

Nama :

Kelas : 5



KEMENTERIAN PENDIDIKAN MALAYSIA
Pejabat Pendidikan Daerah Tangkak

PANITIA KIMIA
PEJABAT PENDIDIKAN
DAERAH TANGKAK

MODUL KECEMERLANGAN SPM
KIMIA
TINGKATAN 5
Kertas 2

4541/2

2 jam 30 minit

JANGAN BUKA KERTAS PEPERIKSAAN INI SEHINGGA DIBERITAHU

1. *Tuliskan nama dan tingkatan pada ruang yang disediakan.*
2. *Kertas peperiksaan ini mengandungi **tiga** bahagian: **Bahagian A**, **Bahagian B** dan **Bahagian C**.*
3. *Jawapan hendaklah ditulis pada ruang jawapan yang disediakan di dalam kertas peperiksaan ini.*
4. *Kertas peperiksaan ini adalah dalam dwibahasa.*
5. *Jawapan boleh ditulis dalam bahasa Melayu atau bahasa Inggeris.*
6. *Kerja mengira anda mesti ditunjukkan.*
7. *Kertas peperiksaan ini hendaklah diserahkan kepada pengawas peperiksaan pada akhir peperiksaan.*

Untuk Kegunaan Pemeriksa			
Bahagian	Soalan	Markah Penuh	Markah Diperoleh
A	1	5	
	2	5	
	3	6	
	4	7	
	5	8	
	6	9	
	7	10	
	8	10	
B	9	20	
	10	20	
C	11	20	
Jumlah			

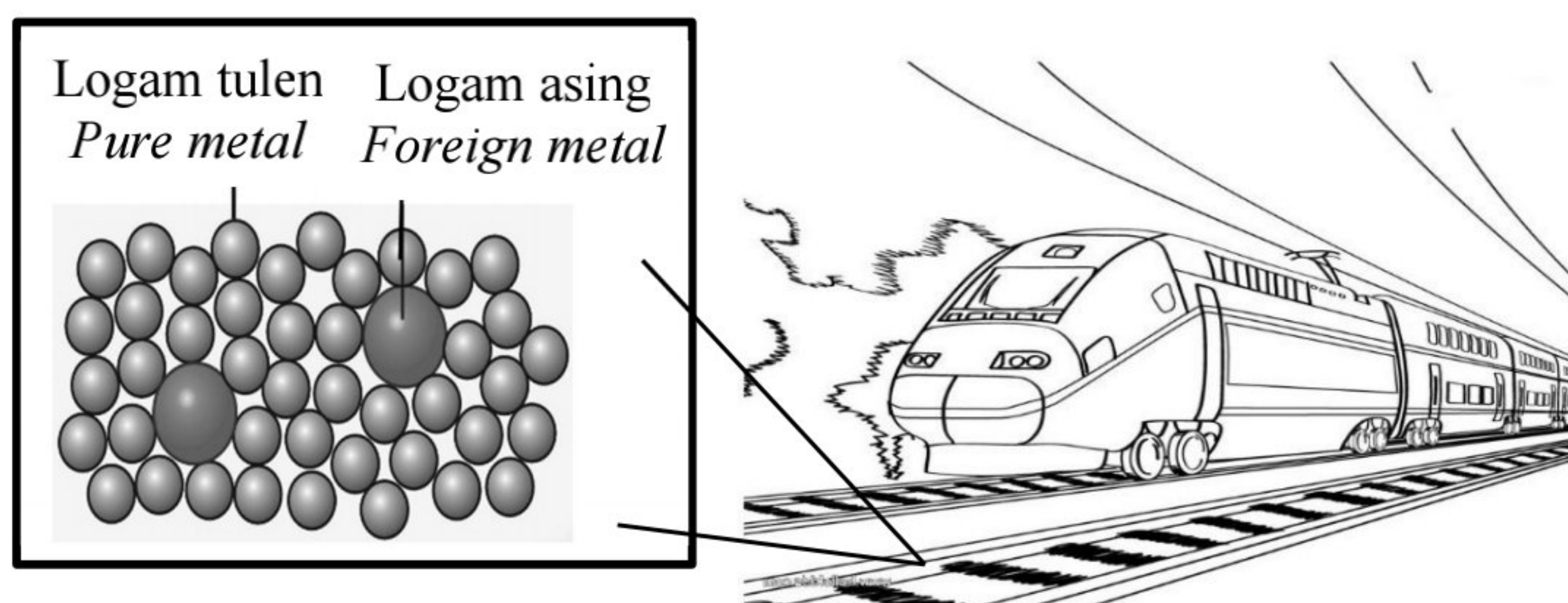
Kertas soalan ini mengandungi **25** halaman bercetak

Bahagian A
Section A

[60 markah]
[60 marks]

Jawab **semua** soalan dalam bahagian ini.
Answer all questions in this section.

- 1 Rajah 1 menunjukkan susunan atom bagi aloi X yang digunakan untuk membuat landasan keretapi.
Diagram 1 shows an arrangement of atom of alloy X which is used to make railway track.



Rajah 1
Diagram 1

- (a) Apakah yang dimaksudkan dengan aloi?
What is meant by alloy?

.....
[1 markah/mark]

- (b) Berdasarkan Rajah 1,
Based on Diagram 1,

- (i) Namakan aloi X.
Name the alloy X.

.....
[1 markah/mark]

- (ii) Aloi X terbina dari gabungan logam tulen dan logam asing. Nyatakan nama bagi
Alloy X is built from the mixture of pure metal and foreign metal.
State the name for

Logam tulen :
Pure metal

Logam asing :
Foreign metal

[2 markah/marks]

- (c) Nyatakan satu sebab mengapa aloi X sesuai digunakan untuk membuat landasan keretapi.
State one reason why alloy X is suitable for use to make railway track.

.....
[1 markah/mark]

- 2 Jadual 1 menunjukkan perbandingan antara bilangan proton, bilangan neutron dan bilangan elektron bagi atom X dan ion X.
Table 1 shows a comparison between the number of protons, the number of neutrons and the number of electrons for X atoms and X ions.

Jenis zarah <i>Type of particle</i>	Atom X <i>Atom X</i>	Ion bagi X <i>Ion for X</i>
Bilangan proton <i>Number of proton</i>	12	12
Bilangan neutron <i>Number of neutron</i>	12	12
Bilangan elektron <i>Number of electron</i>	12	10

Jadual 1

Table 1

- (a) (i) Apakah yang dimaksudkan dengan nombor proton?
What is meant by proton number?

.....
[1 markah/mark]

- (ii) Nyatakan dua zarah sub atom yang terdapat dalam nukleus.
State two subatomic particles in the nucleus.

.....
[2 markah/marks]

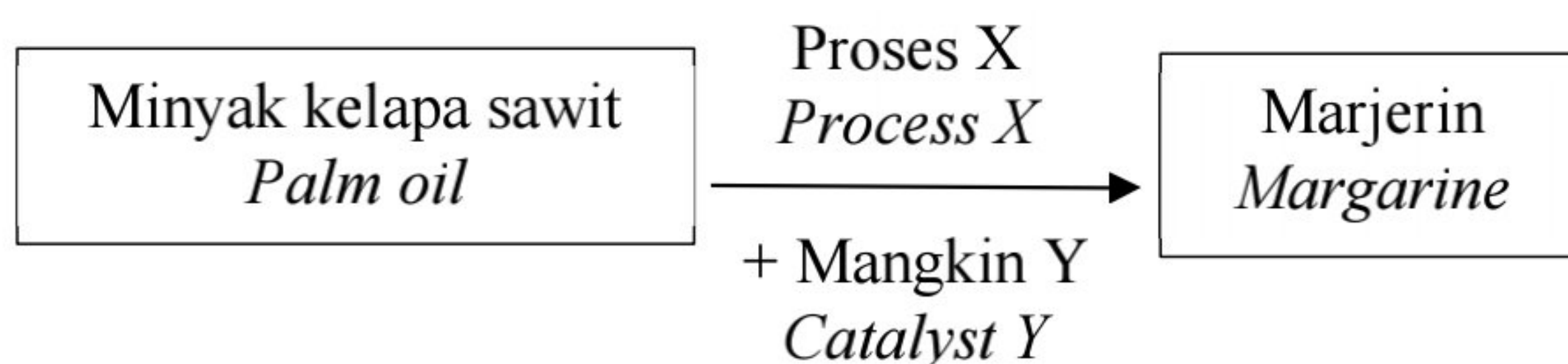
- (b) (i) Tuliskan susunan elektron bagi atom X.
Write the electron arrangement of atom X.

.....
[1 markah/mark]

- (ii) Tuliskan formula bagi ion X.
Write the formula for ion X.

.....
[1 markah/mark]

- 3 (a) Rajah 2.1 menunjukkan proses menyediakan marjerin daripada minyak kelapa sawit melalui proses X.
 Diagram 2.1 shows a process of preparing margarine from palm oil through process X.



Rajah 2.1
 Diagram 2.1

Namakan Proses X dan Bahan Y.
 Name Process X and Substance Y.

Proses X :
 Process X

Mangkin Y :
 Catalyst Y

[2 markah/marks]

- (b) Rajah 2.2 menunjukkan sebuah poster “Sayangi Jantung Anda”.
 Diagram 2.2 shows a poster “Love Your Heart”.



Rajah 2.2
 Diagram 2.2

Minyak sayuran dan lemak haiwan mengandungi lemak tepu dan lemak tak tepu. Berdasarkan Rajah 2.2, kenalpasti jenis lemak yang boleh menyebabkan perubahan keadaan arteri tersebut. Terangkan mengapa.
 Vegetable oil and animal fats contain saturated and unsaturated fat.
 Based on Diagram 2.2, identify the types of fat that cause the change in the condition of the artery. Explain why.

.....

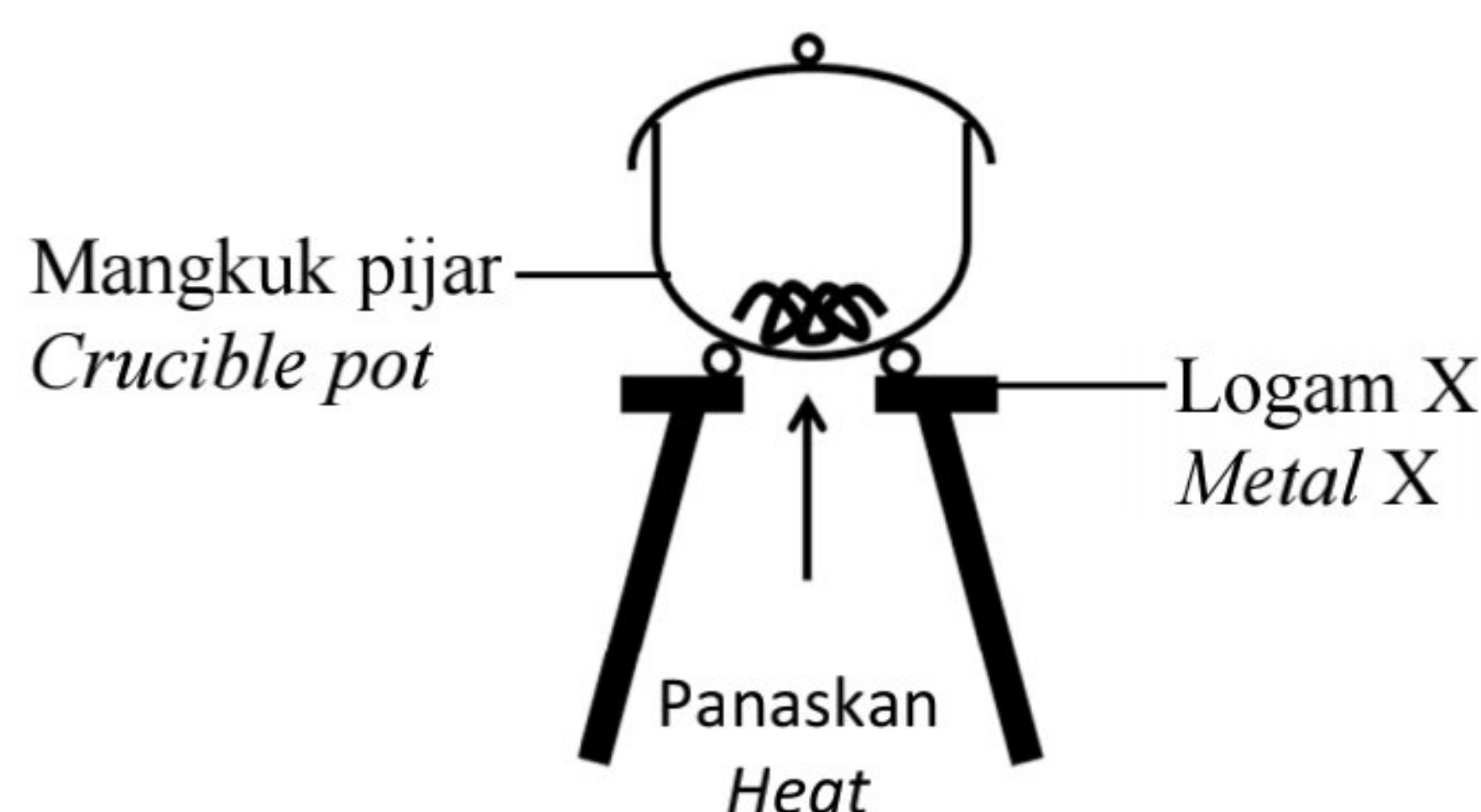
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[4 markah/marks]

- 4 Formula empirik bagi logam oksida X dapat ditentukan menggunakan kaedah yang ditunjukkan dalam Rajah 3. Keputusan eksperimen ditunjukkan dalam Jadual 2.
The empirical formula for oxide of metal X can be determined using the method shown in Diagram 3. The result of the experiment is shown in Table 2.



Rajah 3
Diagram 3

Penerangan <i>Description</i>	Jisim / g <i>Mass / g</i>
Jisim mangkuk pijar + penutup <i>Mass of crucible + lid</i>	24.0
Jisim mangkuk pijar + penutup + logam X <i>Mass of crucible + lid + metal X</i>	26.4
Jisim mangkuk pijar + penutup + oksida logam X <i>Mass of crucible + lid + oxide of metal X</i>	28.0

Jadual 2
Table 2

- (a) Nyatakan maksud formula empirik.
State the meaning of empirical formula.

.....

.....

[1 markah/mark]

- (b) Cadangkan satu logam yang formula empiriknya sesuai ditentukan menggunakan kaedah yang ditunjukkan dalam Rajah 3.
Suggest a metal whose empirical formula is suitable to determine by using the method shown in Diagram 3.

.....
[1 markah/mark]

- (c) Berdasarkan Jadual 2,
Based on Table 2,

- (i) Tentukan jisim oksigen dan jisim logam X yang terlibat.
Determine the mass of oxygen and the mass of metal X involved.

[2 markah/marks]

- (ii) Tentukan formula empirik bagi oksida logam X
Determine the empirical formula for metal oxide X.
[Jisim atom relatif /Relative atomic mass : X=24, O=16]

[3 markah/marks]

- 5 Jadual 3 menunjukkan ion-ion dalam air sungai yang tidak tercemar di Sungai A.
Table 3 shows the ions in unpolluted river water in River A.

Jenis ion <i>Type of ion</i>	Kepekatan (mol dm ⁻³) <i>Concentration (mol dm⁻³)</i>
SO ₄ ²⁻	0.69 x 10 ⁻⁴
Cl ⁻	1.60 x 10 ⁻⁴
Ca ²⁺	3.30 x 10 ⁻⁴
Mg ²⁺	1.50 x 10 ⁻⁴
Na ⁺	0.23 x 10 ⁻⁴
K ⁺	0.30 x 10 ⁻⁴

Jadual 3
Table 3

Sebuah kilang secara tidak sengaja membebaskan air buangan industri ke dalam Sungai A.
A factory accidentally flowed the waste water industry into River A.

- (a) Senaraikan anion yang terdapat dalam air sungai yang tidak tercemar di Sungai A.
List the anion present in unpolluted river water in River A.

.....
[1 markah/mark]

- (b) Selain daripada ion-ion yang dinyatakan dalam Jadual 3, cadangkan satu kation dan satu anion yang terdapat dalam air buangan kilang yang menyebabkan air sungai itu keruh.
Besides the ions stated in Table 3, suggest one cation and one anion in the waste water that cause the river water cloudy.

Kation : Anion :
Cation Anion

[2 markah/marks]

- (c) Ali menggunakan sabun dan air sungai A untuk membersihkan kesan minyak pada pakaiannya tetapi kotoran tersebut tidak dapat ditanggalkan.
Ali uses a soap and river water in River A to clean oil stain on his clothes but the blood stain cannot be removed.

- (i) Berdasarkan Jadual 3, kenal pasti satu ion dalam air sungai yang boleh menyebabkan pencucian pakaian menggunakan sabun menghasilkan kekat.
Based on Table 3, identify one ion in river water that can cause cleaning clothes using soap produce scum.

.....
[1 markah/mark]

- (ii) Dengan menggunakan bahan kimia yang dinamakan, huraikan bagaimana ion dinyatakan di(c)(i) itu boleh disingkirkan dari air sungai.
By using a named chemical substance, describe how ion stated in (c)(i) can be eliminate from river water.

.....

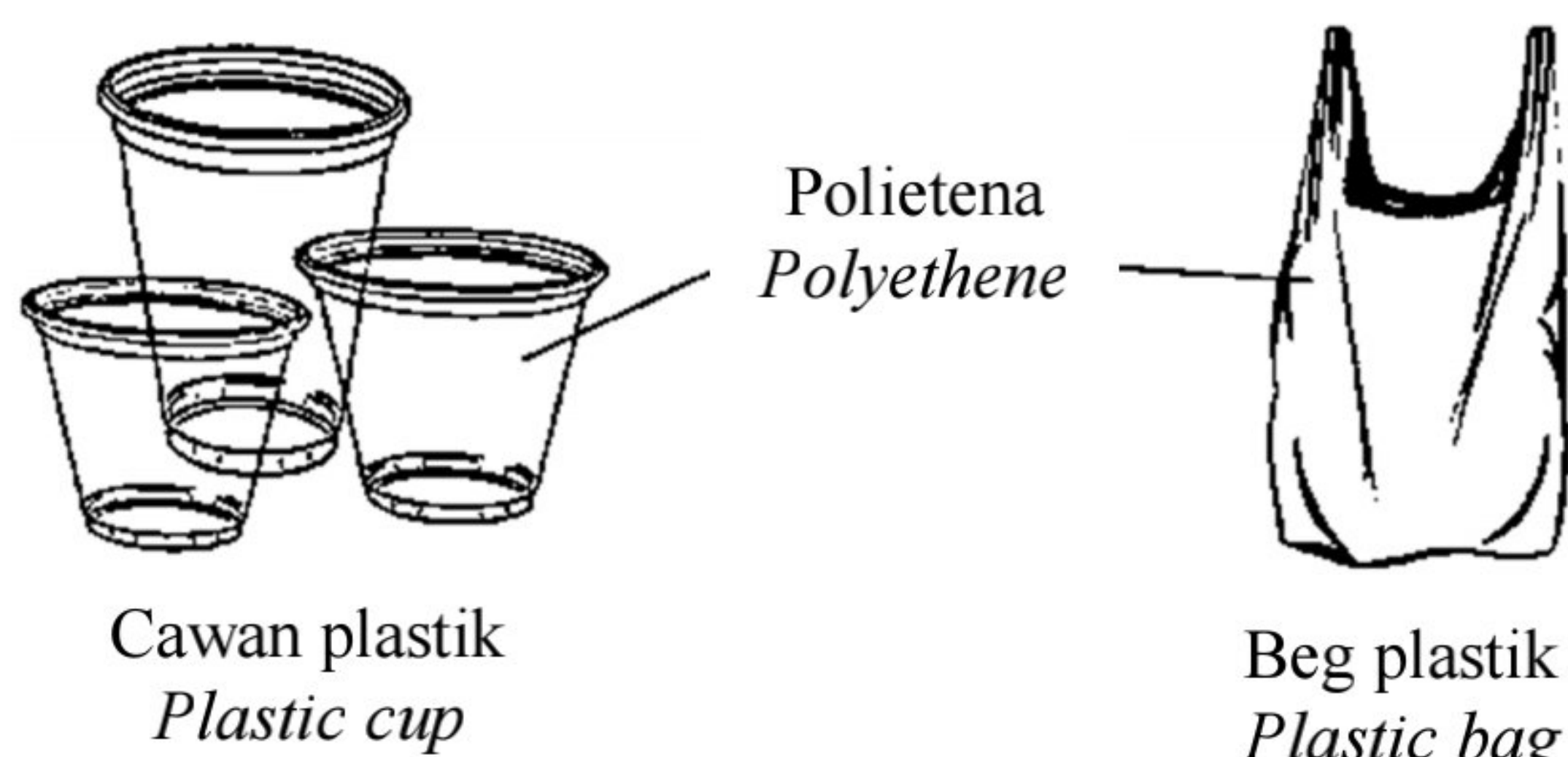
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.....

[4 markah/marks]

- 6 Rajah 4.1 menunjukkan satu produk polimer.
Diagram 4.1 shows a product of polymer.



Rajah 4.1
 Diagram 4.1

- (a) (i) Apakah maksud polimer?
What is the meaning of polymer?

.....

.....

[1 markah/mark]

- (ii) Nyatakan nama monomer bagi produk polimer dalam Rajah 4.1.
State the name of monomer of polymer product in Diagram 4.1.

.....

[1 markah/mark]

- (b) Rajah 4.2 menunjukkan produk getah sintetik yang dihasilkan daripada produk sampingan petroleum.

Diagram 4.2 shows the product of synthetic rubber which is produced from petroleum by product.



Rajah 4.2
Diagram 4.2

Nyatakan dua kaedah pelupusan barangan dalam Rajah 4.2 dan terangkan bagaimana barangan tersebut mengakibatkan pencemaran alam sekitar.

State two method how to dispose of item in Diagram 4.2 and explain how the item can cause environmental pollution.

.....

.....

.....

.....

[3 markah/marks]

- (c) Suatu eksperimen telah dijalankan untuk mengkaji kekenyalan getah X dan getah Y. Jadual 4 menunjukkan keputusan eksperimen tersebut.

An experiment was carried out to investigate the elasticity of rubber X and rubber Y. Table 4 shows the result of the experiment.

Jenis getah <i>Type of rubber</i>	Set	Panjang asal kepingan getah (cm) <i>Initial length of rubber strip (cm)</i>	Panjang kepingan getah dengan pemberat 100 g (cm) <i>Length of rubber strip with 100 g weight (cm)</i>	Panjang kepingan getah apabila pemberat 100 g dialihkan (cm) <i>Length of rubber strip when 100 g weight is removed (cm)</i>
Getah X <i>Rubber X</i>	I	12.00	12.35	12.10
	II	12.00	12.25	12.10
	III	12.00	12.30	12.15
Getah Y <i>Rubber Y</i>	I	12.00	12.05	12.00
	II	12.00	12.10	12.05
	III	12.00	12.00	12.00

Jadual 4
Table 4

Berdasarkan Jadual 4, banding kekenyalan getah X dan getah Y.
Terangkan jawapan anda.
*Based on Table 4, compare the elasticity between rubber X and rubber Y.
Explain your answer.*

.....

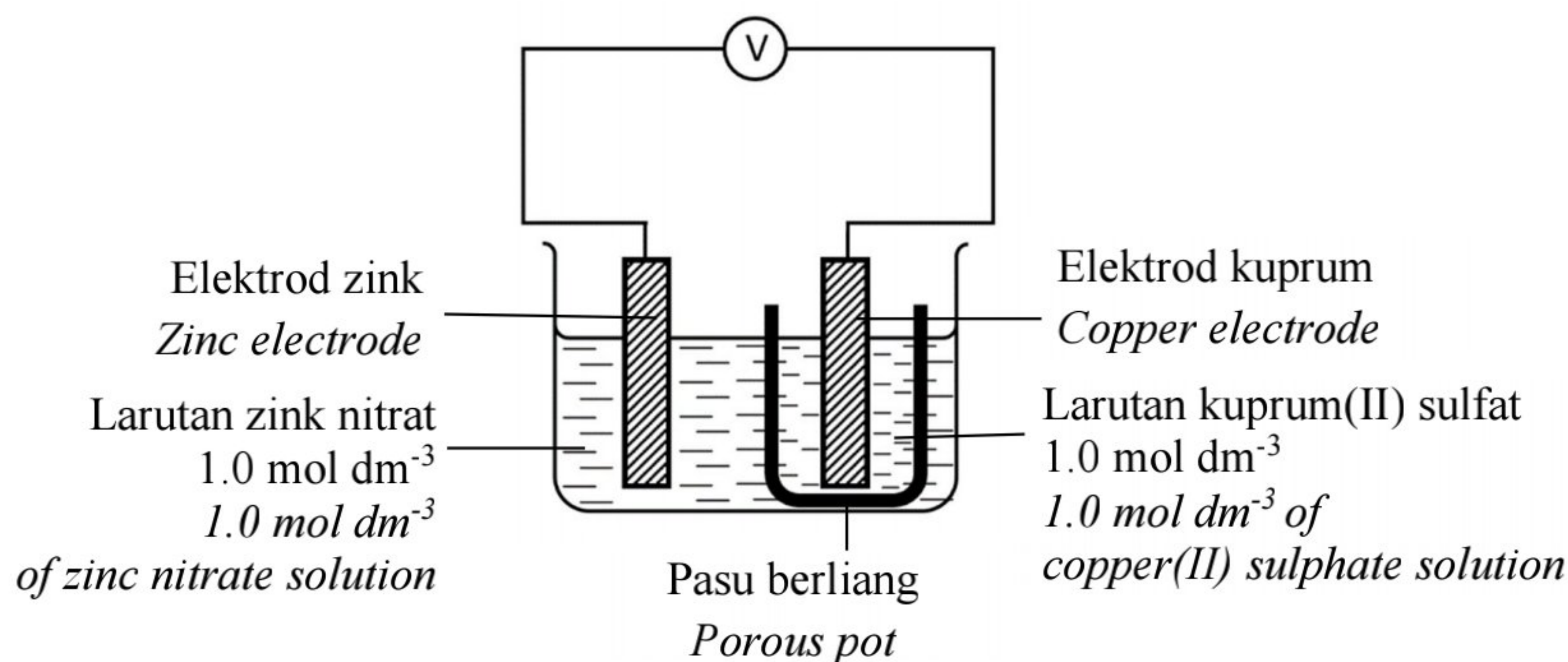
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[4 markah/marks]

- 7 Rajah 5.1 menunjukkan susunan radas bagi satu eksperimen untuk mengkaji beza keupayaan antara dua elektrod dalam tindak balas redoks.
 Diagram 5.1 shows the apparatus set-up for an experiment to study the potential difference between two electrodes in a redox reaction.



Rajah 5.1
 Diagram 5.1

- (a) Nyatakan warna bagi larutan kuprum(II) sulfat.
 State the colour of copper(II) sulphate solution.

.....
 [1 markah/mark]

- (b) Kenal pasti semua kation yang hadir dalam pasu berliang.
 Identify all the cations present in the porous pot.

.....
 [1 markah/mark]

- (c) Jadual 5.1 menunjukkan sebahagian daripada Siri Keupayaan Elektrod Piawai.
 Table 5.1 shows a part of Standard Electrode Potential Series.

Tindak balas sel setengah Half-cell reaction	E^0/V (297K)
$Mg^{2+} + 2e \rightleftharpoons Mg$	-2.38
$Zn^{2+} + 2e \rightleftharpoons Zn$	-0.76
$Fe^{2+} + 2e \rightleftharpoons Fe$	-0.44
$Cu^{2+} + 2e \rightleftharpoons Cu$	+0.34

Jadual 5.1
 Table 5.1

Berdasarkan Rajah 5.1 dan Jadual 5.1,
Based on Diagram 5.1 and Table 5.1,

- (i) tuliskan notasi sel untuk tindak balas itu.
write the cell notation for the reaction.

.....
 [2 markah/marks]

- (ii) hitung nilai E°_{sel} bagi tindak balas itu.
calculate the value of the E°_{cell} for the reaction.

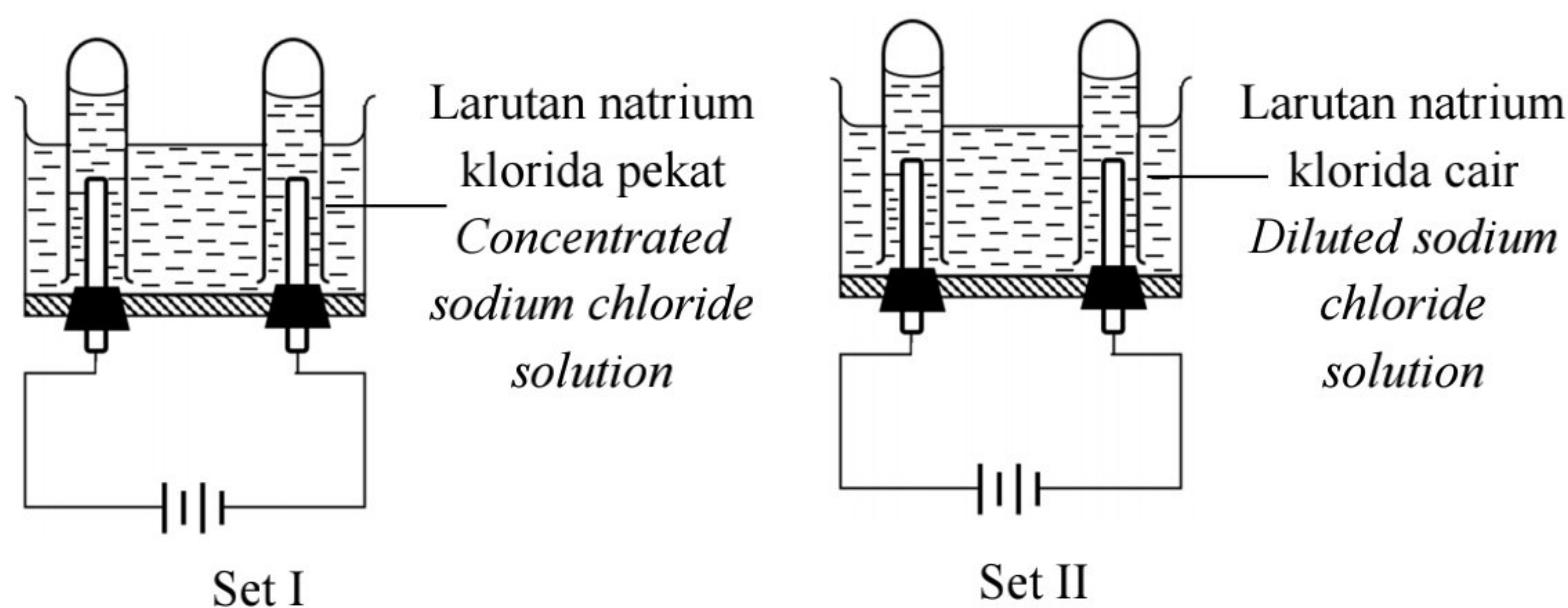
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 [1 markah/mark]

- (iii) Berdasarkan jawapan anda di 8(c)(ii), apakah yang perlu anda lakukan kepada anod untuk meningkatkan nilai E°_{sel} ? Terangkan jawapan anda.
Based on your answer in 8(c)(ii), what should you do to the anode to increase the value of E°_{cell} ? Explain your answer.

.....

 [3 markah/marks]

- (d) Rajah 5.2 menunjukkan dua sel elektrolisis larutan natrium klorida, NaCl dengan kepekatan berbeza menggunakan elektrod karbon.
Diagram 5.2 shows the two-electrolysis cell of sodium chloride, NaCl solution with different concentration using carbon electrode.



Rajah 5.2
 Diagram 5.2

Jadual 5.2 menunjukkan nilai keupayaan elektrod piawai sel setengah bagi beberapa bahan.
Diagram 5.2 shows the standard electrode potential values of half-cells for some substance

Tindak balas sel setengah <i>Reaction of half-cells</i>	$E^{\circ} / V (298K)$
$Na^{+} + 1e \rightleftharpoons Na$	- 2.71
$2H^{+} + 2e \rightleftharpoons H_2$	+ 0.00
$O_2 + 2H_2O + 4e \rightleftharpoons 4OH^{-}$	+ 0.40
$Cl_2 + 2e \rightleftharpoons 2Cl^{-}$	+ 1.36

Jadual 5.2
Table 5.2

Berdasarkan Rajah 5.2 dan Jadual 5.2, terangkan perbezaan pemerhatian pada anod bagi kedua-dua set eksperimen itu.

Based on Diagram 5.2 and Table 5.2, explain the differences of observation at the anode for both set of the experiment.

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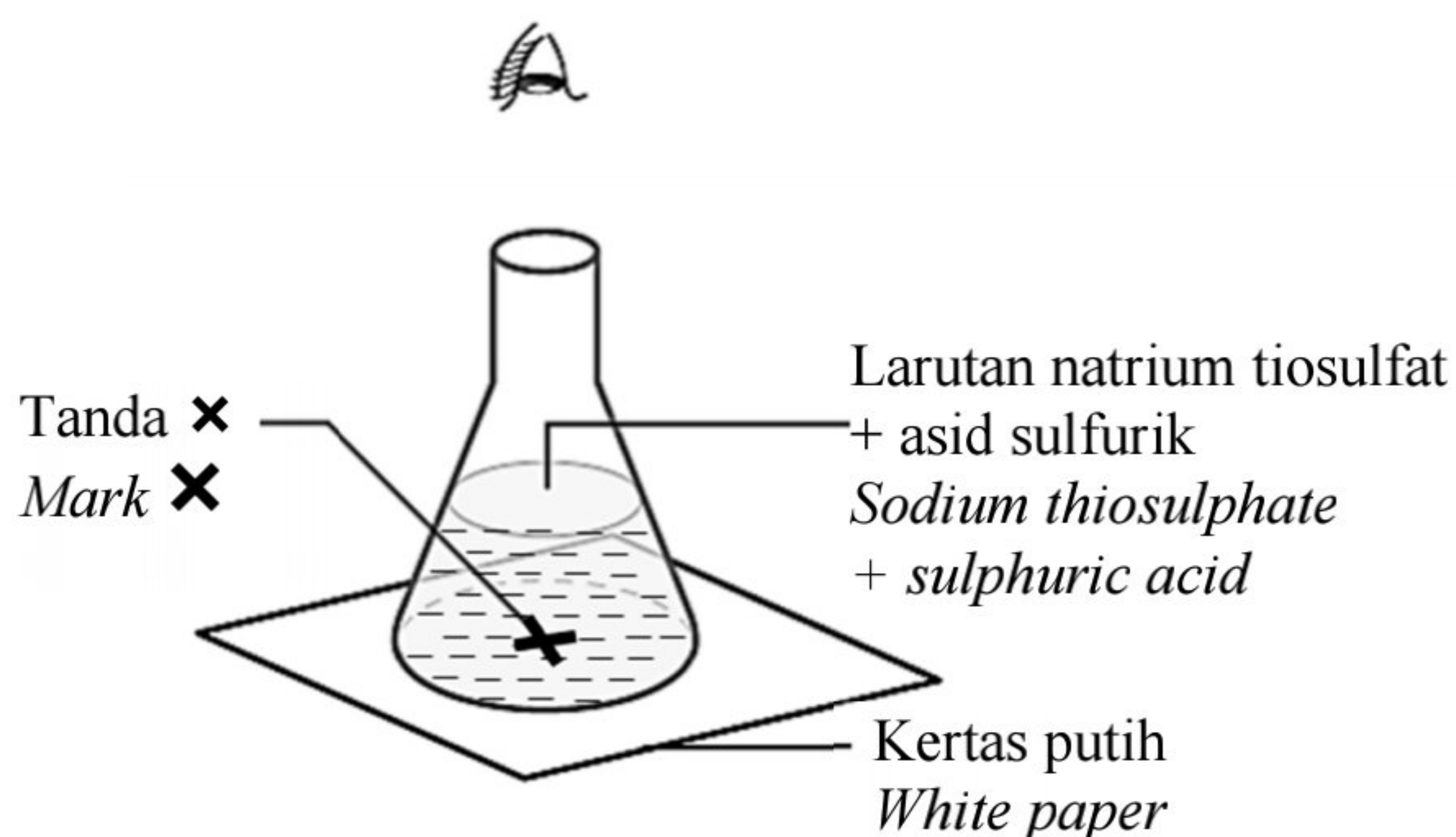
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[2 markah/marks]

- 8 (a) Rajah 6.1 menunjukkan susunan radas bagi Eksperimen I dan Eksperimen II pada suhu yang berbeza untuk menentukan kadar tindak balas antara natrium tiosulfat dengan asid sulfurik.

Diagram 6.1 shows the apparatus set up for Experiment I and II at different temperatures to determine the rate of reaction between sodium thiosulphate with sulphuric acid.



Rajah 6.1
Diagram 6.1

Jadual 6 menunjukkan keputusan dua eksperimen itu.

Table 6 shows the result of the experiment.

Eksperimen <i>Experiment</i>	Bahan tindak balas <i>Reactants</i>	Masa untuk tanda "X" hilang dari penglihatan / s <i>Time taken for the mark "X" to disappear from sight / s</i>
I	50 cm ³ larutan natrium tiosulfat 0.2 mol dm ⁻³ + asid sulfurik 1.0 mol dm ⁻³ berlebihan pada 30°C 50 cm ³ of 0.2 mol dm ⁻³ sodium thiosulphate solution + 1.0 mol dm ⁻³ excess sulphuric acid at 30°C	40
II	50 cm ³ larutan natrium tiosulfat 0.2 mol dm ⁻³ + asid sulfurik 1.0 mol dm ⁻³ berlebihan pada 40°C 50 cm ³ of 0.2 mol dm ⁻³ sodium thiosulphate solution + 1.0 mol dm ⁻³ excess sulphuric acid at 40°C	20

Jadual 6

Table 6

Berdasarkan Rajah 6.1 dan Jadual 6,
Based on Diagram 6.1 and Table 6,

- (i) Apakah warna mendakan sulfur?
What is the colour of sulphur precipitate?

.....
[1 markah/mark]

- (ii) Hitungkan kadar tindak balas bagi :
Calculate the average rate of reaction for:

Eksperimen I
Experiment I

Eksperimen II
Experimen II

[2 markah/*marks*]

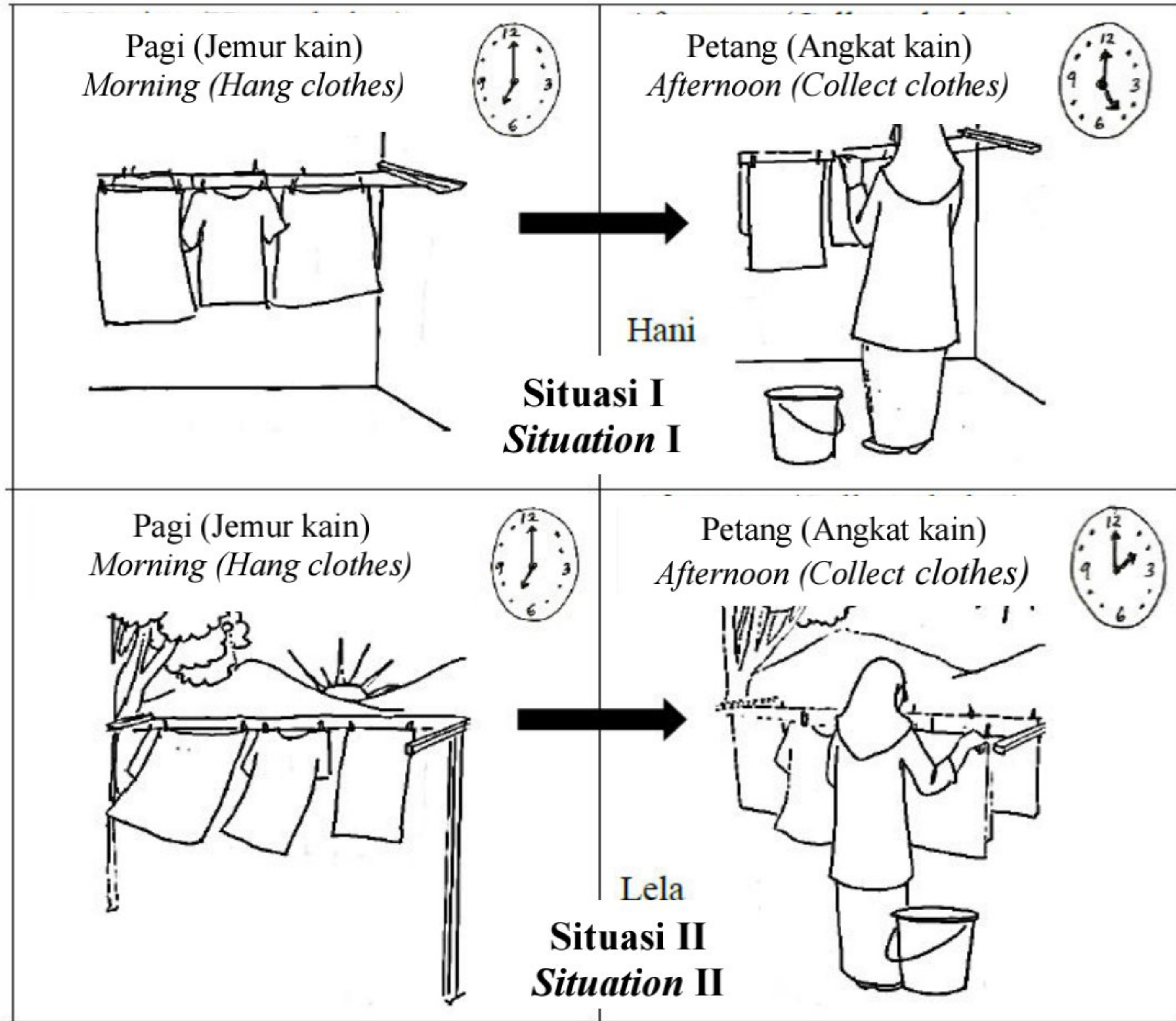
- (iii) Bandingkan kadar tindak balas Eksperimen I dan Eksperimen II.
Compare the rate of reaction of Experiment I and Experiment II.

.....
[1 markah/*mark*]

- (iv) Terangkan jawapan anda di (a)(iii) menggunakan teori perlanggaran.
Explain your answer in (a)(iii) using collision theory.

.....
.....
.....
.....
[3 markah/*marks*]

- (b) Rajah 6.2 menunjukkan Hani dan Lela menjemur pakaian mereka dalam dua situasi yang berbeza. Pada pukul 7.00 pagi, Hani menjemur pakaiannya di balkoni yang berbumbung manakala Lela menjemur pakaiannya di bawah cahaya matahari. *Diagram 6.2 shows Hani and Lela hang their clothes in two difference situations. At 7.00 a.m, Hani hang her clothes at the balcony under the roof while Lela hangs her clothes outside the house under the sun light.*



Rajah 6.2
Diagram 6.2

Berdasarkan maklumat dalam Rajah 6.2, situasi manakah boleh menyebabkan pakaian mengering dengan lebih cepat. Terangkan jawapan anda.
Based on information in Diagram 6.2, which situation can cause the clothes to dry faster? Explain your answer.

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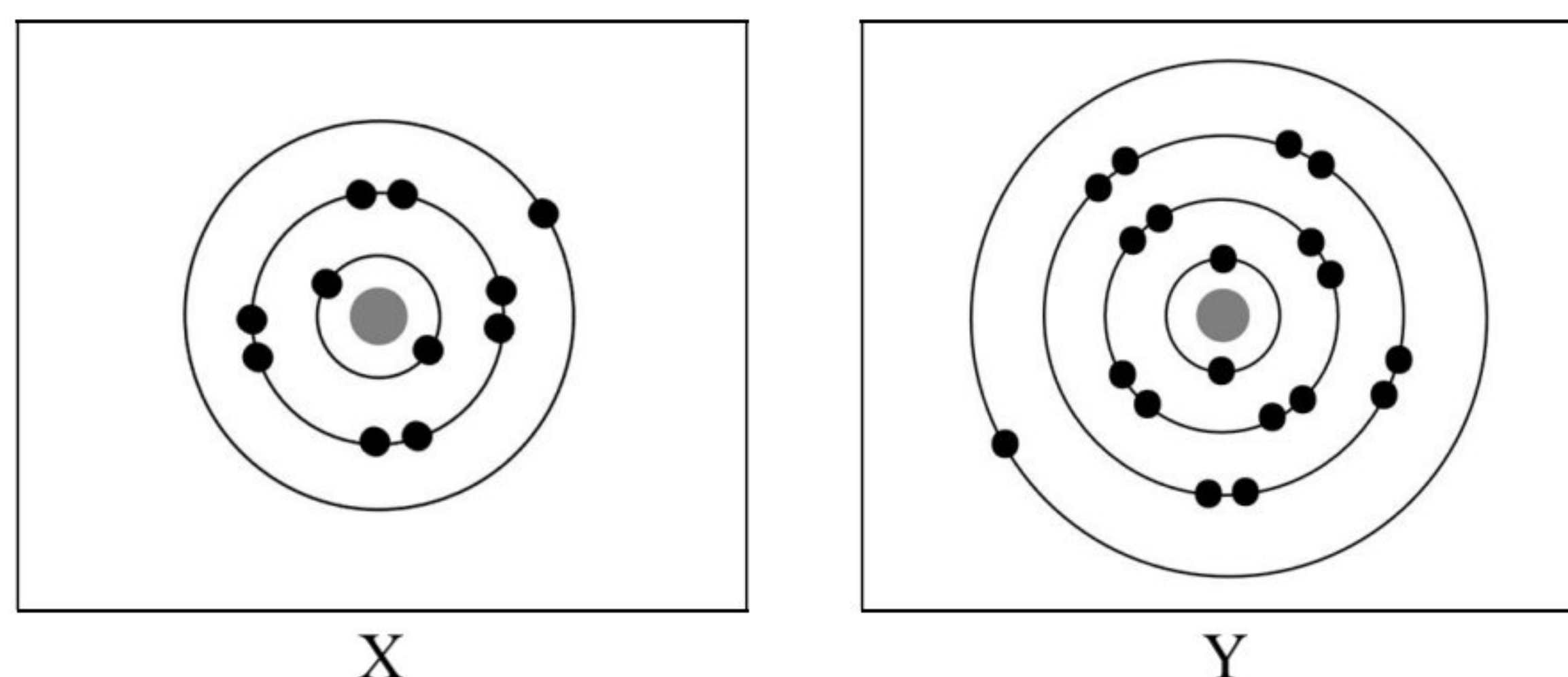
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[3 markah/marks]

Bahagian B
Section B
[20 markah/ 20 marks]

Jawab mana-mana **satu** soalan daripada bahagian ini.
*Answer any **one** question from this section.*

- 9 (a) Rajah 7.1 menunjukkan susunan elektron bagi atom unsur X dan unsur Y yang terletak dalam kumpulan yang sama dalam Jadual Berkala Unsur.
Diagram 7.1 shows the electron arrangement for atoms of element X and element Y which are located in the same group in the Periodic Table of Elements.



Rajah 7.1
Diagram 7.1

Berdasarkan Rajah 7.1,
Based on Diagram 7.1,

- (i) Nyatakan maksud bagi elektron valens dan nyatakan kumpulan di mana terletaknya unsur X dan unsur Y dalam Jadual Berkala Unsur.
State the meaning of valence electron and state the group where element X and element Y are located in the Periodic Table of Elements.

[2 markah/ 2 marks]

- (ii) Tulis persamaan kimia bagi tindak balas antara unsur X dan gas oksigen. Hitung jisim hasil tindak balas yang diperoleh jika 1200 cm³ gas oksigen digunakan dalam tindak balas tersebut.
[Jisim atom relatif: O = 16, X = 23; Isi padu molar gas pada keadaan bilik = 24 dm³ mol⁻¹]
Write the chemical equation for the reaction between element X and oxygen gas.
Calculate the mass of the product obtained if 1200 cm³ of oxygen gas is used in the reaction.
[Relative atomic mass: O = 16, X = 23; Molar volume of gas at room condition = 24 dm³ mol⁻¹]

[5 markah/ 5 marks]

- (iii) Unsur X dan unsur Y menunjukkan sifat kimia yang sama tetapi dengan kereaktifan yang berbeza.
Bandingkan kereaktifan unsur X dan unsur Y.
Terangkan jawapan anda.

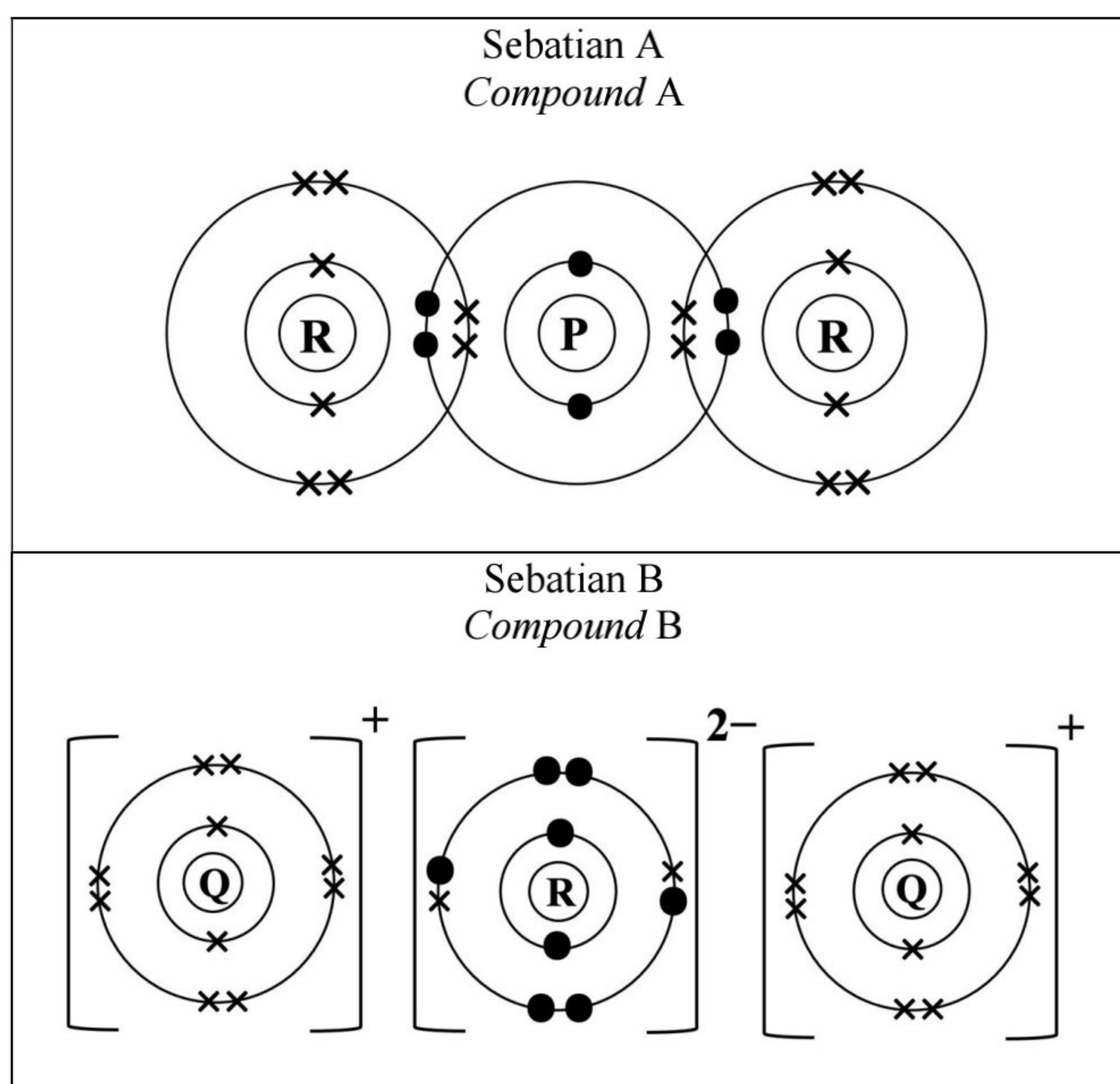
Element X and element Y shows the same chemical properties but with different reactivity.

Compare the reactivity of element X and element Y.

Explain your answer.

[3 markah/ 3 marks]

- (b) Rajah 7.2 menunjukkan susunan elektron bagi sebatian A dan sebatian B.
Diagram 7.2 shows the electron arrangement of compound A and compound B.



Rajah 7.2
Diagram 7.2

Berdasarkan Rajah 7.2,
Based on Diagram 7.2,

- (i) Apakah maksud bagi kation?
What is the meaning of cation?

[1 markah/ 1 mark]

- (ii) Unsur R bertindak balas dengan unsur P membentuk sebatian A manakala membentuk sebatian B apabila ia bertindak balas dengan unsur Q.
Tentukan jenis ikatan yang terbentuk dalam sebatian A dan sebatian B.
Terangkan pembentukan bagi salah satu sebatian sama ada sebatian A **atau** sebatian B.

Element R reacts with element P to form compound A while compound B is formed when it reacts with element Q.

Determine the type of bond formed in compound A and compound B.

*Explain the formation of one of the compounds either compound A **or** compound B.*

[7 markah/ 7 marks]

- (iii) Takat lebur sebatian B adalah lebih tinggi daripada sebatian A.
Terangkan mengapa.

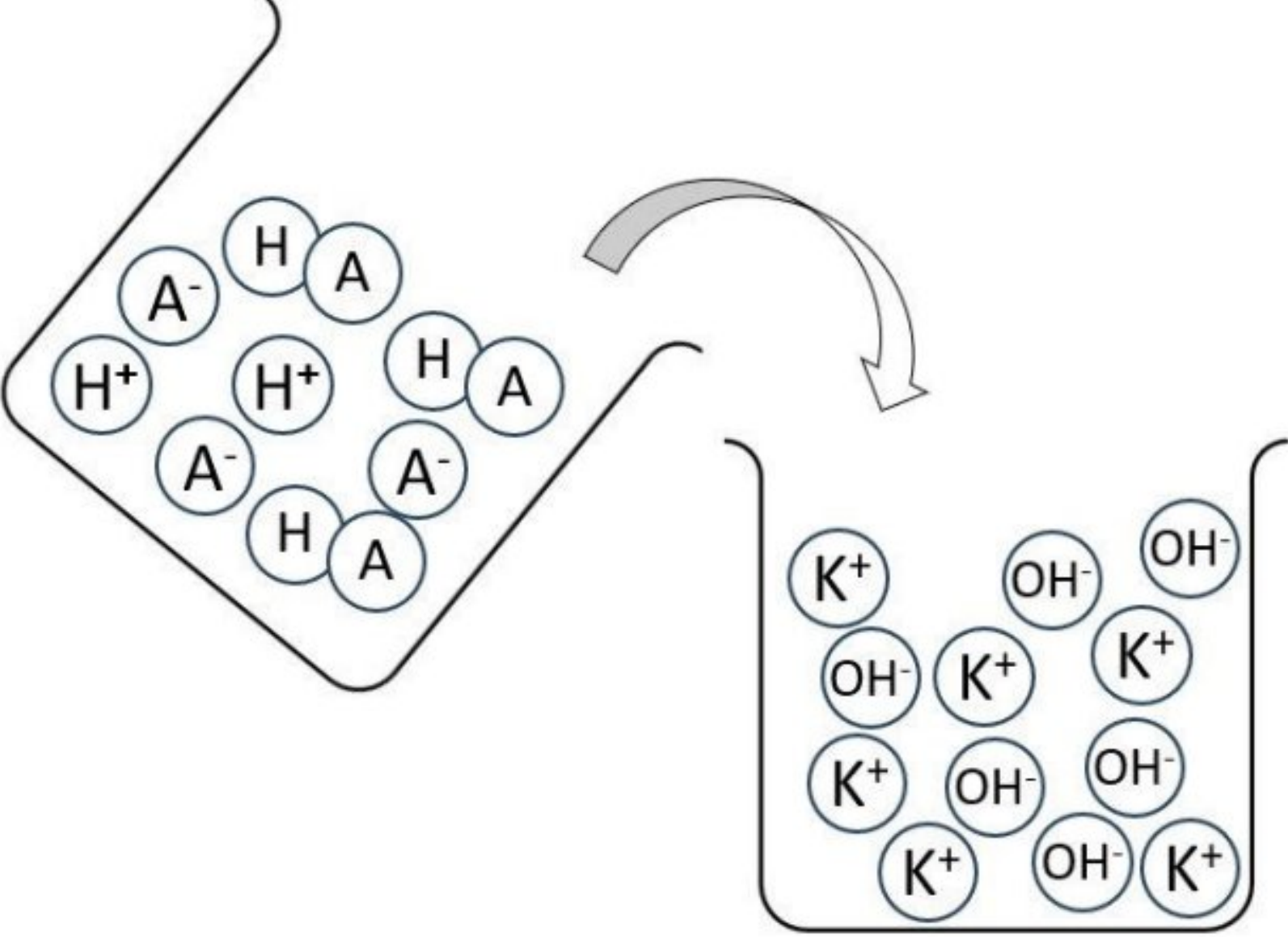
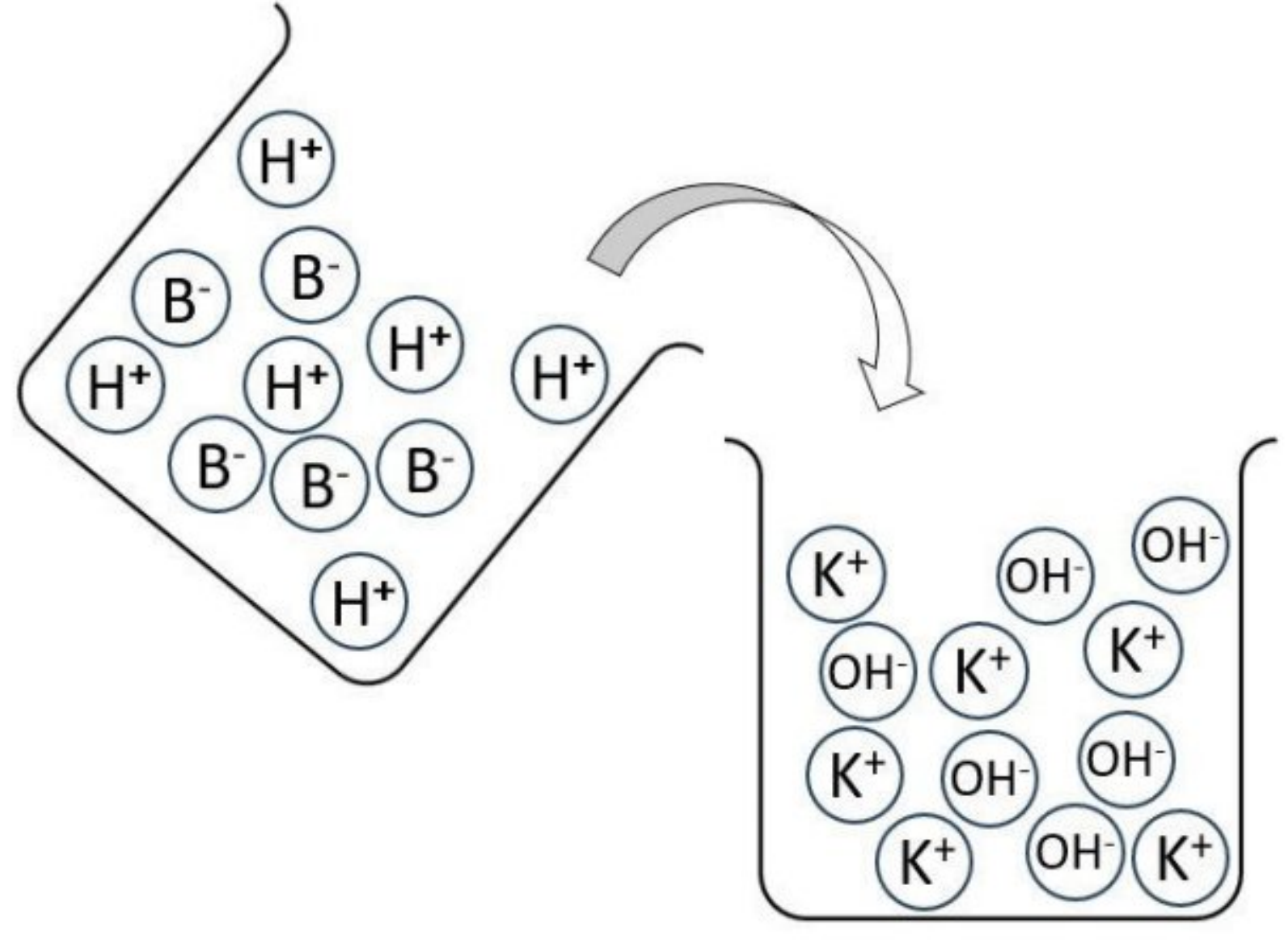
The melting point of compound B is higher than compound A.

Explain why.

[2 markah/ 2 marks]

- 10 (a) Rajah 8.1 menunjukkan bahan tindak balas dan nilai haba peneutralan, ΔH bagi tindak balas larutan kalium hidroksida dengan asid HA dan asid HB. Kedua-dua asid HA dan asid HB adalah asid monoprotik.

Diagram 8.1 shows the reactants and the value of the heat of neutralization, ΔH for the reaction of potassium hydroxide solution with HA acid and HB acid. Both HA acid and HB acid are monoprotic acids.

Bahan tindak balas <i>Reactants</i>	Haba peneutralan, ΔH <i>Heat of neutralisation, ΔH</i>
	$- x \text{ kJ mol}^{-1}$
	$- y \text{ kJ mol}^{-1}$

Rajah 8.1
Diagram 8.1

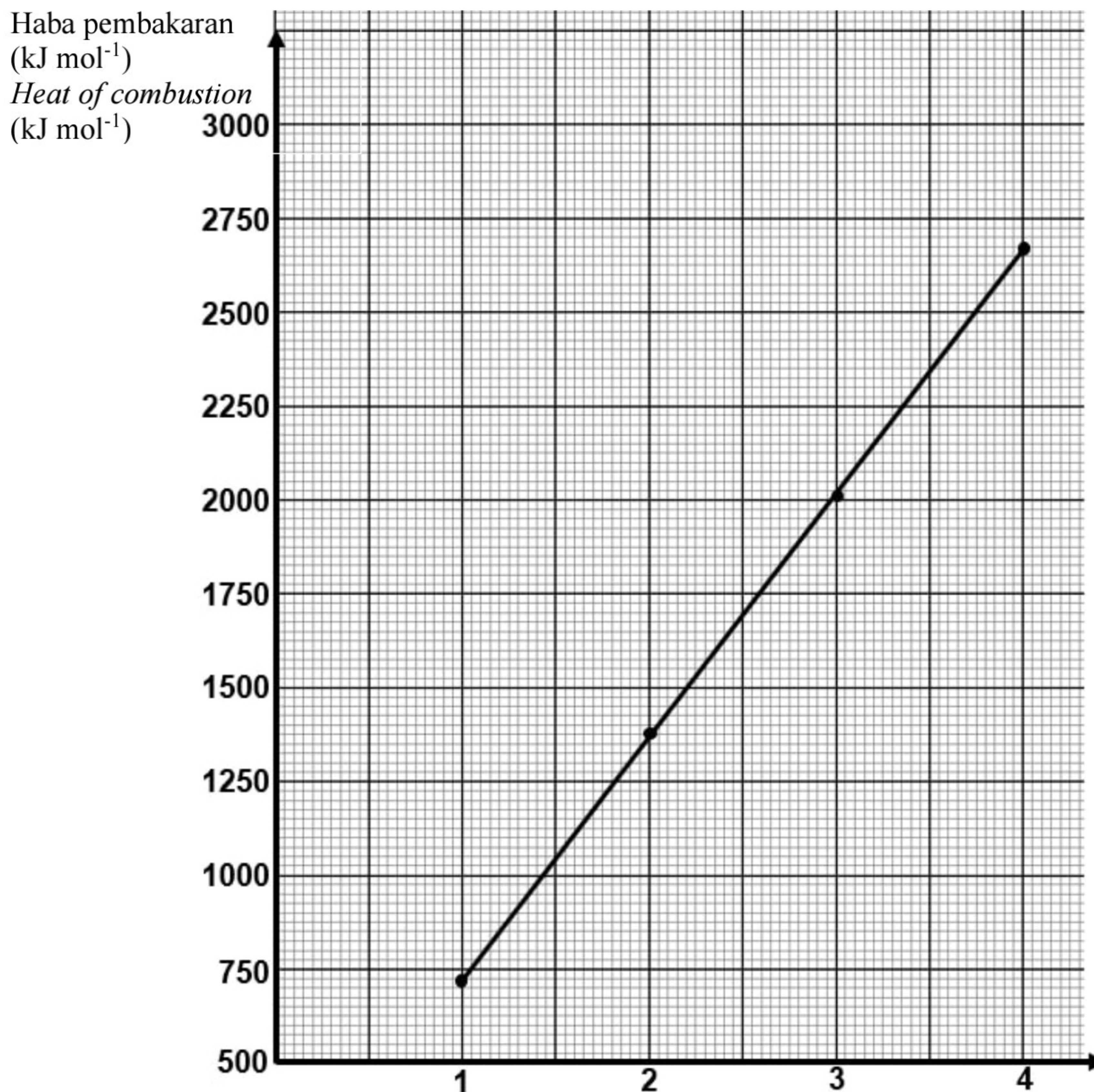
Nilai $- x \text{ kJ mol}^{-1}$ adalah lebih kecil dari $- y \text{ kJ mol}^{-1}$. Cadangkan nama bagi asid HA dan asid HB dan tuliskan persamaan kimia bagi tindak balas salah satu asid yang dinamakan dengan larutan kalium hidroksida. Terangkan mengapa terdapat perbezaan dalam nilai haba peneutralan itu.

The value of $- x \text{ kJ mol}^{-1}$ is smaller than $- y \text{ kJ mol}^{-1}$. Suggest the name of HA acid and HB acid and write the chemical equation for the reaction of one of the named acid with potassium hydroxide solution. Explain why there is a difference in the value of heat of neutralisation.

[7 markah/marks]

- (b) Rajah 8.2 menunjukkan graf haba pembakaran alkohol melawan bilangan atom karbon per molekul alkohol.

Diagram 8.2 shows a graph of the heat of combustion of alcohol against number of carbon atom per molecule of alcohol.



Rajah 8.2
Diagram 8.2

- (i) Nyatakan definisi bagi haba pembakaran. Berdasarkan Rajah 8.2, bandingkan nilai haba pembakaran bagi etanol dan propanol. Terangkan jawapan anda dari segi pembentukan ikatan dalam molekul karbon dioksida dan air yang terhasil. Apakah nilai haba pembakaran etanol, C₂H₅OH?
State the definition of heat of combustion. Based on Diagram 8.2, compare the heat of combustion of ethanol and propanol. Explain your answer in terms of the formation of bond in carbon dioxide and water molecule produced. What is the value of heat combustion of ethanol, C₂H₅OH?

[6 markah/marks]

- (ii) Tulis persamaan kimia bagi pembakaran lengkap propanol. Jika 1.08 g propanol digunakan untuk memanaskan 200 cm³ air, hitung bilangan mol propanol dan perubahan suhu semasa tindak balas.

[Diberi jisim molar propanol = 60 g mol⁻¹]

[Muatan baba tertentu bagi air, $c = 4.2 \text{ J g}^{-1} \text{ }^\circ\text{C}^{-1}$, Ketumpatan air = 1.0 g cm⁻³]

Write a chemical equation for the complete combustion of propanol. If 1.08 g of propanol is used to heat 200 cm³ of water, calculate the number of moles of propanol and the temperature change during the reaction.

[Given that molar mass of propanol = 60 g mol⁻¹]

[Specific heat capacity of water, $c = 4.2 \text{ J g}^{-1} \text{ }^\circ\text{C}^{-1}$,

Density of water = 1.0 g cm⁻³]

[5 markah/marks]

- (c) Nilai bahan api ialah jumlah tenaga haba terbebas apabila 1 g bahan api terbakar lengkap dalam oksigen. Jadual 7 menunjukkan nilai-nilai haba pembakaran dan jisim molar bagi dua jenis bahan api.

Fuel value is the amount of heat energy released when 1 g of fuel is burned completely in oxygen. Table 7 shows the value of heat of combustion and molar mass for two types of fuel.

Jenis bahan api <i>Type of fuel</i>	Haba pembakaran (kJ mol ⁻¹) <i>Heat of combustriion (kJ mol⁻¹)</i>	Jisim molar (gmol ⁻¹) <i>Molar mass (gmol⁻¹)</i>
Butana <i>Butane</i>	2880	58
Butanol <i>Butanol</i>	2679	74

Jadual 7

Table 7

Berdasarkan Jadual 7, tentukan bahan api terbaik yang boleh digunakan dan berikan satu sebab kepada jawapan anda.

Based on Table 7, Determine the best fuel to be used and give a reason for your answer.

[2 markah/marks]

Bahagian C
Section C

[20 markah]

Jawab **semua** soalan dalam bahagian ini.

Answer all questions in this section.

- 11 Jadual 8 menunjukkan sifat sebatian karbon X, sebatian karbon Y dan sebatian karbon Z yang mempunyai dua atom karbon permolekul.

Table 8 shows the properties of three carbon compounds X, Y and Z that consist of two carbon atoms permolecule.

Sebatian karbon <i>Carbon compound</i>	Sifat <i>Properties</i>
X	<ul style="list-style-type: none"> • Larut dalam air <i>Dissolve in water</i> • Bertindak balas dengan bes menghasilkan garam karboksilat dan air <i>Reacts with base to produce carboxylate salt and water</i>
Y	<ul style="list-style-type: none"> • Tidak larut dalam air <i>Does not dissolve in water.</i> • Menyahwarna warna perang air bromin <i>Decolourises the brown colour of bromine water</i>
Z	<ul style="list-style-type: none"> • Larut dalam air <i>Dissolve in water</i> • Mudah terbakar dengan nyalaan biru dan tidak menghasilkan jelaga <i>Easily burned with blue flame and does not produce soot</i>

Jadual 8

Table 8

- (a) Apakah yang dimaksudkan dengan sebatian karbon dan nyatakan jenis sebatian karbon yang berasal daripada benda hidup. Lukis struktur formula bagi sebatian karbon X dan Y.
What is meant by carbon compound and state the type of carbon compound that originated from living things. Draw the structural formula for carbon compound X and Y.

[4 markah/marks]

- (b) Berdasarkan maklumat dalam Jadual 8, nyatakan siri homolog bagi X, Y dan Z. Sebatian karbon Z boleh ditukar kepada sebatian karbon X melalui satu proses. Huraikan secara ringkas langkah proses tersebut di dalam makmal. Huraian disertakan dengan nama hasil tindak balas.

Based on information in Table 8, state the homologous series of X, Y and Z. Carbon compound Z can be converted to carbon compound X through a process. Describe briefly the steps of the process in the laboratory. The description includes the name of the product of the reaction.

[10 markah/marks]

- (c) Sebatian karbon boleh terbakar lengkap dalam udara menghasilkan air dan karbon dioksida. Tulis persamaan kimia bagi pembakaran lengkap untuk sebatian karbon Y dan sebatian karbon Z. Hitung isipadu gas karbon dioksida yang terhasil apabila 0.02 mol sebatian karbon Z terbakar lengkap.

Carbon compounds can be completely burnt in the air to produce water and carbon dioxide.

Write a chemical equation for the complete combustion for carbon compounds Y and Z.

Calculate the volume of carbon dioxide gas produced when 0.02 mol of carbon compound Z is burnt completely.

[Isipadu molar gas pada keadaan bilik: $24 \text{ dm}^3 \text{ mol}^{-1}$]

[Molar volume of gas at room conditions: $24 \text{ dm}^3 \text{ mol}^{-1}$]

[6 markah/marks]

**KERTAS SOALAN TAMAT
END OF QUESTION PAPER**

PERIODIC TABLE OF THE ELEMENTS

Proton number	Symbol	Name of element	Relative atomic mass
1	H	Hydrogen	1
2	He	Helium	4
3	Li	Lithium	7
4	Be	Beryllium	9
5	B	Boron	11
6	C	Carbon	12
7	N	Nitrogen	14
8	O	Oxygen	16
9	F	Flourine	19
10	Ne	Neon	20
11	Na	Sodium	23
12	Mg	Magnesium	24
13	Al	Aluminium	27
14	Si	Silicon	28
15	P	Phosphorus	31
16	S	Sulfur	32
17	Cl	Chlorine	35.5
18	Ar	Argon	40
19	K	Potassium	39
20	Ca	Calcium	40
21	Sc	Scandium	45
22	Ti	Titanium	48
23	V	Vanadium	51
24	Cr	Chromium	52
25	Mn	Manganese	55
26	Fe	Iron	56
27	Co	Cobalt	59
28	Ni	Nickel	59
29	Cu	Copper	64
30	Zn	Zinc	65
31	Ga	Gallium	70
32	Ge	Germanium	73
33	As	Arsenic	75
34	Se	Selenium	79
35	Br	Bromine	80
36	Kr	Krypton	84
37	Rb	Rubidium	86
38	Sr	Strontium	88
39	Y	Yttrium	89
40	Zr	Zirconium	91
41	Nb	Niobium	93
42	Mo	Molybdenum	96
43	Tc	Technetium	98
44	Ru	Ruthenium	101
45	Rh	Rhodium	103
46	Pd	Palladium	106
47	Ag	Silver	108
48	Cd	Cadmium	112
49	In	Indium	115
50	Sn	Tin	119
51	Sb	Antimony	122
52	Te	Tellurium	128
53	I	Iodine	127
54	Xe	Xenon	131
55	Cs	Cesium	133
56	Ba	Barium	137
57	La	Lanthanum	139
58	Ce	Cerium	140
59	Pr	Praseodymium	141
60	Nd	Neodymium	144
61	Pm	Promethium	147
62	Sm	Samarium	150
63	Eu	Europium	152
64	Gd	Gadolinium	157
65	Tb	Terbium	159
66	Dy	Dysprosium	163
67	Ho	Holmium	165
68	Er	Erbium	167
69	Tm	Thulium	169
70	Yb	Ytterbium	173
71	Lu	Lueticium	175
72	Hf	Hafnium	179
73	Ta	Tantalum	181
74	W	Tungsten	184
75	Re	Rhenium	186
76	Os	Osmium	190
77	Ir	Iridium	192
78	Pt	Platinum	195
79	Au	Gold	197
80	Hg	Mercury	201
81	Tl	Thallium	204
82	Pb	Lead	207
83	Bi	Bismuth	209
84	Po	Polonium	210
85	At	Astatine	210
86	Rn	Radon	222
87	Fr	Francium	223
88	Ra	Radium	226
89	Ac	Actinium	227
90	Th	Thorium	232
91	Pa	Protactinium	231
92	U	Uranium	238
93	Np	Neptunium	237
94	Pu	Plutonium	244
95	Am	Americium	243
96	Cm	Curium	247
97	Bk	Berkelium	247
98	Cf	Californium	249
99	Es	Einsteinium	254
100	Fm	Fermium	253
101	Md	Mendelevium	256
102	No	Nobelium	254
103	Lr	Lawrensium	257
104	Unq	Unnilquadium	257
105	Unp	Unnilpentium	260
106	Unh	Unnilhexium	263
107	Uns	Unnilseptium	262
108	Uno	Unniloctium	265
109	Une	Unnilennium	266