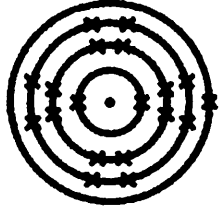
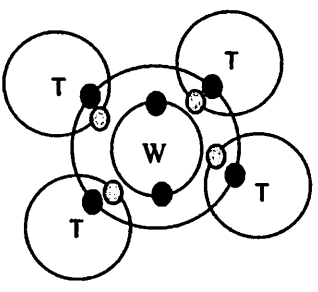


MARKING SCHEME PAPER 2 2012 (CHEMISTRY)

Number			Answer / sample answer	Marks	
1	(a)	(i)	Proton, electron, neutron	1	2
		(ii)	Total number of proton and neutron in an atom.	1	
	(b)	V= 35 W=24	1 1	5	
	(c)	2.8.8	1		
	(d)	 <p>1. The nucleus is labelled correct 2. no of shells and electron correct</p>	1 1		
	(e)	(i)	78° C	1	2
		(ii)	Heat energy is released as the particles attract one another to form solid is equal to heat lost to surrounding.	1	
Total					9

Number			Answer / sample answer	Marks	
2	(a)		X – Sulphuric acid	1	
			Y – Ammonia	1	
	(b)	(i)	(NH ₄) ₂ SO ₄	1	
		(ii)	Percentage of nitrogen = $\frac{2(14)}{2(14) + 8(1) + 32 + 4(16)} \times 100\%$ $= 21.21\%$	1	
	(c)	(i)	Preservative	1	
		(ii)	Flavouring	1	
	(d)		Headaches // Allergy // drowsiness // abdominal pain	1	
	(e)		Gelatin // lecithin // pectin	1	
	(f)		Salt // sugar // spices // turmeric	1	9

Number		Answer / sample answer	Marks	
3	(a)	Form different oxidation number in their compound // form coloured ion or compounds // use as a catalyst // formed complex ion any one	1	
	(b)	(i) U (ii) $2U + 2H_2O \rightarrow 2UOH + H_2$	1 1+1	
	(c)	Y 1. Atom of element Y achieve a stable octet electron arrangement, 2. the atom does not donate or release or share electron	1 1 1	
	(d)	(i) low melting point // low boiling point // do not conduct electricity // do not dissolve in water // dissolve in organic solvent any one (ii)  1. Nucleus marked, no. of shells and no. of e correct 2. 1 atom W and 4 atoms T	1 1	10

Number		Answer/sample answer	Marks	
4	(a)	(i) copper(II) ions , sulphate ions, hydrogen ions , hydroxide ions // Cu^{2+} , SO_4^{2-} , H^+ , OH^-		1
		(ii) Electrode P - SO_4^{2-} , OH^- Electrode Q - Cu^{2+} , H^+	1 1	2
		(iii) Brown solid formed //brown metal formed/deposited		1
		(iv) Blue colour turn colourless // Intensity of blue solution decreases // blue solution fades		1
(b)	(i)	Oxygen gas		1
	(ii)	Insert / put a wooden glowing splinter into the mouth of the test tube containing the gas. The glowing wooden splinter ignited/rekindles/lighted	1 1	2
(c)	Anode: $Cu \rightarrow Cu^{2+} + 2e$ Cathode: $Cu^{2+} + 2e \rightarrow Cu$	1 1	2	
Total				10

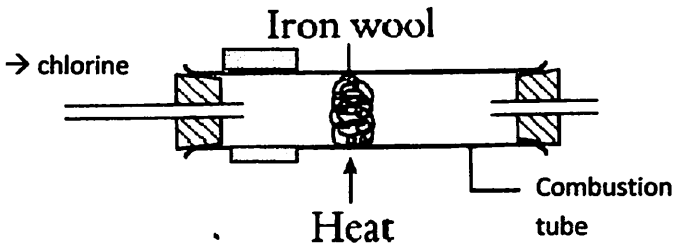
Number		Answer / sample answer	Marks	
5	(a)	$\text{CaCO}_3 + 2\text{HCl} \longrightarrow \text{CaCl}_2 + \text{CO}_2 + \text{H}_2\text{O}$ 1. Correct formula reactants and products 2. Balanced equation	1 1	2
	(b)	(i) <ul style="list-style-type: none"> • correct label of axes and units for both axes – X and – Y and correct uniform scale • correct transfer of data • smooth curve 	1 1 1	3
		(ii) <ul style="list-style-type: none"> • tangent on the curve • answer : $0.14 \pm 0.05 \text{ cm}^3 \text{ s}^{-1}$ 	1 1	2
	(c)	(i) <p>Volume of gas / cm^3</p> <p style="text-align: right;">Time / s</p>	1	
		(ii) (Refer to (b) (i)) <ol style="list-style-type: none"> 1. The smaller the size of reactants, the larger the total surface area // 2. frequency of collision between particles increases 3. frequency of effective collision increases (vice versa for (c) (i)) 	1 1 1	4
				11

Number		Answer / sample answer	Marks	
6	(a)	Heat of combustion - the heat change when one mol of alcohol is completely burnt in oxygen under standard conditions		1
	(b)	$\text{C}_n\text{H}_{2n+1}\text{OH}$		1
	(c)	<ol style="list-style-type: none"> 1. the number of moles of products formed also increases. 2. More bonds are formed and more energy is released. 	1 1	2
	(d)	$\text{C}_2\text{H}_5\text{OH} + 3\text{O}_2 \rightarrow 2\text{CO}_2 + 3\text{H}_2\text{O}$, 1. Correct chemical formula of reactants and products 2. Balanced equation	1 1	2
	(e)	<ol style="list-style-type: none"> 1. Correct label of energy(y-axis) and two levels of energy 2. Correct reactants and products 	1 1	2
	(f)	Number of mol of ethanol = $\frac{4.6}{2(12) + 6(1) + 16}$ = 0.1 mol Heat change = $H = 0.1 \times 1376 \text{ kJ}$ = 1.376 kJ	1 1 1	3
Total				11

Number		Answer / sample answer	Mark	
7	a)	1. Ethanoic acid is a weak acid 2. ionises partially in water to produce low concentration of H ⁺ ion 3. Hydrochloric acid is a strong acid 4. ionises completely in water to produce high concentration of H ⁺ ion	1 1 1 1	4
	(b) (i)	Solvent X = water Solvent Y = propanol// any suitable organic solvent	1 1	2
	(ii)	1. Set I, potassium hydroxide ionize/dissociate in water 2. produce free moving ion 3. Set II, potassium hydroxide does not dissociate in water, 4. no free moving ions .	1 1 1 1	4
	(c) (i)	$\text{H}_2\text{SO}_4 + 2\text{KOH} \rightarrow \text{K}_2\text{SO}_4 + \text{H}_2\text{O}$ 1. correct formula of reactants 2. correct formula products 3. balanced chemical equation	1 1 1	3
	(ii)	1. Correct number of mole of KOH $\text{No. of mole of KOH} = \frac{MV}{1000} = \frac{0.1 \times 25}{1000} = 0.0025 \text{ mol}$ 2. Correct ratio of mole $\text{H}_2\text{SO}_4 : \text{KOH}$ $1 : 2$ $0.00125 : 0.0025$ 3. Correct answer with units $\text{Volume of sulphuric acid} = \frac{1000 \times 0.00125}{0.1}$ $= 12.5\text{cm}^3$	1 1 1	3
	(iii)	Yellow to orange	1	1
	(iv)	25.0 cm ³ Nitric acid is a monoprotic acid// sulphuric acid is a diprotic acid Concentration of hydrogen ion, H ⁺ in nitric acid is half than concentration of hydrogen ion, H ⁺ in sulphuric acid //vice versa	1 1 1	3
Total				20

Number			Answer / sample answer	Marks	
8	(a)	(i)	1. Butane - saturated hydrocarbon 2. contains only single covalent bond between carbon atom/ C - C single covalent bond 3. Butene - unsaturated hydrocarbon 4. contains at least one double covalent bond between carbon atom / C-C double bond	1 1 1 1	4
		(ii)	Any one structure of the isomers But-1-ene // But-2-ene // 2-methylprop-1-ene Correct structure of the isomers and correct name	1 1	2
	(iii)	(sample answer) 1. Hydrogenation / addition of hydrogen 2. Nickel // Platinum, 180°C (Both correct) $C_4H_8 + H_2 \rightarrow C_4H_{10}$ 3. Correct chemical formula of reactants and products 4. Balanced equation	1 1 1 1	4	
	(b)	(i)	1. React with reactive metal to form salt and hydrogen gas Eg: $2CH_3COOH + Mg \rightarrow Mg(CH_3COO)_2 + H_2$ 2. React with metal carbonate to form salt, carbon dioxide and water Eg: $2CH_3COOH + CaCO_3 \rightarrow Ca(CH_3COO)_2 + CO_2 + H_2O$ 3. Esterification // reacts with alcohol (accept correct equation) 4. Neutralization// reaction with alkali to produce salt and water (accept correct equation) 5. React with metal oxide to produce salt and water (accept correct equation) any one answer : chemical equation : correct reactants , correct products balanced equation	1 1+1+1	4
		(ii)	(Sample answer) 1. Apparatus: boiling tubes, measuring cylinder(10 ml) ,dropper, Bunsen Burner Materials: Ethanol, propanoic acid, concentrated sulphuric acid Procedure: 2. Measure 5 cm ³ of ethanol by using a measuring cylinder and pour into a boiling tube/ beaker . 3. Measure 5 cm ³ of ethanoic acid by using a measuring cylinder and add to the ethanol in the boiling tube / beaker. 4. By using a dropper, add 5 drops of concentrated sulphuric acid into the mixture. 5. Heat the mixture 6. Observation: sweet pleasant smell /fruity smell	1 1 1 1 1	6
Total					20

9	(a)	Sample answer : 1. Chlorine atom receive one electron 2. chloride ion formed // $Cl + e \rightarrow Cl^-$ [Chlorine can be replaced by fluorine, bromine, iodine]	1 1	2
	(b)	(i) Sample answer :		

	$3\text{Cl}_2 + 2\text{Fe} \rightarrow 2\text{FeCl}_3$ 1. Correct formula of reactants and product 2. Balanced chemical equation	1 1	2
(ii)	Sample answer (comparing chlorine and bromine): 1. Chlorine is more reactive than bromine 2. The size of chlorine atom smaller than bromine atom 3. the nucleus attraction to the valence electron in chlorine atom is stronger, 4. easier for the chlorine atom to accept one electron (any other pairs of halogen)	1 1 1 1	4
(iii)	 <p>1. functional diagram – clamp, arrow heating , stopper 2. label – chlorine , iron</p>	1 1	2
(b)	<u>Sample answer:</u> 1. Oxidising agent : Chlorine water // bromine water 2. Reducing agent : Iron(II) sulphate solution //potassium bromide solution (any correct pair) Procedure : 3. Pour dilute sulphuric acid into the U-tube until its half level of the U-tube, 4. Using a dropper, carefully add iron(II) sulphate solution to one of the arm of the U-tube, 5. Then, chlorine water is added carefully to the other arm of the U-tube using a dropper, 6. A carbon electrode is dipped into both solution in each arm of the U-tube respectively, 7. The electrodes are connected to a galvanometer by a connecting wire, 8. Leave the set-up of apparatus for 30 minutes, 9. Using a dropper, 1cm^3 of iron(II) sulphate solution is drawn out and placed into test tube, 10. Add a few drops of sodium hydroxide solution into iron(II) sulphate solution, 11. Brown precipitate formed	1 1 1 1 1 1 1 1 1 1 1	2 max 8
			20

10	(a)	(i)	<ol style="list-style-type: none"> 1. The substance exists as solid at room temperature, if the melting point is higher than room temperature 2. The substance exists as liquid at room temperature, if the melting point is lower than room temperature, 3. but the boiling point is higher than room temperature 4. The substance exists as gas at room temperature, if the point boiling point is lower than room temperature 	1 1 1 1	4
		(ii)	<ul style="list-style-type: none"> • $t_0 - t_1$ // A to B : liquid • the particles closely together but not in orderly manner • $t_1 - t_2$ // B to C : liquid and gaseous • some of the particles are closely together but not in orderly manner and some are very far apart from each others. • $t_2 - t_3$ // C to D: gaseous • all the particles are very far apart from each other and more in a random motion 	1 1 1 1 1 1	6
	(b)		<ul style="list-style-type: none"> • suitable chemicals : sodium thiosulphate and hydrochloric acid <p>Prosedur :</p> <ul style="list-style-type: none"> • 50 cm³ of 0.1 moldm⁻³ of sodium thiosulphate solution is measured and • is poured into a conical flask. • 5 cm³ of 0.1 moldm⁻³ of hydrochloric acid is measured. • the solution in the conical flask is heated until the temperature rises to 30°C. • the conical flask is put on the paper mark with 'X'. • the acid is added into the conical flask and the stopwatch is started immediately. • the time taken for the mark 'X' disappeared from sight is recorded. • the experiment is repeated at different temperature. 	1+1 1 1 1 1 1 1 1	10
			•		20