

BAHAGIAN PENGURUSAN SEKOLAH BERASRAMA PENUH / KLUSTER KEMENTERIAN PELAJARAN MALAYSIA



Paper 1

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

<u>Paper 1 (50) + Paper 2 (100)+ Paper 3 (50)</u> X 100% 200

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	1
	Ì,		Atoms W and X have same proton number / number of proton but difference	
			nucleon number/ number of neutron	1
	(e)	(i)		
			Temperature/ ⁰ C	
		1		
		1:	50	
		8	5	
			lime/ s	
				1
			- Shape of curve	1
			- Mark of the melting and boiling points	1
		(ii)		1
			or or	
			Minimum three lovers	
			-No overlanning	
			-All particles must touch each other	
			Total	10

2	(a)		Electrical (energy) to chemical (energy)	1
	(b)		$Ag^{+}, H^{+}/H_{3}O^{+}, NO_{3}^{-}, OH^{-}$	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	1
			r : corrode	
		(ii)	$Cu \rightarrow Cu^{2+} + 2e$	1
	(e)		A : Oxidation	1
			D : Reduction	1
	(f)		Cell 2	1
	(g)		Electroplating /purification of metals/extraction of metals	1
			Tota	al 10



4	(a)	Complete set of apparatus and can be used and label	1 + 1
		Sulphuric acid Zinc powder	
	(b)	$Zn + H_2SO_4 \rightarrow ZnSO_4 + H_2$	1
	(c)	Experiment I = $\frac{20}{120}$ // 0.167 cm ³ s ⁻¹	1
		Experiment II = $\frac{32}{120}$ // 0.267 cm ³ s ⁻¹	1
	(d)	Number of moles of H ₂ SO ₄ = $\frac{0.1x20}{1000}$ = 0.002 mol	1
		$0.002 \text{ mol of } H_2SO_4 \text{ produce } 1 \text{ mol of } H_2$	
		Maximum volume of $H_2 = 0.002 \text{ x } 24\ 000 = 48 \text{ cm}^3$	1
	(e)	• The rate of reaction in experiment II is higher than that of experiment	1
		 Copper(II) sulphate solution lowers the activation energy of the 	1
		 reaction in experiment II. The frequency of effective collisions between hydrogen ions and zinc 	1
		atoms increases in experiment II.	
		Total	10

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



Section B

No	MARKING CRITERIA	MARK	
		SUB	TOTAL
7 (a)	Duralumin	1	
		2	3
	Aluminium is soft /easily dented / cannot withstands pressure		
7(h)(i)	(Any two correct answers)	1	
/(D)(1) (ii)	11n In pure coppor	1	
(11)	a stoms are of the same size	1	
	• atoms are of the same size	1	
	• atoms are orderly arranged in layers	1	
	• the layers of atoms can slide over each one another when a	1	
	force is apply		
	In bronze.		
	 atoms of tin and copper have different size 	1	
		1	
	• the presence of tin atoms disrupt the orderly arrangement of	1	
	the copper atoms.		
	• The layers of conner atoms are prevented from sliding over	1	7
	• The layers of copper atoms are prevented from shaling over		
	each other easily.		
7(c)(i)	A: Hydrophobic part	1	
	B: Hydrophilic part	1	
	Part A is dissolved in oil / grease	1	4
	Part B is dissolved in water	1	
(11)	• Anions of detergent are more effective than anions of soap in	1	
	hard water.		
	• Anions of soan react with calcium ions/magnosium ions	1	
	to form gaum / ingoluble receivitate	1	
	to form scum / insoluble precipitate.		
	• Amount of anions of soap is reduced /decreased.	1	
	• Anions of detergent do not form scum/precipitate /the salts		
	formed are solubled	1	
	• $2 \operatorname{CH}_2(\operatorname{CH}_2)_4 \operatorname{COO}^2 + \operatorname{Ca}^{2+} \rightarrow \operatorname{[CH}_2(\operatorname{CH}_2)_4 \operatorname{COO}^2_2 \operatorname{COO}^2_2$	1	
	2 CH3(CH2)14COO + Ca 7 [CH3(CH2)14COO]2Ca		
	Or 2 CH ₃ (CH ₂) ₁₄ COO ⁻ + Mg ²⁺ \rightarrow [CH ₃ (CH ₂) ₁₄ COO] ₂ Mg		6
		Total	20

ions.

No	MARKING CRITERIA		ARK
		SUB	TOTAL
8(a)	 Z, Y and X Z, Y, and X have three shells / in the same period The proton number //positive charges in the nucleus increases The forces of attraction between the nucleus and the electrons in the shells increase The shells filled with electrons are pulled nearer to the 	1 1	
9(1-)	nucleus. [Any two correct answers from 2,3,and 4]	2	4
8(D)	 The electron arrangement of atom X is 2.1 and atom Y is 2.6 Atom X donates the one valence electron to achieve the stable duplet electron/ electron arrangement of 2 	1	
	 3. An X⁺ ion is formed/ X → X⁺ + e⁻ 4. One atom of Y will receive 2 electrons to achieve the octet electron arrangement 	1	
	5. An Y ²⁻ ion is formed / Y + 2e ⁻ \rightarrow Y ²⁻	1	
	 X⁺ ion and Y²⁻ ion will attract each other by strong electrostatic force to form ionic bond 	1	6
	 A ionic conpound X₂Y is formed. [or correct illustration of electron arrangement in the compound] 		U
8(c)(i)	 Number of shells Electron arrangement 	1	2
8(c)(ii)	Melting point Compound in (b) has higher melting point. Compound in (c) has low melting point. Explanation 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	1 1 1 1	4
	Electric conductivity Compound in (b) can conduct electricity in molten or aqueous solution only. Compound in (c) does not conduct electricity. Explanation Compound (b) : In molten or aqueous solution, ions can move freely.	1 1 1	
	Compound (b) : Only consist of neutral molecules/ no free moving	1	4

	Total	20
1		

Section C

No	MARKING CRITERIA		ARK
		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 chlorideTo 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	1	
	Mass 49.68 g 3.84g	1	
	Moles of atom 49.68/207=0.24 3.84/16=0.24	1	
	Simplest ratio 1 1	1	
	Empirical formula is MO	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	2
(ii)	Unglazed	1	
	Glass wool soaked in ethanol Heat Water	1+1	2

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

20

No	MARKING CRITERIA		MARK	
		SUB	TOTAL	
10(a)	Oxidation is a loss of electrons. Reduction is a gain of electrons	1 1	2	
(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 Cu²⁺ ion. W is stronger than Cu as a reducing agent. [<i>Any three correct questions</i>] 	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)	Crucible Crucible Heat Mixture of carbon powder and oxide X Pipe- clay triangle • Correct set up of apparatus			

• Label correctly		1 1	2
Procedure:			
1. A spatula of carbo	n powder and a spatula of solid oxide of X are	1	
The mixture is here	ta crucible.	1	
2. The inixture is near	ieu strongry.	1	
4 Step a to 3 are rep	eated using oxide of V	1	
		1	
Result:			
Mixture	Observation		
Carbon + oxide of X	The mixture burns with a bright		
	flame / The mixture glow brightly.	1	
Carbon + oxide of Y	No visible change	1	
Conclusion:			
Carbon is more reactive	e than X but less reactive than Y.		
		1	
Equation:			
$C + 2XO \longrightarrow 2Z$	$X + CO_2$		
		1	8
			20

PAPER 3

I AI LK J	
1 (a) KK0503 – Measuring and using numbers	
EXPLANATION	SCORE
[Able to write all the volumes with units accurately]	3
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	
[Able to record all the volumes accurately but without units / one decimal	2
place]	
Initial burette readings: 0.8, 13.4, 25.9	
Final burette readings : 13.4, 25.9, 38.4	
[Able to write at least four readings of the volumes accurately]	1
No response given / wrong response	0

1 (b) KK0506 - Communicating

	EX	PLANATION			SCORE
[Able to construct a correct units and red accurately] Suggested answer:	table correctl cord all the bu	y containing thr rette readings a	ee labeled columns w ind volume of acids u	vith sed	
Titration No.	I	II	II		3
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		
[Able to construct a units/one decimal pl	table correctl ace and reco	y containing thr rd all the volume	ee labeled columns w es accurately]	vithout	2
[Able to construct a table with at least three labels and four correct readings]		1			
No response given /	wrong respon	se			0

1 (c) KK0506 Communicating

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

1 (d) KK0505 - Predicting

EXPLANATION	SCORE
[Able to state the volume correctly]	3
6.25 cm^3	
[Able to state the volume but to one decimal place]	2
$6.3 \text{ cm}^{3//} [6.0 - 7.0] \text{ cm}^{3}$	
[Able to state the volume but inaccurately]	1
$12.5 \text{ cm}^3//25.0 \text{ cm}^3$	
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	3
correctly]	
Strong acids: hydrochloric acid, phosphoric acid, nitric acid	
Weak acids: ethanoic acid, carbonic acid	
[Able to calssify the strong acids and the weak acids correctly but in opposite	2
group]	
Strong acids: ethanoic acid, carbonic acid	
Weak acids: hydrochloric acid, phosphoric acid, nitric acid	
[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]	3
Manipulated variable	Type of elements/metals	
Responding variable:	Rate of reaction//Reactivity of the reaction	
Fixed variable:	Water, size of metal used	
[Able to state any two ve	ariables correctly]	2
[Able to state any one ve	ariable correctly]	1
No response given / wro	ng response	0

2 (b) KK051202 - Stating hypothesis

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

2(c) KK0509 - Operational definition

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

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

2(e) KK0507- Making relationship

EXPLANATION	SCORE
[Able to state the relationship accurrately]	3
Suggested answer:	
The lower the position of the metal in Group 1, the higher the reactivity of the	
metal towards oxygen.	
[Able to state the relationship correctly but less accurrate]	2
Suggested answer:	
The reactivity of the metals is inversely proportional to their position in the	
group.	
[Able to state an idea of a relationship]	1
Suggested answer:	
Position of metals affect the reactivity	
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]	3
Rb, K, Na, Li	
[Able to arrange the metals in ascending order based on their reactivity]	2
Li, Na, K, Rb	
[Able to arrange the position of at least three metals in descending order	1
based on ther reactivity]	
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				
[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				
[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				
[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.				
[Able to state the relationship between manipulated variable and responding	2			
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.				
[Able to state an idea of the hypothesis]	1			
Suggested answer:				
Alcohols have different heat of combustion.				
No response given / wrong response				

3(d) KK051205 – List of substances and apparatus

EXPLANATION				
[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.				
[Able to state the list of substances and apparatus correctly but not complete]	2			
Suggested answer:				
Ethanol, propanol, butanol, water, [metal] beaker, spirit lamp, thermometer, weighing balance.				
[Able to state an idea about the list of substances and apparatus]	1			
Suggested answer:				
Ethanol/propanol/butanol/water, beaker, thermometer.				
No response given / wrong response	0			

3(e) KK051204 – Procedures

EXPLANATION				
[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°C.				
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.				
[Able to state the following procedures]	2			
1, 2, 4, 5,7,8				
[Able to state the following procedures]				
2, 4, 5, 7				
No response given / wrong response				

3(f) Tabulation of data

EXPLANATION					
[Able to exhibit the tabulation of data correctly with suitable headings and					
units]					
Types of	Initial	Highest	Initial mass of	Final mass of	
alcohols Ethanol	temperature/°C	temperature/°C	spirit lamp/g	spirit lamp/g	
Propanol					
Butanol					3
[Able to ex without un Types of alcohols	hibit the tabula its] Initial temperature	tion of data less a Highest temperaturer	ccurately with s	uitable headings Final mass of spirit lamp	2
[Able state an idea about the tabulation of data]					
Alcohol		Temperature	Mass		
No response given / wrong response					

END OF MARKING SCHEME

SULIT