PERCUBAAN SPM PERLIS

Answer Paper 1
TRIAL
CHEMISTRY SPM 2017
https://cikguadura.wordpress.com/

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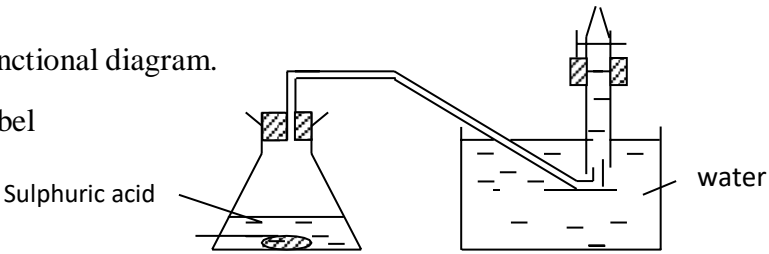
A-12   B-13   C-13   D-12

Question Number		Answer	Mark	
1 (a)		Heat change/released when 1 mol of copper is displaced by iron metal from copper(II) nitrate solution.	1	1
(b)		High rate of reaction // Reaction is fast	1	1
(c)		Reduce heat loss to surrounding // insulator of heat	1	1
(d)		Reading of thermometer increase // blue solution change to green // iron powder dissolve // plastic cup feel warm//temperature	1	1
(e)		Correct formulae of products Fe^{2+} + Cu	1	1
(f)(i)		$50 \times 4.2 \times (33.0 - 29.0)$ J // 840 J // 0.84 kJ (r: without unit)	1	
(ii)		$n = \dfrac{1.0 \times 50}{1000}$ // 0.05 mol	1	2
(iii)		$\Delta H = \dfrac{840}{0.05}$ // $-\dfrac{0.84}{0.05}$ = -16800 J mol^{-1} // -16.8 kJ mol^{-1} (r: without unit)	1 1	2
https://cikguadura.wordpress.com/			**TOTAL**	**9**

Question Number		Answer	Mark
2	(a)(i)	F	1
	(ii)	H	1
	(b)	H, F,G,D,E	1
	(c)	2.8.3	1
	(d)	D^+	1
	(e)	G Atomic size smaller//G atom has a higher tendency to receive electron//force of attraction between nuclei and valence electron stronger	1 1
	(f)(i)	$2D + G_2 \rightarrow 2DG$	1
	(ii)	Ionic bond	1
		Total	**9**

Question Number		Answer	Mark
3	(a)	Strong acid: X	1
		Strong alkali :Z	1
	(b)	- solution Y are weak acid//ionizes partially in water	1
		- have a low concentration of H^+ ion//pH value high	1
	(c)	$H^+ + OH^- \longrightarrow H_2O$	1
	(d)	-Y solution	
		-Y solution are weak acid	1
		- weak asid does not corrode//does not destroy the structure of manggo// vinegar can be eat//does not corrode the tounge//does not has very sharp smell	1
			1
	(e)	$1.0 \ V = 0.1(500)$	1
		$V = 50 cm^3//0.05 \ dm^3$	1
		Total	10

Question Number		Answer	Mark
4	(a)	P : Electrolytic cell	1+1
		Q: Chemical cell	
	(b)	Sulphate ion, $SO_4^{\ 2-}$	
		Hydroxide ion,OH^-	
	(c)(i)	Anode become thinner//dissolve//size smaller	1
	(ii)	$Cu \longrightarrow Cu^{2+} + 2e$	1
	(iii)	Blue colour of solution remain unchanged	1+1
		The concentration of copper(II) ion does not change/remain	
	(d)(i)	Silver plate	1
	(ii)	$Ag^+ + e \longrightarrow Ag$	1
	(e)	increases	1
		Total	10

5	(a)			
		1. Functional diagram.		1
		2. Label		1
		Sulphuric acid	water	
	(b)	$Zn + H_2SO_4 \longrightarrow ZnSO_4 + H_2$ - Correct formulae of reactants - correct formulae of products		1
	(c)	1. Correct number of mol of sulphuric acid $\dfrac{0.1 \times 25.0}{1000}$ // 0.0025 mol		1
		2. 1 mol produce 1 mol Therefore 0.0025 mol produce 0.0025 mol		1

		3. Correct the maximum volume
		        0.0025×24 // 0.06 dm^3 //
		        0.0025×24000 // 60 cm^3
				1

	(d)	(i)	Experiment I . $\dfrac{\mathbf{40.0}}{180}$ // **0.2222 cm^3 s^{-1} // 13.33 cm^3 min^{-1}** - Correct answer with unit	1
		(ii)	Experiment II $\dfrac{\mathbf{52.0}}{180}$ // **0.2889 cm^3 s^{-1}//17.33 cm^3 min^{-1}** - Correct answer with unit	1
		(iii)	The average rate of reaction for experiment II is higher than experiment I.	1
			Catalyst reduce the activation energy.	1
			More colliding particles are able to achieve the lower activation energy // increase the frequency of effective collision.	1
			Total	**11**

Question Number		Answer	Mark
6	(a)	-colourless change to cloudy	1
		-carbon dioxide gas	1
	(b)	Black	1
	(c)	$CuCO_3 \rightarrow CuO + CO_2$	1
	(d)	No. of moles of $CuCO_3$	
		$= \dfrac{12.4}{64 + 12 + 3(16)}$	
		$= 0.1$ mol	1
		1 mol of $CuCO_3$ produce 1 mol CO_2 //	
		0.1 mol $CuCO_3$ produce 0.1 mol CO_2	1
		Volume of gas released	
		$= 0.1 \times 24$	1
		$= $ **2.4 dm³//2400 cm³**	
	(e)(i)	Copper(II) nitrate //copper(II) sulphate//copper(II) chloride	1
		Sodium carbonate//potassium carbonate//ammonium carbonate	1
	(ii)	- Blue colour solution	1
		- Bubble gas are form	1
		Total	**11**

7	(a)	Able to explain the position of element Y in the Periodic Table of Elements correctly	
		Sample answer	
		1 Electron arrangement of atom Y is 2.8.7.	1
		2 Atom Y has 7 valence electrons.	1
		3 Thus, it is located in Group 17.	1
		4 Atom Y has three shells occupied with electrons.	1
		5 Thus, it is located in Period 3.	1
	(b)	**Able to explain the formation of bond formed between atoms P and Q**	
		Sample answer	
		1 Electron arrangement of atom P is 2.4//Atom P has 4 electron valence and electron arrangement of atom Q is 2.6//Atom Q has 6 valence electron	1
		2 One atom P contribute four electrons to be shared with two atom Q	1
		3 To achieve the stable electron arrangement	1
		4. Atom of Q contribute two electrons to be shared with atom P	1
		5. One atom P shares two pairs of electrons with two atoms of Q to form double// covalent bonds is formed	1
	(c)	Able to state the melting point and electrical conductivity correctly and give correct reason.	

		Sample answer		
		1 The melting point of the ionic compound//magnesium chloride/ (b)(ii) is higher than that of the covalent compound/hexane.	1	
		2 In ionic compounds//magnesium chloride the ions are held by strong electrostatic forces.	1	
		3 High heat is needed to overcome these forces.	1	
		4 In covalent compounds//hexane, molecules are held by weak intermolecular/ Van der Waals forces.	1	
		5 Only a little heat is required to overcome the attractive forces	1	
		1 The ionic compound//magnesium chloride conducts electricity in the aqueous state and $PbBr_2$ conduct electricity in molten	1	
		2 This is because in the molten or aqueous state, ionic compounds consist of freely moving ions.	1	
		3 In solid, the ions are not freely to move	1	
		4 The covalent compound//naphthalene does not conduct electricity in all state.	1	
		5 Covalent compounds//naphthalene are made up of molecules only.	1	
		https://cikguadura.wordpress.com/ **Total**	**20**	

8	(a)(i)	Aluminium = +3//3	1	
		Iron = +3//3	1	2
	(a)(ii)	Al_2O_3 - Aluminium oxide	1	
		Fe_2O_3 - Iron(III) oxide	1	
				2
	(a)(iii)	Aluminium have one oxidation number only .	1	
		No need to put roman numerals in the name of compound.	1	
		Oxidation number of iron is +2 dan +3//iron have various oxidation numbers	1	
		Need to put roman numerals in the name of the compound.	1	4
	(b)(i)	Expt I : reducing agent//reduce Mn^{7+} to Mn^{2+}	1	
		Expt II: oxidising agent//oxidise Mg to Mg^{2+}	1	2
	(ii)	<u>Expt II</u> Oxidation: Mg $\longrightarrow$ Mg^{2+} + 2e	1	
		Reduction: Fe^{2+} +2e $\longrightarrow$ Fe //	1	
			//	

		Expt III Oxidation: Fe $\longrightarrow$ Fe^{2+} + 2e Reduction: O$_2$ + 2H$_2$O + 4e $\longrightarrow$ 4OH$^-$	1 1	2
	(c)	Expt I Iron (II) ion oxidised to iron(III) ion//Fe^{2+} loses electron Mn^{7+} reduced to Mn^{2+}//Mn^{7+} gains electrons Electric current produced//electrons transfer from Fe^{2+} ion/ferum(II) sulphate to Mn^{7+} ion/potassium mangganate solution through connecting wire Expt II Mg is more electropositive than Ferum Ferum(II) ion /Fe^{2+}reduced to ferum/Fe atom//Fe^{2+} gains electrons Magnesium/Mg atom oxidised to magnesium ion/Mg^{2+}//Mg atom loses electrons Expt III Ferum is more electropositive than copper Ferum atom oxidised to ferum(II) ion//Iron atom loses electrons The formation of ferum(II) ion in the agar-agar//solution detected by potassium hexayanoferrate(III)	1 1 1 1 1 1 1 1 1	9
			TOTAL	**20**

9	(a)	1- Urea is a better fertilizer	1	
		2- % of N in $(NH_4)_2SO_4$: 28/132 x100 //21.2%	1	
		3- % of N in: $(NH_2)_2CO$:28/60 x100 //46.7%	1	3
	(b)(i)	1- tin	1	
		2- copper	1	2
	(ii)	In pure copper,		
		1-atoms are of the same size	1	
		2-atoms are orderly arranged in layers	1	
		3-the layers of atoms can slide over each one another when a force is apply	1	
		In bronze,		
		4-atoms of tin and copper have different size	1	
		5-the presence of tin atoms disrupt the orderly arrangement of the copper atoms.	1	
		6-The layers of copper atoms are difficult from sliding over each other easily.	1	6
	(c)	1- a steel ball bearing is taped onto a copper block	1	
		2- A 1kg weight is hung at a height of 50 cm above the copper block	1	
		3- the weight is allowed to drop onto the ball bearing	1	
		4- the diameter of the dent made by the ball bearing on the copper block is measured	1	
		5- steps 1 to 4 are repeated on two other parts of the copper block in order to obtain an average value for the diameter of dents formed	1	
		6- steps 1 to 5 are repeated using a brass block to replace the copper block	1	
		7- all readings are recorded in the table	1	
		8- shows the label diagram completely	2	9
			Total	20

No soalan		Rubrik	Markah
10	(a)(i)	P: Alkene	1
		Q: Alkane	1
		R: Alcohol	1
		S: Carboxylic acid	1
		I: Hydrogenation	1
		II: Dehydration	1
		III: Oxidation	1

	(ii)		

```
          H    H     H      H
          |    |     |      |
        H-C = C  -  C  -  C - H        //
                    |      |
                    H      H
                But-1-ene
```

1

1

//

```
          H    H     H      H
          |    |     |      |
        H-C - C  =  C  -   C - H       //
          |                |
          H                H
                But-2-ene
```

1

1

//

```
          H              H
          |              |
      H - C  =  C   -   C  - H
                |        |
                |        H
              H - C- H
                  |
                  H
            2- methylpropene
```

1

1

	(iii)	1. 2 cm^3 of compound R and compound S are poured into two different test tubes.	1
		2. Each of the test tubes is put in with magnesium/zinc/ aluminium / ferum ribbon/powder//[calcium carbonate]	1
			1
		3. The effervescence of gas occurs in test tube containing compound S while there are no reaction in test containing compound R.	
	(iii)	Bahan dan radas: ethanoic acid pentanol	1 1
		Procedure: 1 [4-10] cm^3 of pentanol is poured into a boiling tube. 2 [2 -5] cm^3 of ethanoic acid is is added . 3 [2-5] drops of concentrated sulphuric acid are added and the mixture is shaken well. 4 The mixture is heated .	1 1 1 1
		Observation: A colourless liquid is produced//a sweet fruity smell is produced	1
		$CH_3COOH + C_5H_{11}OH \longrightarrow CH_3COO\ C_5H_{11} + H_2O$	1
		https://cikguadura.wordpress.com/ Total	20

END OF MARKING SCHEME

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Question	Rubric	Score
1 (a)	Able to record all the temperature accurately with one decimal place. Answer | Experiment I	Experiment II
---	---
Initial temperature = 29.0	Initial temperature = 29.0
Highest temperature = 41.0	Highest temperature = 39.0
Change of temperature = 12.0	Change of temperature = 10.0		3
	Able to record any 3 readings accurately // all readings correctly but without decimal point.	2
	Able to record any 2 readings correctly	1
	No response given / wrong response	0

Question	Rubric	Score
1(b)	Able to state the relationship between temperature change and type of alkali Sample answer: The temperature change is higher when the alkali is strong // [vice versa]	3
	Able to state the relationship between temperature and type of alkali less correctly Sample answer: Temperature change is higher when the alkali is stronger//The temperature change higher when NaOH is used.	2
	Able to give an idea of the relationship between temperature and rate of reaction Sample answer: Type of alkali affects the temperature change	1
	No response or wrong response	0

Question	Rubric	Score
1 (c)	Able to state hypothesis correctly Sample answer The reaction between a strong acid and strong alkali produce a **greater** heat of neutralization than weak alkali.// The reaction between hydrochloric acid and sodium hydroxide produce a greater than ammonia	3
	Able to state hypothesis less correctly Sample answer: The heat of neutralization between a strong acid and a strong alkali is greater than the heat of neutralization between a strong acid and a weak alkali//strong alkali produce high heat of neutralization while weak alkali produce low heat of neutralization//the stronger the alkali, the higher the heat od neutralization	2
	Able to state an idea of the hypothesis Sample answer: Heat released // exothermic reaction	1
	No response given / wrong response	0

Question	Rubric	Score
1(d)	Able to state **All** variables correctly Sample answer : Manipulated variable : Type of alkali // sodium hydroxide solution and ammonia solution Responding variable : Temperature change//Heat of neutralization // Temperature rise Constant variable : Hydrochloric acid// polystyrene cup	3
	Able to state any **two** variables correctly	2
	Able to state any **one** variable correctly	1
	No response or wrong response	0

Question	Rubric	Score
1 (e)	Able to write the operational definition for the heat of neutralization correctly. Able to describe the following criteria (i) What should be observed: thermometer reading //temperature increases. (ii)What should be done: The heat released when 1 mol of water is formed when alkali/OH^- is react with hydrochloric acid(H^+) Sample answer : The heat released when 1 mol of water is formed when alkali/OH^- is react with hydrochloric acid(H^+) causes the thermometer reading /temperature increases.	3
	Able to state the idea of operational definition less correctly by stating either what to do or what to observe Sample answer Temperature change when acid react with alkali form water//Heat released when 1 mol of water formed	2
	Able to give an idea of the operational definition Sample answer Heat released // Water produced	1
	No response given / wrong response	0

Question	Rubric	Score
1(f)	Able to predict the temperature change accurately Sample answer : [1 < value >10] with correct unit	3
	Able to predict the temperature change correctly Sample answer: Lower than 12 ^oC // 10 ^0C// [1 < value >10] without unit	2
	Able to state an idea of temperature change Sample answer: Decreases //lower than 10 ^0C	1
	No response given / wrong response	0

Question	Rubric	Score
2 (a)(i)	Able to state the observation correctly. Sample answer: Yellow solid changes to grey solid//reading of weighing balance decreases//grey solid formed	3
	Able to state any observation less accurately. Sample answer: Yellow solid changed//mass decreases	2
	Able to give an idea of observation. Sample answer: Reading of weighing balance is…….at step I// Reading of weighing balance is…….at step II// Reading of weighing balance is…….at step III	1
	No response given / wrong response	0

Question	Rubric	Score
2 (a)(ii)	Able to give the inference correctly. Sample answer: Lead oxide changed to lead // Lead oxide is reduced//lead metal is formed.	3
	Able to give inference less accurately. Sample answer: Metal oxide changed to metal//lead produced.	2
	Able to give an idea of inference. Sample answer: Lead oxide changes.	1
	No response given / wrong response	0

Question	Rubric	Score
2(b)	Able to complete the table and record the mass correctly containing: 1. Correct description 2. Readings (2 decimal places) Sample answer: <table><tr><td>Description</td><td>Mass (g)</td></tr><tr><td>Combustion tube + asbestos paper</td><td>**64.00**</td></tr><tr><td>Combustion tube + asbestos paper + lead oxide/yellow solid</td><td>**117.52**</td></tr><tr><td>Combustion tube + asbestos paper + lead/ grey solid</td><td>**113.68**</td></tr></table>	3
	Able to complete the table less accurately that contain : 3. Correct description 4. Readings (4 decimal places)	2

	Sample answer:	

Description	Mass (g)
Combustion tube + asbestos paper	**64.0025**
Combustion tube + asbestos paper + lead oxide/yellow solid	**117.5193**
Combustion tube + asbestos paper + lead/ grey solid	**113.6768**

Able to complete the table with at least one description / readings.		1
No response given / wrong response		0

Question	Rubric	Score
2(c)	Able to calculate the empirical formula of lead oxide correctly. Sample answer: <table><tr><td>Element</td><td>Pb</td><td>O</td></tr><tr><td>Mass (g)</td><td>113.68-64.00 // 49.68</td><td>117.52 – 113.68 // 3.84</td></tr><tr><td>Number of moles (mol)</td><td>49.68÷207 // 0.24</td><td>3.84 ÷16// 0.24</td></tr><tr><td>Ratio of moles</td><td>0.24/0.24// 1</td><td>0.24/0.24// 1</td></tr><tr><td colspan="3">Empirical formula : PbO</td></tr></table>	3
	Able to calculate the empirical formula of lead oxide less accurately. Sample answer: <table><tr><td>Element</td><td>Pb</td><td>O</td></tr><tr><td>Mass (g)</td><td>113.68-64.00 // 49.68</td><td>117.52 – 113.68 // 3.84</td></tr><tr><td>Number of moles (mol)</td><td>49.68÷207 // 0.24</td><td>3.84 ÷32// 0.12</td></tr><tr><td>Ratio of moles</td><td>0.24/0.12// 2</td><td>0.12/0.12// 1</td></tr><tr><td colspan="3">Empirical formula : Pb_2O</td></tr></table>	2
	Able to give an idea of calculating the empirical formula of lead oxide. Sample answer: *Mass of Pb and O // number of moles of Pb and O*	1
	No response given / wrong response	0

Question	Rubric	Score
2 (d)	Able to classify all chemical formule correctly Sample answer : 		Empirical formula *Formula empririk*	Molecular formula *Formula molekul*
	CH CH_2O CH_2	$C_6H_{12}O_6$ C_3H_6 $C_2H_4O_2$		3
	Able to classify **five** chemical formule correctly	2
	Able to classify any **three** chemical formulae correctly or give opposite answers.	1
	[No response or wrong response]	0

Question 3– Experimenting

Question	Mark Scheme	Mark
3(a)	**Able to give the problem statement correctly** Sample answer Is detergent more effective in cleansing action in sea water compared to soap? // Is soap less effective in cleansing action in sea water compared to detergent? // //Which one is more effective in sea water, detergent or soap?	**3**
	Able to give the problem statement Sample answer To investigate the effectiveness of soap and detergent in sea water // Does detergent and soap show different effectiveness in sea water? //	**2**
	Able to give an idea of the problem statement Sample answer Detergent is effective // Soap is effective // Detergent cleans better	**1**
	No response or wrong response	**0**

Question	Mark Scheme	Mark
3(b)	**Able to state all the three variables correctly** Sample answer **Manipulated variable** Detergent and soap // Type of cleansing agent **Responding variable** Effectiveness of cleansing // Absence / presence of oily stains // Formation of scum // Ability to remove stain **Fixed variable** Sea water // cloth with oily stains	**3**
	Able to state any two variables correctly	**2**
	Able to state any one variable correctly	**1**
	No response or wrong response	**0**

Question	Mark Scheme	Mark
3(c)	**Able to state the hypothesis correctly** Sample answer Detergent is more effective in cleansing action in sea water while soap is less effective // When detergent is used, the oily stains is removed while when soap is used the oily stains remains// When detergent is used ,no scum is formed while when soap is used , scum is formed.	**3**
	Able to state the hypothesis Sample answer Detergent is effective in cleansing action in sea water // When detergent is used, the oily stains is removed// When detergent is used ,no scum is formed// when soap is used , scum is formed// Effectiveness of detergent and soap in sea water are different //Different cleansing agent have different effectiveness in sea water	**2**
	Able to give an idea of the hypothesis Sample answer No scum formed in detergent // Scum will formed in soap // Effectiveness of detergent and soap are different	**1**
	No response or wrong response	**0**

Question	Mark Scheme	Mark
3(d)	**Able to list the materials and apparatus completely** Sample answer **Materials** 1. Soap 2. Detergent 3. Sea water//magnesium nitrate solution//calcium nitrate solution 4. Cloth with oily stains // Dirty cloth **Apparatus** 1. Beaker 2. Stirrer / glass rod/brush-see the procedure, if the student rub the clothes, no need use the brush/glass rod/stirrer	**3**
	Able to list the materials and apparatus Sample answer **Materials** 1. Soap solution 2. Detergent 3. Sea water 4. Cloth with oily stains // Dirty cloth **Apparatus** 1. Any suitable container	**2**
	Able to give an idea of materials and apparatus Sample answer **Materials** 1. Soap solution //Detergent 3. Any kind of water //hard water 4. Cloth with oily stains // Dirty cloth **Apparatus** 1.[Any suitable container]	**1**
	No response or wrong response	**0**

Question	Mark Scheme	Mark
3(e)	**Able to list all the steps of procedure correctly** Sample answer √1 1. sea water/magnesium nitrate solution//calcium nitrate solution is pour into a beaker. √2 2. Add soap solution//soap powder √3 3. Put a piece of cloth with oily stain into the beaker √4 4. Shake / Stir the mixture//brush the oily cloth//rub √5 5. Record the observations √6 6. Repeat steps 1 to 5 using detergent to replace soap solution	**3**
	Able to state the steps 1 , 2 , 3 and 6 less correctly	**2**
	Able to state steps 1, 2 and 3	**1**
	No response or wrong response	**0**

Question	Mark Scheme	Mark
3(f)	**Able to construct a table that consists of :** 1. Headings for manipulated and responding variables 2. List of cleansing agent : detergent and soap <u>Sample answer</u> <table><tr><td>**Cleansing agent**</td><td>**Observation**</td></tr><tr><td>Soap</td><td></td></tr><tr><td>Detergent</td><td></td></tr></table>	**2**
	Able to construct a table that consists of : 1. Headings for manipulated or responding variables <u>Sample answer</u> <table><tr><td>**Type of cleansing agent**</td><td>**//**</td><td>**Observation**</td></tr><tr><td>Soap</td><td colspan="2"></td></tr><tr><td>Detergent</td><td colspan="2"></td></tr></table>	1
	No response or wrong response	**0**

☺ **HAPPY MARKING** ☺

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