



Scheme
y Peper 1 & 2
er

**PERSIDANGAN KEBANGSAAN PENGETUA-PENGETUA
SEKOLAH MENENGAH MALAYSIA (PKPSM)
CAWANGAN MELAKA**

**PEPERIKSAAN PERCUBAAN
SIJIL PELAJARAN MALAYSIA 2007**

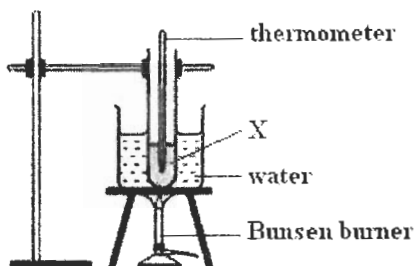
**MARKING SCHEME
CHEMISTRY
Paper 1 and Paper 2**

UNTUK KEGUNAAN PEMERIKSA SAHAJA

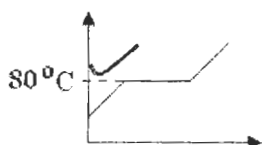
**SKEMA PERMARKAHAN
PEPERIKSAAN PERCUBAAN SPM 2007
CHEMISTRY 4541/1 DAN 4541/2**

	Jawapan	No. Soalan	Jawapan	No. Soalan	Jawapan	No. Soalan	Jawapan
	C	14	A	27	B	40	D
	D	15	A	28	D	41	A
	C	16	D	29	C	42	B
	A	17	D	30	D	43	A
	B	18	B	31	C	44	D
	C	19	D	32	B	45	B
	A	20	C	33	A	46	D
	C	21	D	34	D	47	D
	B	22	B	35	C	48	B
	B	23	C	36	B	49	C
	C	24	A	37	C	50	C
	B	25	B	38	D		
	C	26	A	39	C		

- 1. Functional diagram shows 1
- 2. Thermometer, X, water and bunsen burner/heat is labelled 1
- 3. X level must below water level 1



- 1. Size of particles are same 1
 - 2. Are arrange closely pack 1
 - 3. At least 3 rows, 3 columns 1
 - 1. Both axis are labelled and with unit 1
y axis ; temperature/ $^{\circ}\text{C}$ and x axis ; time/s
 - 2. Uniform scale (size of graph must be bigger) 1
 - 3. All points are transferred correctly and best fit curve 1
- [The melting point is marked accurately on the graph] 1



- 1. Heat energy is absorbed 1
- 2. to overcome the forces between particles 1

10

2.8.8 1
the atoms have achieved stable electron arrangement

- (i) S 1
- (ii)- atoms of S have a higher nucleic charge 1
- the valence electron attracted more closely to the nucleus 1

- (i) bursts into fire // white fume//white solid formed 1
- (ii) $4\text{X} + \text{O}_2 \rightarrow 2\text{X}_2\text{O}$ 1

- (i) X 1
- (ii)-atoms of X are bigger 1

- (i) gas bubbles formed 1
(ii) $4\text{OH}^- \rightarrow 2\text{H}_2\text{O} + \text{O}_2 + 4\text{e}^-$ 1
(iii) oxidation 1
- (i) anode 1
(ii) Chlorine gas released 1
(iii) $2\text{Cl}^- \rightarrow \text{Cl}_2 + 2\text{e}^-$ 1
- (i) the mixture turns brown 1
(ii) $\text{Cl}_2 + 2\text{I}^- \rightarrow \text{I}_2 + 2\text{Cl}^-$ 1
(iii). Chlorine 1
(iv). Chlorine atom receives electron // oxidation number of chlorine decreases // chlorine acts as oxydising agent 1

10

lead (II) iodide 1
precipitation reaction // double decomposition 1

(i) potassium iodide solution and lead (II) nitrate solution 2

(ii) $\text{Pb}^{2+} + 2\text{I}^- \rightarrow \text{PbI}_2$ 2
. correct chemical formula for reactants and product
. balanced chemical equation

(i) sulphuric acid 1

(ii) $\text{CuO} + \text{H}_2\text{SO}_4 \rightarrow \text{CuSO}_4 + \text{H}_2\text{O}$

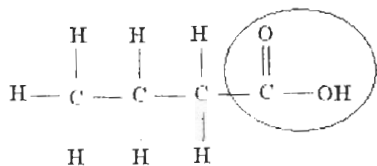
number of mol of hydrochloric acid, $n = \frac{MV}{1000} = \frac{2 \times 50}{1000} = 0.1 \text{ mol}$ 1

number of mol of copper(II) chloride = $0.1 \text{ mol} / 2 = 0.05 \text{ mol}$ 1

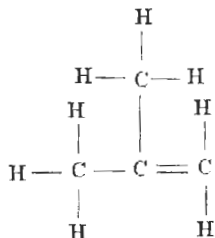
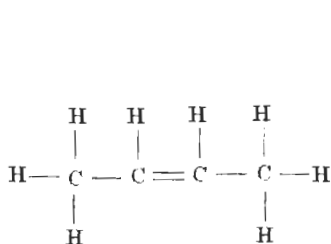
the mass of copper(II) chloride produced = $0.05 \times 135 = 6.75 \text{ g}$ 1

10

1. J : Alkene 1
 2. K : Alcohol 1



- (i) Butanol 1
 (ii) C₅H₁₁OH 1



1 + 1

- (i) Orange solution turn to green // Smell of vinegar // The product change blue litmus paper to red 1
 (ii) CH₃CH₂CH₂CH₂OH + 2[O] → CH₃CH₂CH₂COOH + H₂O 1+1
10

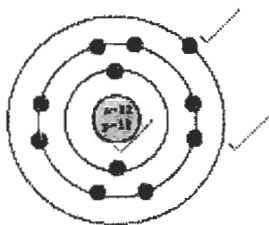
- (i) an electrolyte to increase the rate of rusting. 1
 (ii) to determine the presence of Fe³⁺ 1

- (i) dark blue precipitate 1
 (ii) copper / lead / any metal lower than iron in the Electrochemical Series 1
 (iii) Fe → Fe²⁺ + 2e 1
 (iv) iron 1

- (i) Y loses electrons to form ion Y 1
 (ii) zinc / magnesium / any metal higher than iron in the Electrochemical Series 1
 1

connect iron with sacrificial metal / metal that is more electropositive than iron. 1

1. The proton number is 11 // Number of proton is 11 1
2. Nucleon number is 23 // Atomic mass is 23 1
3. Number of neutron = $23 - 11 = 12$ 1
4. Nucleus contains 11p and 12n 1
5. Position of electron circulating the nucleus 1
6. Correct number shell consists of electron 1



- (i) Formula that show **simplest ratio** number of atoms of each element in compound 1

- (ii) 1. Relative molecular mass for $n(\text{CH}_2\text{O}) = 180$ // 1
 $12n + 2n + 16n = 180$

2. $n = 6$ 1



(i)

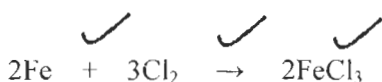
Element	Fe	Cl
1. Mass/g	2.80	5.32
2. No. of moles	$2.80/56 = 0.05$	$5.32/35.5 = 0.15$
3. Ratio of moles/ Simplest ratio	$0.05/0.05 = 1$	$0.15/0.05 = 3$

4. Empirical formula = FeCl_3 1

- (ii) 1. Formula of the reactants 1

2. Formula of products 1

3. Balance equation 1



4. No. of moles Fe = $2.80/56 = 0.05$ mol 1

5. No. of moles $\text{Cl}_2 = (0.05 \times 3)/2 = 0.075$ mol 1

6. Volume of $\text{Cl}_2 = 0.075 \times 24 = 1.8 \text{ dm}^3 / 1,800 \text{ cm}^3$ 1

- (i)
1. Both axis are labelled and with unit
y axis ; volume/cm³ and x axis ; time/s 1
 2. Uniform scale (size of graph must be bigger) 1
 3. All points are transferred correctly 1
 4. Best fit curve 1
- (ii)
1. Average rate of reaction = 19.0/120 1
 2. = 0.0528 cm³s⁻¹ 1
 3. Construct tangen at 210 s 1
 4. 0.052 cm³s⁻¹ 0.050 ≤ k ≤ 0.054 1
- (iii)
1. Boiling point of oil is higher than boiling point of water 1
 2. At higher temperature potatoes is faster to cook 1
- (iv)
1. The higher the temperature, rate of reaction increase 1
 2. High temperature, kinetic energy of particles increase//particles moves faster 1
 3. Collision frequency between particles increase 1
 4. Effective collision frequency increase 1

	Type of food additive		Example	
1.	X = Preservatives	4.	Salt/Sugar/Vinegar/Sodium nitrite/Sodium nitrate/Benzoic acid/Sodium benzoate	1+1
2.	Y = Antioxidants	5.	Ascorbic acid/Sodium citrate/	1+1
3.	Z = Flavourings	6.	Monosodium glutamate/aspartame/sugar/salt/vinegar/[ester]	1+1

20

- 1 the atoms of both X and Y have 1 valence electron 1
- 2 chlorine (eg) atoms have 7 valence electrons 1
- 3 X forms a covalent compound with chlorine 1
- 4 Y forms an ionic compound with chlorine 1
- 5 1 X atom shares 1 pair of electron with 1 chlorine atom 1
- 6 [diagram showing electron arrangement in XCl] 1
- 7 a Y atom donates the valence electron to a chlorine atom //
a chlorine atom receives an electron from a Y atom 1
- 8 to achieve stability in the electron arrangement. 1
- 9 To form Y⁺ and Cl⁻ ions. 1
- 10 Y⁺ and Cl⁻ ions attract one another to form a compound 1
- 11 [diagram showing electron arrangement of YCl] 1

(i)[any 2 of the following :

- with high melting or boiling point
- dissolves in water. does not dissolve in

1

- (ii)[diagram – apparatus set up for testing conductivity
 labeling : carbon electrode, YCl, heat, galvanometer]
 put some solid YCl into a crucible switch on circuit] and heat
 needle deflects
 current flows
 shows there are charges / ions moving freely
 YCl consists of ions

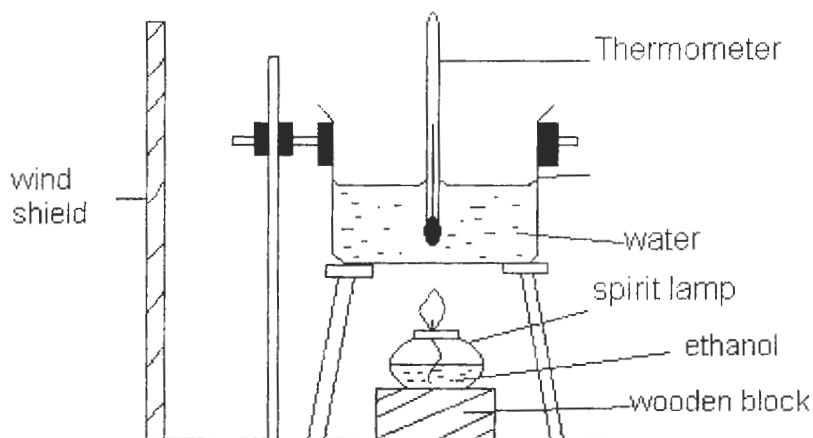
1
1
1
1
1
1
1

20

Heat of combustion of ethanol is the heat energy released
 When 1 molc of ethanol completely burnt

1
1

(i)



3

(ii).Procedure :

- 200 cm³ of water is measured and poured into a copper can and
 the copper can is placed on a tripod stand
- the initial temperature of the water is measured and recorded
- a spirit lamp with ethanol is weighed and its mass is recorded
- the lamp is then placed beneath the copper can and the wick of
 The lamp is lighted up immediately
- the water in the can is stirred continuously until the temperature
 of the water increases by about 30°C.
- the flame is put off and the highest temperature reached by the
 Water is recorded

1
1
1
1
1
1

Data

The highest temperature of water	=	t_2	
The initial temperature of water	=	t_1	1
Increase in temperature, θ	=	$t_2 - t_1$	
Mass of lamp after burning	=	m_2	
Mass of lamp before burning	=	m_1	1
Mass of lamp ethanol burnt, m	=	$m_2 - m_1$	

Calculation :

Number of mole of ethanol, C_2H_5OH , n	=	$\frac{m}{46}$	1
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The heat energy given out during combustion by ethanol	=	the heat energy absorbed by water	1
	=	$m c \theta$ kJ	

Heat of combustion of ethanol	=	$\frac{m c \theta}{n}$ kJmol ⁻¹	1
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:

There precautions taken to achieve accurate results⊗(any three)

- make sure the flame from the combustion of ethanol touches the bottom of the copper can. / the spirit lamp is placed very close or just beneath the bottom of the copper can. 1
 - stir the water in the copper can continuously 1
- the spirit lamp must be weighed immediately (because the ethanol is very volatile)
- a wind shield must be used during experiment 1

Detail	Score
[Able to state the inferens correctly following the statement below] 2.5, 0.8, 0.4, 1.1	3
[Able to state any 3 of the no below]	2
[Able to state any 2 of the no below]	1
[Able to arangge all in correctly oder] Example, Mg, Zn, Fe, Pb, Cu	3
[Able to arangge any 4 the correctly]	2
[Able to arangge any 3 the correctly or any 4 but reversly]	1
[Able to relate the pair of metal and the voltage base on electrochemical series] The pair of metals, which are positioned at a further distance in the electrochemical series, will produce a bigger cell voltage.	3
[Able to relate the pair of metal and the ampere base on electrochemical series]	2
[Idea to relate the pair of metal and the voltage base on electrochemical series]	1
[Able to writein symbol balence chemical equation] $\text{Mg} \rightarrow \text{Mg}^{2+} + 2\text{e}$	3
[Able to write in symbol unbalaence chemical equation] $\text{Mg} \rightarrow \text{Mg}^{2+} + \text{e}$	2

[Able to predict between 0.4 < answer < 0.8] Example 0.6	3
[Able to predict between 0.8 < answer < 1.0]	2
[Able to predict between 1.0 < answer < 1.5]	1

[Able to name the gas] Oxygen gas	3
[Able to write symbol of the gas] O ₂	2
[Able to write symbol of the oxygen] O	1
[Able to state the relationship between the manipulated variable and responding variable]. The higher the hydrogen peroxide concentration, the higher the decomposition rate of hydrogen peroxide	3
[Able to state the relationship between the manipulated variable and responding variable inaccurately].	2
[Able to state any idea about the hypothesis].	1
X is $(49.5 - 17.0) = 32.5 \text{ cm}^3$	3
[answer without unit]	2
[answer without calculation]	1

<p>[<i>Able to draw graph correctly and completely in the same axis</i>]</p> <ul style="list-style-type: none"> - The axis is labeled and with units - The scale are constant - All the point are correctly transferred - The curve are correctly draw - The size of the graph are more than 50% of the graph paper 	3
<p>[<i>Able to draw graph correctly in the same axis</i>]</p> <ul style="list-style-type: none"> - The axis is labeled and with // without units - The scale are constant - All the point are 90% correctly transferred - The curve are correctly draw - The size of the graph are more than 50% of the graph paper 	2
<p>[<i>Able to draw graph correctly in the same axis</i>]</p> <ul style="list-style-type: none"> - The axis is labeled and with // without units - All the point are 80% correctly transferred - The curve are correctly draw - The size of the graph are more than 50% of the graph paper 	1
<p>[<i>Answer with unit</i>] 38.0 cm³ (± 0.5 cm³)</p>	3
<p>[<i>Answer without unit</i>] 38.0</p>	2
<p>38</p>	1
<p>[<i>Able to infer correctly</i>]</p> <p>The higher the concentration of hydrogen peroxide the higher the rate of decomposition/reaction</p>	3
<p>The concentration of hydrogen peroxide in Experiment II is higher compared to the concentration of hydrogen peroxide in Experiment I.</p>	2
<p>[<i>idea to infer</i>]</p>	1

<p><i>Able to give the problem statement accurately]</i> How X and Y can be differentiated by using [acidified Potassium manganate 7/ bromine water]. ?</p>	3
<p><i>Able to give the problem statement inaccurately]</i> X and Y can be differentiated by using [Potassium manganate].</p>	2
<p><i>Able to give an idea about the problem statement of the experiment]</i></p>	1
<p><i>Able to state the correct procedure]</i>) (2-3) hexane and hexene are poured into two different test tubes. i) Three drops of bromine water are added into the test tubes. ii) The test tubes are closed with stoppers. v) The mixtures are shaken. r) The observations are recorded.</p>	3
<p><i>Able to state the procedure to conduct the experiment]</i> ## Procedure no. 2, 3, 4 and 5</p>	2
<p><i>Able to state an idea about the hypothesis]</i> ## Procedure no. 2, 3 and 4</p>	1
<p><i>Able to state complete material and apparatus to conduct the experiment</i> Lists of apparatus and materials: Test tubes, dropper, stopper, bromine water li] Example , <u>Material</u> : bromine water, reagent X and Y <u>Apparatus</u> : Test tube, dropper, stopper</p>	3

<p>[<i>Able to state material and apparatus to conduct the experiment</i>] Lists of apparatus and materials: Test tubes, dropper, stopper, bromine water</p> <p>Example , <u>Material</u> : bromine water, reagent X and Y <u>Apparatus</u> : Test tube</p>	2						
<p>[<i>Able to state material and apparatus to conduct the experiment</i>]</p> <p>Example , <u>Material</u> : bromine water, reagent X and Y <u>Apparatus</u> : Test tube</p>	1						
<p>[<i>Able to state the procedure to conduct the experiment</i>]</p>	3						
<p>[<i>Able to state the procedure to conduct the experiment</i>]</p> <p>l) ## Procedure no. 1, 2, 4 and 5</p>	2						
<p>[<i>Able to state the minimum procedure to conduct the experiment</i>]</p> <p>## Procedure no. 1 and 2</p>	1						
<p>[<i>Able to make a labeled tabulation of data</i>]</p> <p>Example,</p> <table border="1" data-bbox="49 1521 591 1639"> <thead> <tr> <th>Test tube</th> <th>observation</th> </tr> </thead> <tbody> <tr> <td>X</td> <td></td> </tr> <tr> <td>Y</td> <td></td> </tr> </tbody> </table>	Test tube	observation	X		Y		3
Test tube	observation						
X							
Y							

[*Able to make a tabulation of data*]

Test tube	
A	
B	

2

[*Able to make an idea for tabulation of data*]

1

For report

If the total mark for Question 3 is 12 and above, the score for report is 2.

If the total mark for Question 3 is 8 to 11 , the score for report is 1.

SKEMA PEMARKAHAN TAMAT