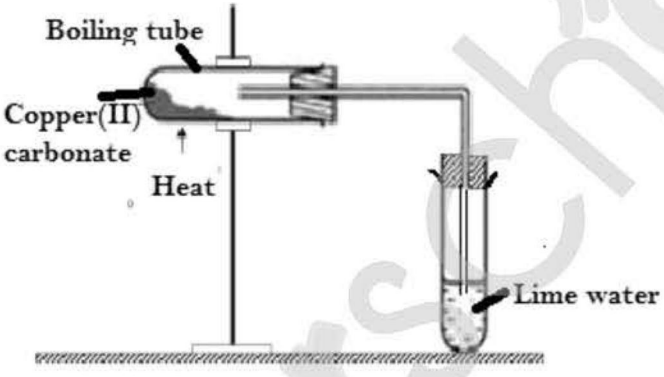
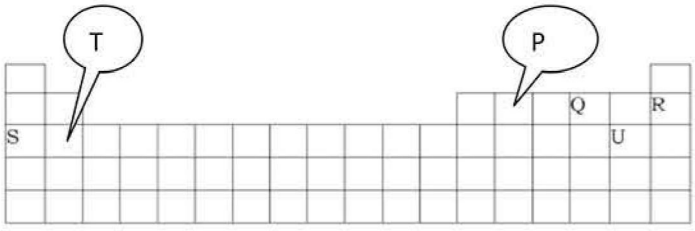
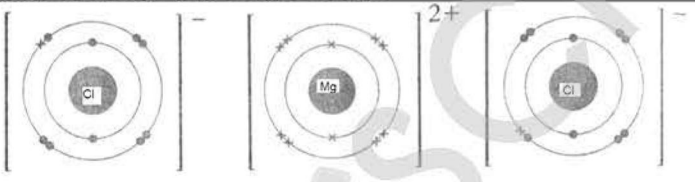
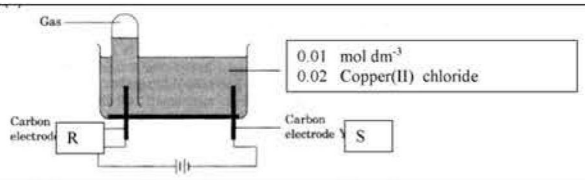
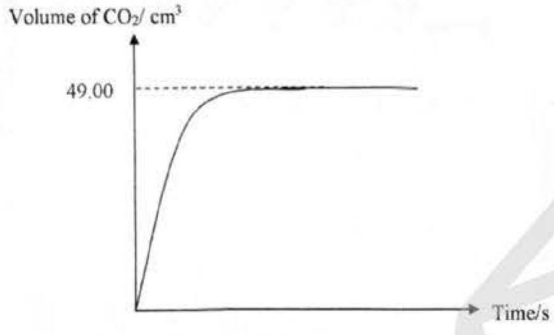
Chemistry *Paper 2*

Section A

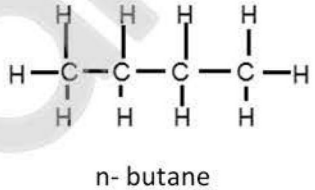
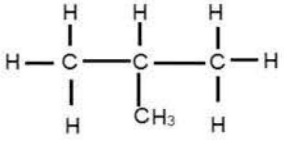
Question			Mark scheme	Sub mark	Total mark
1	(a)	(i)	Nucleon number	1	1
		(ii)	Proton number	1	1
	(b)	(i)	Isotopes is the same element that has same proton number but different number of neutron/ nucleon number	1	1
		(ii)	X and Y	1	1
		(iii)	$^{12}_{6}X$ or $^{14}_{6}Y$	1	1
	(c)	(i)	8	1	1
	(d)		Period 2. Because atom Y and Z both has two number of shell that filled/occupied with electrons.	1 1	2
				Total	8
2	(a)			F = 1 L = 1	2
	(b)	(i)	$CuCO_3$	1	1
		(ii)	Copper(II) oxide	1	1
		(iii)	Carbon dioxide	1	1
		(iv)	$CuCO_3 \rightarrow CuO + CO_2$	1	1
	(c)	(i)	0.44 g	1	1
		(ii)	Volume = Moles X Molar volume = 0.01 X 24 = 0.24 dm^3	 1 1	2
	(d)		Moles of XSO_4 = 0.1 mol	1	1
				Total	10

3	(a)			2	
	(b)	(i)	S	1	
		(ii)	T	1	
		(iii)	R	1	
	(c)		Sodium hydroxide	1	
	(d)		As bleach and as a disinfectant for swimming pools and water supplies.	1	
	(e)		T has more proton number than S. It has more electrons/valence electron that has stronger nuclei attraction causes its become smaller	1 1	2
				Total	9
4	(a)		Magnesium / Sodium / Aluminium	1	1
	(b)		Al has less proton number than P atom so it has less number of electrons. The nuclei attractions with electrons in atom P is weaker compared to Al atom.	1 1	2
	(c)	(i)	MgO and SO_2	1	1
		(ii)	MgO is basic but SO_2 is acidic	1	1
	(d)	(i)		1 + 1	2
		(ii)	Has higher melting and boiling point.	1	1
				Total	8
5	(a)		Cu^{2+}, Cl^-, H^+, OH^-	1 + 1	2
	(b)		Brown solid deposited	1	1
	(c)	(i)	Electrode P = Chlorine gas Electrode R = Oxygen gas	1 1	2
		(ii)	Chlorine gas formed at P because chloride ion, Cl^- is selected to be discharged as the solution of Copper(II) chloride, $CuCl_2$ is concentrated whereas at electrode R, hydroxide ion, OH^- is selected to be discharged as the electrolyte is diluted.	1 1	2
	(d)	(i)	The pale green solution turns brown	1	1
		(ii)	+2 → +3	1	1
		(iii)	$Fe^{2+} \rightarrow Fe^{3+} + e$	1+ 1	2

	(e)			1+ 1	2
				Total	13
6	(a)		$CaCO_3 + 2HCl \rightarrow CaCl_2 + CO_2 + H_2O$	1 + 1	2
	(b)				4
	(c)		Rate of reaction decreases. Because the reaction is going to complete/ reactant reacted completely	1+1	2
	(d)		Rate of reaction at 80 s is = 0.17 cm3 s-1 [0.10-0.25]	1+1	2
	(e)		Use small size/powder of $CaCO_3$ and High concentration of HCl // high temperature of HCl solution	1 + 1	2
				Total	12

Section B

7	(a)		1. Potassium hydroxide solution is a strong alkali that ionized completely in water 2. To produced high concentration of hydroxide ion, OH^- 3. Ammonium solution is a weak alkali which ionized partially in water 4. To produced low concentration of hydroxide ion, OH^-	1 1 1 1	4
	(b)		1. Put the blue litmus paper into the test tube contains 2 cm^3 of sulphuric acid solution. 2. Blue litmus will change to red. Show it acidic properties. 3. Put 2cm^3 $BaCl_2$ into the another test tube that contain 2 cm^3 of sulphuric acid solution 4. White precipitate formed, $BaSO_4$ show that SO_4^{2-} ion is present.	1 1 1 1	4

	(c)	(i)	1. Ethanoic acid is a monoprotic acid because 1 mol of ethanoic acid molecule can ionized in water 2. To produced 1 mol of hydrogen ion, H^+ 3. Equation : $CH_3COOH \rightarrow CH_3COO^- + H^+$	1 1 1	2 max
		(ii)	1. Glacial ethanoic acid cannot ionized and produced hydrogen ion, H^+. It exists as molecule 2. Ethanoic acid in aqueous solution can ionized and produced hydrogen ion,H^+ 3. H^+ in the aqueous solution can move freely and react with another substances.	1 1 1	3
		(iii)	$Zn + 2C_2H_5COOH \rightarrow (C_2H_5COO)_2Zn + H_2$	1+1	2
	(d)		1. Mol hydrogen gas = volume/molar volume = 0.048/ 24 = 0.002 mol 2. Relate between H_2 and HCl according to balanced equation 2 mol of HCl will produced 1 mol of of H_2 0.004 mol of HCl produced 0.002 mol of H_2 3. Molarity = Moles/volume = 0.004 / 0.05 = 0.08 $moldm^{-3}$	1 1 1 1 1	5
				Total	20
8	(a)	(i)	<table><tr><td></td><td>Carbon</td><td>Hydrogen</td></tr><tr><td>% mass</td><td>82.75</td><td>17.25</td></tr><tr><td>1. no of moles</td><td>82.75/12 =6.9</td><td>17.25/1 =17.25</td></tr><tr><td>2. Smallest ratio of moles</td><td>6.9/6.9 =1 x 2 =2</td><td>17.25/6.9 =2.5 x 2 = 5</td></tr></table> Empirical formula = C_2H_5	1 1 1 1	4
		(ii)	 n- butane  2-methylpropane	1+1 1+1	4

	(b)		1. Pour about [2-5]cm^3 cyclohexane solutions into test tube A and cyclohexene solutions into test tube B. 2. add 3 drops of bromine water into the test tubes // add 3 drops of acidified potassium manganite(VII) into the test tubes. 3. Shake the solutions. 4. No changes on brown colour of bromine water / no changes on purple colour of acidified potassium manganite(VII) shows it is cyclohexane. 5. Brown colour of bromine water/purple colour of acidified potassium manganite(VII) changes to colourless shows it is cyclohexene	1 1 1 1 1	5
	(c)		1. Pour about [2-5] cm^3 butanoic acid into the test tube and added about [2-5] cm^3 ethanol into the solutions. 2. Shakes the solutions. 3. Add several drops of concentrated sulphuric acid. 4. Heat the solutions. 5. Pour the solutions quickly into the beaker that contain water. 6. The nice / fruity smell produced. 7. Chemical equations : $C_3H_7COOH + C_2H_5OH \rightarrow C_3H_7COOC_2H_5 + H_2O$	1 1 1 1 1 1 1	7
				Total	20

Section C

9	(a)		Glass(silica) / Ceramic(silicate) They are bad conductors of heat and electricity. / They are good insulators of electricity and heat Used in cooking because its reacts with other chemicals to withstand high heats / Used for storage food because ceramics don't conduct electricity.	1+1 1+1	4
	(b)	(i)	1. X is alloy/bronze and Y is pure metal/copper. 2. Pure copper is made up of same type of atoms and same size. 3. The atoms are arranged in an orderly manner. 4. The layer of atoms can slide over each other make it soft and weak. 5. Bronze is made up of atoms of different size. 6. The atoms are not orderly arranged// The presence of tin disturb the orderly arranged of copper atoms in bronze. 7. This reduces/prevents the layer of copper atoms from sliding make it hard and strong.	1 1 1 1 1 1 1	7

		(ii)	Alloy is a mixture of two or more elements with a certain fixed composition in which the major component is a metal.	1	1
		(iii)	Two aims of alloying 1. Improve the appearance 2. Improve the strength and hardness 3. Increase the resistance to corrosion	 1 1 1	2 max
		(iv)	1. Example of alloy is bronze and example of pure metal is copper. Alloy is harder than pure copper because……. 2. Pure copper is made up of same type of atoms, same size and are arranged in an orderly manner. 3. The layer of atoms can slide over each other make it soft and weak. 4. Bronze is made up of atoms of different size and are not orderly arranged. 5. This reduces/prevents the layer of copper atoms from sliding make it hard and strong.	1 1 + 1 1 1 + 1 1	6 max
				Total	20
10	(a)		1. When food can dented, the tin plate is crack and the iron is exposed. 2. Iron will donate/released 2 electrons to form iron(II) ions. 3. In food some water and oxygen gas presence. The water and oxygen gas gain electrons to formed hydroxide ions. 4. Iron(II) ions will combined with hydroxide ions to formed iron(II) hydroxide and continue until formed iron(III) oxide, the rust.	1 1 1 1	4
	(b)		Similar 1. The cell used two electrode and have an electrolyte. 2. The electrical energy change to chemical energy. 3. The product at cathode is same, silver atom. Different 4. Used different electrode, in cell I used silver (pure silver and impure silver) and Cell II is used carbon. 5. The product at anode is different. In cell I will produced silver ions and cell II will released oxygen gas. The equation as below: At anode : Cell I = $Ag \rightarrow Ag^+ + e$ Cell II = $4OH^- \rightarrow O_2 + 2H_2O + 4e$ 6. The observation in Cell I is the anode will becomes thinner but in Cell II will released bubbles.	 1 1 1 1 1 1	6

	(C)		Procedure 1. 2 cm^3 of potassium iodide was poured into the test tube. 2. 2 cm^3 of chlorine water was added into the test tube. 3. The test tube was shake. 4. The observation was be make and recorded. Confirmatory test 5. The 2 cm^3 of product solutions was added into test tube. 6. Add 1,1,1-trichloromethane and shake 7. The purple colour layer formed, confirm that iodine present. Explanation on oxidation and reduction processes 8. Iodide ion will releses an electron and iodine formed. 9. Iodide ion will oxidized and act as reducing agent. 10. Chlorine water will receive electron and formed chloride ion. 11. Chlorine water will be reduced and act as oxidizing agent. Ionic equation : $Cl_2 + 2\ I^- \rightarrow I_2 + Cl^-$	1 1 1 1 1 1 1 1 1 1 1	10 max
				Total	20

END OF MARKING SCHEME