BAHAGIAN PENGURUSAN
SEKOLAH BERASRAMA PENUH / KLUSTER
KEMENTERIAN PELAJARAN MALAYSIA

CHEMISTRY
TRIAL-EXAM
SPM 2008
MARKING SCHEME

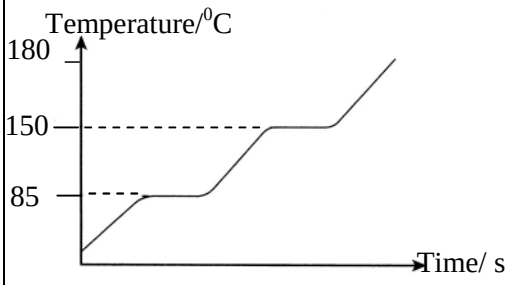
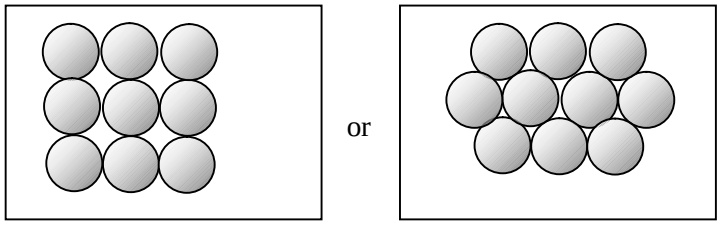
PAPER 1
PAPER 2
PAPER 3

Paper 1

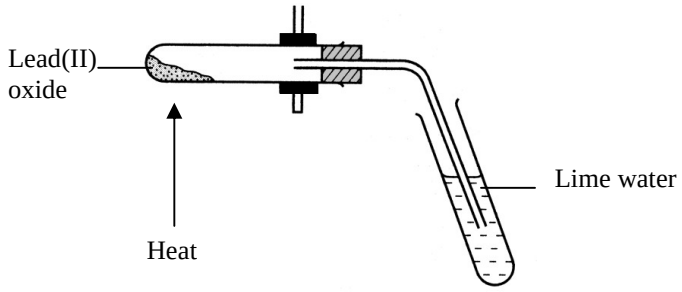
1	**D**	26	**D**
2	**D**	27	**C**
3	**B**	28	**C**
4	**B**	29	**D**
5	**C**	30	**D**
6	**C**	31	**C**
7	**C**	32	**B**
8	**A**	33	**B**
9	**D**	34	**C**
10	**A**	35	**C**
11	**B**	36	**B**
12	**D**	37	**B**
13	**D**	38	**D**
14	**D**	39	**B**
15	**A**	40	**D**
16	**C**	41	**A**
17	**D**	42	**A**
18	**A**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

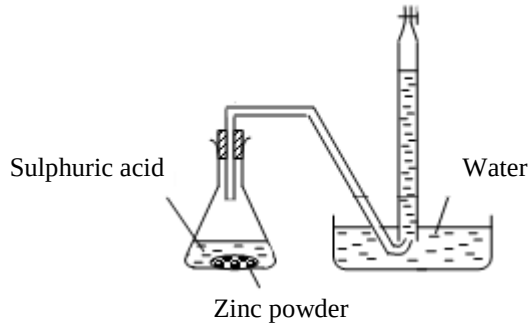
$$\frac{\textbf{Paper 1 (50) + Paper 2 (100)+ Paper3 (50)}}{\textbf{200}} \times \textbf{100\%}$$

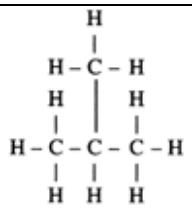
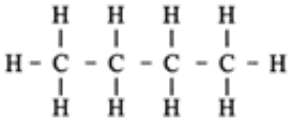
Kertas 2-Bahagian A

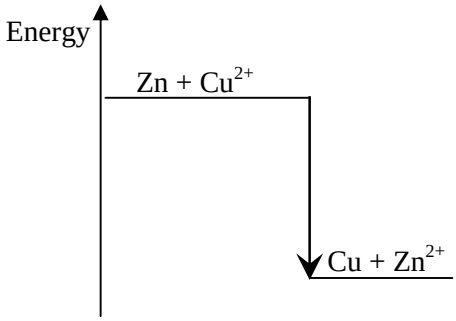
1	(a)	(i)	**nucleon number** is the total number of protons and neutrons in its atom.	1
		(ii)	17	1
	(b)		$^{24}_{12}Y$	1
	(c)	(i)	2.8.1	1
		(ii)	1	1
	(d)		W and X Atoms W and X have same **proton number**/ *number of proton* but difference **nucleon number**/ *number of neutron*	1 1
	(e)	(i)	 - Shape of curve - Mark of the melting and boiling points	 1 1
		(ii)	 -Minimum three layers. -No overlapping -All particles must touch each other	1
			Total	**10**

2	(a)		Electrical (energy) to chemical (energy)	1
	(b)		Ag^+ , H^+/H_3O^+ , NO_3^- , OH^-	1
	(c)	(i)	Shiny grey / silvery grey solid deposited	1
		(ii)	$Ag^+ + e \rightarrow Ag$	1
	(d)	(i)	Becomes thinner / size becomes smaller / mass decreases r : corrode	1
		(ii)	$Cu \rightarrow Cu^{2+} + 2e$	1
	(e)		A : Oxidation D : Reduction	1 1
	(f)		*Cell 2*	1
	(g)		Electroplating /purification of metals/extraction of metals	1
			Total	10

No.		Rubric	Mark
3	(a) (i)	Lead(II) oxide	1
	(ii)		
		1. Diagram of set up of apparatus complete and functional	1
		2. Label	1
	(iii)	$PbCO_3 \rightarrow PbO + CO_2$	1
	(iv)	1. Mole of $PbCO_3 = \frac{13.35}{267}$ $= 0.05$	1
		2. Volume of $CO_2 = (0.05)(24)$ $= 1.2\ dm^3$ or $1200\ cm^3$	1
	(c) (i)	Lead(II) iodide	1
	(ii)	Yellow	1
	(iii)	$Pb^{2+} + 2I^- \rightarrow 2PbI_2$	1
	(iv)	Filter the mixture	1 ...10

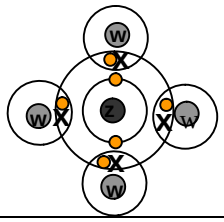
4	(a)		*Complete set of apparatus and can be used and label*  	1 + 1
	(b)		$Zn + H_2SO_4 \rightarrow ZnSO_4 + H_2$	1
	(c)		Experiment I = $\frac{20}{120}$ // 0.167 $cm^3 s^{-1}$ Experiment II = $\frac{32}{120}$ // 0.267 $cm^3 s^{-1}$	1 1
	(d)		Number of moles of H_2SO_4 = $\frac{0.1x20}{1000}$ = 0.002 mol 1 mol of H_2SO_4 produce 1 mol of H_2 0.002 mol of H_2SO_4 produce 0.002 mol of H_2 Maximum volume of H_2 = 0.002 x 24 000 = 48 cm^3	1 1
	(e)		• The rate of reaction in experiment II is higher than that of experiment I. • Copper(II) sulphate solution lowers the activation energy of the reaction in experiment II. • The frequency of **effective collisions** between hydrogen ions and zinc atoms increases in experiment II.	1 1 1
			Total	**10**

No		Marking scheme	Mark
5(a)		C_nH_{2n+2} n = 1, 2, 3, ...	1
(b)		A : carbon-carbon double bond // $-\overset{|}{C}=\overset{|}{C}-$ B : carboxyl group // - COOH	1 1
(c)		 	1 1
(d)	(i) (ii)	Butyl propanoate Sweet / pleasant /fragrance / fruity smell	1 1
(e)	(i) (ii)	$C_4H_8 + 6O_2 \rightarrow 4CO_2 + 4H_2O$ mol A = 11.2 // $\frac{0.2}{56}$ mol CO_2 = 4 x 0.2 // 0.8 No of molecule CO_2 = 0.8 x 6.2 x 10^{23} // 4.96 x 10^{23}	1 1 1
		TOTAL	10

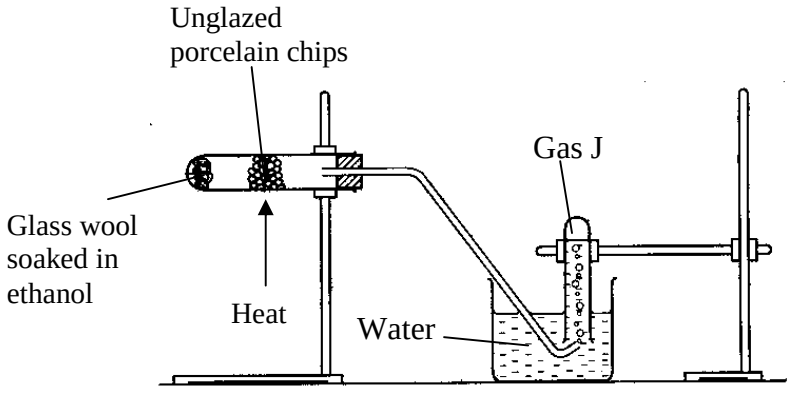
6	(a) (i)	Heat change/release when one mole of a metal is displaced from its salt solution by a more electropositive metal.	1
	(b)	1. Brown solid is deposited/ formed 2. Blue solution becomes colourless	1 1
	(c)	To reduce heat loss to the surrounding	1
	(d)	$Zn + Cu^{2+} \rightarrow Zn^{2+} + Cu$	1
	(e)(i)	Q = (50)(4.2)(8) = 1680 J	1
	(ii)	Mole of $CuSO_4 = \frac{50x0.2}{1000}$ = 0.01	1
	(ii)	Heat of displacement of copper = $-\frac{1680}{0.01}$ = - 168 $kJmol^{-1}$	1
	(iii)	 • Two different energy levels • Chemical / Ionic equation	1 1...10

Section B

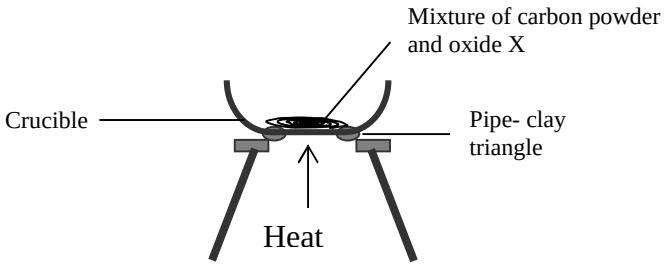
No	MARKING CRITERIA	MARK	
		SUB	**TOTAL**
7 (a)	Duralumin Aluminium is soft /easily dented / cannot withstands pressure (Any two correct answers)	**1** **2**	**3**
7(b)(i) (ii)	Tin In pure copper, • atoms are of the same size • atoms are orderly arranged in layers • the layers of atoms can slide over each one another when a force is apply In bronze, • atoms of tin and copper have different size • the presence of tin atoms disrupt the orderly arrangement of the copper atoms. • The layers of copper atoms are prevented from sliding over each other easily.	**1** **1** **1** **1** **1** **1** **1**	**7**
7(c)(i)	A: Hydrophobic part B: Hydrophilic part Part A is dissolved in oil / grease Part B is dissolved in water	**1** **1** **1** **1**	**4**
(ii)	• Anions of detergent are more effective than anions of soap in hard water. • Anions of soap react with **calcium ions/magnesium ions** to form **scum** / insoluble **precipitate**. • Amount of anions of soap is reduced /decreased. • Anions of detergent do not form scum/precipitate /the salts formed are solubled • $2\ CH_3(CH_2)_{14}COO^- + Ca^{2+} \rightarrow [CH_3(CH_2)_{14}COO]_2Ca$ Or $2\ CH_3(CH_2)_{14}COO^- + Mg^{2+} \rightarrow [CH_3(CH_2)_{14}COO]_2Mg$	**1** **1** **1** **1** **1** **1**	**6**
		Total	**20**

No	MARKING CRITERIA	MARK	
		SUB	TOTAL
8(a)	• Z, Y and X 1. Z, Y, and X have three shells / in the same period 2. The proton number //positive charges in the nucleus increases 3. The forces of attraction between the nucleus and the electrons in the shells increase 4. The shells filled with electrons are pulled nearer to the nucleus. [Any two correct answers from 2,3,and 4]	**1** **1** **2**	**4**
8(b)	1. The electron arrangement of atom X is 2.1 and atom Y is 2.6 2. Atom X donates the one valence electron to achieve the stable duplet electron/ electron arrangement of 2 3. An X^+ ion is formed/ X → $X^+ + e^-$ 4. One atom of Y will receive 2 electrons to achieve the octet electron arrangement 5. An Y^{2-} ion is formed / $Y + 2e^- \rightarrow Y^{2-}$ 6. X^+ ion and Y^{2-} ion will attract each other by strong electrostatic force to form ionic bond 7. A ionic conpound X_2Y is formed. [or correct illustration of electron arrangement in the compound]	**1** **1** **1** **1** **1** **1**	**6**
8(c)(i)	• Number of shells • Electron arrangement  	 **1** **1**	**2**
8(c)(ii)	<u>Melting point</u> Compound in (b) has higher melting point. Compound in (c) has low melting point. <u>Explanation</u> In compound (b), ions are held together by strong electrostatic forces. In compound (c), molecules are held together by weak intermolecular forces / van der Waals' forces <u>Electric conductivity</u> Compound in (b) can conduct electricity in molten or aqueous solution only. Compound in (c) does not conduct electricity. <u>Explanation</u> Compound (b) : In molten or aqueous solution, ions can move freely. Compound (b) : Only consist of neutral molecules/ no free moving ions.	 **1** **1** **1** **1** **1** **1** **1**	**4** **4**
		Total	**20**

Section C

No	MARKING CRITERIA	MARK	
		SUB	TOTAL
9(a) (i)	• The end of the thistle funnel must lower than the level of the hydrochloric acid solution. • The end of the delivery tube must be above the level of the acid • The stopper must be tight. *[Accept other suitable precaution steps]* *[Any two correct answers]*	**2**	**2**
(ii)	• Anhydrous calcium chloride • To dry the hydrogen gas	**1** **1**	**2**
(iii)	• The dry hydrogen reacts /reduces the hot oxide of M to produce M and water. *[Correct reactants and products]*	**1** **1**	**2**
(iv)	M Oxygen Mass 49.68 g 3.84g Moles of atom 49.68/207=0.24 3.84/16=0.24 Simplest ratio 1 1 Empirical formula is MO	**1** **1** **1** **1**	**4**
9(b) (i)	Relative Molecular mass of $(CH_2)_n$ = 28 $(12 + 2)n = 28$ $n = 2$ Thus, molecular formula = C_2H_4	**1** **1**	**2**
(ii)		**1+1**	**2**

	1. A small amount of glass wool soaked in J is placed in a boiling tube. 2. The boiling tube is clamped horizontally 3. The unglazed porcelain chips are placed in the middle section of the boiling tube. 4. The boiling tube is closed with a stopper fitted with a delivery tube 5. The unglazed porcelain chips are heated strongly. Then, the glass wool is warmed gently to vaporize the ethanol. 6. The gas released is collected in a test tube.	**1** **1** **1** **1** **1** **1**	**6**
			20

No	MARKING CRITERIA	MARK	
		SUB	TOTAL
10(a)	Oxidation is a loss of electrons.	**1**	**2**
	Reduction is a gain of electrons	**1**	
(b) (i)	• Magnesium / zinc / iron / lead / tin *[accept symbol]* *[reject Na, K, Ca]*	**1**	**1**
(ii)	• W is more electropositive than Cu. • W has higher tendency to donate electrons. • W is located above Cu in the electrochemical series • W is able to displace Cu from its salt solution • W is able to reduce Cu^{2+} ion. • W is stronger than Cu as a reducing agent. [*Any three correct questions*]	**3**	**3**
(ii)	• Oxidation number of W increases from 0 to +2 • W undergoes oxidation • Oxidation number of Z decreases from +2 to 0 • Z undergoes reduction	**1** **1** **1** **1**	**4**
(c)	 • Correct set up of apparatus • Label correctly	**1** **1**	**2**

	Procedure: 1. A spatula of carbon powder and a spatula of solid oxide of X are mixed throughly in a crucible. 2. The mixture is heated strongly. 3. Any changes that occur are observed. 4. Step a to 3 are repeated using oxide of Y. Result: Mixture / Observation Carbon + oxide of X / The mixture burns with a bright flame / The mixture glow brightly. Carbon + oxide of Y / No visible change Conclusion: Carbon is more reactive than X but less reactive than Y. Equation: $C + 2XO \longrightarrow 2X + CO_2$	**1** **1** **1** **1** **1** **1** **1** **1**	**8**
			20

PAPER 3

1 (a) KK0503 – Measuring and using numbers

EXPLANATION	SCORE
[Able to write all the volumes with units accurately] Initial burette readings: 0.80 cm^3, 13.40 cm^3, 25.90 cm^3 Final burette readings : 13.40 cm^3, 25.90 cm^3, 38.40 cm^3	3
[Able to record all the volumes accurately but without units / one decimal place] Initial burette readings: 0.8, 13.4, 25.9 Final burette readings : 13.4, 25.9, 38.4	2
[Able to write at least four readings of the volumes accurately]	1
No response given / wrong response	0

1 (b) KK0506 – Communicating

EXPLANATION	SCORE
[Able to construct a table correctly containing three labeled columns with correct units and record all the burette readings and volume of acids used accurately] Suggested answer: Titration No. | I | II | II Initial burette reading/cm^3 | 0.80 | 13.40 | 25.90 Final burette reading/cm^3 | 13.40 | 25.90 | 38.40 Volume of acid used/cm^3 | 12.60 | 12.50 | 12.50	3
[Able to construct a table correctly containing three labeled columns without units/one decimal place and record all the volumes accurately]	2
[Able to construct a table with at least three labels and four correct readings]	1
No response given / wrong response	0

1 (c) KK0506 Communicating

EXPLANATION	SCORE
[Able to calculate the average volume of acid used correctly and with unit] Suggested answer: Volume of acid used = $\frac{12.6 + 12.5 + 12.5}{3}$ = 12.5 cm^3	3
[Able to calculate the average volume correctly but without unit.]	2
[Able to show the calculation of average volume of acid used but incorrect answer]	1
No response given / wrong response	0

1 (d) KK0505 - Predicting

EXPLANATION	SCORE
[Able to state the volume correctly] 6.25 cm^3	3
[Able to state the volume but to one decimal place] 6.3 cm^3// [6.0 – 7.0] cm^3	2
[Able to state the volume but inaccurately] 12.5 cm^3//25.0 cm^3	1
No response given / wrong response	0

1(e) KK0508 – Interpreting Data

EXPLANATION	SCORE
[Able to classify the strong acids and the weak acids into their group the correctly] Strong acids: hydrochloric acid, phosphoric acid, nitric acid Weak acids: ethanoic acid, carbonic acid	3
[Able to calssify the strong acids and the weak acids correctly but in opposite group] Strong acids: ethanoic acid, carbonic acid Weak acids: hydrochloric acid, phosphoric acid, nitric acid	2
[Able to classify at least three acids into the correct group]	1
No response given / wrong response	0

2(a) KK0510 - State variables

EXPLANATION	SCORE
[Able to state the three variables correctly] Manipulated variable: Type of elements/metals Responding variable: Rate of reaction//Reactivity of the reaction Fixed variable: Water, size of metal used	3
[Able to state any two variables correctly]	2
[Able to state any one variable correctly]	1
No response given / wrong response	0

2 (b) KK051202 – Stating hypothesis

EXPLANATION	SCORE
[Able to state the relationship between manipulated variable and responding variable correctly] Suggested answer: The metal which is below in Group 1 is more reactive the reaction with water//The lower the metal in Group 1 the more reactive the reaction with water	3
[Able to state the relationship between manipulated variable and responding variablebut in the opposite direction] Suggested answer: The more reactive the reaction, the lower the position of the metal in Group 1	2
[Able to state an idea of the hypothesis] Suggested answer: Metals in Group 1 can react with water	1
No response given / wrong response	0

2(c) KK0509 – Operational definition

EXPLANATION	SCORE
[Able to state the operational definition accurrately] Suggested answer: The metal that reacts more vigorously with water is a more reactive metal	3
[Able to give the operational definition correctly but inaccurrate] Suggested answer: The metals can react with water at a different rate.	2
[Able to state an idea of the operational definition] Suggested answer: Metals can react with water.	1
No response given / wrong response	0

2(d)KK0504 – Making inference

EXPLANATION	SCORE
[Able to state the inference accurately] Suggested answer: The solution produced is a strong alkali.	3
[Able to state the inference correctly] Suggested answer: The solution produced is an alkali.	2
[Able to give idea for inference] The metals dissolve in water.	1
No response given / wrong response	0

2(e) KK0507- Making relationship

EXPLANATION	SCORE
[Able to state the relationship accurrately] Suggested answer: The lower the position of the metal in Group 1, the higher the reactivity of the metal towards oxygen.	3
[Able to state the relationship correctly but less accurrate] Suggested answer: The reactivity of the metals is inversely proportional to their position in the group.	2
[Able to state an idea of a relationship] Suggested answer: Position of metals affect the reactivity	1
No response given / wrong response	0

2(f) KK 0508 – Interpreting Data

EXPLANATION	SCORE
*[Able to arrange the metals **in descending order** based on their reactivity]* Rb, K, Na, Li	3
*[Able to arrange the metals **in ascending order** based on their reactivity]* Li, Na, K, Rb	2
[Able to arrange the position of at least three metals in descending order based on ther reactivity]	1
No response given / wrong response	0

3 (a) KK051021 – Statement of problem

EXPLANATION	SCORE
[Able to make a statement of the problem accurately and must be in question form] Suggested answer: How does the number of carbon per molecule of alcohol affect/influence the heat of combustion?//Does the increase in the number of carbon per molecule of alcohol increases the heat of combustion?	3
[Able to make a statement of the problem but less accurrate//Accurate statement of the problem but not in question form.] Suggested answer: Does different types of alcohols have different heat of combustions?// When the number of carbon per molecule of alcohol increases the heat of combustion increases.	2
[Able to state an idea of statement of the problem] Suggested answer: Alcohols have different heat of combustion.	1
No response given / wrong response	0

3(b) KK051202 – Stating variables

EXPLANATION	SCORE
[Able to state all the three variables correctly] Suggested answer: Manipulated variable: Different types of alcohols//Different alcohols such as ethanol, propanol and butanol. Responding variable: Heat of combustion//Increase in temperature Fixed variable: Volume of water,type of container/ size of container	3
[Able to state any two of the variables correctly]	2
[Able to state any one of the variables correctly]	1
No response given / wrong response	0

3 (c) KK051202 – Stating hypothesis

EXPLANATION	SCORE
[Able to state the relationship between manipulated variable and responding variable correctly] Suggested answer: When the number of carbon per molecule of alcohol increases, the heat of combustion increases.	3
[Able to state the relationship between manipulated variable and responding variable but in reverse direction] Suggested answer: The heat of combustion increases when the number of carbon per molecule of alcohol increases.// Different types of alcohols have different heat of combustion.	2
[Able to state an idea of the hypothesis] Suggested answer: Alcohols have different heat of combustion.	1
No response given / wrong response	0

3(d) KK051205 – List of substances and apparatus

EXPLANATION	SCORE
[Able to state the list of substances and apparatus correctly and completely] Suggested answer: Ethonol, propanol, butanol, water, [metal] beaker, spirit lamp, thermometer, weighing balance, wooden block, tripod stand, wind shield, measuring cylinder.	3
[Able to state the list of substances and apparatus correctly but not complete] Suggested answer: Ethanol, propanol, butanol, water, [metal] beaker, spirit lamp, thermometer, weighing balance.	2
[Able to state an idea about the list of substances and apparatus] Suggested answer: Ethanol/propanol/butanol/water, beaker, thermometer.	1
No response given / wrong response	0

3(e) KK051204 –Procedures

EXPLANATION	SCORE
[Able to state a complete experimental procedure] Suggested answer: 1. [200 cm^3] of water is poured into a [copper] beaker. 2. Initial temperature of the water is recorded. 3. A spirit lamp is half filled with ethanol. 4. Initial mass of the spirit lamp is recorded. 5. Put the spirit lamp under the copper beaker and ignite the wick immediately. 6. Stir the water and the flame is put off after the temperature has increased by 30^oC. 7. The highest temperature of the water is recorded 8. Immediately the final mass of the spirit lamp is recorded. 9. Repeat the experiment by replacing ethanol with propanol and butanol.	3
[Able to state the following procedures] 1, 2, 4, 5,7,8	2
[Able to state the following procedures] 2, 4, 5, 7	1
No response given / wrong response	0

3(f) Tabulation of data

EXPLANATION	SCORE
[Able to exhibit the tabulation of data correctly with suitable headings and units] *Types of alcohols* | *Initial temperature/^oC* | *Highest temperature/^oC* | *Initial mass of spirit lamp/g* | *Final mass of spirit lamp/g* *Ethanol* *Propanol* *Butanol*	3
[Able to exhibit the tabulation of data less accurately with suitable headings without units] *Types of alcohols* | *Initial temperature* | *Highest temperaturer* | *Initial mass of spirit lamp* | *Final mass of spirit lamp*	2
[Able state an idea about the tabulation of data] Alcohol | Temperature | Mass	1
No response given / wrong response	0

END OF MARKING SCHEME