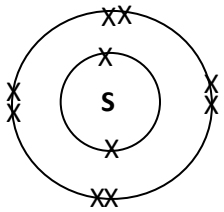
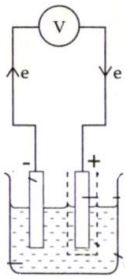
ANSWER SCHEME
MODUL 1 PAPER 2

No			Sample answer	Mark
1	(a)	(i)	The number of protons in the nucleus of an atom.	1
		(ii)	17	1
	(b)	(i)	2.8.1 // 2, 8, 1	1
		(ii)	Reacts with water to produce hydrogen and metal hydroxide// Reacts with oxygen to form metal oxide.// Reacts with chlorine gas to produce metal chloride.	1
	(c)		Q and R because they have the same proton number but different nucleon number// same number of proton but different number of neutrons	1 1
	(d)	(i)	Correct no of shells Correct e arrangement  	1 1
		(ii)	To fill advertising light bulb	1
			Total	**9 m**

2	(a)		Element D Atom D has achieved octet electron arrangement / 8 valence electrons // atom D does not receive, release or share electrons with other atom	1 1
	(b)		A	1
	(c)		G	1
	(d)		D, B, A, G, E	1
	(e)	(i)	Use a small piece of A // use a filter paper to dry A //The gas jar spoon is quickly placed into a gas jar	1
		(ii)	4 A + O_2 → 2 A_2O	1
		(iii)	4 moles of A : 2 moles of R_2O 1 moles of A : 0.5 moles of R_2O Mass of R_2O = 0.5 x [2(7) + 16] = 15 g [r: answer without unit]	1 1

			Total	**9 m**

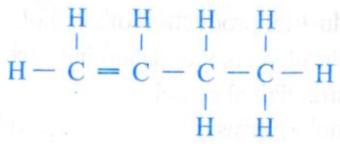
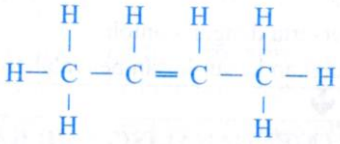
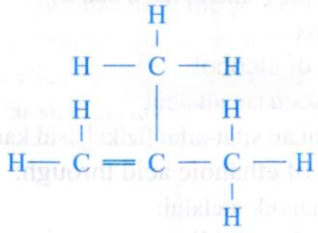
3	(a)		Boron oxide	1
	(b)		In pure copper, the atoms can slide easily. *Dalam kuprum tulen, atom-atom boleh mengelungsur dengan mudah.* In bronze/alloy, tin atoms/foreign atoms disrupt the orderly arrangement of copper atoms//layers of atoms cannot slide easily *Dalam aloi/bronze atom asing atau atom timah menggangu susunan teratur atom kuprum.//Lapisan atom tidak dapat bergelungsur dengan mudah*	1 1
	(c)	(i)	H Cl | | C = C | | H H	1
		(ii)	Do not rust//oxidised	1
	(d)		Reinforced concrete *Konkrit yg diperkukuhkan*	1
	(e)	(i)	$2NH_3 + H_2SO_4 \rightarrow (NH_4)_2SO_4$ Correct formulae balance	 1 1
		(ii)	urea % of N in $CO(NH_2)_2$ = 14x2 / (12+16+(14x2)+4) x 100 = 46.67% % of N in $(NH_4)_2SO_4$ = 14x 2 / (14x2)+6+32+(16x4) = 21.5%	1 1 1
			Total	**11 m**

4	(a)	(i)	Chemical energy to electrical energy	1
		(ii)	Electrical energy to chemical energy	1
	(b)		 Cell A *Sel A*	1
	(c)	(i)	$Zn + Cu^{2+} \longrightarrow Zn^{2+} + Cu$ Correct ionic formula Balance equation	 1 1
	(d)	(i) (ii)	become thicker become thinner	 1 1
	(e)	(i)	No change // blue solution remain unchanged	1
		(ii)	The rate of copper ionises at anode is the same as the rate of copper ion discharged at cathode number/concentration of Cu^{2+} ion in the solution remain	1 1
			Total	**10 m**

5	(a)	(i)	Salts is an **ionic compound** formed when **hydrogen ion in an acid** is replaced by **metal ion or ammonium ion.**	1
		(ii)	<table><tr><td>White solid turns brown when hot and yellow when cold *Pepejal putih bertukar perang semasa panas dan kuning semasa sejuk*</td><td>√</td></tr><tr><td>Black solid turns brown *Pepejal hitam bertukar perang*</td><td></td></tr></table>	1+1

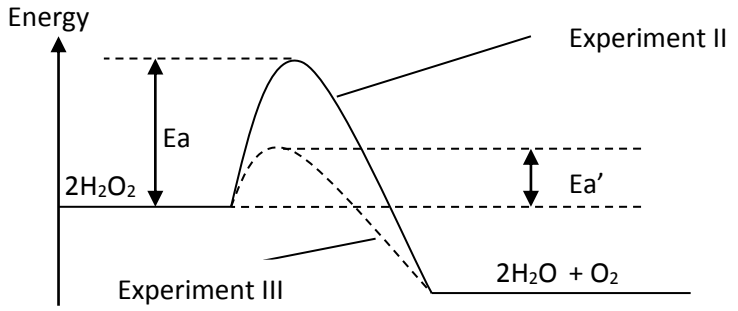
			<table><tr><td>Lime water remain unchanged *Air kapur tidak berubah*</td><td></td></tr><tr><td>Lime water turns chalky *Air kapur menjadi keruh*</td><td>√</td></tr></table>	
	(b)	(i)	$Pb(NO_3)_2 + Na_2CO_3 \rightarrow Pb\ CO_3 + 2NaNO_3$ Correct formula of reactant and product Correct balancing	 1 1
		(ii)	Double decomposition reaction	1
		(iv)	Filter the solution mixture using filter funnel and filter paper Rinse the residue	1 1
	c		1. Add **2 cm^3** of **KI/NaI solution** into the **test tube** contain **2 cm^3** of $Pb(NO_3)_2$ solution and the test tube is **shaken** 2.**Yellow precipitate** formed indicates the presence on Pb^{2+} ion	1 1
			Total	**11 m**

6	(a)		Hidrogenation // Addition	1
	(b)		$C_4H_8 + H_2 \rightarrow C_4H_{10}$	1
	(c)		1. Put 2 – 3 drops of bromine into two different test tubes 2. Fill 2 cm^3 of but-1-ene and 2 cm^3 of hydrocarbon Y in the test tubes with stopper. 3. But-1-ene decolourise brown bromine water but in hydrocarbon Y remain unchanged or 1. Put 2 – 3 drops of acidified potassium manganate(VII) solution into two different test tubes 2. Fill 2 cm^3 of but-1-ene and 2 cm^3 of hydrocarbon Y into the test tubes with stopper. 4. Shake the test tubes 3. But-1-ene decolourise purple acidified potassium manganate(VII) solution but in hydrocarbon Y purple colour remain unchanged	1 1 1
	(d)		Able to calculate number of mole with unit 0.05 mol	1
			Able to calculate mass with unit Ratio: 1 mol Y $\rightarrow$ 4 mol CO_2 0.5 $\rightarrow$? $\frac{0.5}{1} \times 4$ = 2 mol Or 1 mol Y : 4 mol CO_2 0.5 mol : 2 mol CO_2 Mass of CO_2 2 x 44 g // 88 g [r: answer without unit]	1 1

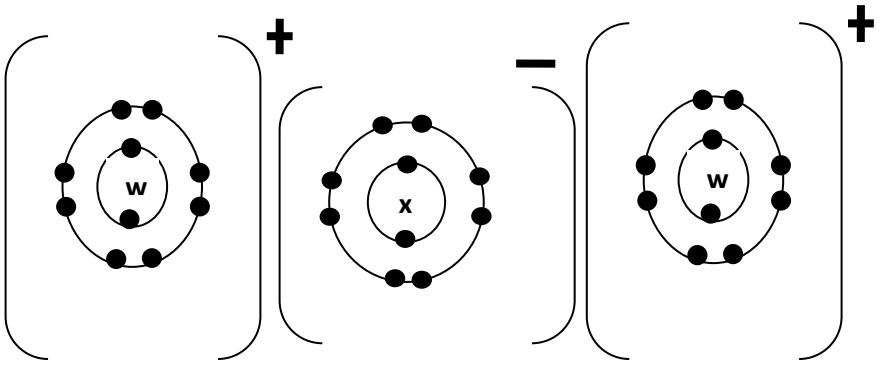
	(e)		Isomer   	1 1 1
			Total	**11 m**

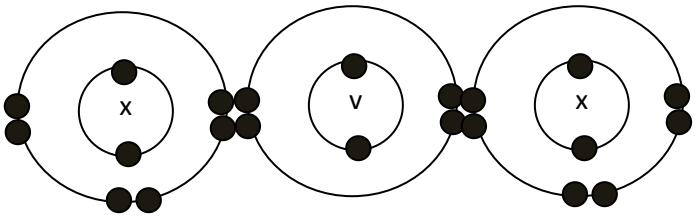
7			acid P : hydrochloric acid/ sulphuric acid/ nitric acid. Acid P/ hydrochloric acid/ sulphuric acid/ nitric acid is a strong acid// ionize completely in water to produce high concentration of H^+ ions. It will cause the pH value to be lower (smaller). acid Q : ethanoic acid. Acid Q/ ethanoic acid is a weak acid // Ionise partially in water to produce low concentration of H^+ ions. Hence, pH value is higher (bigger)	1 1 1 1 1 1 1 1
			NH_4OH neutralize the acid secreted by ant	1 1 1
			$H_2SO_4 + 2NaOH \rightarrow Na_2SO_4 + 2H_2O$ Correct formula reactants and products Balance equation Calculation: Mole of H_2SO_4 $\frac{MV}{1000} = \frac{0.5 \times 50}{1000}$ = 0.025 mole Ratio 1 mole of H_2SO_4 : 2 mole of NaOH 0.025 : 0.05 Correct Molarity of NaOH with unit: $n = \frac{0.05 \times 1000}{25}$ = 2.0 mol dm^{-3} [r: answer without unit]	 1 1 1 1 1 1

			mol dm^{-3}/ halved / decrease halved / less halved hydrochloric acid is monoprotic/monobasic acid. sulphuric acid is a diprotic acid / dibasic acid	1 1 1
			Total	**20 m**

8	(a)		1. average rate = $\frac{50}{55}$ 2. = 0.909//0.91 cm3 s-1 [r: answer without unit]	1 1
	(b)		 1.y axis labeled energy 2.both curve drawn correctly with label 3.energy level labeled with reactant and products [a: exo or endo] 4.activation energy labeled correctly	 1 1 1 1
	(c)		Experiment I and Experiment II 1. Rate of reaction of experiment II is higher than experiment I 2. Experiment II use higher concentration of hydrogen peroxide 3. the number of Hydrogen peroxide molecules/reactant particles per unit volume in experiment II is higher. 4 .Frequency of collision between Hydrogen peroxide molecules of experiment II become higher 5. Frequency of effective collision between Hydrogen peroxide molecules/reactant particles of experiment II become higher Experiment II and Experiment III 6. Rate of reaction of experiment III is higher than experiment	 1 1 1 1 1

			II 7. Catalyst that is Manganese(IV) oxide present in experiment III 8. Manganese(IV) oxide lower the activation energy of the reaction in experiment III 9. More colliding hydrogen peroxide molecules easily overcome the lower activation energy in experiment III 10. Frequency of effective collision between Hydrogen peroxide molecules of experiment III become higher	1 1 1 1 1
	(d)		1. number of mole of H_2O_2 = $\frac{0.5 \times 30}{1000}$ // 0.015 2. 2 mole of H_2O_2 produce 1 mole of O_2 3. number of mole of O_2 = $\frac{0.015}{2}$ // 0.0075 4.volume of O_2 = 0.0075 x 24 dm3 //0.18 dm3 //180 cm3 [r: answer without unit]	1 1 1 1
			Total	20 m

9	(a)	(i)	Ionic compound: W and X // covalent compound : V and X	1+1
		(ii)	*Ionic compound*  1. Correct charge of ion 2. correct number of electron in the shell for each ion 3. contain nucleus Explanation Ionic compound • Electron arrangement of an atom of element W is **2.8.1** • 2 Atom W **donates** one electron each to achieve the **stable** electron arrangement which is 2.8 • 2 W ion, W^+ is formed • Electron arrangement of atom X is **2.6** • Electrons from atom W are transferred to an atom of **X** • Atom X receives **TWO** electrons to achieve the **stable** electron arrangement which is 2.8. • W ion, X^{2-} is formed • The W ion, W^+ and X ion X^{2-} , formed are **attracted** to one another to form an **ionic** compound, W_2X • The strong **electrostatic** forces between the opposite-charged ions is called **ionic** bond. Any 7 points Any physical state	1 1 1 7 marks 1 mark



Covalent bond

- Atom V has **four** valence electrons, with an electron arrangement of **2.4**
- It needs **four** more electrons to achieve the **stable** electron arrangement
- One atom of X contributes 2 electrons for **sharing**
- Atom Xhas **SIX** valence electrons, with an electron arrangement of **2.6**
- It needs **two** more electron to achieve the **stable** electron arrangement
- One atom of v share a pair of electrons with ***two*** atoms of x
- Covalent compound of **VX_2** is formed

7 marks

Any physical state

1 mark

1. correct number of electron for each atom combined
2. contain nucleus
3. correct the position (share the electron + shell)

	b	i	Substance Y is glacial ethanoic acid // gas hydrogen chloride Solvent Z is tetrachloromethane//ethanol//any organic solvent	1 1
		ii	Solution I Substance Y dissolve in water The ions in water dissociate and move freely Solution II Substance Y do not dissolve Exist as neutral covalent molecules	 1 1 1 1 Max 5
			Total	20 m

Question No			Mark Scheme	Marks
10	(a)		elements C : H : O mass/g 64.9 : 13.5 : 21.6 no of mole 5.4 : 13.5 : 1.35 ratio 4 : 10 : 1 C_4H_9OH butanol	 1 1 1 1
	(b)		From glucose: <u>Process</u> Fermentation <u>Step</u> • 50 cm^3 glucose solution is added with yeast into a conical flask • Left for 3 days • The product is then purified by fractional distillation <u>Chemical equation</u> $C_6H_{12}O_6 \rightarrow 2C_2H_5OH + 2CO_2$ From ethene: <u>Process</u> Hydration // addition reaction <u>Step</u> • A mixture of ethene and water vapour/ steam are passed over phosphoric acid as the catalyst • At temperature of 300 °C and pressure of 60 atm <u>Chemical equation</u> $C_2H_4 + H_2O \rightarrow C_2H_5OH$	 1 1 1 1 1 1+1 1
	(c)		• Name any suitable alcohol • Name any suitable carboxylic • Mix alcohol and carboxylic acid (same volume) • In round bottom flask • Add a few drops of sulphuric acid concentrated • Heat the mixture in bath bath under reflux	1 1 1 1 1 1
			Total	**20 m**

END OF MARK SCHEME