

NO. KAD PENGENALAN 

						-			-				
--	--	--	--	--	--	---	--	--	---	--	--	--	--

ANGKA GILIRAN 

--	--	--	--	--	--	--	--	--

Nama ..... Tingkatan .....

Sekolah .....

## MODUL PINTAS 2019 TINGKATAN 5

**4541/2**

### CHEMISTRY

Kertas 2

Ogos/September

2  $\frac{1}{2}$  jam

Dua jam tiga puluh minit

#### JANGAN BUKA KERTAS PEPERIKSAAN INI SEHINGGA DIBERITAHU

1. *Tulis nombor kad pengenalan, angka giliran, nama, tingkatan dan sekolah anda pada petak yang disediakan.*
2. *Kertas peperiksaan ini adalah dalam dwibahasa.*
3. *Soalan dalam bahasa Inggeris mendahului soalan yang sepadan dalam bahasa Melayu.*
4. *Calon dibenarkan menjawab keseluruhan atau sebahagian soalan sama ada dalam bahasa Inggeris atau bahasa Melayu.*
5. *Calon dikehendaki membaca maklumat di halaman belakang kertas peperiksaan ini.*

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

Kertas peperiksaan ini mengandungi 31 halaman bercetak dan 1 halaman tidak bercetak.



**Section A**  
**Bahagian A**

[60 marks]

[60 markah]

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

- 1** Diagram 1 shows symbols of atoms P, Q, R, S and T.  
*Rajah 1 menunjukkan simbol bagi atom P, Q, R, S dan T.*

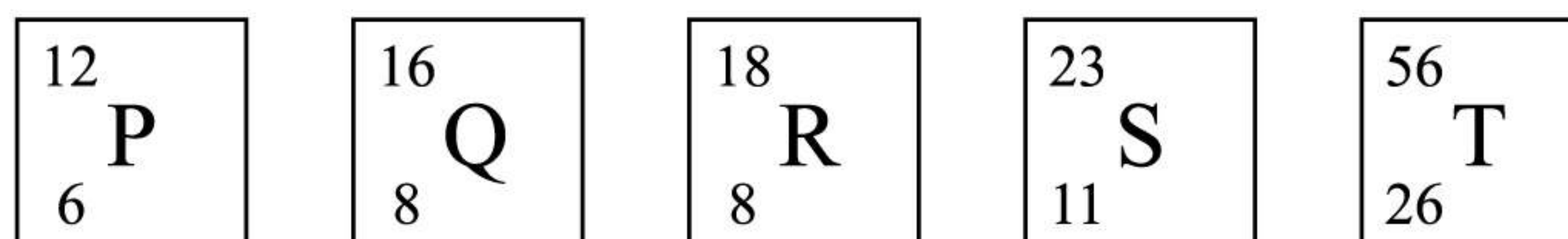


Diagram 1  
*Rajah 1*

The letters used are not the actual symbols of the atoms. Use the letters to answer the following questions.

*Huruf yang digunakan bukan simbol sebenar bagi atom-atom itu. Gunakan huruf tersebut untuk menjawab soalan berikut.*

- (a) Draw the atomic structure of atom P.  
*Lukis struktur atom bagi atom P.*

**1(a)**

2

[2 marks]

[2 markah]

**1(b)(i)**

1

- (b) (i) Based on Diagram 1, which atoms are isotopes?

*Berdasarkan Rajah 1, atom-atom yang manakah merupakan isotop?*

.....

[1 mark]

[1 markah]

**1(b)(ii)**

1

- (ii) Explain your answer in 1(b)(i).

*Terangkan jawapan anda dalam 1(b)(i).*

.....

[1 mark]

[1 markah]



- (c) (i) Write the electron arrangement for atom S.

*Tulis susunan elektron atom S.*

.....  
[1 mark]  
[1 markah]

1(c)(i)

	1
--	---

- (ii) When S is exposed to the air, it reacts with oxygen to form an oxide of S.  
Write the chemical formula of the oxide.

*Apabila S terdedah kepada udara, ia bertindak balas dengan oksigen untuk membentuk oksida S.*

*Tulis formula kimia oksida itu.*

.....  
[1 mark]  
[1 markah]

1(c)(ii)

	1
--	---

- (iii) Oxide S is highly soluble in water to form an aqueous solution.

State **one** observation when red litmus paper is put into the solution formed.

*Oksida S sangat larut dalam air untuk membentuk larutan akueus.*

*Nyatakan **satu** pemerhatian apabila kertas litmus merah dimasukkan ke dalam larutan yang terbentuk itu.*

.....  
[1 mark]  
[1 markah]

1(c)(iii)

	1
--	---

- (d) Element T is placed in Group 8 in the Periodic Table of Elements. It is able to react with chlorine to form a green solid  $\text{TCl}_2$  or brown solid  $\text{TCl}_3$ .

Explain why.

*Unsur T terletak dalam Kumpulan 8 di dalam Jadual Berkala Unsur. Ia boleh bertindak balas dengan klorin untuk membentuk pepejal berwarna hijau  $\text{TCl}_2$  atau berwarna perang  $\text{TCl}_3$ .*

*Terangkan mengapa.*

.....  
[2 marks]  
[2 markah]

1(d)

	2
--	---

Total  
A1

	9
--	---



- 2 Diagram 2 shows the set-up of apparatus used by students of 4 Murni to determine the empirical formula of oxide D.

*Rajah 2 menunjukkan susunan radas yang digunakan oleh pelajar 4 Murni untuk menentukan formula empirik oksida D.*

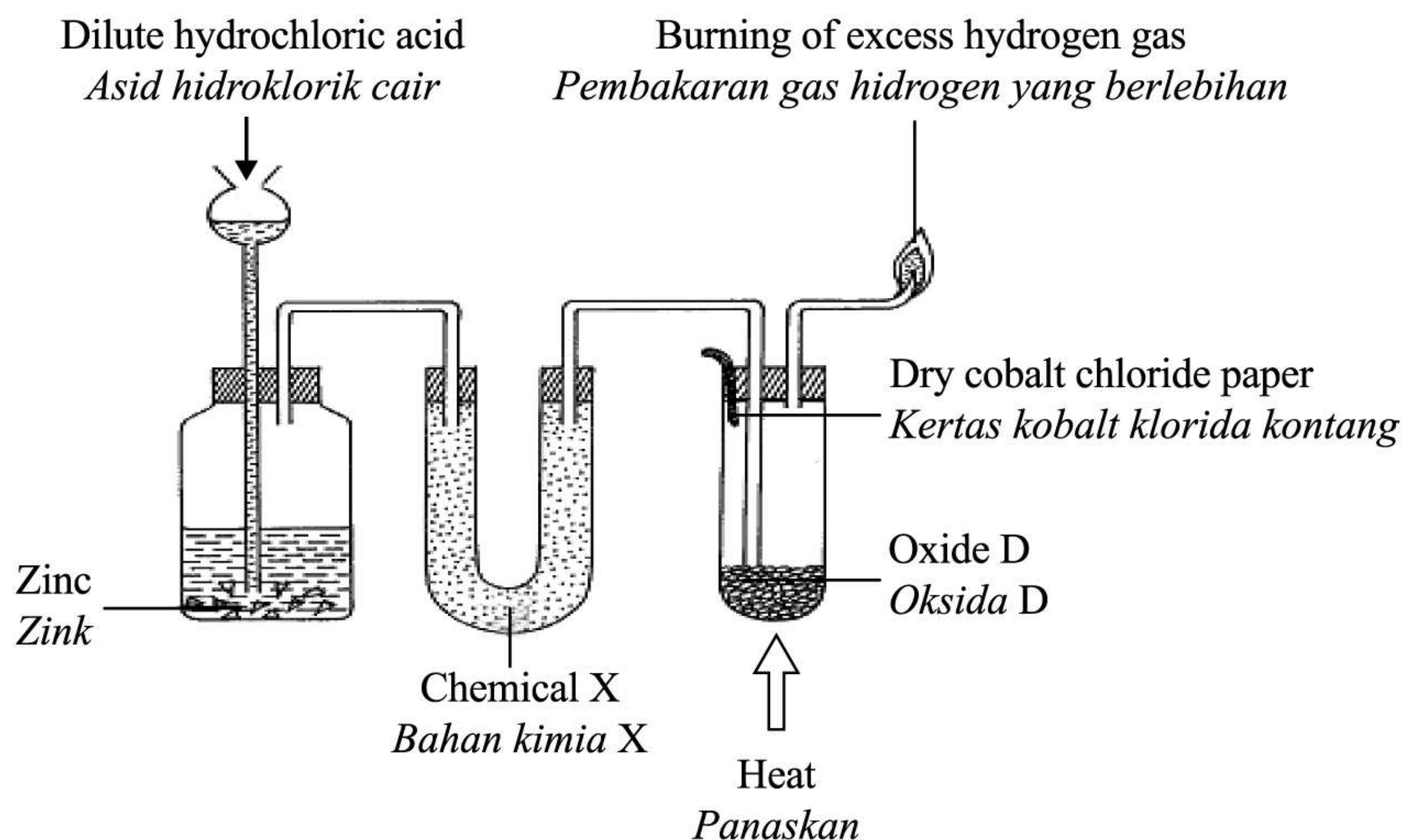


Diagram 2  
*Rajah 2*

Table 2 shows the result of the experiment.

*Jadual 2 menunjukkan keputusan eksperimen tersebut.*

Description <i>Penerangan</i>	Mass, g <i>Jisim, g</i>
Boiling tiub <i>Tabung didih</i>	10.45
Boiling tiub + oxide D <i>Tabung didih + oksida D</i>	32.75
Boiling tiub + metal D <i>Tabung didih + logam D</i>	31.15

Table 2  
*Jadual 2*

- (a) State the change of the dry cobalt chloride paper which can be observed.  
*Nyatakan perubahan kertas kobalt klorida kontang yang dapat diperhatikan.*

.....

[1 mark]

[1 markah]



- (b) (i) Based on Table 2, calculate the mass of metal D and oxygen.  
*Berdasarkan Jadual 2, hitung jisim logam D dan oksigen.*

[2 marks]  
[2 markah]

2(b)(i)

	2
--	---

- (ii) Calculate the ratio of mole atom D to atom oxygen.  
[Relative atomic mass: D = 207, O = 16]  
*Hitung nisbah mol bagi atom D kepada atom oksigen.*  
[Jisim atom relatif: D = 207, O = 16]

[3 marks]  
[3 markah]

2(b)(ii)

	3
--	---

- (iii) What is the empirical formula of oxide D?  
*Apakah formula empirik oksida D?*

[1 mark]  
[1 markah]

2(b)(iii)

	1
--	---

- (c) Explain why the process of cooling, weighing and heating is repeated a few times until a constant mass is obtained.

*Terangkan mengapa proses penyejukan, penimbangan dan pemanasan diulangi beberapa kali sehingga jisim malar diperoleh.*

[1 mark]  
[1 markah]

2(c)

	1
--	---

- (d) Daniel repeats the experiment by replacing oxide D with zinc oxide.  
Explain why Daniel cannot use the same method to determine the empirical formula of zinc oxide.

*Daniel mengulangi eksperimen dengan menggantikan oksida D dengan zink oksida.*

*Terangkan mengapa Daniel tidak boleh menggunakan kaedah yang sama untuk menentukan formula empirik zink oksida.*

[1 mark]  
[1 markah]

2(d)

	1
--	---

**Total**  
**A2**

	9
--	---



- 3 In the year 2018, John's school had won 3rd place of Young Inventor Year 2018. The trophy they received is kept in school gallery. The trophy still looks shiny as in Diagram 3.1.

*Pada tahun 2018, sekolah John telah memenangi tempat ketiga Pencipta Muda Tahun 2018. Piala yang mereka terima disimpan dalam galeri sekolah. Piala tersebut masih kelihatan berkilat seperti dalam Rajah 3.1.*



Diagram 3.1  
Rajah 3.1

- (a) (i) The trophy is made from bronze.

State the main element in bronze.

*Piala tersebut diperbuat daripada gangsa.*

*Nyatakan unsur utama dalam gangsa.*

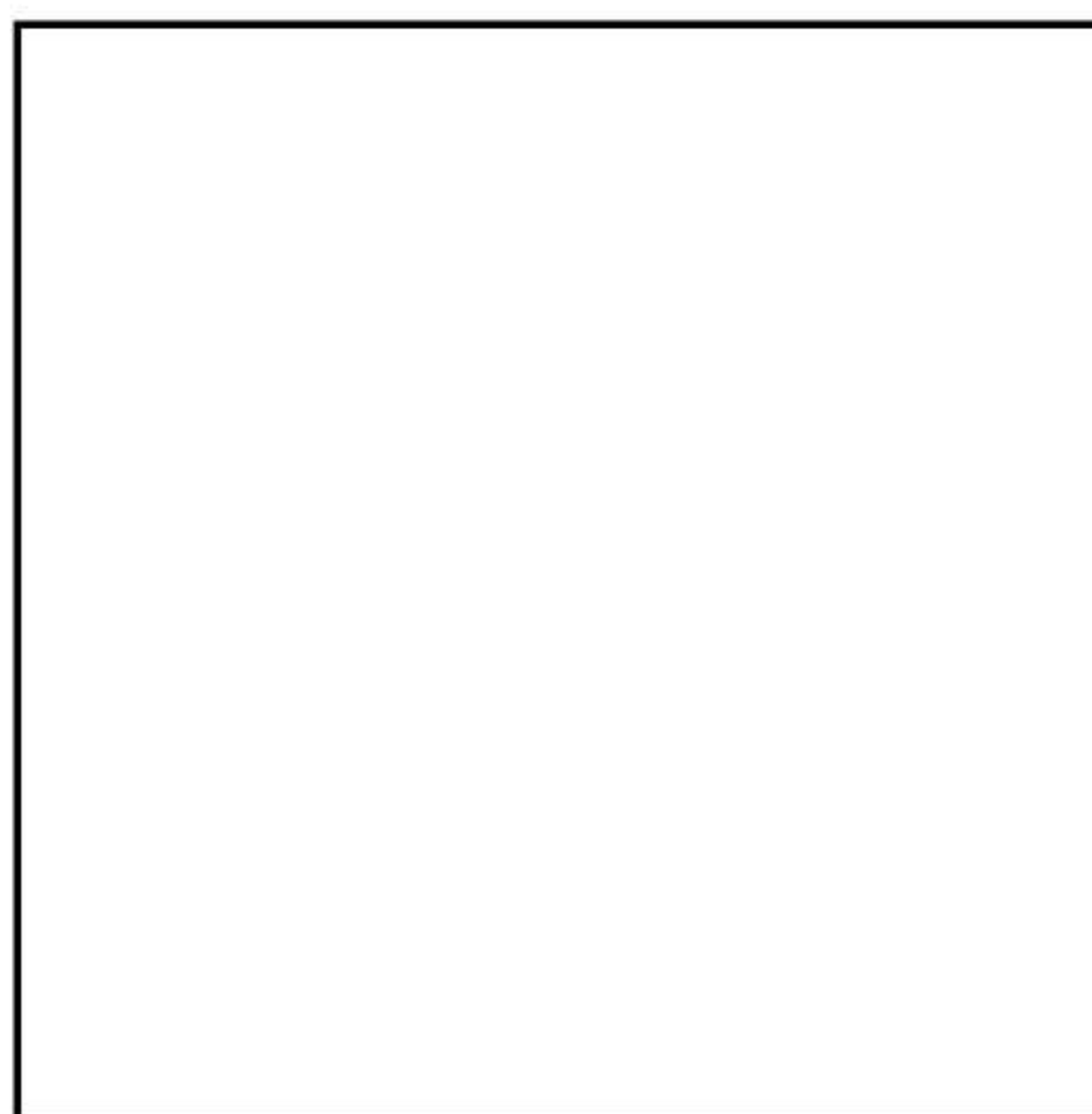
.....

[1 mark]

[1 markah]

- (ii) Draw the arrangement of atoms in bronze in the space provided.

*Lukis susunan atom dalam gangsa dalam ruangan yang disediakan.*



[2 marks]

[2 markah]

3(a)(i)  
1

3(a)(ii)  
2



- (iii) Bronze is used to make monuments.

Explain why bronze is suitable to make monuments in terms of the arrangement of atoms.

*Gangsa digunakan untuk membuat monumen.*

*Terangkan mengapa gangsa sesuai digunakan untuk membuat monumen dari segi susunan atomnya.*

.....

.....

.....

[3 marks]

[3 markah]

- (b) Diagram 3.2 shows a part of the cleansing action of soap particles on a grease stained cloth.

*Rajah 3.2 menunjukkan satu bahagian tindakan pencucian oleh zarah sabun ke atas kotoran bergris pada kain.*

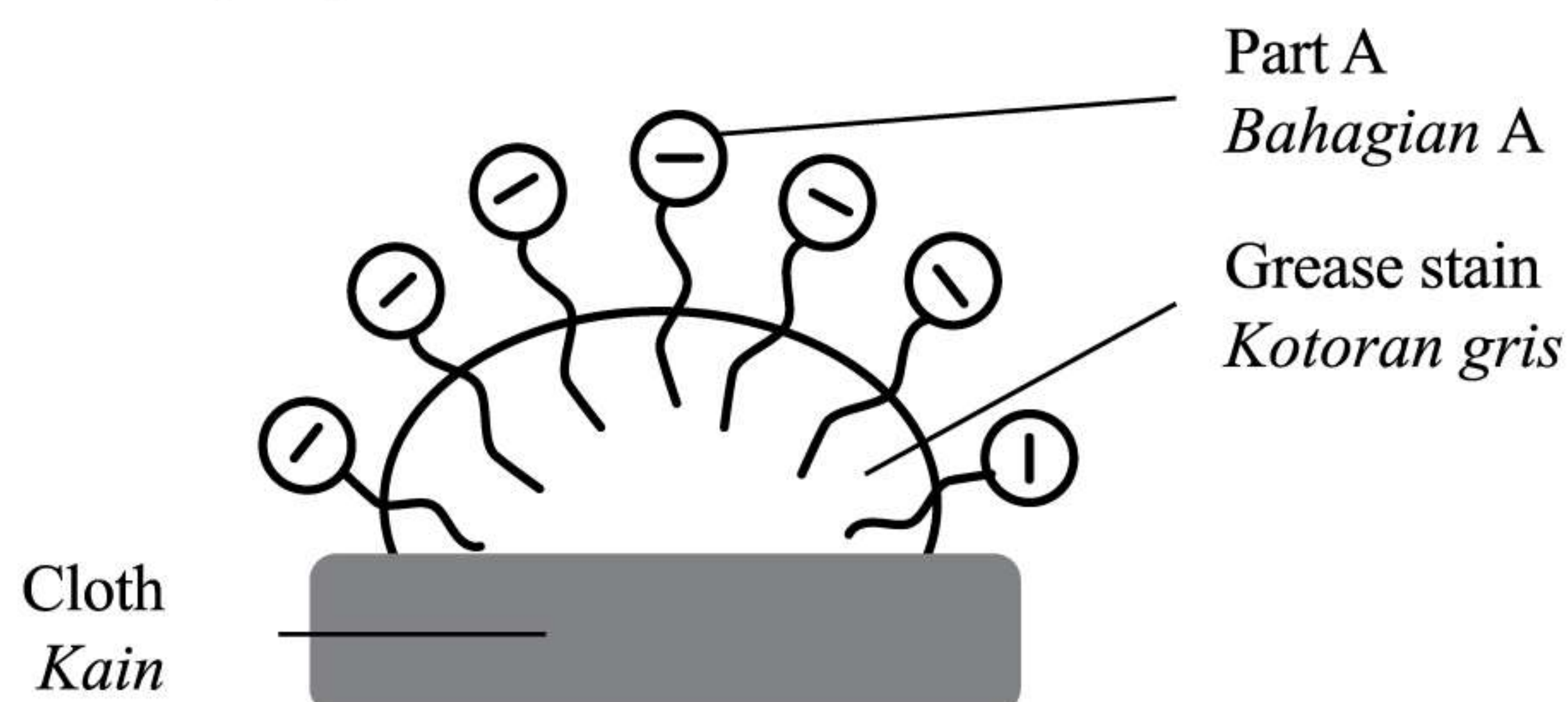


Diagram 3.2  
*Rajah 3.2*

- (i) Name part A of the soap particles.

*Namakan bahagian A zarah sabun.*

.....

[1 mark]

[1 markah]

3(a)(iii)

	3
--	---

3(b)(i)

	1
--	---



- (ii) Diagram 3.3 shows the boys are washing their clothes near a well. They are using soap to clean the oil stain on their clothes. The well water is hard water.

*Rajah 3.3 menunjukkan budak lelaki sedang mencuci baju mereka berdekatan dengan telaga. Mereka menggunakan sabun untuk membersihkan kotoran berminyak pada baju mereka. Air telaga ini merupakan air liat.*



Diagram 3.3  
*Rajah 3.3*

Explain the effectiveness of cleansing action of soap particles on the oil stains.

*Terangkan keberkesanan tindakan pencucian zarah sabun ke atas kotoran berminyak.*

.....

.....

.....

[2 marks]

[2 markah]

- (iii) Suggest **one** cleaning agent which can clean more effective with well water to the boys in Diagram 3.3.

*Cadangkan **satu** agen pencuci yang boleh mencuci dengan lebih berkesan kepada budak lelaki dalam Rajah 3.3.*

.....

[1 mark]

[1 markah]

3(b)(ii)

2
---

3(b)(iii)

1
---

Total  
A3

10
----



- 4 Diagram 4 shows a series of reactions of an alkene.  
Rajah 4 menunjukkan satu siri tindak balas satu alkena.

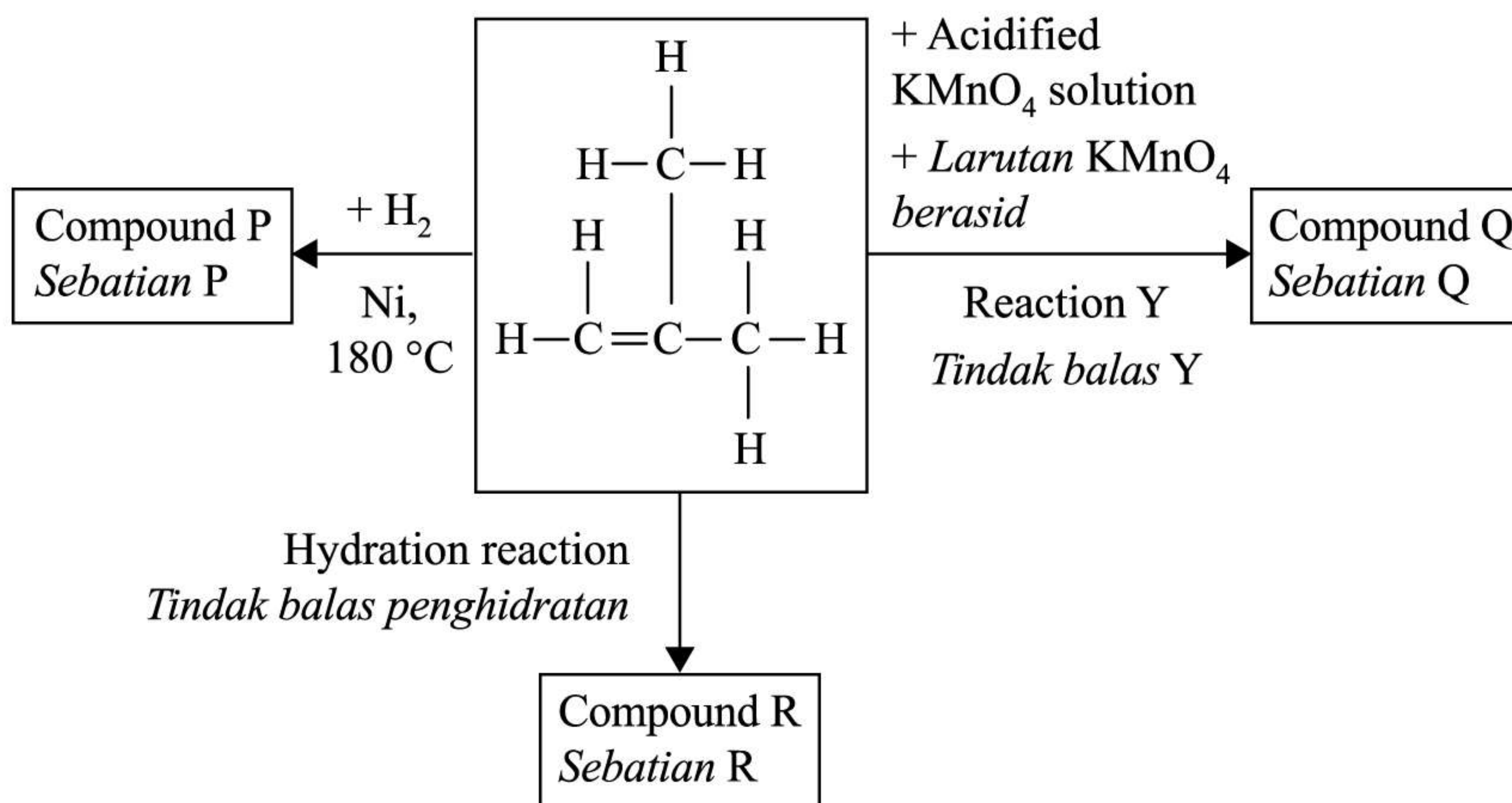


Diagram 4  
Rajah 4

- (a) (i) Name compound R according to IUPAC nomenclature.  
Namakan sebatian R mengikut penamaan IUPAC.

4(a)(i)

1
---

[1 mark]  
[1 markah]

- (ii) Draw the structural formula of compound R.  
Lukis formula struktur bagi sebatian R.

4(a)(ii)

1
---

[1 mark]  
[1 markah]



4(a)(iii)

1
---

- (iii) When compound R is heated with methanoic acid, a new carbon compound is formed.

Give **one** characteristic of the compound formed.

*Apabila sebatian R dipanaskan bersama dengan asid metanoik, satu sebatian karbon baru terbentuk.*

*Beri **satu** sifat sebatian yang terbentuk itu.*

.....  
[1 mark]

[1 markah]

- (b) Compound P is produced by heating butene with hydrogen gas with the present of nickel at 180 °C.

State the function of nickel in the reaction.

*Sebatian P dihasilkan dengan memanaskan butena dengan gas hidrogen dengan kehadiran nikel di bawah 180 °C.*

*Nyatakan fungsi nikel dalam tindak balas tersebut.*

.....  
[1 mark]

[1 markah]

- (c) (i) Name reaction Y.

*Namakan tindak balas Y.*

.....  
[1 mark]

[1 markah]

- (ii) Write the balance chemical equation of reaction Y.

*Tuliskan persamaan kimia yang seimbang untuk tindak balas Y.*

.....  
[2 marks]

[2 markah]

- (d) Briefly describe a chemical test to differentiate compound P and butene.

*Huraikan secara ringkas satu ujian kimia untuk membezakan sebatian P dan butena.*

.....  
[3 marks]

[3 markah]

4(d)

3
---

Total  
A4

10
----



- 5 (a) Table 5 shows the apparatus set-up of experiment I and experiment II that have been carried out by Fatimah in chemistry laboratory.

*Jadual 5 menunjukkan susunan radas untuk eksperimen I dan eksperimen II yang telah dijalankan oleh Fatimah dalam makmal kimia.*

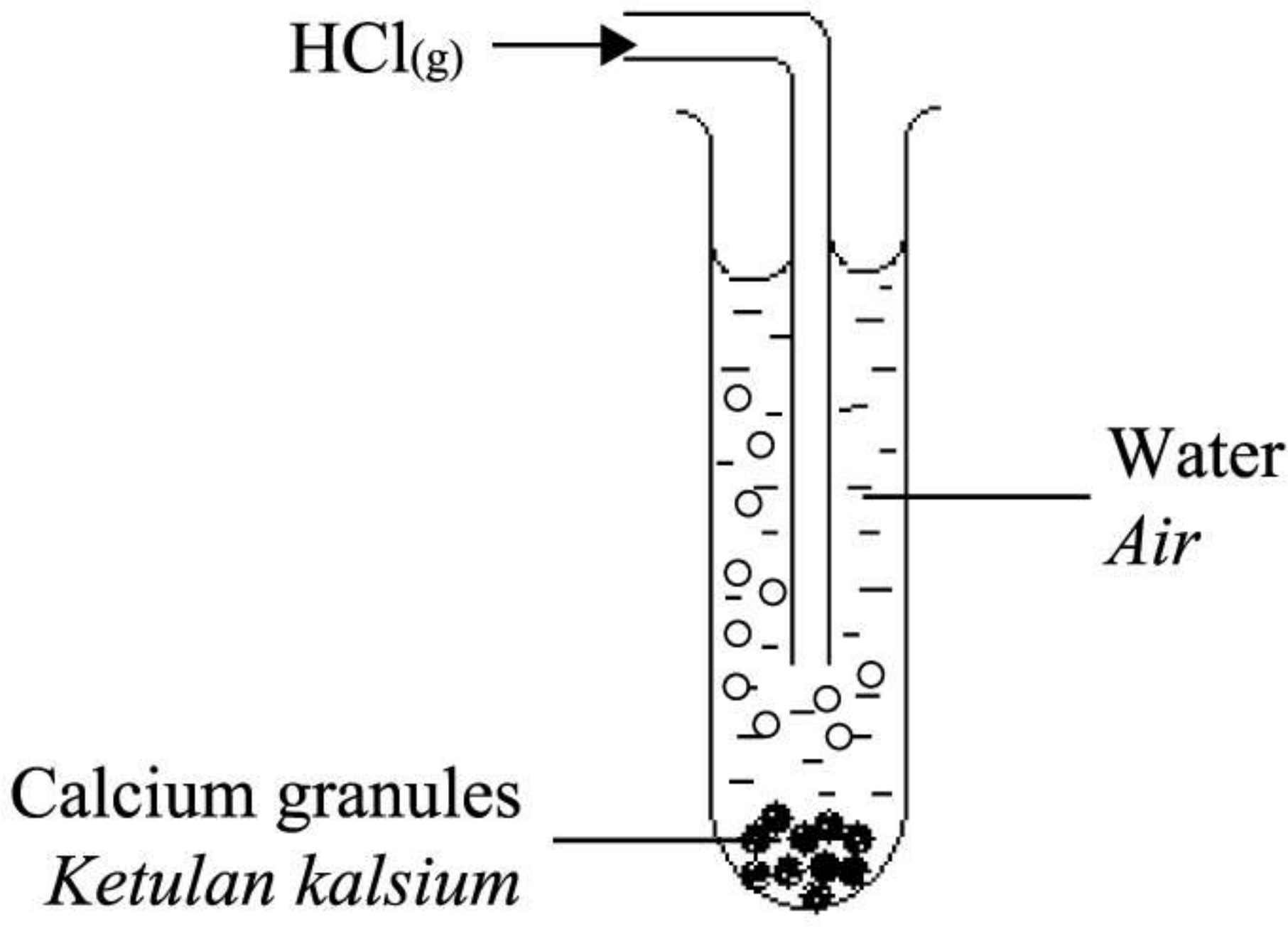
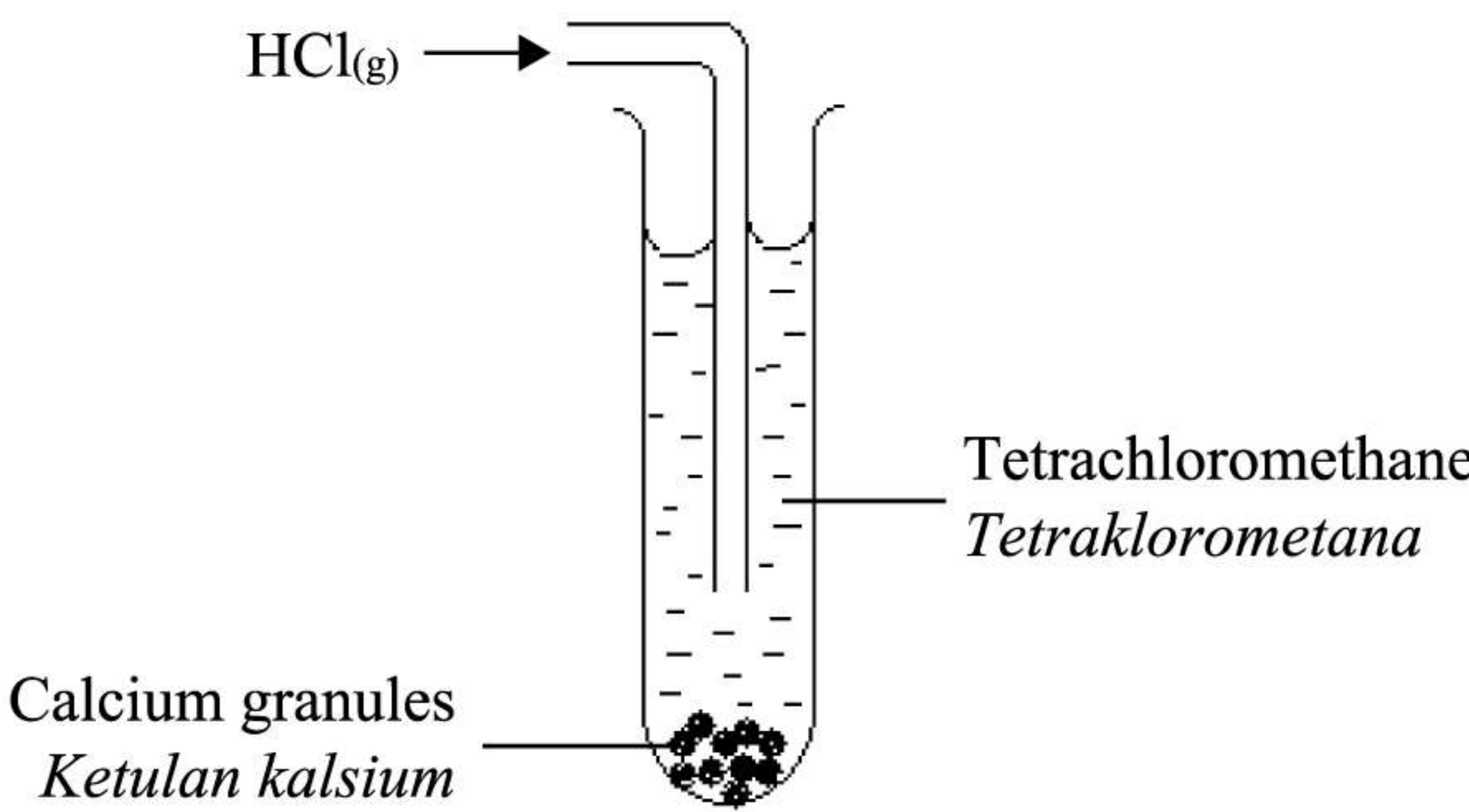
Experiment <i>Eksperimen</i>	Apparatus set-up <i>Susunan radas</i>
I	 <p>Calcium granules <i>Ketulan kalsium</i></p>
II	 <p>Calcium granules <i>Ketulan kalsium</i></p>

Table 5  
*Jadual 5*

- (i) What does acid mean?  
*Apakah maksud asid?*

.....

[1 mark]  
[1 markah]

5(a)(i)

1
---



5(a)(ii)

1
---

- (ii) State **one** observation in experiment I.

*Nyatakan **satu** pemerhatian dalam eksperimen I.*

.....  
[1 mark]  
[1 markah]

5(a)(iii)

2
---

- (iii) Write the ionic equation for the reaction in experiment I.

*Tuliskan persamaan ion bagi tindak balas di eksperimen I.*

.....  
[2 marks]  
[2 markah]

- (iv) There is no changes in experiment II.

Explain why.

*Tiada perubahan dalam eksperimen II.*

*Terangkan mengapa.*

5(a)(iv)

2
---

.....  
.....  
[2 marks]  
[2 markah]

- (b) (i) Experiment I is repeated by replacing calcium with calcium carbonate.  
Briefly describe how to identify the gas produced.

*Eksperimen I diulangi dengan menggantikan kalsium dengan kalsium karbonat.*

*Terangkan secara ringkas bagaimana mengenal pasti gas yang terhasil.*

5(b)(i)

2
---

.....  
.....  
[2 marks]  
[2 markah]



- (ii) If 1.0 g of calcium carbonate has reacted completely with 25 cm<sup>3</sup> of hydrochloric acid in experiment I, what is the molarity of the hydrochloric acid?

[Relative atomic mass: Ca = 40, C = 12, O = 16]

*Sekiranya 1.0 g kalsium karbonat telah bertindak balas lengkap dengan 25 cm<sup>3</sup> asid hidroklorik dalam eksperimen I, apakah kemolaran asid hidroklorik tersebut?*

[Jisim atom relatif: Ca = 40, C = 12, O = 16]

[3 marks]  
[3 markah]

5(b)(ii)

3

Total  
A5

11



- 6 Diagram 6.1 shows the set-up of apparatus and observations for a redox reaction between copper(II) nitrate solution and metal X.

*Rajah 6.1 menunjukkan susunan radas dan pemerhatian untuk satu tindak balas redoks antara larutan kuprum(II) nitrat dengan logam X.*

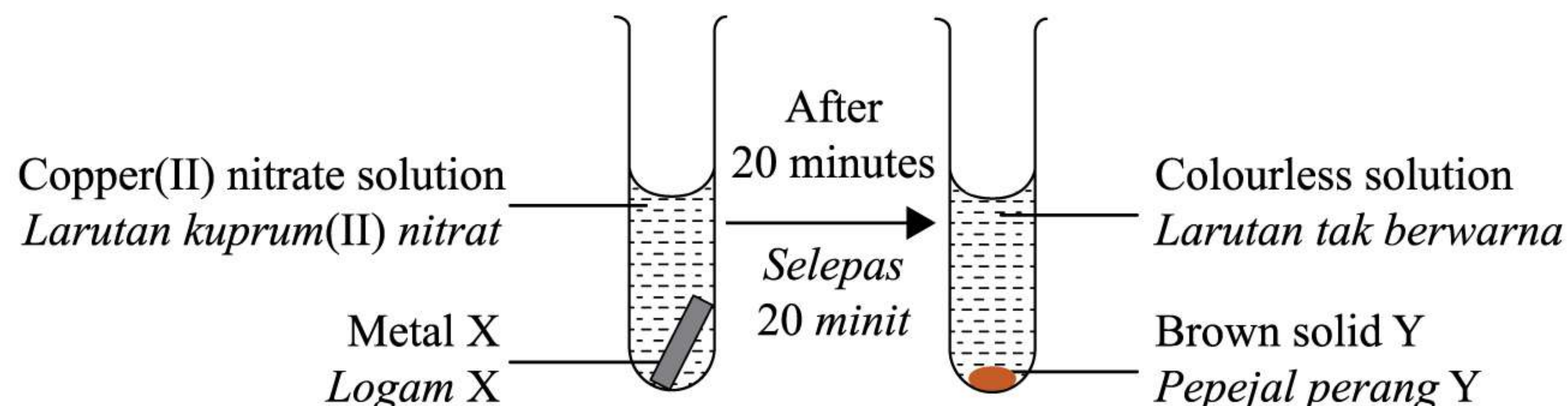


Diagram 6.1  
*Rajah 6.1*

- (a) (i) Name the type of reaction that occurs in Diagram 6.1.

*Namakan jenis tindak balas yang berlaku di Rajah 6.1.*

.....

[1 mark]

[1 markah]

- (ii) Suggest metal X.

Explain your answer.

*Cadangkan logam X.*

*Terangkan jawapan anda.*

.....

.....

[2 marks]

[2 markah]

- (iii) Write the oxidation half equation of the reaction in Diagram 6.1.

*Tuliskan persamaan setengah pengoksidaan bagi tindak balas di Rajah 6.1.*

.....

[1 mark]

[1 markah]



- (b) Diagram 6.2 shows the apparatus set-up for investigating the reaction between iron(II) sulphate solution and acidified potassium dichromate(VI) solution through the transfer of electrons at a distance.

*Rajah 6.2 menunjukkan susunan radas untuk menyiasat tindak balas antara larutan ferum(II) sulfat dan larutan kalium dikromat(VI) berasid melalui pemindahan elektron pada suatu jarak.*

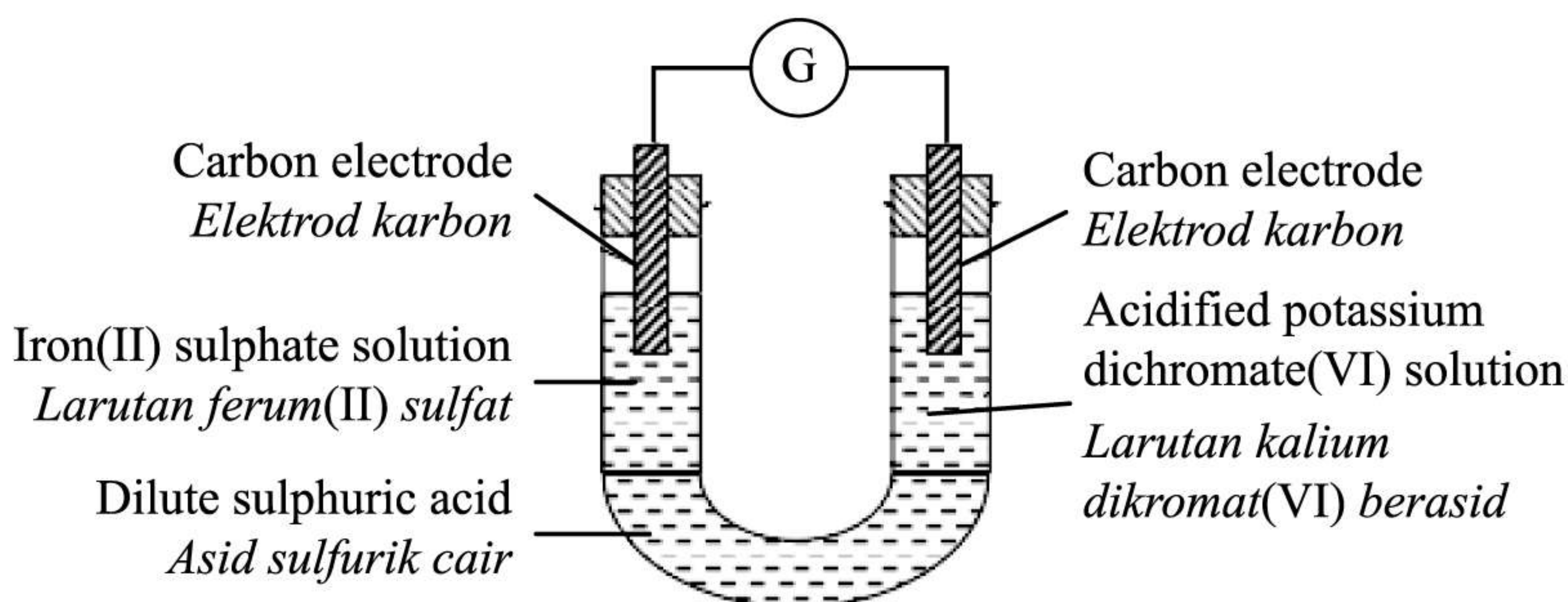


Diagram 6.2  
*Rajah 6.2*

- (i) What is the function of dilute sulphuric acid in Diagram 6.2?

*Apakah fungsi asid sulfurik cair dalam Rajah 6.2?*

6(b)(i)

	1
--	---

[1 mark]

[1 markah]

- (ii) Label the negative terminal for the cell in Diagram 6.2.

*Label terminal negatif untuk sel di Rajah 6.2.*

6(b)(ii)

	1
--	---

[1 mark]

[1 markah]

- (iii) Based on Diagram 6.2, explain the process that occurs at negative terminal in terms of transferring electrons.

*Berdasarkan Rajah 6.2, terangkan proses yang berlaku di terminal negatif dari segi pemindahan elektron.*

6(b)(iii)

	1
--	---

[1 mark]

[1 markah]



6(b)(iv)

	1
--	---

- (iv) State the change of colour of acidified potassium dichromate(VI) solution after 30 minutes.

*Nyatakan perubahan warna larutan kalium dikromat(VI) berasid selepas 30 minit.*

.....  
[1 mark]

[1 markah]

6(b)(v)

	2
--	---

- (v) Write the ionic equation for the process that occurs in 6(b).

*Tulis persamaan ion untuk proses yang berlaku di 6(b).*

.....  
[2 marks]

[2 markah]

6(b)(vi)

	1
--	---

- (vi) Suggest another solution that can replace iron(II) sulphate solution in Diagram 6.2.

*Cadangkan larutan lain yang boleh menggantikan larutan ferum(II) sulfat dalam Rajah 6.2.*

.....  
[1 mark]

[1 markah]

Total  
A6

	11
--	----



**Section B**  
**Bahagian B**

[20 marks]

[20 markah]

Answer any **one** question from this section.

Jawab mana-mana **satu** soalan daripada bahagian ini.

- 7 Diagram 7.1 shows the set-up of apparatus used for electrolyse copper(II) nitrate solution.

Rajah 7.1 menunjukkan susunan radas yang digunakan untuk mengelektrolisiskan larutan kuprum(II) nitrat.

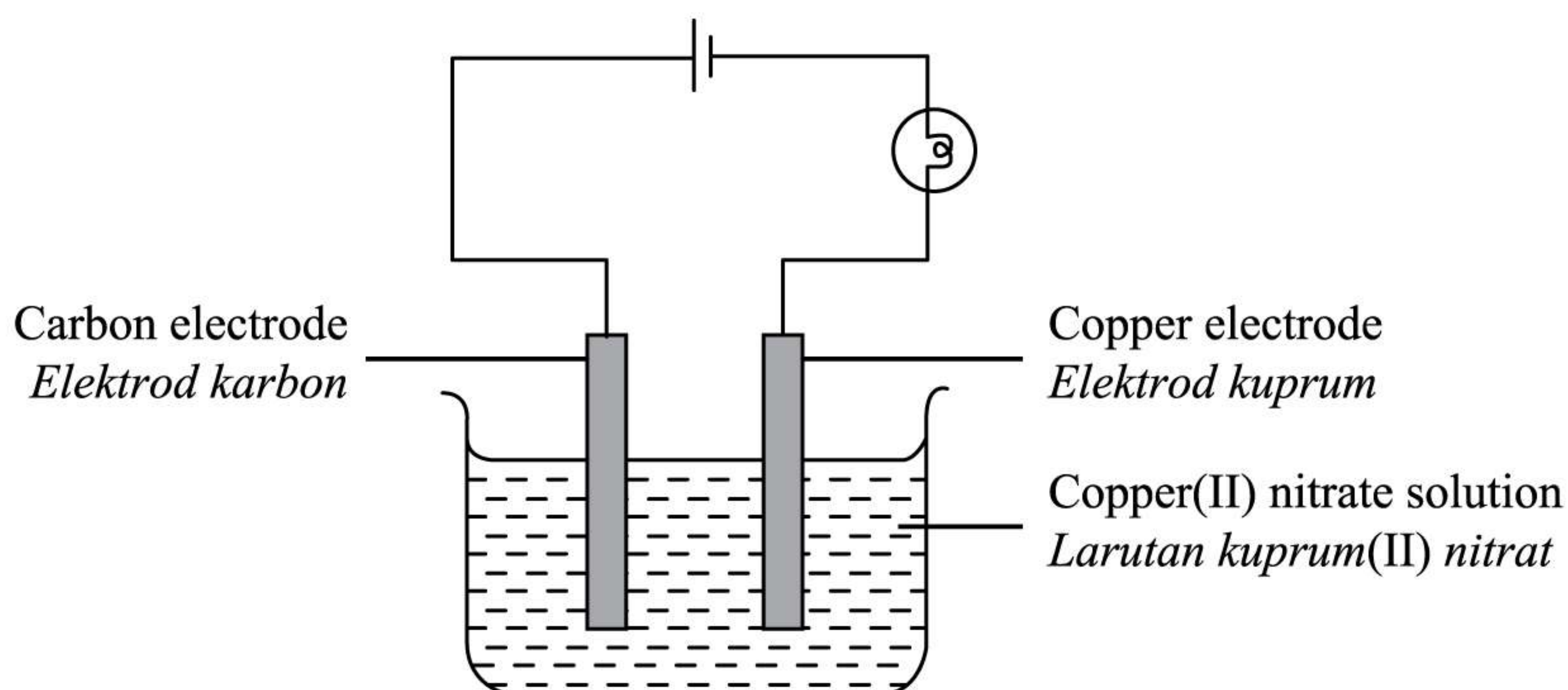


Diagram 7.1

Rajah 7.1

- (a) (i) Based on Diagram 7.1, explain the reaction that occurs at anode and cathode.

In your explanation must include the following aspects:

Berdasarkan Rajah 7.1, terangkan tindak balas yang berlaku di anod dan katod.

Dalam penerangan anda perlu merangkumi aspek-aspek berikut:

- Observation  
*Pemerhatian*
- Products formed  
*Hasil yang terbentuk*
- Half equations for each reaction  
*Persamaan setengah bagi setiap tindak balas*
- Factor that affects the product formed  
*Faktor yang mempengaruhi hasil yang terbentuk*

[8 marks]

[8 markah]



- (ii) The electrolysis of copper(II) nitrate solution is repeated by inverse the terminal of the battery as in Diagram 7.2.

*Elektrolisis larutan kuprum(II) nitrat diulangi dengan terbalikkan terminal bateri seperti dalam Rajah 7.2.*

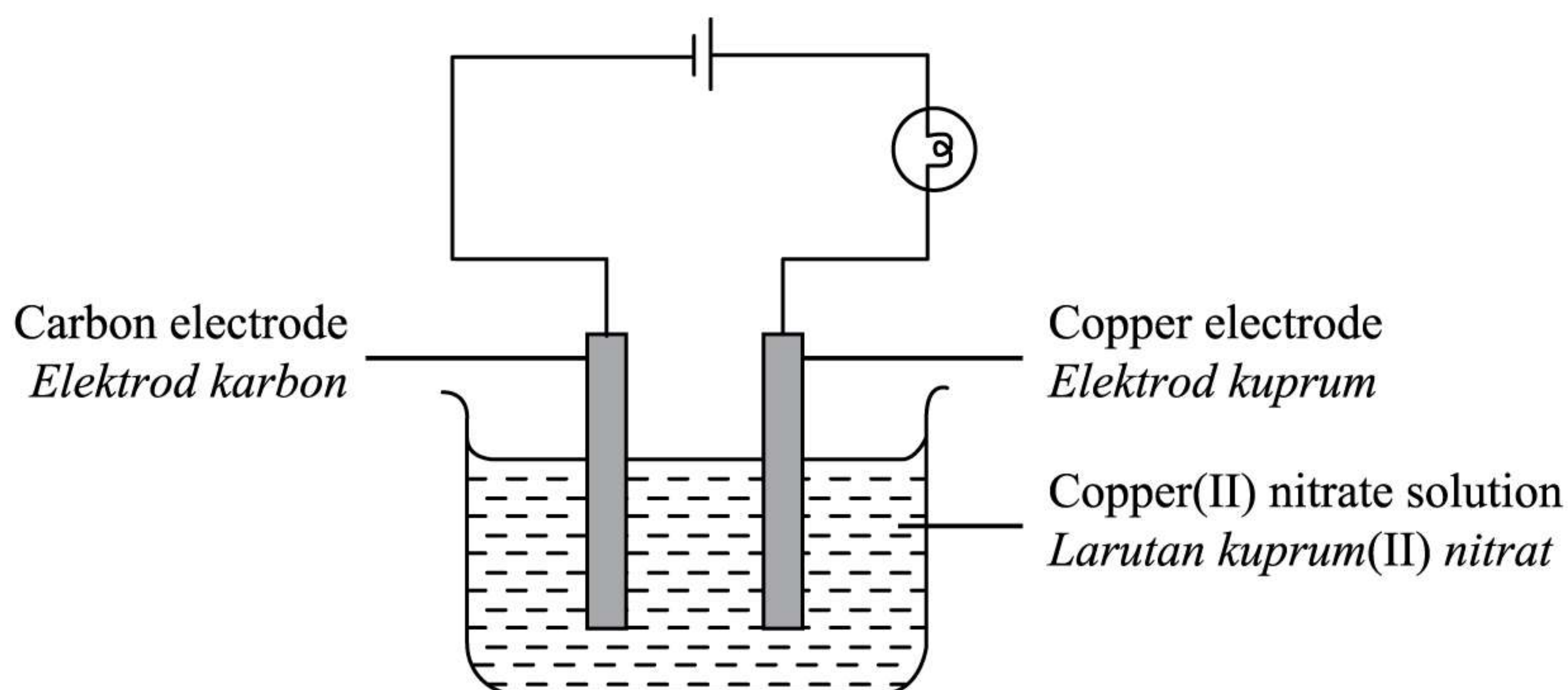


Diagram 7.2  
Rajah 7.2

Explain the changes occur at the anode. In your explanation must include the following aspects:

*Terangkan perubahan yang berlaku di anod. Penerangan anda perlu merangkumi aspek-aspek berikut:*

- Observation  
*Pemerhatian*
- Products formed  
*Hasil yang terbentuk*
- Half equations for each reaction  
*Persamaan setengah bagi setiap tindak balas*
- Factor that affects the product formed  
*Faktor yang mempengaruhi hasil yang terbentuk*

The blue colour of the copper(II) nitrate solution is remain unchanged.  
Explain why.

*Warna biru larutan kuprum(II) nitrat kekal tak berubah.  
Terangkan mengapa.*

[5 marks]  
[5 markah]



- (b) Bar chart in Diagram 7.3 shows the voltage of three chemical cells using different pairs of metals as electrodes.

*Carta bar dalam Rajah 7.3 menunjukkan nilai voltan bagi tiga sel kimia menggunakan pasangan logam berbeza sebagai elektrod.*

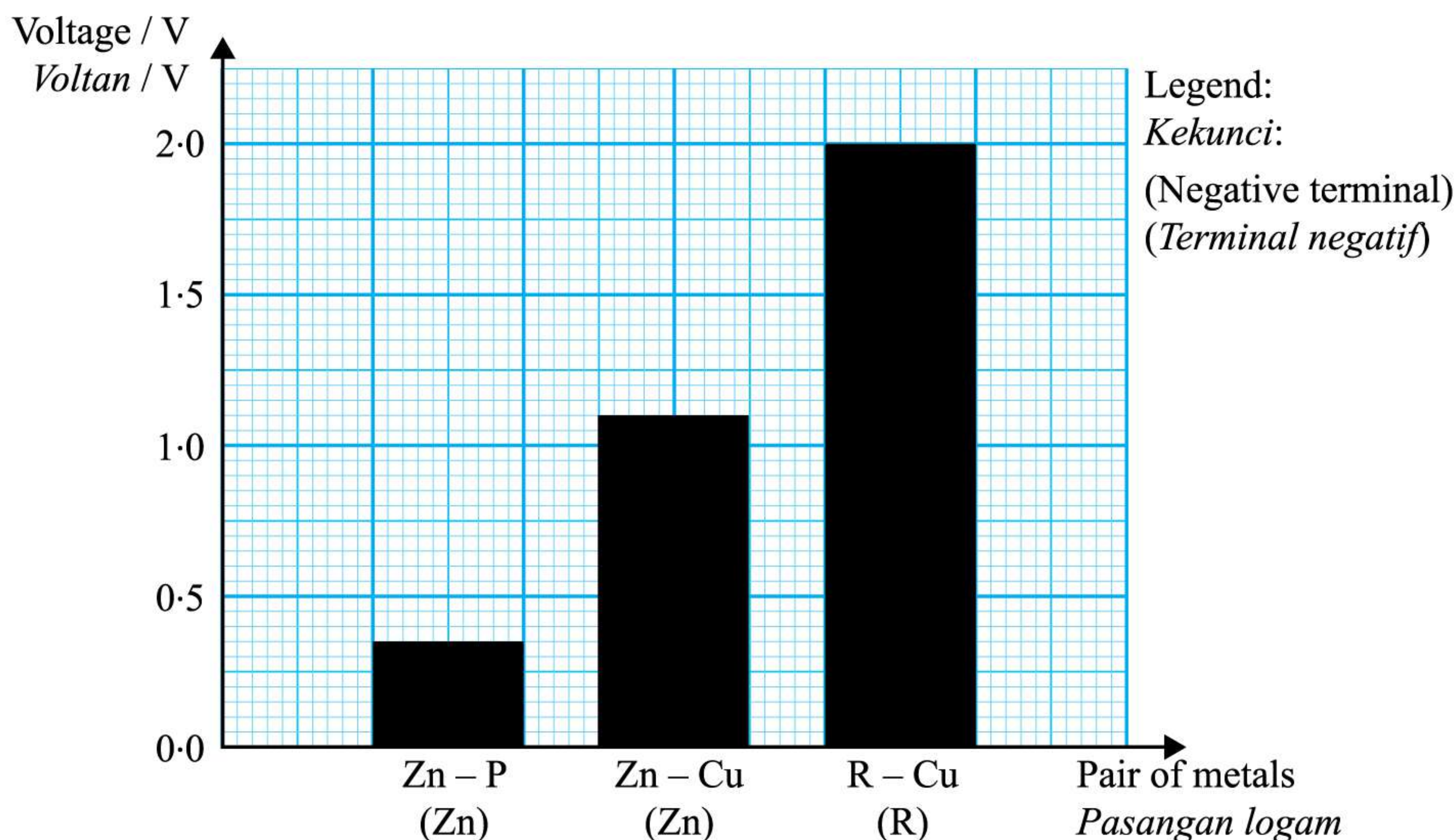


Diagram 7.3  
Rajah 7.3

- (i) The voltage of chemical cell R – Cu is higher than the voltage of chemical cell Zn – Cu. Explain the statement.

*Voltan sel kimia R – Cu lebih tinggi daripada voltan sel kimia Zn – Cu.  
Terangkan pernyataan tersebut.*

[2 marks]  
[2 markah]

- (ii) Based on Diagram 7.3, arrange metals Zn, Cu, P and R in ascending order of electropositivity. Then determine the potential difference of metal R and P.

*Berdasarkan Rajah 7.3, susun logam Zn, Cu, P dan R mengikut tertib menaik keelektropositifannya. Kemudian, tentukan perbezaan keupayaan logam R dan P.*

[3 marks]  
[3 markah]

- (c) By using zinc plate, copper plate and suitable electrolytes, draw a diagram of a functional chemical cell.

*Dengan menggunakan kepingan zink, kepingan kuprum dan elektrolit yang sesuai, lukiskan satu rajah untuk menunjukkan sel kimia yang berfungsi.*

[2 marks]  
[2 markah]



- 8 (a) Diagram 8 shows a bottle of antacid. It is used to relief gastric pain.

*Rajah 8 menunjukkan sebotol antasid. Ia digunakan untuk melegakan kesakitan gastrik.*



Diagram 8  
*Rajah 8*

Antacid is made up of the chemical compound named magnesium oxide.

*Antasid dibuat daripada sebatian kimia yang bernama magnesium oksida.*

- (i) Write the chemical formula of magnesium oxide.

State the type of chemical bond.

*Tulis formula kimia magnesium oksida.*

*Nyatakan jenis ikatan kimia.*

[2 marks]  
[2 markah]

- (ii) Explain how magnesium oxide is formed.

*Terangkan bagaimana magnesium oksida terbentuk.*

[8 marks]  
[8 markah]

- (iii) Draw the electron arrangement of magnesium oxide formed.

*Lukis susunan elektron magnesium oksida yang terbentuk.*

[2 marks]  
[2 markah]



(b) Table 8 shows the properties of substance W and Z.

*Jadual 8 menunjukkan sifat-sifat bahan W dan Z.*

Substance <i>Bahan</i>	Properties <i>Sifat-sifat</i>
W	<ul style="list-style-type: none"> <li>Can conduct electricity in molten state <i>Boleh mengkonduksikan elektrik dalam keadaan leburan</i></li> <li>Soluble in water <i>Larut dalam air</i></li> </ul>
Z	<ul style="list-style-type: none"> <li>Cannot conduct electricity in all states <i>Tidak boleh mengkonduksikan elektrik dalam semua keadaan</i></li> <li>Soluble in tetrachloromethane <i>Larut dalam tetraklorometana</i></li> </ul>

Table 8  
*Jadual 8*

(i) Based on Table 8, compare the electrical conductivity of substance W and Z.  
Explain your answer.

*Berdasarkan Jadual 8, bandingkan kekonduksian elektrik bahan W dan Z.  
Terangkan jawapan anda.*

[4 marks]  
[4 markah]

(ii) The boiling point of substance Z is 18 °C.

What is the physical state of substance Z at room condition?  
Explain why substance Z has low boiling point.

*Takat didih bahan Z adalah 18 °C.*

*Apakah keadaan fizikal bahan Z pada keadaan bilik?*

*Terangkan mengapa bahan Z mempunyai takat didih yang rendah.*

[4 marks]  
[4 markah]



**BLANK PAGE**  
***HALAMAN KOSONG***



**Section C**  
**Bahagian C**

[20 marks]  
[20 markah]

Answer any **one** question from this section.

*Jawab mana-mana **satu** soalan daripada bahagian ini.*

- 9 (a) Table 9 shows the heat of neutralization for the reaction between sodium hydroxide solution, NaOH with monoprotic acid X and monoprotic acid Y.

*Jadual 9 menunjukkan haba peneutralan bagi tindak balas antara larutan natrium hidroksida, NaOH dengan asid monoprotik X dan asid monoprotik Y.*

Reaction <i>Tindak Balas</i>	I	II
Reactants <i>Bahan tindak balas</i>		
Volume and concentration of acid <i>Isi padu dan kepekatan asid</i>	25 cm <sup>3</sup> 0.1 mol dm <sup>-3</sup>	25 cm <sup>3</sup> 0.1 mol dm <sup>-3</sup>
Volume and concentration of sodium hydroxide solution <i>Isi padu dan kepekatan larutan natrium hidroksida</i>	25 cm <sup>3</sup> 0.1 mol dm <sup>-3</sup>	25 cm <sup>3</sup> 0.1 mol dm <sup>-3</sup>
Heat of neutralization / kJ mol <sup>-1</sup> <i>Haba peneutralan / kJ mol<sup>-1</sup></i>	- 57	- 54

Table 9  
*Jadual 9*



- (i) Based on Table 9, suggest **one** monoprotic acid X and **one** monoprotic acid Y.

*Berdasarkan Jadual 9, cadangkan **satu** asid monoprotik X dan **satu** asid monoprotik Y.*

[2 marks]

[2 markah]

- (ii) Compare the heat of neutralization of experiment I and experiment II.  
Explain your answer.

*Bandingkan haba peneutralan eksperimen I dan eksperimen II.*

*Terangkan jawapan anda.*

[5 marks]

[5 markah]

- (b) Mutu dissolves sodium hydroxide and ammonium nitrate in water respectively in two different beaker. Diagram 9.1 and Diagram 9.2 show the energy level diagram of two reactions.

*Mutu melarutkan natrium hidroksida dan ammonium nitrat dalam air dalam dua bikar yang berasingan. Rajah 9.1 dan Rajah 9.2 menunjukkan rajah aras tenaga dua tindak balas.*

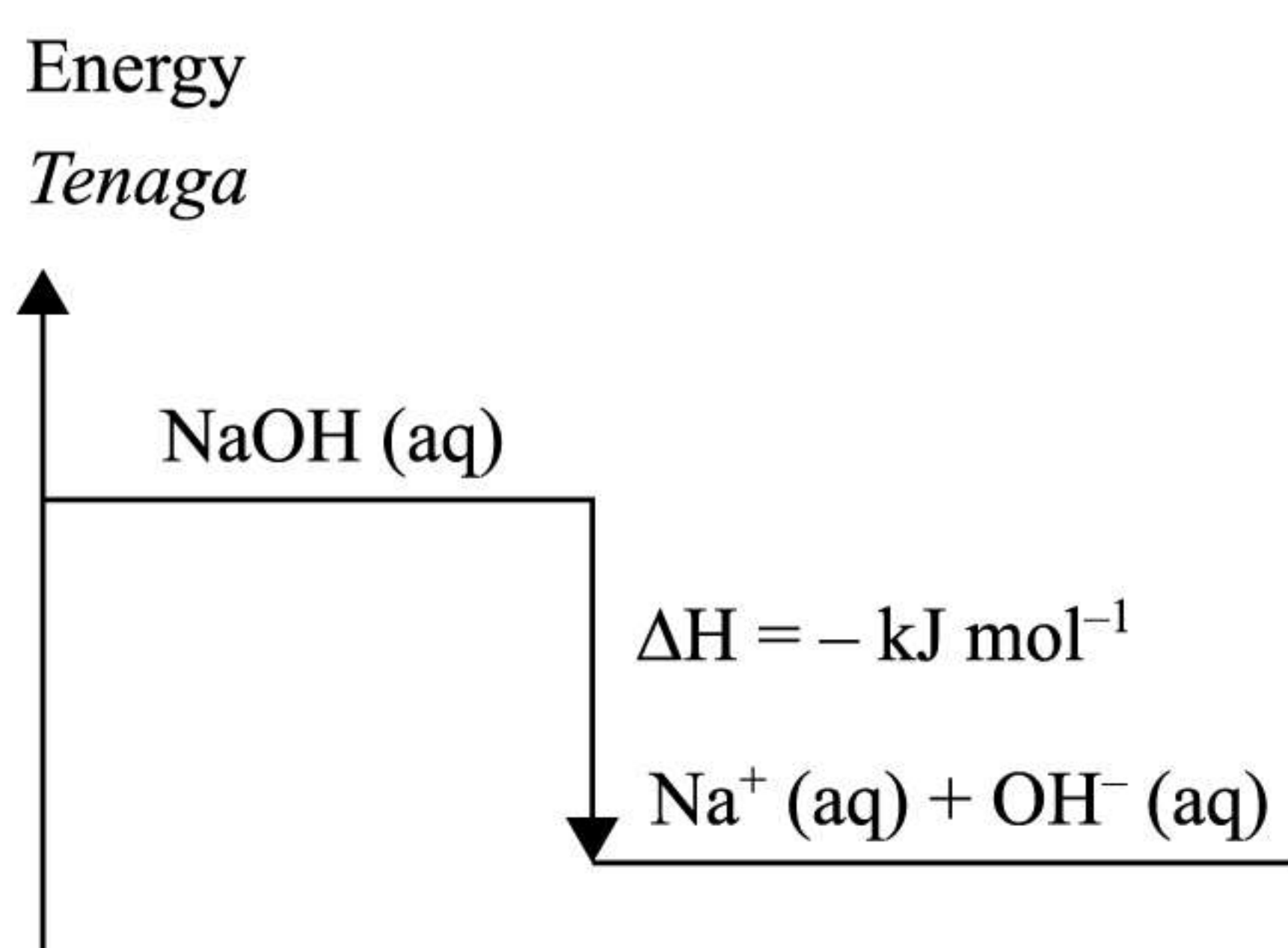


Diagram 9.1  
*Rajah 9.1*

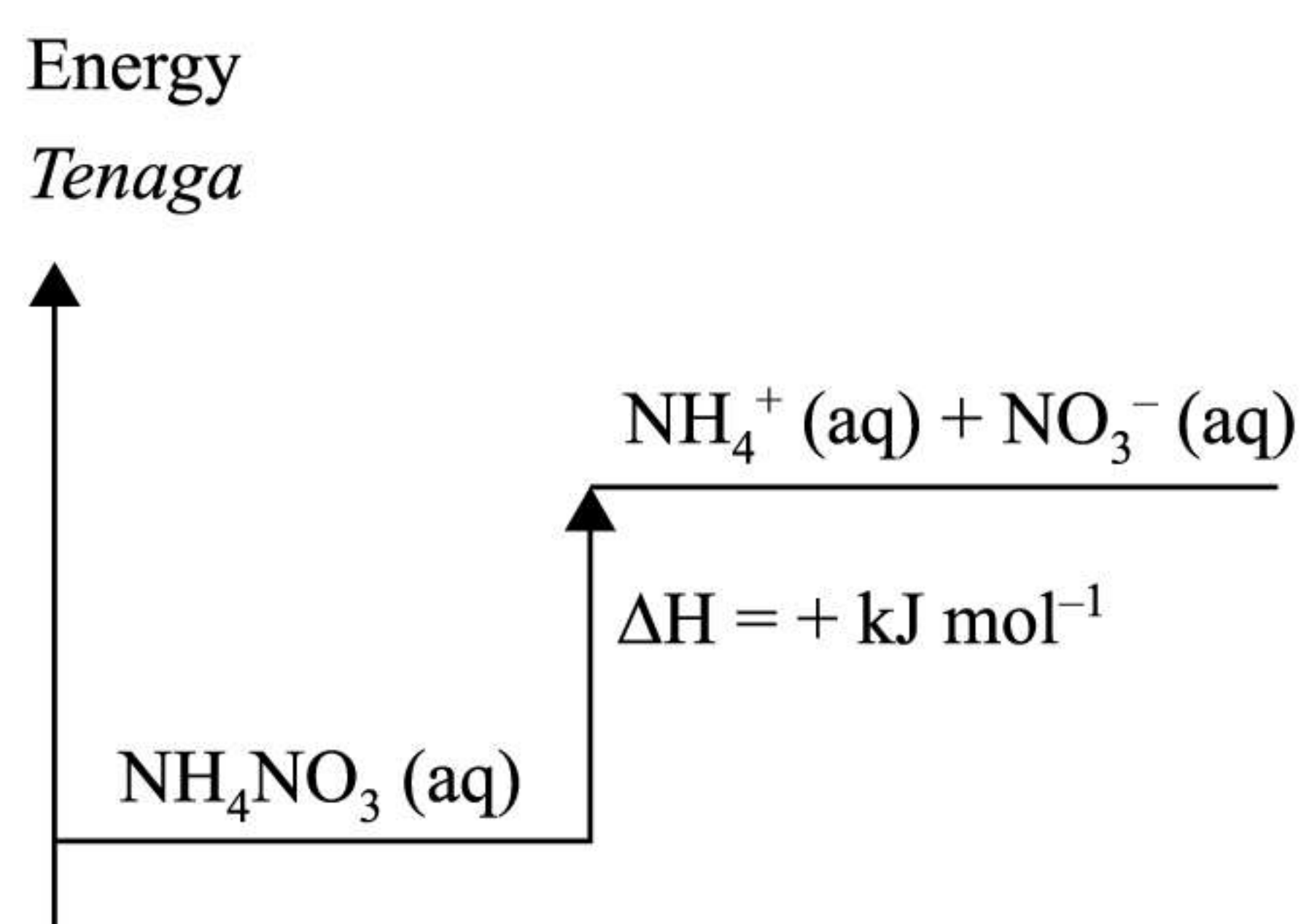


Diagram 9.2  
*Rajah 9.2*

Based on Diagram 9.1 and Diagram 9.2, compare the reaction in terms of

- Type of reaction
- Temperature change
- Change in total energy content of reactants and products

*Berdasarkan Rajah 9.1 dan Rajah 9.2, bandingkan tindak balas tersebut dari segi*

- *Jenis tindak balas*
- *Perubahan suhu*
- *Perubahan jumlah kandungan tenaga bahan tindak balas dan hasilnya*

[3 marks]

[3 markah]



- (c) Diagram 9.3 shows structural formulae of two different types of fuels X and Y.  
*Rajah 9.3 menunjukkan formula struktur dua jenis bahan api X dan Y.*

Type of fuels <i>Jenis bahan api</i>	Structural formulae <i>Formula struktur</i>
Fuel X <i>Bahan api X</i>	$  \begin{array}{ccccccccc}  & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} & & \\  &   &   &   &   &   &   & & \\  \text{H} & -\text{C} & -\text{C} & -\text{C} & -\text{C} & -\text{C} & -\text{C} & -\text{H} \\  &   &   &   &   &   &   & & \\  & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} & &   \end{array}  $
Fuel Y <i>Bahan api Y</i>	$  \begin{array}{ccccccccccc}  & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} & & \\  &   &   &   &   &   &   &   &   & & \\  \text{H} & -\text{C} & -\text{C} & -\text{C} & -\text{C} & -\text{C} & -\text{C} & -\text{C} & -\text{C} & -\text{H} \\  &   &   &   &   &   &   &   &   & & \\  & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} & &   \end{array}  $

Diagram 9.3  
*Rajah 9.3*

The heat of combustion of fuel Y is higher than fuel X  
*Haba pembakaran bahan api Y lebih tinggi daripada bahan api X*

Describe an experiment to test the above statement.

In your description should include the following:

- Procedure of the experiment
- The steps to calculate the heat of combustion

[Relative atomic mass: H = 1, C = 12, specific heat capacity of solution =  $4.2 \text{ J g}^{-1} \text{ }^{\circ}\text{C}^{-1}$ ]

*Huraikan satu eksperimen untuk menguji pernyataan di atas.*

*Dalam huraian anda perlu mengandungi perkara berikut:*

- *Prosedur eksperimen*
- *Langkah-langkah pengiraan haba pembakaran*

[Jisim atom relatif: H = 1, C = 12, muatan haba tentu larutan =  $4.2 \text{ J g}^{-1} \text{ }^{\circ}\text{C}^{-1}$ ]

[10 marks]

[10 markah]



- 10 Loke found 2 bottles of zinc salt, bottle X and bottle Y in chemistry laboratory. The label of the bottles are faded. So he can't identify the types of zinc salt in the bottles. Loke had heated the white powder of zinc salt strongly and tested the gas released using lime water and glowing wooden splinter. Table 10.1 shows the observation recorded.

*Loke terjumpa dua botol garam zink, botol X dan botol Y di makmal kimia. Label pada botol telah pudar. Maka dia tidak dapat mengenal pasti jenis garam zink dalam botol. Loke telah memanaskan serbuk putih garam zink dengan kuat dan menguji gas yang terbebas menggunakan air kapur dan kayu uji berbara. Jadual 10.1 menunjukkan pemerhatian yang direkodkan.*



<p><b>Bottle of zinc salt</b> <i>Garam zink dalam botol</i></p>	 <p>Bottle X <i>Botol X</i></p>	 <p>Bottle Y <i>Botol Y</i></p>
<p><b>Observation</b> <i>Pemerhatian</i></p>	<ul style="list-style-type: none"> <li>Yellow solid is formed, it turns white when cooled <i>Pepejal kuning terbentuk, ia menjadi putih apabila sejuk</i></li> <li>Lime water turns cloudy <i>Air kapur menjadi keruh</i></li> </ul>	<ul style="list-style-type: none"> <li>Yellow solid is formed, it turns white when cooled <i>Pepejal kuning terbentuk, ia menjadi putih apabila sejuk</i></li> <li>Brown gas is released <i>Gas perang terbebas</i></li> <li>The glowing wooden splinter relighted <i>Kayu uji berbara menyala semula</i></li> </ul>

Table 10.1  
*Jadual 10.1*



- (a) Based on the observation in Table 10.1, identify the salt in bottle X and bottle Y.

*Berdasarkan pemerhatian dalam Jadual 10.1, kenal pasti garam yang ada dalam botol X dan botol Y.*

[2 marks]

[2 markah]

- (b) From your answer in 10(a), write a chemical equation of the decomposition of **one** zinc salt.

*Daripada jawapan anda di 10(a), tulis persamaan kimia untuk penguraian **satu** garam zink.*

[2 marks]

[2 markah]

- (c) Describe another confirmatory test for the anion in bottle Y.

*Huraikan satu ujian pengesahan yang lain untuk anion dalam botol Y.*

[6 marks]

[6 markah]

- (d) Table 10.2 shows three substances prepared by Pn. Lew.

*Jadual 10.2 menunjukkan tiga bahan disediakan oleh Pn. Lew.*

Sulphuric acid	Zinc nitrate	Zinc carbonate
<i>Asid sulfurik</i>	<i>Zink nitrat</i>	<i>Zink karbonat</i>

Table 10.2

*Jadual 10.2*

Choose the suitable substances in Table 10.2, describe how to prepare zinc sulphate salt in the laboratory.

Write the chemical equation involved.

*Pilih bahan yang sesuai dalam Jadual 10.2, huraikan bagaimana menyediakan garam zink sulfat di dalam makmal.*

*Tulis persamaan kimia yang terlibat.*

[10 marks]

[10 markah]

**END OF QUESTION PAPER**  
**KERTAS PEPERIKSAAN TAMAT**



**BLANK PAGE**  
***HALAMAN KOSONG***



THE PERIODIC TABLE OF ELEMENTS

<div><div>1</div><div>H</div><div>Hydrogen</div><div>1</div></div>		<div><div>10</div><div>Ne</div><div>Neon</div><div>20</div></div> <div>Proton number</div> <div>Symbol</div> <div>Name of element</div> <div>Relative atomic mass</div>																<div><div>2</div><div>He</div><div>Helium</div><div>4</div></div>
<div><div>3</div><div>Li</div><div>Lithium</div><div>7</div></div>	<div><div>4</div><div>Be</div><div>Beryllium</div><div>9</div></div>																	<div><div>10</div><div>Ne</div><div>Neon</div><div>20</div></div>
<div><div>11</div><div>Na</div><div>Sodium</div><div>23</div></div>	<div><div>12</div><div>Mg</div><div>Magnesium</div><div>24</div></div>																	<div><div>9</div><div>F</div><div>Flourine</div><div>19</div></div>
<div><div>19</div><div>K</div><div>Potassium</div><div>39</div></div>	<div><div>20</div><div>Ca</div><div>Calcium</div><div>40</div></div>	<div><div>21</div><div>Sc</div><div>Scandium</div><div>45</div></div>	<div><div>22</div><div>Ti</div><div>Titanium</div><div>48</div></div>	<div><div>23</div><div>V</div><div>Vanadium</div><div>51</div></div>	<div><div>24</div><div>Cr</div><div>Chromium</div><div>52</div></div>	<div><div>25</div><div>Mn</div><div>Manganesce</div><div>55</div></div>	<div><div>26</div><div>Fe</div><div>Iron</div><div>56</div></div>	<div><div>27</div><div>Co</div><div>Cobalt</div><div>59</div></div>	<div><div>28</div><div>Ni</div><div>Nickel</div><div>59</div></div>	<div><div>29</div><div>Cu</div><div>Copper</div><div>64</div></div>	<div><div>30</div><div>Zn</div><div>Zinc</div><div>65</div></div>	<div><div>31</div><div>Ga</div><div>Gallium</div><div>70</div></div>	<div><div>32</div><div>Ge</div><div>Germanium</div><div>73</div></div>	<div><div>33</div><div>As</div><div>Arsenic</div><div>75</div></div>	<div><div>34</div><div>Se</div><div>Selenium</div><div>79</div></div>	<div><div>35</div><div>Br</div><div>Bromine</div><div>80</div></div>	<div><div>36</div><div>Kr</div><div>Krypton</div><div>84</div></div>	<div><div>18</div><div>Ar</div><div>Argon</div><div>40</div></div>
<div><div>37</div><div>Rb</div><div>Rubidium</div><div>86</div></div>	<div><div>38</div><div>Sr</div><div>Srontium</div><div>88</div></div>	<div><div>39</div><div>Y</div><div>Yttrium</div><div>89</div></div>	<div><div>40</div><div>Zr</div><div>Zirconium</div><div>91</div></div>	<div><div>41</div><div>Nb</div><div>Niobium</div><div>93</div></div>	<div><div>42</div><div>Mb</div><div>Molybdenum</div><div>96</div></div>	<div><div>43</div><div>Tc</div><div>Technetium</div><div>98</div></div>	<div><div>44</div><div>Ru</div><div>Ruthenium</div><div>101</div></div>	<div><div>46</div><div>Pd</div><div>Palladium</div><div>106</div></div>	<div><div>47</div><div>Ag</div><div>Silver</div><div>108</div></div>	<div><div>48</div><div>In</div><div>Indium</div><div>115</div></div>	<div><div>48</div><div>Cd</div><div>Cadmium</div><div>112</div></div>	<div><div>50</div><div>Sn</div><div>Tin</div><div>119</div></div>	<div><div>51</div><div>Sb</div><div>Antimony</div><div>122</div></div>	<div><div>52</div><div>Te</div><div>Tellurium</div><div>128</div></div>	<div><div>53</div><div>I</div><div>Iodine</div><div>127</div></div>	<div><div>54</div><div>Xe</div><div>Xenon</div><div>131</div></div>	<div><div>86</div><div>Rn</div><div>Radon</div><div>222</div></div>	
<div><div>55</div><div>Cs</div><div>Cesium</div><div>133</div></div>	<div><div>56</div><div>Ba</div><div>Barium</div><div>137</div></div>	<div><div>57</div><div>La</div><div>Lanthanum</div><div>139</div></div>	<div><div>72</div><div>Hf</div><div>Hafnium</div><div>179</div></div>	<div><div>73</div><div>Ta</div><div>Tantalum</div><div>181</div></div>	<div><div>74</div><div>W</div><div>Tungsten</div><div>184</div></div>	<div><div>75</div><div>Re</div><div>Rhenium</div><div>186</div></div>	<div><div>76</div><div>Os</div><div>Osmium</div><div>190</div></div>	<div><div>78</div><div>Pt</div><div>Platinum</div><div>195</div></div>	<div><div>79</div><div>Au</div><div>Gold</div><div>197</div></div>	<div><div>80</div><div>Hg</div><div>Mercury</div><div>201</div></div>	<div><div>81</div><div>Tl</div><div>Thallium</div><div>204</div></div>	<div><div>82</div><div>Pb</div><div>Lead</div><div>207</div></div>	<div><div>83</div><div>Bi</div><div>Bismuth</div><div>209</div></div>	<div><div>84</div><div>Po</div><div>Polonium</div><div>210</div></div>	<div><div>85</div><div>At</div><div>Astatine</div><div>210</div></div>	<div><div>86</div><div>Rn</div><div>Radon</div><div>222</div></div>		
<div><div>87</div><div>Fr</div><div>Francium</div><div>223</div></div>	<div><div>88</div><div>Ra</div><div>Radium</div><div>226</div></div>	<div><div>89</div><div>Ac</div><div>Actinium</div><div>227</div></div>	<div><div>104</div><div>Unq</div><div>Unnil-quadium</div><div>257</div></div>	<div><div>105</div><div>Unp</div><div>Unnil-pentium</div><div>260</div></div>	<div><div>106</div><div>Unh</div><div>Unnil-hexium</div><div>263</div></div>	<div><div>107</div><div>Uns</div><div>Unnil-septium</div><div>262</div></div>	<div><div>108</div><div>Uno</div><div>Unnil-octium</div><div>265</div></div>	<div><div>109</div><div>Une</div><div>Unnil-ennium</div><div>266</div></div>										

<div><div>58</div><div>Ce</div><div>Cerium</div><div>140</div></div>	<div><div>59</div><div>Pr</div><div>Praseo-dymium</div><div>141</div></div>	<div><div>60</div><div>Nd</div><div>Neodymium</div><div>144</div></div>	<div><div>61</div><div>Pm</div><div>Promethium</div><div>147</div></div>	<div><div>62</div><div>Sm</div><div>Samarium</div><div>150</div></div>	<div><div>63</div><div>Eu</div><div>Europium</div><div>152</div></div>	<div><div>64</div><div>Gd</div><div>Gadolinium</div><div>157</div></div>	<div><div>65</div><div>Tb</div><div>Terbium</div><div>159</div></div>	<div><div>66</div><div>Dy</div><div>Dysprosium</div><div>163</div></div>	<div><div>67</div><div>Ho</div><div>Holmium</div><div>165</div></div>	<div><div>68</div><div>Er</div><div>Erbium</div><div>167</div></div>	<div><div>69</div><div>Tm</div><div>Thulium</div><div>169</div></div>	<div><div>70</div><div>Yb</div><div>Ytterbium</div><div>173</div></div>	<div><div>71</div><div>Lu</div><div>Lutetium</div><div>175</div></div>
<div><div>90</div><div>Th</div><div>Thorium</div><div>232</div></div>	<div><div>91</div><div>Pa</div><div>Proactinium</div><div>231</div></div>	<div><div>92</div><div>U</div><div>Uranium</div><div>238</div></div>	<div><div>93</div><div>Np</div><div>Neptunium</div><div>237</div></div>	<div><div>94</div><div>Pu</div><div>Plutonium</div><div>244</div></div>	<div><div>95</div><div>Am</div><div>Americium</div><div>243</div></div>	<div><div>96</div><div>Cm</div><div>Curium</div><div>247</div></div>	<div><div>97</div><div>Bk</div><div>Berkelium</div><div>247</div></div>	<div><div>98</div><div>Cf</div><div>Californium</div><div>249</div></div>	<div><div>99</div><div>Es</div><div>Einsteinium</div><div>254</div></div>	<div><div>100</div><div>Fm</div><div>Fermium</div><div>253</div></div>	<div><div>101</div><div>Md</div><div>Mendelevium</div><div>256</div></div>	<div><div>102</div><div>No</div><div>Nobelium</div><div>254</div></div>	<div><div>103</div><div>Lr</div><div>Lawrenesium</div><div>257</div></div>



# JADUAL BERKALA UNSUR

—  
**H**  
—  
Hydrogen

3 <b>Li</b> Lithium 7	4 <b>Be</b> Beryllium 9
11 <b>Na</b> Sodium 23	12 <b>Mg</b> Magnesium 24

19	<b>K</b> Kalium 39	20	<b>Ca</b> Kalsium 40	21	<b>Sc</b> Skandium 45
37	<b>Rb</b> Rubidium 86	38	<b>Sr</b> Strontium 88	39	<b>Y</b> Itrium 89
55	<b>Cs</b> Sesium 133	56	<b>Ba</b> Barium 137	57	<b>La</b> Lantanum 139
87	<b>Fr</b> Fransium 223	88	<b>Ra</b> Radium 226	89	<b>Ac</b> Aktinium 227

72	<b>Hf</b> Hafnium 179	73	<b>Ta</b> Tantalum 181	74	<b>W</b> Tungsten 184	75	<b>Re</b> Rhenium 186	76	<b>Os</b> Osmium 190	77	<b>Ir</b> Iridium 192
104	<b>Unq</b> Unnil- quadium 257	105	<b>Unp</b> Unnil- pentium 260	106	<b>Unh</b> Unnilhek- sium 263	107	<b>Uns</b> Unnilseptium 262	108	<b>Uno</b> Unniloktium 265	109	<b>Une</b> Unnilenium 266

58	<b>Ce</b> Serium 140	59	<b>Pr</b> Praseo- dium 141	60	<b>Nd</b> Neodimium 144	61	<b>Pm</b> Prometium 147	62	<b>Sm</b> Samarium 150	63	<b>Eu</b> Europium 152	64	<b>Gd</b> Gadolinium 157	65	<b>Tb</b> Terbium 159	66	<b>Dy</b> Disprosium 163	67	<b>Ho</b> Holmium 165	68	<b>Er</b> Erbium 167	69	<b>Tm</b> Tulium 169	70	<b>Yb</b> Iberbium 173	71	<b>Lu</b> Lutetium 175
90	<b>Th</b> Torium 232	91	<b>Pa</b> Proaktinium 231	92	<b>U</b> Uranium 238	93	<b>Np</b> Neptunium 237	94	<b>Pu</b> Plutonium 244	95	<b>Am</b> Amerisium 243	96	<b>Cm</b> Kurium 247	97	<b>Bk</b> Berkelium 247	98	<b>Cf</b> Kalifornium 249	99	<b>Es</b> Einsteinium 254	100	<b>Fm</b> Fermium 253	101	<b>Md</b> Mendele- vium 256	102	<b>No</b> Nobelium 254	103	<b>Lr</b> Lawrensium 257

Periodik tafel	2 <b>He</b> Helium 4	9 <b>F</b> Flourin 19	8 <b>O</b> Oksigen 16	7 <b>N</b> Nitrogen 14	6 <b>C</b> Karbon 12	5 <b>B</b> Boron 11
	10 <b>Ne</b> Neon 20	17 <b>Cl</b> Klorin 35	16 <b>S</b> Sulfur 32	15 <b>P</b> Fosforus 31	14 <b>Si</b> Silikon 28	13 <b>Al</b> Aluminium 27
	18 <b>Ar</b> Argon 40	35 <b>Br</b> Bromin 80	34 <b>Se</b> Selenium 79	33 <b>As</b> Arsenik 75	32 <b>Ge</b> Germanium 73	31 <b>Ga</b> Galium 70
	36 <b>Kr</b> Kripton 84	53 <b>I</b> Iodin 127	52 <b>Te</b> Telurium 128	51 <b>Sb</b> Antimoni 122	50 <b>Sn</b> Stanum 119	48 <b>In</b> Indium 115
	54 <b>Xe</b> Xenon 131	85 <b>At</b> Astatin 210	84 <b>Po</b> Polonium 210	83 <b>Bi</b> Bismut 209	82 <b>Pb</b> Plumbum 207	81 <b>Tl</b> Taliun 204
	86 <b>Rn</b> Radon 222					

The diagram shows a central nucleus with a '+' sign, containing '10' and 'Ne'. It is surrounded by two concentric circles representing electron shells. The inner shell contains '10' and the outer shell contains '20'. Labels on the right with lines pointing to the diagram are: 'Nombor proton' (points to '10' in the nucleus), 'Simbol' (points to 'Ne'), 'Nama unsur' (points to 'Neon'), and 'Jisim atom relatif' (points to '20').







1. This question paper consists of **three** sections: **Section A**, **Section B** and **Section C**.  
*Kertas peperiksaan ini mengandungi tiga bahagian: Bahagian A, Bahagian B dan Bahagian C.*
2. Answer **all** questions in **Section A**. Write your answers for **Section A** in the spaces provided in the question paper.  
*Jawab semua soalan dalam Bahagian A. Tulis jawapan anda bagi Bahagian A pada ruang yang disediakan dalam kertas peperiksaan ini.*
3. Answer any **one** question from **Section B** and any **one** question from **Section C**. Write your answers for **Section B** and **Section C** on the 'helaian tambahan' provided by the invigilators. You may use equations, diagrams, tables, graphs and other suitable methods to explain your answers.  
*Jawab mana-mana satu soalan daripada Bahagian B dan mana-mana satu soalan daripada Bahagian C. Tulis jawapan anda bagi Bahagian B dan Bahagian C dalam helaian tambahan yang dibekalkan oleh pengawas peperiksaan. Anda boleh menggunakan persamaan, rajah, jadual, graf, dan cara lain yang sesuai untuk menjelaskan jawapan anda.*
4. The diagrams in the questions are not drawn to scale unless stated.  
*Rajah yang mengiringi soalan tidak dilukis mengikut skala kecuali dinyatakan.*
5. Marks allocated for each question or sub-part of a question are shown in brackets.  
*Markah yang diperuntukkan bagi setiap soalan atau ceraihan soalan ditunjukkan dalam kurungan.*
6. Show your working, it may help you to get marks.  
*Tunjukkan kerja mengira, ini membantu anda mendapatkan markah.*
7. If you wish to change your answer, cross out the answer that you have done. Then write down the new answer.  
*Jika anda hendak menukar sesuatu jawapan, batalkan jawapan yang telah dibuat. Kemudian tulis jawapan yang baharu.*
8. The Periodic Table of Elements is provided on pages 29 and 30.  
*Jadual Berkala Unsur disediakan di halaman 29 dan 30.*
9. You may use a scientific calculator.  
*Anda dibenarkan menggunakan kalkulator saintifik.*
10. You are advised to spend 90 minutes to answer questions in **Section A**, 30 minutes for **Section B** and 30 minutes for **Section C**.  
*Anda dinasihati supaya mengambil masa 90 minit untuk menjawab soalan dalam Bahagian A, 30 minit untuk Bahagian B dan 30 minit untuk Bahagian C.*
11. Detach **Section B** and **Section C** from this question paper. The candidates are given a choice to either combine the 'helaian tambahan' together with this question paper by using stapler or punching a hole on this question paper. Then, tie the papers together and hand in to the invigilator at the end of the examination.  
*Ceraikan Bahagian B dan Bahagian C daripada kertas peperiksaan ini. Calon ada pilihan sama ada mencantumkan helaian tambahan bersama-sama kertas peperiksaan ini dengan menggunakan stapler atau menebuk lubang dan ikat kemudian serahkan kepada pengawas peperiksaan pada akhir peperiksaan.*