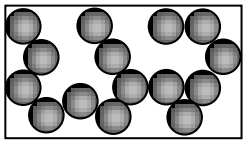
MARKING SCHEME PAPER 2 SET 1 JUJ CHEMISTRY 2019

Question No.		Mark Scheme	Sub Mark	ΣMark
1(a)	(i)	H_2O	1	1
	(ii)	To achieved stable octet electron arrangement	1	1
(b)	(i)	Water: Covalent bond	1	1
	(ii)	Potassium oxide : Ionic bond	1	1
(c)	(i)	O^{2-}	1	1
	(ii)	2.8.8.1	1	1
(d)	(i)	The boiling point of water is low while the boiling point of potassium oxide is high// The boiling point of water is lower than potassium oxide	1	1
	(ii)	1.The force of attraction between molecule in water is weak // The intermolecular force in water is weak// the electrostatic force between ions in potassium oxide is strong. 2.Less heat energy is needed to overcome the weak force//more heat energy is needed to overcome the strong force	1 1	2
		TOTAL	**9**	

Question No.		Mark Scheme	Sub Mark	ΣMark
2 (a)	(i)	Silicone dioxide	1	1
	(ii)	Change colour/sensitive when expose to light/sunlight	1	1
	(iii)	1. Atomic size of iron and foreign atoms are different. 2. Foreign atoms distrupt the orderly arrangement of iron atom. 3. If force is applied the layer of atoms difficult to slide easily. [Any two]	1 1	2
(b)	(i)	1.Pressure: 200 atm 2.Temperature: 450- 550^{O}C 3.Catalyst:Ferum/ Iron/ Fe [Any two]	1 1	2
	(ii)	1.Number of mole of NH_3 2. ratio of mole 3. correct volume of N_2 with unit n $NH_3 = \frac{1000}{17}$ // 58.82	1 1 1	3

		2 mol NH_3 formed from 1 mol N_2 // 58.82 mol NH_3 formed from 29.41 mol N_2 Volume N_2 = 29.41 x 24 dm^3 // 705.84 dm^3		
		TOTAL	**9**	

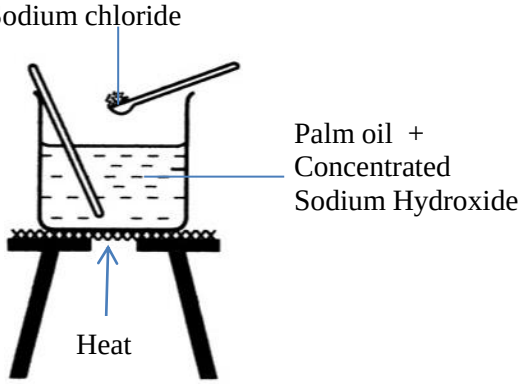
Question No.		Mark Scheme	Sub Mark	ΣMark
3(a)	(i)	Copper block – atom Water - molecule	1 1	2
	(ii)		1	1
	(iii)	1. The particles can move randomly 2. The force of attraction between particles is strong but weaker than solid.	1 1	2
	(iv)	1. Number of mole of Helium 2. Correct number of helium atom n He = $\frac{1.2}{24}$// 0.05 number of atom = 0.05 x 6.02 x 10^{23} // 3.01 x 10^{22}	1 1	2
(b)		1. Diffusion 2. Particles of cake smell move randomly in between air particles. 3. From high concentration region to low concentration Region	1 1 1	3
		TOTAL	**10**	

Question No.		Mark Scheme	Sub Mark	ΣMark
4(a)		Heat change when 1 mol of metal is displace from it salt solution by a more electropositive metal.	1	1
(b)	(i)	use polystyrene/plastic cup	1	1
	(ii)	The blue colour become colourless// brown solid is formed/deposited	1	1
(c)		1. No heat change 2. Reaction is not occurs// silver is less electropositive than copper	1 1	2

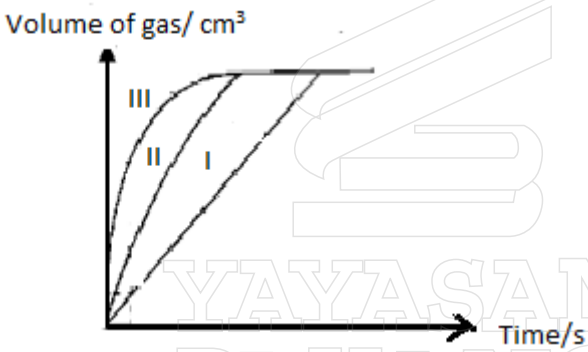
(d)	(i)	1.Heat change, H 2.Change in temperature, Θ 3.Correct highest temperature with unit H = 42 X 0.5 kJ// 21 kJ //42000 x 0.5 kJ// 21000 J Θ = $\frac{42000}{100}$ x 4.2 °C//5 °C Highest temperature = 3.28 + 5 °C//33 °C	1 1 1	3
	(ii)	1. No. of mole of copper(II) sulphate 2. correct mass of magnesium with unit n $CuSO_4$ = $\frac{0.5\ x100}{1000}$ // 0.05 mass Mg = 0.05 x 24g//1.2g	1 1	2
			TOTAL	**10**

Question No.		Mark Scheme	Sub Mark	ΣMark
5(a)		Standard solution	1	1
(b)	(i)	The volumetric flask can measured the volume of solution accurately.	1	1
	(ii)	To prevent evaporation of the solution	1	1
(c)	(i)	1. No. of mole of NaOH 2. Correct mass with unit n NaOH = $\frac{1\ X\ 250}{1000}$ // 0.25 Mass = 0.25 X [23 +16 + 1]g // 0.25 X 40 g // 10g	1 1	2
	(ii)	1. Step of calculation 2. Correct volume with unit 1 X V_1 = 0.1 X 250 // 0.1 X 250/1 V_1 = 25 cm^3	1 1	2
(d)	(i)	1. Hydrochloric acid is a monoprotic acid while sulphuric acid is a diprotic acid. 2. The number of H^+ ions in sulphuric acid is twice/double compared to hydrochloric acid.	1 1	2

	(ii)	1. Pour sodium hydroxide solution into conical flask with a few drops of phenolphthalein 2. Add Hydrochloric acid into conical flask until the pink colour turns to colourless	1 1	2
		TOTAL	**11**	

Question No.		Mark Scheme	Sub Mark	ΣMark
6(a)	(i)	Water that contain calcium ion and magnesium ion	1	1
	(ii)	$CH_3(CH_2)_{14}COO^-$ // $CH_3(CH_2)_{11}OSO_3^-$	1	1
	(iii)	Cleaning agent X	1	1
	(iv)	1. Correct formula of reactants and products 2. Balanced equation $2CH_3(CH_2)_{14}COO^- + Ca^{2+} \longrightarrow Ca(CH_3(CH_2)_{14}COO)_2$ // $2CH_3(CH_2)_{14}COO^- + Mg^{2+} \longrightarrow Mg(CH_3(CH_2)_{14}COO)_2$	1 1	2
(b)		Effectiveness : cleansing action X is not effective in hard water while cleansing action Y effective in hard water. Sources: cleansing action X from animal fat/vegetable oil while cleansing action Y from petroleum. Effect to invironment : cleansing action X is a biodegradable while cleansing action Y is non biodegradable // cleansing action X do not cause water pollution while cleansing action Y cause water pollution.	1 1 1	3
(c)		1. Functional diagram with arrow and heat 2. Label of concentrated Sodium Hydroxide and palm oil 3. Label of sodium chloride  	1 1 1	3
		TOTAL	**11**	

Question No.		Mark Scheme	Sub Mark	ΣMark
7(a)	(i)	1. Set I reduction reaction while Set II oxidation reaction	1	
		2. Set I purple colour solution change to colourless while Set II colourless solution change to brown	1	
		Set I:		
		3. Correction formulae of reactants and products	1	
		4. Balanced equation	1	
		$MnO_4^- + 8H^+ + 5e \rightarrow Mn^{2+} + 4H_2O$		
		Set II:		
		5. Correction formulae of reactants and products	1	
		6. Balanced equation	1	6
		$2Br^- \rightarrow Br_2 + 2e$		
		1. Set I oxidation number iron increase / +2 to +3 while Set II oxidation number iron decrease / +3 to +2	1	
		2. Set I electron flow from Y/Q to X/P through connecting wire while Set II electron flow from X/P to Y/Q through connecting wire.	1	
		3. Add sodium hydroxide solution until excess	1	
		4. Set I brown precipitate formed while Set II green precipitate formed.	1	
		5. Set I : Fe^{3+} present	1	
		6. Set II : Fe^{2+} present	1	6
		1. Oxidising agent : Hydrogen peroxide // H_2O_2	1	
		2. H_2O_2 is electron acceptor // oxidation number of hydrogen decrease // H_2O_2 under goes reduction reaction.	1	
		3. Reducing agent : Iodide ion // I^- ion	1	
		4. I^- ion is electron donor // oxidation of iodine increase // I^- ion under goes oxidation reaction	1	
		Oxidation reaction		
		5. Correction formulae of reactants and products	1	
		6. Balanced equation	1	
		Oxidation reaction		
		7. Correction formulae of reactants and products	1	
		8. Balanced equation	1	8
		TOTAL	**20**	

Question No.		Mark Scheme	Sub Mark	ΣMark
8 (a)	(i)	1.Correct chemical formula of reactants and products 2. Balanced equation 3. Number of mole of HCl 4. Ratio of mole 5.Correct volume of H_2 with unit $Zn + 2HCl \rightarrow ZnCl_2 + H_2$ n HCl = $\frac{0.1 \times 25}{1000}$ // 0.025 2 mol of HCl produced 1 mol of H_2 // 0.025 mol of HCl produced 0.00125 mol of H_2 Volume = 0.00125 x 24 dm^3// 0.3 dm^3 // 300 cm^3	1 1 1 1 1	5
	(ii)	1. Axis labeled with unit 2. Correct curve and label  	1+1	2
	(iii)	1. Experiment III, II, I <u>Experiment I and II</u> 2. Temperature of experiment II is higher than experiment I 3. The kinetic energy of particles in experiment II is higher than experiment I 4. The frequency of collision between H^+ ions and zinc in experiment II is higher than experiment I 5. The frequency of effective collision between H^+ ions and zinc in experiment II is higher than experiment I <u>Experiment II and III</u> 6. $CuSO_4$ is used as a catalyst in experiment III 7. The presence of catalyst lower the activation energy 8. more colliding particles can achieved a lower activation energy 9. Frequency of effective collision between between H^+ ions and zinc in experiment III is higher than experiment II	1 1 1 1 1 1 1 1	9

(b)		1. The temperature in a refrigerator is lower than room temperature 2. Bacterial activity is lower in refrigerator 3. Less toxin produced by bacteria in refrigerator 4. The rate of fruit spoilage is lower in refrigerator than room temperature.	1 1 1 1	4
		TOTAL	**20**	

Question No.		Mark Scheme	Sub Mark	ΣMark
9(a)		1. Hydrogen easily flammable /explode. 2. Helium 3. Helium is lighter 4. Helium is inert gas// unreactive	1 1 1 1	4
(b)		1. Correct formulae of reactants and products 2. Balanced equation $2\ Fe + 3Br_2 \rightarrow 2FeBr_3$ 3. The reactivity of reaction I is higher than reaction II. 4. The atomic size of chlorine is smaller than bromine 5. The forces of attraction of the nucleus toward the electrons is stronger in chlorine atom than in bromine atom 6. It is easier for chlorine atom to attract electron	1 1 1 1 1 1	6
(c)		1. Cut a small piece of lithium using a knife and forceps 2. Dry the oil on the surface of the lithium with filter paper 3. Place the lithium slowly onto the water surface in a through 4. Record the observations 5. Repeat steps 1-5 using sodium and potassium to replace lithium. 6. Lithium moves slowly on the water surface 7. Sodium moves faster and randomly on the surface of water// Sodium ignites with a yellow flame 8. Potassium moves vigorously and randomly on the water surface.// Potassium ignites with a lilac flame // produce 'pop' sound 9. Correct formulae of reactants and products 10. Balanced equation $2Li + 2H_2O \rightarrow 2\ LiOH + H_2$	1 1 1 1 1 1 1 1 1 1	10
		TOTAL	**20**	

Question No.		Mark Scheme	Sub Mark	ΣMark
10(a)	(i)	1. Cation : Ba^{2+} // Pb^{2+} // Ag^{+}	1	
		2. Anion : CO_3^{2-}	1	
		3. Ba^{2+} // Pb^{2+} // Ag^{+} reacts with SO_4^{2-} ion to form insoluble salt //	1	
		Pb^{2+} // Ag^{+} reacts with Cl^{-} ion to form insoluble salt.	1	
		4. $Ba^{2+} + SO_4^{2-} \rightarrow BaSO_4$ // $Pb^{2+} + SO_4^{2-} \rightarrow PbSO_4$ // $2Ag^{+} + SO_4^{2-} \rightarrow Ag_2SO4$ // $Pb^{2+} + Cl^{-} \rightarrow PbCl_2$ // $Ag^{+} + Cl^{-} \rightarrow AgCl$	1	
		5. CO_3^{2-} reacts with Ca^{2+} / Mg^{2+} ion to form insoluble salt.	1	6
		6. $Ca^{2+} + CO_3^{2-} \rightarrow CaCO_3$ // $Mg^{2+} + CO_3^{2-} \rightarrow MgCO_3$		
	(ii)	1. Ca^{2+} ion	1	
		2. Mg^{2+} ion	1	
		3. Sodium carbonate // Potassium carbonate	1	
		4. Measure [20-100] cm^3 of river water and pour into a beaker	1	
		5. Measure [20-100] cm^3 of [0.1-2.0] mol dm^{-3} sodium carbonate solution and pour into the beaker	1	
		6. Stir the mixture	1	
		7. Filter the mixture	1	
		8. Double decomposition reaction	1	
		9. Product is calcium carbonate // magnesium carbonate	1	
		10. Product is insoluble	1	10
(b)		1. Add barium chloride / nitrate solution into salt J	1	
		2. white precipitate formed, SO_4^{2-} present	1	
		3. Add silver chloride solution into salt L	1	
		4. white precipitate formed, Cl^{-} present	1	4
		TOTAL	**20**	

END OF MARKING SCHEME