SKEMA PEMARKAHAN KERTAS 2 SET 2

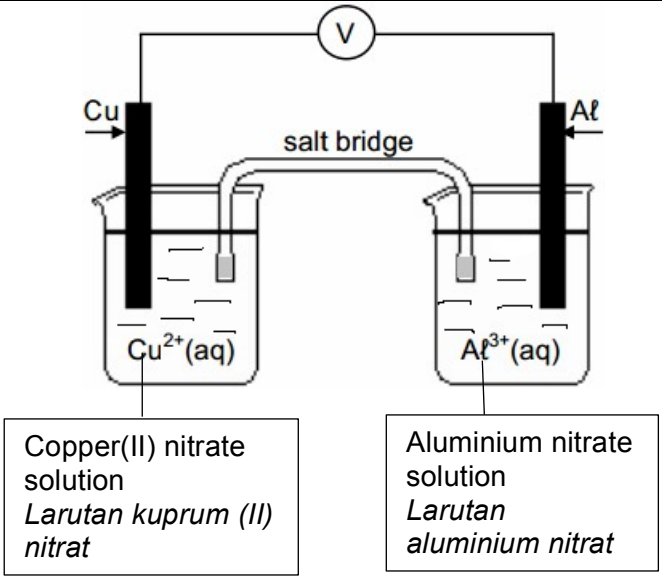
No			Mark scheme	Sub mark	Total mark
1	a	i	Diffusion	1	1
		ii	Molecules	1	1
		iii	The lower part of the beaker which is contains ice-cold water becomes green. The green colour spreads higher up the water in the beaker which is contain water at room temperature. The water in the beaker which is contains hot water is green throughout.	1 1 1	3
	b	i	$(CH_2)_n = 28$ $(12 + 2) = 28$ $n = 2$ molecular formula for X is C_2H_4	 1 1	 2
		ii	$C_2H_4 + Br_2 \rightarrow C_2H_4Br_2$	1 1	2
				TOTAL	**9**
2	(a)		Aluminium/ Al		1
	(b)	(i)	R		1
		(ii)	Can form coloured ion/compound		1
	(c)		2.8.1		1
	(d)		Q^-		1
	(e)	(i)	$2Y + Q_2 \rightarrow 2YQ$ Correct chemical formula of reactant and product Balanced	 1 1	

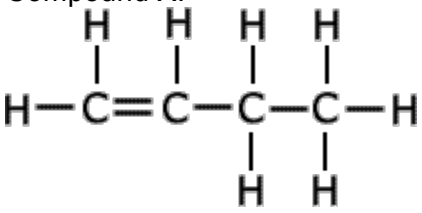
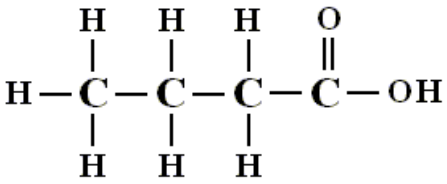
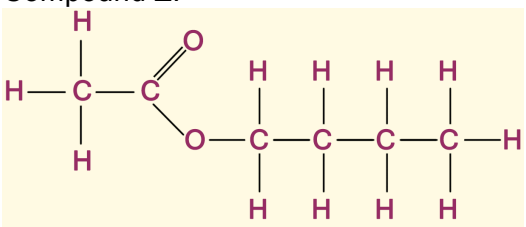
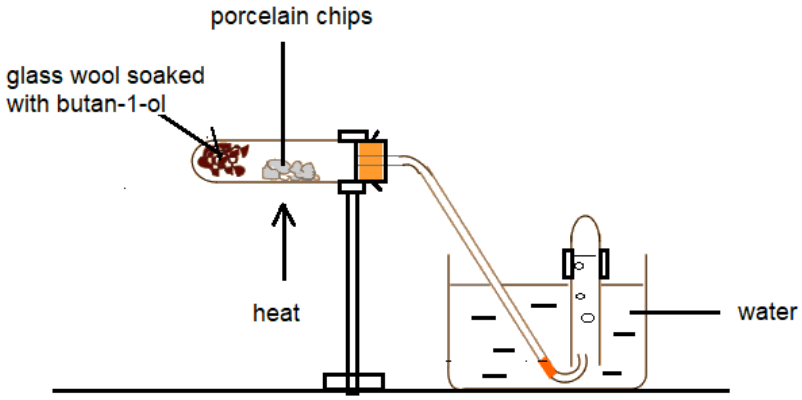
			 Correct number of electron with circle for nucleus Correct number of charge		1 1
			TOTAL		**9**
3	a	Process X Process X: Process Haber Substance Y: Sulphuric acid Bahan Y		1 1	 2
	b	$2\ NH_3 + H_2SO_4 \longrightarrow (NH_4)_2SO_4$ Correct reactant and product Balance equation		 1 1	 2
	c	28/132 x 100% 21.21%		1 1	 2
	d	As fertilizer		1	1
	e	Sulphur dioxide dissolves in water/ rain water to produce **acid solution/acid rain**. <u>Any two correct answers:</u> - Acid rain can corrode buildings /metal structures -Lake and river become acidic - pH of soil decreases -Destroys trees/forest		1 1 1	 3
		TOTAL			**10**

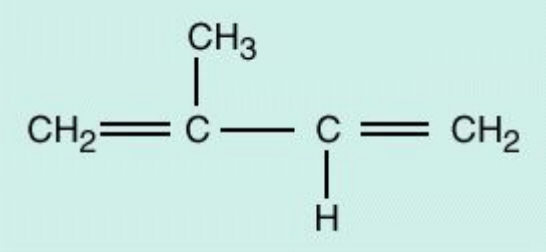
4	(a)		Chemical substance that ionises completely in water to produce hydrogen ion.		1
	(b)		Acid that produce 2 hydrogen ion per molecule when ionises in water		1
	(c)		Neutralisation process produced salt which is ionic compound Free moving ion exist when Salt in form of aqueous		1 1
	(d)	(i)	$2YOH + H_2SO_4 \rightarrow Y_2SO_4 + 2H_2O$ Correct chemical formula of reactant and product Balanced		 1 1
		(ii)	n=MV/1000 n=0.025 mol		 1
		(ii)	2 mol YOH : 1 mol H_2SO_4 0.025 mol NaOH : 0.0125mol HCl n=MV/1000 M=1M		1 1 1
			TOTAL		**10**

Num 5	Mark Scheme		Sub mark	Total mark
(a)	(i)	Carbon dioxide	1	1
	(ii)	heating	1	1
	(iii)	Aluminium chloride // zinc chloride	1	1
	(iv)	$AlCl_3$ // $ZnCl_2$	1	1
	(v)	Ammonia solution	1	1
(b)	(i)	Yellow	1	1
	(ii)	Nitrogen dioxide	1	1
	(iii)	$2Zn(NO_3)_2 \rightarrow 2ZnO + 4NO_2 + O_2$ Correct chemical formula for reactants and products Balance chemical equation	 1 1	 2
(c)	(i)	Any soluble chloride salt	1	1
	(ii)	$Pb^{2+} + 2Cl^- \rightarrow PbCl_2$	1	1
		TOTAL		**11**

6	(a)	Heat change when 1 mol of water is formed from the reaction between nitric acid and sodium hydroxide solution.	1	
	(b)	(i) heat release, H = m c Θ = 50 x 4.2 x 6.8 = 1428 J	1	
		(ii) no of mol nitric acid = $\frac{MV}{1000} = \frac{(1.0)(25)}{1000}$ = 0.025 mol	1	
		(iii) Heat of neutralisation, $\Delta H = \frac{1428}{0.025}$ = 57120 J mol^{-1} = - 57.12 kJ mol^{-1}	1	
	(c)	*Energy* *Tenaga* $HNO_3 + NaOH$ ΔH = - 57.12 kJ mol^{-1} $NaNO_3 + H_2O$	1 + 1	2
	(d)	Ethanoic acid is a weak acid which ionises partially in water to form low concentration of hydrogen ion. Some of heat is absorbed to ionise ethanoic acid completely	1 1 1	3
	(e)	(i) Some of heat has lost to the surrounding.	1	
		(ii) Cover the polystyrene cup with lid	1	
		TOTAL		11
7(a)	(i)	1. Copper is more electropositive than silver in the	1	

		electrochemical series 2. Copper will act as negative terminal while silver will act as positive terminal 3. Electrons move from negative terminal to positive terminal through external circuit 4. Half equation at negative terminal : $Cu \rightarrow Cu^{2+} + 2e$ 5. Copper electrode becomes thinner 6. Half equation at positive terminal : $Ag^{+} + e \rightarrow Ag$ 7. Silvery / shiny solid deposited at silver electrode // silver electrode becomes thicker 8. Concentration of blue solution decreases 9. Overall ionic equation : $Cu + 2Ag^{+} \rightarrow Cu^{2+} + 2Ag$ 10. The flow of electrons cause the deflection of voltmeter and register a reading.	1 1 1 1 1 1 1 1 1	10
	(ii)	Cell voltage = 1.56V – 1.10V = 0.46V	1 1	2
(b)	(i)	Aluminium nitrate Copper (II) nitrate	1 1	2
	(ii)	 Functioned diagram : salt brige and electrode half immerse in solution Labelled : 1. Two electrolyte 2. Two electrodes 3. Salt bridge 4. Voltmeter 5. Movement of electron	 1 1 1 1 1 1	6
			TOTAL	**20**

8	(a)(i)	Compound X:  Compound Y:  Compound Z: 	1 1 1	
	(ii)	 Add 4 drops of bromine water // acidified potassium manganate(VII) and shake the test tube. Brown turns colourless // purple turns colourless.	1+1 1 1	
	(iii)	Reaction III: Esterification Equation: $CH_3COOH + C_4H_9OH \rightarrow CH_3COOC_4H_9 + H_2O$ Physical property: Sweet smell // fruity smell // insoluble in water // easily volatile	1 1+1 1	
	(iv)	$C_4H_8 + 6O_2 \rightarrow 4CO_2 + 4H_2O$ 1 mol $C_4H_8 \rightarrow$ 4 mol CO_2 0.02 mol $C_4H_8 \rightarrow$ 0.08 mol CO_2 Volume of CO_2 = no of mol x 24 = 0.08 x 24 = 1.92 dm^3	1+1 1 1	

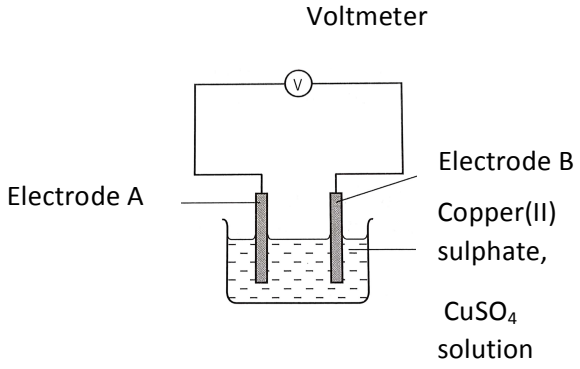
	(b)(i)	 IUPAC Name: 2-methylbut-1,3-diene	1 1	
	(ii)	Add ammonia solution. Ammonia ionises in water to form hydroxide ions. Hydroxide ion neutralise hydrogen ion produced by lactic acid. Rubber particles remain negatively charged and repel each other,	1 1 1 1 Max 3	
		TOTAL	**20**	

9	a)		$Zn(s) + 2HCl(aq) \rightarrow ZnCl_2(aq) + H_2(g)$ No. of moles of HCl = (0.2 x 25) / 1000 = 0.005 mol No. of moles of H_2 = 0.005 / 2 = 0.0025 mol Maximum volume of H_2 = 0.0025 x 24 = 0.06 dm^3 = 60 cm^3	2 1 1	
			Jumlah	4	
	b)	i)	Rate of reaction for set I = 50 cm^3 / 90s = 0.56 cm^3 s^{-1} Rate of reaction for set II = 50 cm^3 / 55s = 0.91 cm^3 s^{-1}	1	
			• The rate of reaction for set II is higher than set I • The concentration of HCl is higher in set II than set I • The number of H^+ particles per unit volume is higher in set II than set I • Frequency of collisions between H^+ ion and Zn atom in set II is higher than set I • Frequency of effective collisions of H^+ ion and Zn atom in set II is higher than set I	1 1 1 1 1	
			Jumlah	6	
			Or / Atau		
		ii)	Rate of reaction for set I = 50 cm^3 / 90s = 0.56 cm^3 s^{-1} Rate of reaction for set III = 50 cm^3 / 30 s = 1.67 cm^3 s^{-1}	1	
			• The rate of reaction for set III is higher than set I • The reacting temperature is higher in set III than set I • The kinetics energy of H^+ particles increases with increases in temperature • Number of H^+ ion and Zn atom achieve the activation energy increases. • Frequency of collisions between H^+ ion and Zn atom in set III is higher than set I • Frequency of effective collisions of H^+ ion and Zn atom in set III is higher than set I	1 1 1 1 1	
			Jumlah	6	
	c)		**<u>Catalyst</u>** Material: 0.5 mol dm^{-3} hydrochloric acid, zinc, 0.5 mol dm^{-3} copper(II) sulphate solution and water. Apparatus: Burrette, basin, conical flask, measuring cylinder, stopper with delivery tube, electronic balance, stopwatch, retort stand and clamp. Procedure: 1) Fill a basin with water until half full. 2) Fill a burrette with water until full and invert it into the	 1 1	

			basin filled with water. 3) Clamp the burrette vertically to a retort stand. Record the initial burrette reading. 4) Measure 50 cm^3 of 0.5 mol dm^{-3} hydrochloric acid and pour into a conical flask. 5) Weigh 2 g of zinc granule and place it into the conical flask containing hydrochloric acid. 6) Pour 5 cm^3 of 0.5 mol dm^{-3} copper(II) sulphate into the conical flask. 7) Close the conical flask immediately with stopper fitted with delivery tube abd connect the rubber tube into the burrette. 8) Start the stopwatch immediately. 9) Shake / swirl the conical flask continuously. 10) Record the burrette reading at 30 seconds intervals. 11) Repeat steps 1 – 10 without adding copper(II) sulphate solution.	1 1 1 1 1 1 1 1	
				10	
			TOTAL	20	

10	a	(i)	***Electrolyte:*** copper(II) nitrate / Copper(II) sulphate solution. ***Gas K:*** Oxygen gas ***Chemical test*** Placed a glowing wooden splinter into a test tube The splinter ignited/rekindled/lit up	1 1 1 1	
		(ii)	***At anode:*** 1. Position OH^- ion lower than NO_3^- in electrochemical series. 2. OH^- ion is discharge by releasing electron. 3. Oxidation occur//oxidation number of oxygen increased from -2 to 0. ***At cathode:*** 4. Position of Cu^{2+} ion is lower than H ion in electrochemical series. 5. Cu ion is discharged by accepting electron 6. Reduction occur// oxidation number of Cu decreased from +2 to 0.	 1 1 1 1 1 1	

b



1. **Apparatus:** voltmeter, connecting wire with crocodile clips and 250 cm^3 beaker. — 1
2. **Materials:** 0.1 mol dm^{-3} copper(II) sulphate, $CuSO_4$, P, Q, R, S and sandpaper. — 1

Procedure:

1. Clean each of the metals using a piece of sandpaper. — 1
2. Fill a beaker with 0.1 mol dm^{-3} copper(II) sulphate, $CuSO_4$ until it is half full. — 1
3. Dip the two pieces of metals P and Q into the copper(II) sulphate, $CuSO_4$ solution. — 1
4. Connect the two pieces of metals to a voltmeter using connecting wires. — 1
5. Record the reading of the voltmeter. — 1
6. Repeat steps 1 to 5 using another metal to replace metal P and Q as electrode A and B. — 1

max5

Pair of metals	Reading of voltmeter /V	Negative terminal
P and S		
Q and S		
R and S		

1

Data interpretation:

7. Metal place higher in the electrochemical series will act as negative terminal, and metal place lower in the electrochemical series will act as positive terminals. — 1
8. The further the distance between pair of metals in the electrochemical series, the higher the potential difference. — 1

10

TOTAL **20**