



OTI2 Peperiksaan Pertengahan Tahun Tingkatan 4 2012
4541/2 CHEMISTRY
Paper 2

Section A

1	(a)		1 Proton 2 Electron	1 1
	(b)		1. Proton = 11 2. Nucleon = 23	1 1
	(c)	(i)	2.6	1
		(ii)	8 = proton number 16 = nucleon number	1 1
		(iii)	1. <i>Correct proton number and nucleon number</i> 2. <i>Correct symbol [symbol atom O , position of proton number and nucleon number]</i> Sample answer 18 17 O // O 8 8	1 1
TOTAL				9

2	(a)		Atoms of same element with same proton number/number of proton but different nucleon number / number of neutron	1
	(b)		Estimate the age of fossil /artifact	1
	(c)	(i)	12	1
		(ii)	2.4	1
		(iii)	4	1
	(d)	(i)	Mg : atom Water : Molecule	1 1
		(ii)	Mg : Solid Water : Liquid	1 1
TOTAL				9

3	(a)	(i)	Carbon-12	1
		(ii)	Easy to handle	1
		(iii)	$\text{Relative atomic mass of an element} = \frac{\text{Average mass of one atom of an element}}{12 \text{ mass of one atom of C-12}}$	1
		(iv)	72	1
		(v)	6	1
		(vi)	2	1
(b)	(i)	Butane : $4(12) + 10(1) = 58$	1	
	(ii)	Ethanoic acid : $2(12) + 4(1) + 2(16) = 60$	1	
(c)	(i)	Aluminium oxide : $2(27) + 3(16) = 102$	1	
	(ii)	Magnesium nitrate : $24 + 2[14 + 3(16)] = 148$	1	
TOTAL				10

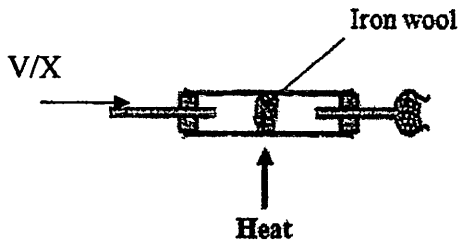
4	(a)	To fill the gas tank diver / gas in weather balloon	1		
	(b)	(i)	2.8.7	1	
		(ii)	7	1	
	(c)	(i)	Sodium	1	
		(ii)	Sodium atom is easier to release electron	1	
		(iii)	$2\text{Na} + \text{Cl}_2 \rightarrow 2\text{NaCl}$ <i>Chemical formula of reactant & product</i> <i>Balanced</i>	1 1	
	(d)		Sodium atom is bigger // Chlorine atom is smaller	1	
			Number of proton in chlorine atom is more than Sodium atom	1	
			Attraction force between nucleus & electron stronger	1	
	TOTAL				10

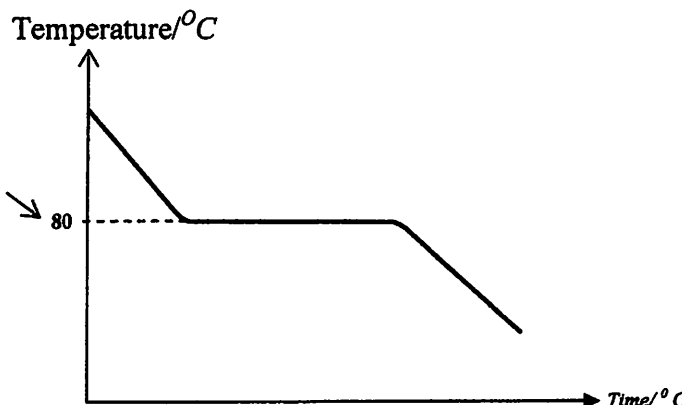
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5	(a)		Sodium carbonate : Na_2CO_3 Copper(II) chloride : CuCl_2	1 1
	(b)	(i)	Reactants : Sodium carbonate <u>and</u> copper(II) chloride // Na_2CO_3 and CuCl_2 Products : Sodium chloride <u>and</u> copper(II) carbonate // NaCl and CuCO_3	1 1
		(ii)	$\text{Na}_2\text{CO}_3 + \text{CuCl}_2 \rightarrow 2\text{NaCl} + \text{CuCO}_3$ [Correct formula of reactants] [Correct formula of products] [Balanced equation]	1 1 1
	(c)	(i) mole of copper(II) carbonate, CuCO_3 decomposed to produce mole of copper, CuO and mole of carbon dioxide, CO_2 .	1
		(ii)	Number of mole of $\text{CuCO}_3 = \frac{24.8}{124}$ $= 0.02 \text{ mol}$ 0.02 mol of CuCO_3 produce 0.02 mol of CO_2 Volume of $\text{CO}_2 = 0.02 \times 24$ $= 0.24 \text{ dm}^3 // 240 \text{ cm}^3$	1 1 1
			TOTAL	11

6	(a)		Alkali metal	1
	(b)		2	1
	(c)		W Atom W have achieve octet electron arrangement // 8 valence electron Atom W Does not need to release, accept or share electron	1 1 1
	(d)	(i)	V	1
		(ii)	FeX_3	1
		(iii)	Heat iron wool Flow V/X through hot iron	1 1
		(iv)	 <p style="text-align: right;">Functional diagram Label</p>	1 1
			TOTAL	11

	(iii)	<p>1. <i>Correct curve</i> 2. <i>Mark freezing at 80 °C</i> Sample answer</p> 	<p>1 1.....2</p>
	(d)	<p>1. The particles / ion in copper (II) sulphate tiny and discrete 2. Move randomly very slow 2.From high concentration region to low concentration region 4. Diffusion</p>	<p>1 1 1 1 4</p>
TOTAL			20

8	(a)	Empirical formula : Q Empirical formula is the formula that shows the simplest ratio of atoms of each element in a compound.	1 1.....2																
	(b)	(i) <table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th>Element</th> <th>Carbon</th> <th>Hydrogen</th> <th>Oxygen</th> </tr> </thead> <tbody> <tr> <td>Percentage</td> <td>40.00</td> <td>6.66</td> <td>53.33</td> </tr> <tr> <td>Number of moles / mol</td> <td>$\frac{40.00}{12} = 3.33$</td> <td>$\frac{6.66}{1} = 6.66$</td> <td>$\frac{53.33}{16} = 3.33$</td> </tr> <tr> <td>Ratio of moles</td> <td>1</td> <td>2</td> <td>1</td> </tr> </tbody> </table> <p>Empirical formula is CH₂O</p>	Element	Carbon	Hydrogen	Oxygen	Percentage	40.00	6.66	53.33	Number of moles / mol	$\frac{40.00}{12} = 3.33$	$\frac{6.66}{1} = 6.66$	$\frac{53.33}{16} = 3.33$	Ratio of moles	1	2	1	1 1 1
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		(ii) $\begin{aligned} n(\text{CH}_2\text{O}) &= 180 \\ 12n + 2n + 16n &= 180 \\ 30n &= 180 \\ n &= 6 \end{aligned}$ <p>Molecular formula = C₆H₁₂O₆</p>	1 1.....5																
	(c)	(i) <ol style="list-style-type: none"> P : Magnesium/Mg // Zinc/ Zn // Aluminium/ Al Q : Copper/Cu // Lead/Pb // Tin/ Sn 	1 1.....2																
		(ii) <ol style="list-style-type: none"> [<i>Mass of P and Oxygen</i>] [<i>Number of mole of P and Oxygen</i>] [<i>Simplest ratio of P and Oxygen</i>] [<i>Correct Empirical Formula</i>] <p><u>Answer :</u></p> <table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th>Element</th> <th>P</th> <th>O</th> </tr> </thead> <tbody> <tr> <td>Mass (g)</td> <td>21.2 – 20.0 = 1.2</td> <td>22.0 – 21.2 = 0.8</td> </tr> <tr> <td>Number of mole /mol</td> <td>1.2 /24 = 0.05</td> <td>0.8 /16 = 0.05</td> </tr> <tr> <td>Simplest ratio</td> <td>1</td> <td>1</td> </tr> </tbody> </table> <p>Empirical formula is PO</p>	Element	P	O	Mass (g)	21.2 – 20.0 = 1.2	22.0 – 21.2 = 0.8	Number of mole /mol	1.2 /24 = 0.05	0.8 /16 = 0.05	Simplest ratio	1	1	1 1 1 1				
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		5. [<i>Correct formula of reactants and product</i>] 6. [<i>Balanced equation</i>] <u>Answer :</u> $2P + O_2 \rightarrow 2PO$	1 1.....6
	(d)	(i) <ol style="list-style-type: none"> 1. [<i>Correct formula of reactants</i>] 2. [<i>Correct formula of product</i>] <u>Answer :</u> $NH_3 + HCl \rightarrow NH_4Cl$	1 1.....2
		<ol style="list-style-type: none"> 1. Mol $NH_3 = \frac{1.2}{24}$ $= 0.05 \text{ mol}$ 2. Molar mass of $NH_4Cl = [14 + 4(1) + 35.5]$ $= 53.5$ 3. Mass of $NH_4Cl = 0.05 \times 53.5$ $= 2.9 \text{ g}$ 	1 1 1.....3
		TOTAL	20

Section C

9	(a)	The elements present in a molecule of ethanoic acid are carbon, hydrogen and oxygen 2 carbon atoms , 4 hydrogen atoms and 2 oxygen atoms are combined together to form one molecule of ethanoic acid	1 1.....2									
	(b)	Adding the relative atomic mass of all atom that form the compound RFM MgO = 24 + 16 = 40 RMM C ₂ H ₄ O ₂ = 2(12) +4(1)+2(16) = 60	1 1 1.....3									
	(c)	CH ₂ O	1									
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	(d)	1 A crucible with its lid are weighed.	1									
		2 10 m of magnesium ribbon is cleaned with sandpaper.	1									
		3 The magnesium ribbon is coiled and placed in the crucible.	1									
		4 The crucible with its lid and magnesium coil inside are weighed.	1									
		5 The crucible without its lid and magnesium ribbon inside is heated strongly.	1									
		6 When the magnesium ribbon starts to burn, the crucible is covered with its lid.	1									
		7 Using a pair of tongs, the lid is carefully raised a little at intervals.	1									
		8 When the burning is complete, the lid is removed and the crucible is heated strongly.	1									
		9 The crucible is allowed to cool to room temperature and then weigh again.	1									
		10 Results [Table]	1									
		11 Calculation	1.....11									
TOTAL			20									

