PENTAKSIRAN DIAGNOSTIK AKADEMIK SBP 2015
SKEMA JAWAPAN
CHEMISTRY 4541/2

PENTAKSIRAN DIAGNOSTIK AKADEMIK SBP 2015
SKEMA KERTAS 1
CHEMISTRY 4541/1

1	C	26	C
2	B	27	D
3	D	28	D
4	A	29	B
5	B	30	D
6	B	31	A
7	D	32	C
8	A	33	B
9	A	34	C
10	C	35	C
11	D	36	A
12	B	37	C
13	A	38	D
14	A	39	C
15	D	40	A
16	B	41	B
17	C	42	B
18	C	43	D
19	D	44	A
20	B	45	C
21	D	46	A
22	B	47	A
23	D	48	D
24	A	49	C
25	B	50	A

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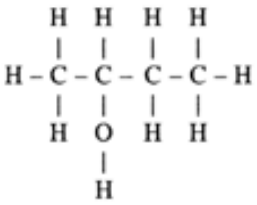
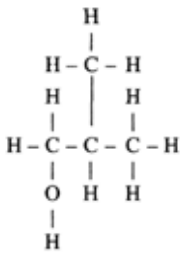
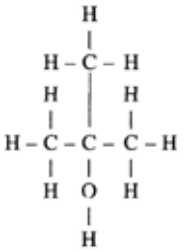
PENTAKSIRAN DIAGNOSTIK AKADEMIK SBP 2015
SKEMA KERTAS 2
CHEMISTRY 4541/2

<table>
<tr><th>QUESTION NO.</th><th>MARK SCHEME</th><th>MARK</th><th>TOTAL</th></tr>
<tr><td>1(a)</td><td>General Formula
Formula Am : C_nH_{2n}
Homologous series
Siri Homolog : Alkene</td><td>1

1</td><td>2</td></tr>
<tr><td>(b) (i)</td><td>Hydroxyl group</td><td>1</td><td rowspan="2">2</td></tr>
<tr><td>(ii)</td><td>Butan-1-ol</td><td>1</td></tr>
<tr><td>(c) (i)</td><td>Hydration</td><td>1</td><td rowspan="2">3</td></tr>
<tr><td>(ii)</td><td>• Able to draw structural formula correctly
• State the name of isomer correctly.

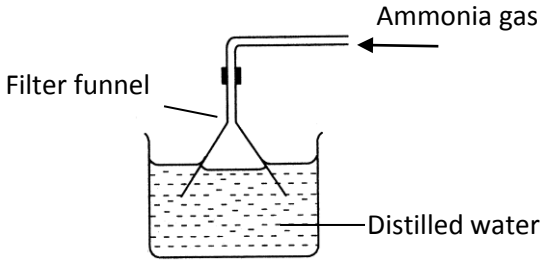
Suggestion answer :
<table><tr><th>Structure formula
Formula struktur</th><th>Name
Nama</th></tr><tr><td>  </td><td>Butan-2-ol</td></tr><tr><td>  </td><td>2-methylpropan-1-ol</td></tr></table></td><td>1
1</td></tr>
</table>

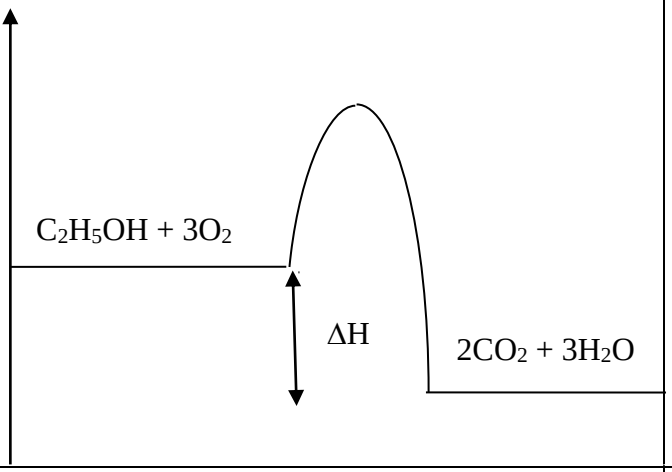
	 2-methylpropan-2-ol *Any one pair of structure formula and it's correct name*		
(d)	$C_5H_{11}OH + CH_3COOH \rightarrow CH_3COOC_5H_{11} + H_2O$ • *Correct formulae of reactants* • *Correct formulae of products*	1 1	2
	TOTAL		**9**

Question			Answer	Mark	TOTAL
2	(a)	(i)	Contact Process	1	3
		(ii)	Temperature: 450^oC// Pressure: 1 atm// Catalyst: vanadium(V) oxide	1	
		(iii)	Sulphur and oxygen/air	1	
	(b)	(i)	Codeine	1	3
	(c)	(i)	Food preservative	1	
		(ii)	Nausea//sore throat// asthma// allergy	1	
	(d)	(i)	Detergent	1	3
		(ii)	• Detergent ion reacts with calcium ion/ Ca^{2+} /magnesium ion/ Mg^{2+} • produces soluble salt // not produce scum	1 1	
			TOTAL		**9**

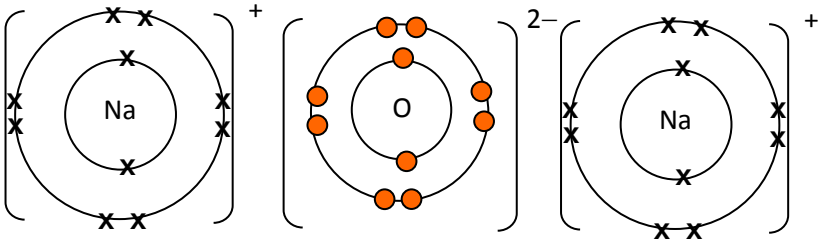
NO.			RUBRIC	MARK	TOTAL
3	a		Mg^{2+}, NO_3^-, H^+, OH^- // Magnesium ion, nitrate ion, hydrogen ion and hydroxide ion	1	1
	b	(i)	Potassium nitrate solution// potassium chloride solution // Potassium sulphate solution // Sodium nitrate solution// Sodium chloride solution// Sodium sulphate solution Accept: any electrolyte which will not form precipitate	1	1
	c	(i)	Reduction	1	2
		(ii)	The oxidation number of copper change from +2 to 0	1	
	d		Negative terminal: $Mg \rightarrow Mg^{2+} + 2e$ Positive terminal: $Cu^{2+} + 2e \rightarrow Cu$	1 1	2
	e		Increases		
	f	(i)	From copper to silver through connecting wires/ external circuit.	1	1
		(ii)	$Cu + 2Ag^+ \rightarrow Cu^{2+} + 2Ag$ Correct formulae of ions Balanced equation	**1** **1**	**2**
			TOTAL		**10**

No			Rubric	Mark	Total
4	a)		Proton number *Nombor proton* r : number of proton	1	1
	b)		Q	1	1
	c)	i)	the atomic size of Q is <u>smaller</u> than P // the atomic size of P is <u>bigger</u> than Q	1	1
		ii)	1. <u>proton number</u> of Q is bigger than P 2. the <u>force of attraction between nucleus of Q toward electron</u> in the shell become stronger.	1 1	2
	d)	(i)	$2P + 2H_2O \rightarrow 2POH + H_2$// $2Na + 2H_2O \rightarrow 2NaOH + H_2$ Correct formula of reactant and product Balanced equation	1 1	2
		(ii)	0.25 x 24 // 6 dm^3 // 6000 cm^3	1	1
	e)		• Provide an inert atmosphere • The hot filament in the light bulb does not burn	1 1	2
Total					10

No		Rubric	Mark	Total
5	(a)	Chemical substances which ionises partially in water to produce low concentration of hydroxide ions.	1	**1**
	(b)	P	1	**1**
	(c)		1 1	**2**
	(d)	S, Q, P, R	1	**1**
	(e)	(i) P	1	**1**
	(ii)	(ii) In solution P, ammonia ionise to produce hydroxide ion. In solution Q, ammonia exits as neutral molecule.	1 1	**2**
	(f)	Method: Add calcium carbonate into solution S. Then flow the gas produced into lime water Observation : colourless lime water become chalky/milky/cloudy **OR** Method: Add magnesium/zinc into a test tube containing solution S. Put lighted wooden splinter into the test tube. Observation: "pop" sound produces	1 1 1 1 1 1	**3**
			Total	**11**

No			Mark scheme	Sub Mark	Total Mark
6	(a)		Reaction that gives out / released heat to the surroundings.	1	1
	(b)			1	1
	(c)	(i)	Heat of combustion of propane is higher than methane	1	1
		(ii)	• The number of carbon / hydrogen atoms per molecule propane is higher • More carbon dioxide / water produced when propane is burnt • More heat energy released	1 1 1	3
	(d)		Molar mass of propanol, C_3H_7OH = 60 g mol^{-1} 60 g of C_3H_7OH burnt released 2016 kJ // 1 g C_3H_7OH burnt released $\frac{1 \times 2016}{60}$ kJ = 33.6 kJ g^{-1} (correct answer with correct unit)	1 1	2
	(e)		• place the cold packs on his swollen knee • to absorbs heat from his swollen knee • constrict blood vessels and slows down blood flow / reduce the formation of fluid in the affected area.	1 1 1	3
			TOTAL		**11**

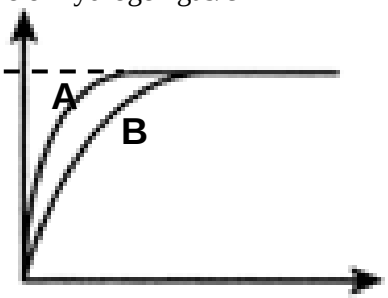
Section B [20 marks]

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Mark</th></tr>
<tr><td>7</td><td>(a)</td><td>(i)</td><td>Covalent
Has low melting point /boiling point
Cannot dissolve in water</td><td>1
1
1</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>Cannot conduct electricity / volatile</td><td>1</td></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td>
<table>
<tr><th></th><th>Compound P</th><th>Compound Q</th></tr>
<tr><td>Type of bonds</td><td>Covalent</td><td>Ionic</td></tr>
<tr><td>Type of particles forms</td><td>Molecule</td><td>Ion</td></tr>
<tr><td>Type of attraction force between the particles</td><td>Intermolecular force / Van der Waals</td><td>Electrostatic force</td></tr>
<tr><td>Way for the atoms to achieve the stable octet electron arrangement</td><td>Sharing the electron</td><td>Transferring of electron // sodium atom donates electron and chlorine atom accept electron</td></tr>
</table>
</td><td>1+1
1+1
1+1
1+1</td></tr>
<tr><td></td><td></td><td>(ii)</td><td> 

Correct electron arrangement
Correct number of charge</td><td>
1
1</td></tr>
<tr><td></td><td>(c)</td><td>(i)</td><td>
<table>
<tr><td>Element</td><td>C</td><td>H</td><td>O</td></tr>
<tr><td>Mass (g)</td><td>32</td><td>4</td><td>64</td></tr>
<tr><td>Number of moles of atoms</td><td>$\frac{32}{12} = 2.667$</td><td>$\frac{4}{1} = 4$</td><td>$\frac{64}{16} = 4$</td></tr>
<tr><td>ratio</td><td>$\frac{2.667}{2.667} = 1$</td><td>$\frac{4}{2.667} = 1.5$</td><td>$\frac{4}{2.667} = 1.5$</td></tr>
<tr><td>Simplest ratio</td><td>2</td><td>3</td><td>3</td></tr>
</table>
Empirical formula = $C_2H_3O_3$</td><td>1
1
1
1</td></tr>
<tr><td></td><td></td><td></td><td>Relative molecular mass of $(C_2H_3O_3)n = 150$

$(24+3+48)\ n = 150$
$75n = 150$
$n = 2$
Therefore, the molecular formula is $C_4H_6O_6$</td><td>

1
1</td></tr>
<tr><td></td><td></td><td></td><td>Sub total</td><td>20</td></tr>
</table>

Question			Answer	Mark
8	**(a)**		P1: III, I, II P2: Sulphuric acid in experiment III is a strong diprotic acid //ionises completely in water to produce 0.2 mole of hydrogen ion P3: Hydrochloric acid in experiment I is a strong monoprotic acid // ionises completely in water to produce 0.1 mole of hydrogen ion P4: Ethanoic acid in experiment II is a weak acid // ionises partially in water to produce less than 0.1 mole of hydrogen ion/ low concentration of hydrogen ion.	1 1 1 1
	(b)	(i)	$\underline{\mathbf{2}}\ Al + \underline{\mathbf{3}}\ H_2SO_4 \rightarrow Al_2(SO_4)_3 + \underline{\mathbf{3}}\ H_2$ *Balance reactants* *Balance product*	 1 1
		(ii)	P1: Mole H_2SO_4 = (0.5)(100)/1000 // 0.05 mol P2: From the equation: 1 mole of sulphuric acid produce 1 mole of hydrogen gas 0.05 mole of sulphuric acid produce 0.05 mole of hydrogen gas P3: Volume of hydrogen gas = 0.05 x 24 = 1.2 dm^3	**1** **1** **1**
		(iii)	Volume of hydrogen gas/cm^3  time/s P1: x-axis and y-axis with title and unit and the graph curve P2: Label A and B	 1 1
		(iv)	P1: The rate of reaction in experiment A is higher than experiment B P2: The temperature in experiment A is higher P3 : The **kinetic energy** of the hydrogen ions/ H^+ ion in experiment A is higher P4: The frequency of collision between **aluminium atom** and **hydrogen ion** in experiment A is higher P5: The **frequency of effective collision** in experiment A is higher	1 1 1 1 1

	(c)	1. The size of antacid become smaller. 2. Total surface area exposed become bigger 3. Frequency of effective collision between anti-asid/aluminium hidroxide/magnesium hidroxyde and stomach acid / gastric acid / hydrogen ion higher. 4. The rate of reaction become higher.// The indisgetion can be cured faster.// The neutralization occured faster. 5.	1 1 1 1
		Sub total	**20**

Section B [20 marks]

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Mark</th></tr>
<tr><td>9</td><td>(a)</td><td>(i)</td><td>Metal M : Copper/ kuprum
Half-equation for oxidation: $Cu \rightarrow Cu^{2+} + 2e^-$
Half-equation for reduction: $Ag^+ + e^- \rightarrow Ag$
Oxidation number change : +1 to 0</td><td>1
1
1
1</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>
<table>
<tr><th>Reactant</th><th>Iron(II) sulphate</th><th>Bromine water</th></tr>
<tr><td>Role</td><td>Reducing agent</td><td>Oxidising agent</td></tr>
<tr><td>Transfer of electron</td><td>donates electron // Iron(II) /Fe^{2+} ion donates electron to produce iron(III)/ Fe^{3+} ion</td><td>accept/receive electron // Bromine/ Br_2 accepts electron to produce bromide/ Br^- ion</td></tr>
<tr><td>Colour change</td><td>Green/pale green to brown/yellowish-brown</td><td>Brown to colourless</td></tr>
</table>
</td><td>1+1
1+1
1+1</td></tr>
<tr><td></td><td></td><td></td><td>Procedure:
1. One spatula of copper(II) oxide powder and one spatula of carbon powder is placed into a crucible
2. The crucible and its content are heated strongly.
3. The observation is recorded.
4. Steps 1 to 3 are repeated by replacing copper(II) oxide powder with magnesium oxide powder.

Observation
<table>
<tr><th>Mixture</th><th>Observation</th></tr>
<tr><td>Carbon and copper(II) oxide</td><td>The mixture burns brightly.
//The black powder turns brown</td></tr>
<tr><td>Carbon and magnesium oxide</td><td>No Changes</td></tr>
</table>
Explanation
Carbon can react with copper(II) oxide.
Carbon more reactive than copper / carbon is above copper in the Reactivity Series
Carbon cannot react with magnesium oxide
Carbon less reactive than magnesium / carbon is below magnesium in the Reactivity Series

Arrangement
Copper, carbon, magnesium</td><td>1
1
1
1
1
1
1
1
Max 10</td></tr>
<tr><td></td><td></td><td>Sub total</td><td></td><td>20</td></tr>
</table>

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Question		Answer	Mark
10	(a)	1. Neutralized acidic soil/ lakes Treated with calcium oxide/ calcium hydroxide / calcium carbonate 2. Treating factory waste such as SO_2 Using powder calcium carbonate (*Any suitable answer*)	1 1 1 1
		To verify zinc ion **Procedure** • Pour zinc chloride solution into a test tube • Add ammonia solution into the test tube until in excess **Observation** • White precipitate formed and dissolve in excess ammonia solution shows the presence of zinc ion **To verify chloride ion** **Procedure** • Pour zinc chloride solution into a test tube • Add nitric acid and silver nitrate solution into the test tube **Observation** • White precipitate formed shows the presence of chloride ion.	 1 1 1 1 1 1
		Suggestion Solid X : Zinc oxide / zinc carbonate , zinc Acid Y : sulphuric acid **Preparation of zinc sulphate solution** P1 : Pour [50 -100 cm^3] of [0.1 - 1.0 mol dm^{-3}] sulphuric acid into a beaker and heat slowly. P2 : Add zinc oxide / zinc carbonate / zinc powder into the acid P3 : stir P4 : stop adding zinc oxide / zinc carbonate / zinc when the solid cannot dissolve/ in excess P5 : filter the mixture solution P6 : transfer the filtrate to a evaporating dish and heat until saturated. P7 : cool down to room temperature P8 : Filter to obtain the crystal form P9 : dry the crystal by pressing between filter paper	 1 1 1 1 1 1 1 1 1 1 1 1 **Max 10**
		Sub total	**20**

MARKING SCHEME
PENTAKSIRAN DIAGNOSTIK KIMIA TINGKATAN 5 TAHUN 2015
4541/3 CHEMISTRY PAPER 3

<table>
<tr><th>QUESTION</th><th>RUBRIC</th><th>SCORE</th></tr>
<tr><td rowspan="4">1(a)</td><td>Able to state two observation correctly

Answer:
<table><tr><th>Electrolytic cell</th><th>Observation</th></tr><tr><td>I</td><td>Gas bubbles released//
Effervescenes</td></tr><tr><td>II</td><td>Brown solution formed</td></tr></table>.</td><td>3</td></tr>
<tr><td>Able to state one observation correctly</td><td>2</td></tr>
<tr><td>Able to state an idea of observation

<u>Sample answer :</u>
Gas released //
Colour of solution changed</td><td>1</td></tr>
<tr><td>No response given / wrong answer</td><td>0</td></tr>
</table>

<table>
<tr><th>QUESTION</th><th>RUBRIC</th><th>SCORE</th></tr>
<tr><td rowspan="4">1(b)</td><td>Able to state any related inference correctly

<u>Sample answer:</u>
<table><tr><th>Observation</th><th>Inference</th></tr><tr><td>Gas bubbles released //
Effervescenes</td><td>Oxygen gas released//
OH^- ion discharged</td></tr><tr><td>Brown solution formed</td><td>Bromine solution formed//
Bromine molecules formed//
Bromine water formed//
Br^- ion discharged</td></tr></table>.</td><td>3</td></tr>
<tr><td>Able to state inference less correctly

<u>Sample answer :</u>
Colourless gas released //
Halogen solution</td><td>2</td></tr>
<tr><td>Able to state any idea of inference

<u>Sample answer :</u>
Gas produced/released</td><td>1</td></tr>
<tr><td>No response given / wrong answer</td><td>0</td></tr>
</table>

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QUESTION	RUBRIC	SCORE
1(c)	*Able to state all variables correctly* <u>Sample answer :</u> Manipulated variable : Concentration of sodium bromide solution// 0.0001 mol dm^{-3} sodium bromide solution and 1.0 mol dm^{-3} sodium bromide solution Responding variable : product of electrolysis//product at anode Constant variable : Type of electrolyte// Sodium bromide solution// Type of electrode// Carbon electrodes	3
	Able to state any two variables correctly	2
	Able to state any one variables correctly	1
	No response given / wrong answer	0

QUESTION	RUBRIC	SCORE
1(d)	*Able to give the hypothesis correctly* <u>Sample answer:</u> When the concentration of sodium bromide solution is higher, product at anode is bromine solution and when the concentration of sodium bromide solution is lower, product at anode is oxygen gas// Concentrated sodium bromide solution produces bromine solution and diluted sodium bromide solution produces oxygen gas.	3
	Able to give the hypothesis almost correct <u>Sample answer:</u> When the concentration of sodium bromide solution is higher, product at anode is bromine solution// When the concentration of sodium bromide solution is lower, product at anode is oxygen gas// Concentrated sodium bromide solution produce bromine // Diluted sodium bromide solution produces oxygen gas//	2
	Able to state an idea of the hypothesis <u>Sample answer:</u> Concentration of electrolyte affect product formed// Different concentration of sodium bromide, different product at anode	1
	No response given / wrong answer	0

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<table>
<tr><th>QUESTION</th><th>RUBRIC</th><th>SCORE</th></tr>
<tr><td rowspan="4">1(e)</td><td>Able to predict the product formed at anode correctly

<u>Answer :</u>
Oxygen gas/molecule</td><td>3</td></tr>
<tr><td>Able to predict the product at anode less correctly

<u>Sample answer:</u>
Colourless gas//
Gas</td><td>2</td></tr>
<tr><td>Able to state an idea of product at anode

<u>Sample answer:</u>
Hydroxide ion//OH^-</td><td>1</td></tr>
<tr><td>No response given / wrong answer</td><td>0</td></tr>
</table>

<table>
<tr><th>QUESTION</th><th>RUBRIC</th><th>SCORE</th></tr>
<tr><td rowspan="4">1(f)</td><td>Able to classify all the chemical substances correctly

<u>Answer :</u>
<table>
<tr><th>Electrolyte</th><th>Non-electrolyte</th></tr>
<tr><td>Potassium carbonate solution
Molten lead (II) chloride</td><td>Benzene
Glucose solution
Molten naphthalene</td></tr>
</table></td><td>3</td></tr>
<tr><td>Able to classify any three chemical substances correctly</td><td>2</td></tr>
<tr><td>Able to classify any two chemical substances correctly or give opposite answer

<u>Sample answer:</u>
<table>
<tr><th>Electrolyte</th><th>Non-electrolyte</th></tr>
<tr><td>Benzene
Glucose solution
Molten naphthalene</td><td>Potassium carbonate solution
Molten lead (II) chloride</td></tr>
</table>.</td><td>1</td></tr>
<tr><td>No response given / wrong answer</td><td>0</td></tr>
</table>

<table>
<tr><th>QUESTION</th><th>RUBRIC</th><th>SCORE</th></tr>
<tr><td rowspan="4">2(a)</td><td>Able to record all reading accurately to one decimal point with unit

<u>Answer :</u>
Set I = 55.0 s
Set II = 47.0 s
Set III = 42.0 s
Set IV = 37.0 s
Set V = 33.0 s</td><td>3</td></tr>
<tr><td>Able to record any 4 reading accurately//
Able to record all reading without decimal place//
Able to record all reading without unit</td><td>2</td></tr>
<tr><td>Able to record any 3 reading accurately</td><td>1</td></tr>
<tr><td>No response given / wrong answer</td><td>0</td></tr>
</table>

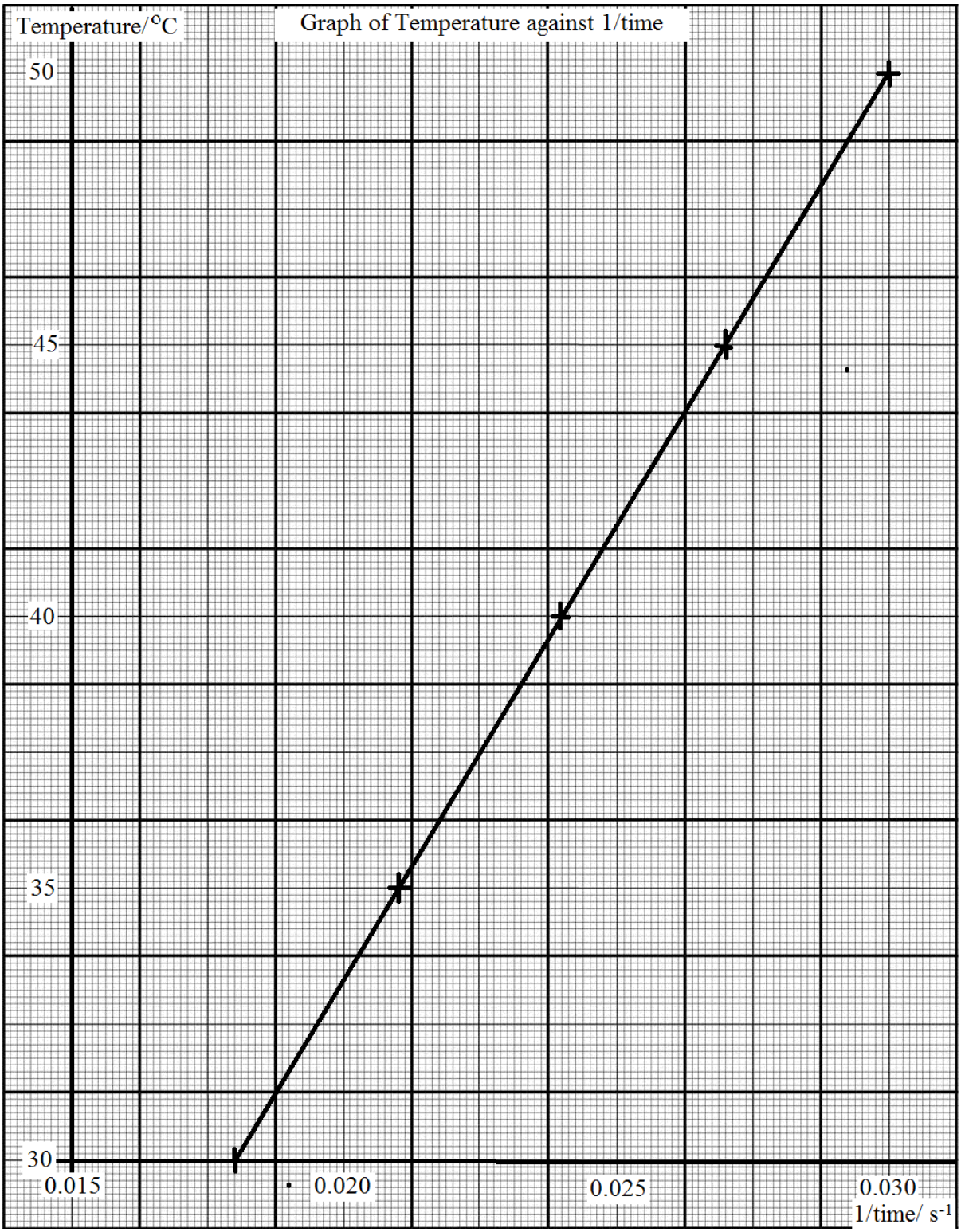
<table>
<tr><th>QUESTION</th><th>RUBRIC</th><th>SCORE</th></tr>
<tr><td rowspan="4">2(b)</td><td>Able to construct a table that contains the following information:

1. Heading in the table : temperature, time and 1/time with unit.
2. Transfer all temperature and time reading from (a) correctly.
3. Value of 1/time is uniform/consistent and with three decimal places.

<table>
<tr><th>Set</th><th>Temperature, ^{o}C</th><th>Time, s</th><th>1/time, s^{-1}</th></tr>
<tr><td>I</td><td>30</td><td>55.0</td><td>0.018</td></tr>
<tr><td>II</td><td>35</td><td>47.0</td><td>0.021</td></tr>
<tr><td>III</td><td>40</td><td>42.0</td><td>0.024</td></tr>
<tr><td>IV</td><td>45</td><td>37.0</td><td>0.027</td></tr>
<tr><td>V</td><td>50</td><td>33.0</td><td>0.030</td></tr>
</table>
</td><td>3</td></tr>
<tr><td>Able to construct a table that contain following information:

1. Heading in the table : temperature, time and 1/time without unit.
2. Transfer all temperature and time reading from (a) correctly.</td><td>2</td></tr>
<tr><td>Able to state an idea to construct a table</td><td>1</td></tr>
<tr><td>No response given / wrong answer</td><td>0</td></tr>
</table>

QUESTION	RUBRIC	SCORE
2(c)	*Able to draw a graph correctly* 1. Correct axis with unit Vertical axis : temperature / ^{o}C, horizontal axis : 1/time / s^{-1} 2. Consistent scale for temperature and 1/time 3. The graph at least half of the graph paper 4. All the point are transferred correctly 5. Best fit straight line and smooth	3
	Able to draw a graph incorrectly 1. Correct axis without unit // Inversed axis Vertical axis : temperature , horizontal axis : 1/time 2. Consistent scale for temperature and 1/time 3. About 3 point are transferred correctly 4. Best fit straight line and smooth	2
	Able to state an idea to draw the graph 1. Draw the vertical axis and horizontal axis 2. Straight line	1
	No response given / wrong answer	0



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QUESTION	RUBRIC	SCORE
2(d)	*Able to state the relationship between temperature and rate of reaction correctly* Sample answer: When the temperature of sodium thiosulphate solution is higher, the rate of reaction is higher// When the temperature of sodium thiosulphate solution is lower, the rate of reaction is lower	3
	Able to state the relationship between temperature and rate of reaction incorrectly Sample answer: Different temperature of sodium thiosulphate solution, different the rate of reaction//	2
	Able to give an idea of the relationship between temperature and rate of reaction Sample answer: Temperature affect the rate of reaction// When temperature is higher, rate of reaction is faster// Rate of reaction is directly proportional with temperature	1
	No response given / wrong answer	0

QUESTION	RUBRIC	SCORE
2(e)	*Able to give the operational definition accurately* Sample answer: What should be observed : One per time taken for mark 'X' to disappear from sight What should be done : sulphuric acid is added into sodium thiosulphate solution with different temperature. One per time taken for mark 'X' to disappear from sight when sulphuric acid is added into sodium thiosulphate solution with different temperature.	3
	Able to state the meaning of the rate of reaction less accurately Sample answer: Time taken for mark 'X' to disappear from sight when sulphuric acid is added into sodium thiosulphate solution with different temperature.	2

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	Able to give an idea for the meaning of the rate of reaction Sample answer: Time taken for mark 'X' to disappear from sight// Sulphuric acid is added into sodium thiosulphate solution with different temperature.	1
	No response given / wrong answer	0

QUESTION	RUBRIC	SCORE
3(a)	*Able to give the problem statement correctly* Sample answer: How does the reactivity of (alkali metals)/(Group 1 elements) towards oxygen gas changes when going down Group 1?// How does the reactivity of lithium, sodium and potassium towards oxygen gas changes when going down Group 1?	3
	Able to give the problem statement less accurately Sample answer: How does the reactivity of (alkali metals)/(Group 1 elements) changes when going down Group 1?// How does the reactivity of lithium, sodium and potassium changes when going down Group 1?	2
	Able to give an idea of the problem statement Sample answer: How the reactivity of alkali metals is different?	1
	No response given / wrong answer	0

QUESTION	RUBRIC	SCORE
3(b)	*Able to state all variables correctly* Sample answer : Manipulated variable : Alkali metals// Group 1 elements// Lithium, sodium and potassium. Responding variable : Reactivity of alkali metals // Brightness of flame Constant variables : Size of alkali metals// Oxygen gas.	3
	Able to state **any two** variables correctly	2

	Able to state **any one** variables correctly	1
	No response given / wrong answer	0

QUESTION	RUBRIC	SCORE
3(c)	*Able to write the relationship between manipulated variables and responding variable with direction correctly.* Sample answer : When going down Group 1 from lithium to potassium, the reactivity of alkali metals towards oxygen gas increases.// When going down Group 1, the reactivity of alkali metals towards oxygen gas increases.	3
	Able to write the relationship between manipulated variables and responding variable inaccurately. Sample answer : When going down Group 1, the reactivity of alkali metals increases// The reactivity of alkali metals towards oxygen gas increases when going down Group 1.	2
	Able to state an idea of the hypothesis. Sample answer : Different alkali metals have different reactivity towards oxygen gas// The reactivity of alkali metals is depends on the position of alkali metals in Group 1	1
	No response given / wrong answer	0

QUESTION	RUBRIC	SCORE
3(d)	*Able to state all materials and apparatus correctly.* Sample answer : List of materials : Lithium, sodium and potassium, oxygen gas, filter paper List of apparatus : Gas jar, gas jar spoon with cover, knife and forceps.	3
	Able to state all materials and 3 apparatus inaccurately. Sample answer : List of materials : Lithium, sodium, potassium, oxygen gas	2

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	List of apparatus : Gas jar, gas jar spoon and forceps.	
	Able to state any (1) metal, oxygen gas and 2 apparatus inaccurately. <u>Sample answer :</u> List of materials : Lithium/ sodium/ potassium, oxygen gas, List of apparatus : Gas jar, gas jar spoon.	1
	No response given / wrong answer	0

QUESTION	RUBRIC	SCORE
3(e)	*Able to write all steps correctly.* <u>Sample answer :</u> 1. Cut a small piece of lithium. 2. Dry the lithium metal by using a filter paper 3. Put lithium on a gas jar spoon. 4. Heat the lithium until it burns. 5. Put the lithium in the gas jar containing oxygen gas and cover it. 6. Observe and record the changes. 7. Repeat steps 1 to 7 by using sodium and potassium respectively to replace lithium.	3
	Able to write steps 1, 2, 5, 6, 7 and 8 inaccurately. <u>Sample answer :</u> 1. Cut a small piece of lithium. 2. Dry the outer surface of lithium metal by using a filter paper 5. Heat the lithium. 6. Put the lithium in the gas jar filled with oxygen gas and cover it. 7. Observe and record the changes. 8. Repeat steps 1 to 7 by using sodium and potassium respectively to replace lithium.	2
	Students are able to write steps 5, 6, 7 inaccurately. <u>Sample answer :</u> 5. Heat the lithium/ sodium/ potassium.	1

	6. Put the lithium/ sodium/ potassium in the gas jar and cover it. 7. Observe and record the changes.	
	No response given / wrong answer	0

QUESTION	RUBRIC	SCORE
3(f)	*Able to draw a complete table of data with all three manipulated variables and observation for the responding variable correctly.* **Alkali metals// Group 1 elements** / **Observation** Lithium/ Li Sodium/ Na Potassium/ K	2
	Able to draw a complete table of data with all three manipulated variables correctly but the responding variable inaccurately. **Type of metals// elements// Set** / **Reactivity** Lithium/ Li Sodium/ Na Potassium/ K	1
	No response given / wrong answer	0