{C}$	1
(d)	 <p>1. Axis with label energy and two level, 2. Correct position of reactants and products, 3. $\Delta H = -105 \text{ kJmol}^{-1}$</p>	1 1 1 3
	TOTAL	11

No.	Answer	Mark
7 a (i)	 <p>[Draw and label]</p> <p>[Able to describe the atom Carbon-14]</p> <ul style="list-style-type: none"> • Has nucleus at the centre of the atom • nucleus contains 6 proton and 8 neutron • has 2 shell occupied electron • 4 valence electrons 	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p><i>Max</i> 4</p>

No.	Answer			Mark
(ii)	Carbon-12// Carbon-13			1
	6 // 7			1
	$\begin{array}{cc} 12 & 13 \\ \text{C} & // & \text{C} \\ 6 & & 6 \end{array}$			1
			3
(b)(i)	P			1
	Boiling point P higher than melting point naphthalene			1
(ii)	Naphthalene is flammable			1
			3
(c)	At time $t_1 - t_2$	At time $t_2 - t_3$	At time $t_3 - t_4$	Mark
	Naphthalene is in liquid state	In liquid and solid state	In solid state	1 + 1+ 1
	The molecules are closely pack	The molecules are closely pack	The molecules are closely pack	1
	The molecules not in orderly arrangement	Some molecules are in orderly arrangement but some are not in orderly arrangement.	The molecules are in orderly arrangement	1 + 1+ 1
	The kinetic energy decrease	The kinetic energy is constant	The kinetic energy decrease	1 + 1+ 1
	TOTAL			20

No	Answer	Sub Mark	Mark
8(a)(i)	Solvent X : Water / H ₂ O Solvent Y : Propanone / Methyl benzene / [any organic solvent]	1 1	2
(ii)	1. Hydrochloric in solvent X / water reacts with copper(II) oxide 2. Hydrochloric in solvent Y / propanone does not reacts with copper(II) oxide 3. Acid only shows its acidic properties when dissolve in water 4. In the present of water, hydrochloric acid ionize to form H ⁺ ion 5. The H ⁺ ion causes the hydrochloric acid reacts with copper(II) oxide // 6. $H^+ + CuO \rightarrow Cu^{2+} + H_2O$ 7. Produce copper(II) chloride / Cu ²⁺ ion 8. In propanone, hydrochloric acid exist as molecule // In propanone, H ⁺ ion is not present	1 1 1 1 1 1 1 1	8
(iii)	1. Neutralisation 2. Correct formulae of reactant and product 3. Balanced equation $CuO + 2HCl \rightarrow CuCl_2 + H_2O$ 4. Number of mole of HCl = $\frac{1 \times 50}{1000}$ // 0.05 5. Number of mole of CuO = $\frac{0.05}{2}$ // 0.025 mol 6. Mass of CuO = 0.025 X (64 + 16) g // 2.5 g	1 1 1 1 1 1	6
(b)	1. Sodium hydroxide is a strong alkali // Sodium hydroxide ionises completely in water 2. Ammonia is a weak alkali // ammonia ionises partially in water 3. The concentration of hydroxide ions in sodium hydroxide is higher than in ammonia solution. 4. When the concentration of hydroxide ion is higher, the pH value is higher	1 1 1 1	4
TOTAL		20	

No	Answer	Mark
9 (a)	General formula : C _n H _{2n} n= 2,3..... Functional group : Double bond between carbon atoms/ C=C Structural formula : [But-1-ene // But-2-ene] Example : $\begin{array}{ccccccc} & \text{H} & \text{H} & \text{H} & \text{H} \\ & & & & \\ \text{H} - & \text{C} & - \text{C} = & \text{C} & - \text{C} - \text{H} \\ & & & & \\ & \text{H} & & & \text{H} \end{array}$	1 1 1 3
(b)	C ₄ H ₈ + H ₂ O → C ₄ H ₉ OH Condition: <ul style="list-style-type: none"> • Temperature : 300°C • Pressure: 60 atm • Catalyst: Concentrated Phosphoric acid 	1 <div style="display: flex; align-items: center;"><div style="margin-right: 5px;">1 } 1 } 1 }</div>Max 2 3</div>
(c)	1. Y is unsaturated hydrocarbon 2. Y react with bromine 3. Butane is saturated hydrocarbon 4. Butane does not react with bromine	1 1 1 1 4
(d)	<u>Sample answer</u> List of material : Butanol, [etanoic acid], concentrated sulphuric acid Procedure : 1.Pour[2- 5]cm ³ butanol into a boiling tube 2.Add [2- 5] cm ³ of ethanoic acid . 3.Add 3 drops of concentrated sulphuric acid . 4.Heat the mixture carefully over a small flame 5.Boil the mixture slowly about 2 to 3 minutes. 6.Pour the content of the boiling tube into the beaker containing water 7.Smell the contents of the beaker. 8.Observation : Fruity smell substance produced 9&10 Chemical equation : <div style="text-align: center;"> $\text{C}_4\text{H}_9\text{OH} + \text{CH}_3\text{COOH} \longrightarrow \text{CH}_3\text{COOC}_4\text{H}_9 + \text{H}_2\text{O}$ <p>Correct formulae of reactants</p> <p>Correct formulae of products</p> </div> 11.Name : Buthyl ethanoate	1 1 1 1 1 1 1 1 1 1 1 1 Max 10
TOTAL		20

No	Answer	Sub Mark	Mark									
10(a)	Acidic gases released in industries dissolved in rain water / water vapour to form electrolyte which increases the rate of rusting	1 1	2									
(b)	1. Reaction I is not a redox reaction 2. No change in oxidation number for all elements before and after the reaction. // $\text{HCl} + \text{NaOH} \rightarrow \text{H}_2\text{O} + \text{NaCl}$ Oxidation No. +1-1 +1-2 +1 +1 -2 +1 -1 3. Reaction II is a redox reaction 4. Oxidation numbers of magnesium increases (from 0 to +2) and copper decreases (from +1 to 0) // $\text{Mg (s)} + \text{CuSO}_4 \text{ (aq)} \rightarrow \text{MgSO}_4 + \text{Cu}$ Oxidation No. 0 +2 +2 0	1 1 1 1	4									
(c)	<table><tr><th>Step</th><th>Chemicals used</th><th>Observation</th></tr><tr><td>I</td><td>Any suitable oxidising agent / e.g : Copper(II) sulphate solution</td><td>Correct corresponding observation / Blue solution of Copper(II) sulphate solution becomes paler or colourless.</td></tr><tr><td>II</td><td>Any suitable reducing agent / e.g : zinc powder</td><td>Correct corresponding observation / zinc powder dissolves // brown colour of iron(III) ions becomes pale green.</td></tr></table>	Step	Chemicals used	Observation	I	Any suitable oxidising agent / e.g : Copper(II) sulphate solution	Correct corresponding observation / Blue solution of Copper(II) sulphate solution becomes paler or colourless.	II	Any suitable reducing agent / e.g : zinc powder	Correct corresponding observation / zinc powder dissolves // brown colour of iron(III) ions becomes pale green.	1+1 1+1	4
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(d)	<p><u>Sample answer</u></p> <p>▶ <u>Labeled diagram</u> :</p> <ol style="list-style-type: none"> 1. Functional apparatus 2. Label (consists of one reducing agent and one oxidizing agent in solution form separated by a salt bridge) <p><u>Sample answer</u></p> <p>▶ <u>Procedure</u> :</p> <ol style="list-style-type: none"> 3. Filled the “U-tube” with dilute H_2SO_4 until 5 cm from the mouth of each arm 4. Add potassium iodide solution carefully to one arm and bromine water to another arm until 3 cm height 5. Immersed the carbon electrodes to each arm and connect to the galvanometer using connecting wire. 6. Record the observation. <p>▶ <u>Half-equations involved</u> :</p> <ol style="list-style-type: none"> 7. Electrode in KI / Anode : $2 \text{I}^- \rightarrow \text{I}_2 + 2\text{e}^-$ 8. Electrode in Br_2 / Cathode : $\text{Br}_2 + 2\text{e}^- \rightarrow 2 \text{Br}^-$ <p>▶ <u>Observation</u> :</p> <ol style="list-style-type: none"> 9. Electrode in KI / Anode : colourless solution of KI becomes brown 10. Electrode in Br_2 / Cathode : Brown colour of bromine becomes colourless. 	<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> <p>1</p>	<p>10</p>
TOTAL		20	

END OF MARKING SCHEME