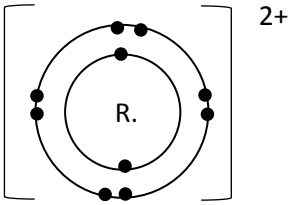
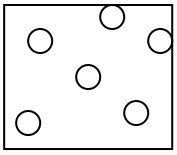
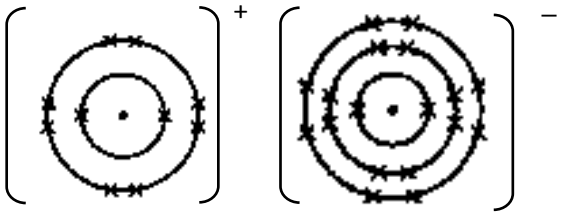
SKEMA KERTAS 2, GEMPUR KIMIA SPM PERLIS 2019

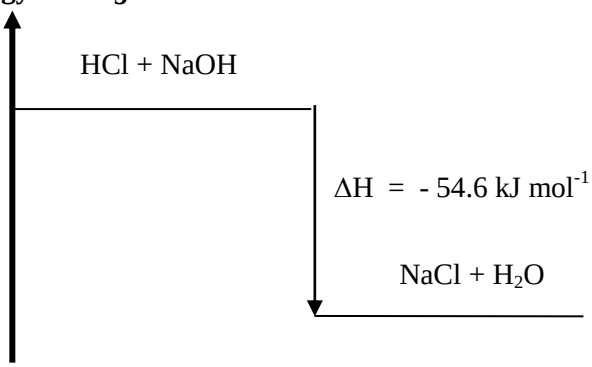
Questions			Mark Scheme	Mark
1	(a)		Electrons in the outermost occupied shells of an atom	1
	(b)	(i)	2.8.2	1
		(ii)	2	1
		(iii)		1
	(c)	(i)	Atoms of the same element with the same number of protons but different number of neutrons	1
		(ii)	S and T	1
		(iii)	both atoms have same number of protons but different number of neutrons	1
	(d)	(i)	gas	1
		(ii)		1
			TOTAL	9

Question			Mark scheme	Mark
2	(a)	19		1
	(b)	(i)	Group 1	1
		(ii)	Has one valence electron	1
	(c)	The valence electron of atom Y is further from nucleus// The atomic size of atom Y is bigger Forces attraction of nucleus on the valence electron in atom Y is weaker // Atom Y easily release it valence electron compared to atom X.		1 1
	(d)	(i)	Ionic bond	1
		(ii)	 Correct electron arrangement Correct number of charge	 1 1
	(e)	The red litmus paper turns blue//Litmus paper turns blue		1
			TOTAL	9

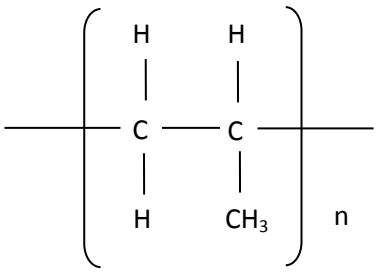
Question			Mark scheme	Mark
3	(a)	Copper(II) ion , hydrogen ion // Cu^{2+} , H^{+}		1
	(b)	Experiment I: Gas bubbles released Experiment II: Greenish yellow gas released		1 1
	(c)	(i)	Oxygen	1
		(ii)	Insert a glowing splinter into the test tube. The glowing splinter relighted.	1 1
	(d)	(i)	Chloride ion // Cl^- ion Concentration of Cl^- ion is higher than OH^- ion	1 1
		(ii)	$2\ Cl^- \rightarrow Cl_2 + 2e$	1
		(iii)	Chlorine//Cl_2	1
			TOTAL	10

Question				Mark
4	(a)	(i)	Preservative. Prevent the growth of microorganism.	1 1
		(ii)	It may cause cancer// intestine ulcer// stomach ulcer//allergy//damage nervous system	1
	(b)	(i)	Salt withdraws the water from microorganisms of the cells. It retards/inhibit the growth of microorganisms.	1 1
		(ii)	Sugar/ Vinegar	1
	(c)	(i)	Lecithin/ Gelatin	1
		(ii)	Stabilizer	1
	(d)	Growth of bacteria/ fungi Oxidation of food		1 1
			TOTAL	10

Question			Marking scheme	Mark
5	(a)	Heat change/released when 1 mole of water is formed from the reaction between hydrochloric acid and sodium hydroxide solution		1
	(b)	Plastic cup// paper cup//ceramic cup		1
	(c)	(i)	Heat change = (50+50) × 4.2 × (35.5 - 29.0) // 2730 J // 2.73 kJ (r: without unit)	1
		(ii)	Number of mole of HCl / H^+ $= \frac{1.0 \times 50}{1000}$ // 0.05 mol OR Number of mole of NaOH / OH^- $= \frac{1.0 \times 50}{1000}$ // 0.05 mol Formation of 0.05 mol of water release 2730 kJ of heat Thus formation of 1.0 of water release $= \frac{2730}{0.05}$ // $\frac{2.73}{0.05}$ Heat of neutralization, ΔH = -54.6 kJ mol^{-1}	1 1 1 1
	(d)	(i)	Less than 54.6 kJ mol^{-1} (r: if no unit)	1

		(ii)	Ethanoic acid is weak acid// ionise partially in water to produce low concentration of hydrogen ion. some heat release is absorbed to ionise ethanoic acid completely	1 1
	(c)		**Energy / *Tenaga***  1. Axis with label and correct energy level 2. Label reactants and products at correct level and value of heat	 1 1
			TOTAL	11

Question		Mark scheme				Mark
6	(a)	(i)	Not soluble/ dissolve in water			1
		(ii)				
			Element	Ca	C	O
			Mass(g)	40	12	48
			Number of mole	40/40	48/16	48/16
			Simplest ratio	1	1	3
			Empirical formula : $CaCO_3$			1 1 1 1
	(b)	(i)	$CaCO_3 + 2HCl \rightarrow CaCl_2 + CO_2$ - correct reactant & product -correct balance			1 1
		(iii)	3 mol			1
		(ii)	mol HCl = 25 x 0.5/1000 // 0.0125 from the equation 2 mol HCl produces 1 mol CO_2 if 0.0125 mol HCl produces 0.0125 mol CO_2 volume for CO_2 = 0.0125 x 24 = 0.3 dm^3			1 1 1
			TOTAL			11

Question	Mark scheme	Sub Mark	Total Mark
7(i)	– Zinc//Tin – Brass is harder than copper – Atoms in pure copper are the same size, while atoms in alloy Y are of different size. – The atoms in pure copper are arranged orderly, while alloy Y is no orderly // – The presence of zinc/Tin atom disrupt/disturb the orderly arrangement in pure copper. – In pure copper, the layers of atoms can easily slide over each other, while in alloy Y, layers of atoms is harder to slide over each other.	1 1 1 1 1	4
(b) (i)	 Polypropene	1 1	2
(ii)	– It is non-biodegradable – cannot decompose by microorganism – Improper disposal can cause flash flood/clog drain	1 1 1	3
(c)	– % of N in $(NH_4)_2SO_4$: 28 ÷ 132 x 100 // 21.21% – % of N in: $CO(NH_2)_2$: 28 ÷ 60 x 100 // 46.67% – Urea is a better fertilizer – Percentage of N per molecule in urea is higher	1 1 1 1	4
(d) (i)	Anay two answer $S + O_2 \rightarrow SO_2$// $2SO_2 + O_2 \rightarrow 2SO_3$// $SO_3 + H_2SO_4 \rightarrow H_2S_2O_7$// $H_2S_2O_7 + H_2O \rightarrow 2\ H_2SO_4$	1 1	2
(ii)	Temperature [450-550] ^oC Pressure 1 atm Catalyst : Vanadium (V) oxide	1 1 1	3
	TOTAL		20

Question		Mark scheme	Mark
8	(a)	$CH_3COOH + NaOH \longrightarrow CH_3COONa + H_2O$ - correct reactant & product	1
		mol of CH_3COOH = 50 x 0.1 /1000 // 0.005 mol	1
		from the equation 1 mol CH_3COOH produces 1 mol NaOH if 0.005 mol CH_3COOH produces 0.005 mol NaOH	1
		mass of x =0.005 × 40 g // 0.2g	1
	(b)(ii)	– solvent L : water – solvent M : methylbenzene, propanone// acetone// chloroform// 1,1,1- trichloroethane// toulene – ethanoic acid ionizes in water, H+ present – ethanoic acid does not ionize in organic solvent, no H+ present	1 1 1 1
		$2CH_3COOH + Mg \rightarrow (CH_3COO)_2Mg + H_2$ - correct reactant & product -correct balance	1 1
(c)	(i)	– pH value for 0.001 mol dm^{-3} of HCl is higher while pH value for 0.1 mol dm^{-3} of HCl is lower higher – concentration of H^+ in 0.001 mol dm^{-3} of HCl is lower while concentration of H^+ 0.1 mol dm^{-3} of HCl is higher	1 1
	(ii)	– HCl is a strong acid – ionized completely in water – to produce higher concentration of H^+ – pH value is lower – CH_3COOH is a weak acid – ionized partially in water – to produce lower concentration of H^+ – pH value is higher	1 1 1 1 1 1 1 1
		TOTAL	20

<table>
<tr><td>Question</td><td>Mark scheme</td><td>Mark</td></tr>
<tr><td>9 (a)</td><td>$Mg + H_2SO_4 \rightarrow MgSO_4 + H_2$

mol of H_2SO_4 = $1.0 \times 50/1000$ // 0.05 mol

from the equation 1 mol H_2SO_4 produces 1 mol H_2
if 0.05 mol H_2SO_4 produces 0.05 mol H_2

volume for H_2 = 0.05 x 24
= 1.2 dm^3</td><td>1

1

1

1</td></tr>
<tr><td>(b)</td><td>Experiment I has higher rate of reaction than experiment II

Size of magnesium in experiment I is smaller than experiment II//
The total surface area exposed for collision in experiment I is higher than experiment II

The frequency of effective collision between magnesium atom and hydrogen ions in experiment I is higher

Experiment III has higher rate of reaction than experiment I

The concentration of sulphuric acid in experiment III is higher than experiment I//
The number of particles per unit volume in experiment III is higher

The frequency of effective collision between magnesium atom and hydrogen ions in experiment III is higher</td><td>1

1

1

1

1

1</td></tr>
<tr><td>(c)</td><td>Procedure:

1. (25-50) cm^3 of 0.2 mol dm^{-3} sodium thiosulphate solution was poured into a conical flask.
2. Record the temperature of the sodium thiosulphate solution.
3. 5 cm^3 of mol dm^{-3} hydrochloric acid was added to the sodium thiosulphate solution.
4.The mixture is shaken and then placed on a paper marked with X.
5.The stop watch is started .
6. Record the time taken for the X mark disappeared.
7. The experiment is repeated by using different temperature of sodium thiosulphate solutions

Result:
<table>
<tr><td>Experiment</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr>
<tr><td>Temperature of sodium thiosulphate (°C)</td><td>28</td><td>35</td><td>40</td><td>45</td><td>50</td></tr>
<tr><td>Time (s)</td><td>T_1</td><td>T_2</td><td>T_3</td><td>T_4</td><td>T_5</td></tr>
<tr><td>1/time (s^{-1})</td><td>$1/T_1$</td><td>$1/T_2$</td><td>$1/T_3$</td><td>$1/T_4$</td><td>$1/T_5$</td></tr>
</table>
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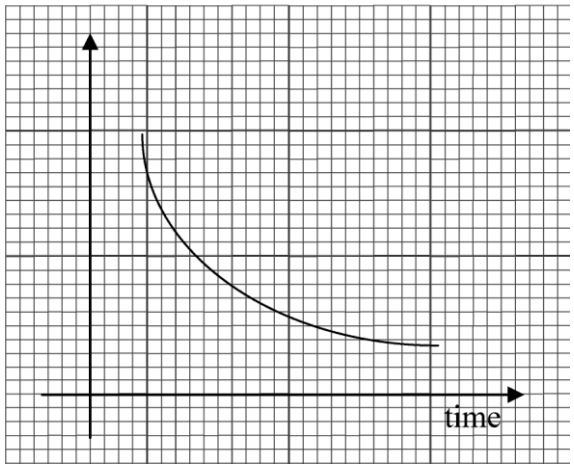
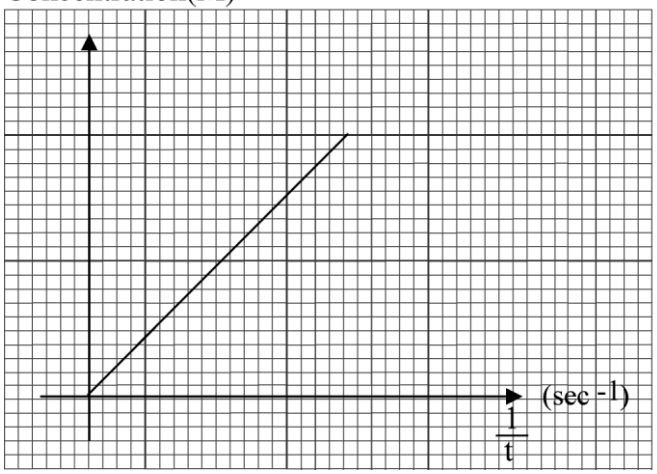
	Sketch **any one** of the graph (i) Temperature against time, t Temperature (°C)  **OR** (ii) Temperature against 1/time, 1/t Concentration(M)  . Conclusion: When the temperature of sodium thiosulphate, $Na_2S_2O_3$ solution increases the rate of reaction between sodium thiosulphate, $Na_2S_2O_3$ and hydrochloric acid also increases	1 1
	TOTAL	20

Question			Mark scheme	Mark
10	(a)	(i)	$2NH_3 + H_2SO_4 \rightarrow (NH_4)_2SO_4$	1
		(ii)	No of mol of $H_2SO_4 = \frac{50 \times 1}{1000}$ // 0.05 mol	1
			1 mol of H_2SO_4 used produces 1 mol $(NH_4)_2SO_4$ // 0.05 mol of H_2SO_4 used produces 0.05 mol $(NH_4)_2SO_4$	1
			0.05 × 132 g // 6.6 g	1
	(b)		1. Residue Z : zinc oxide/ ZnO	1
			2. Gas A : Carbon dioxide / CO_2	1
			3. Gas B : Nitrogen dioxide/ NO_2	1
			4. Gas C : Oxygen/ O_2	1
			5. Salt X : $ZnCO_3$	1
			6. Salt Y : $Zn(NO_3)_2$	1
	(c)		Cation test: Zn^{2+}	
			1. Pour the solution in the test tube.	1
			2. Add NaOH/ ammonia solution little by little until excess.	1
			3. White precipitate formed dissolves in excess of NaOH/ ammonia solution. Shows the presence of Zn^{2+}.	1
			Anion test: NO_3^-	
			4. Add dilute H_2SO_4	1
			5. Add $FeSO_4$ solution	1
			6. Add slowly/ drops concentrated H_2SO_4	1
			7. Brown ring formed, shows NO_3^- present.	1
			Anion test: Cl^-	
			8. Add HNO_3	1
			9. Add $AgNO_3$/ $Pb(NO_3)_2$ solution	1
			10.White precipitate formed, shows the prence of Cl^-.	1
			Note: point 3, 7 and 10 : observation + conclusion	
			TOTAL	20