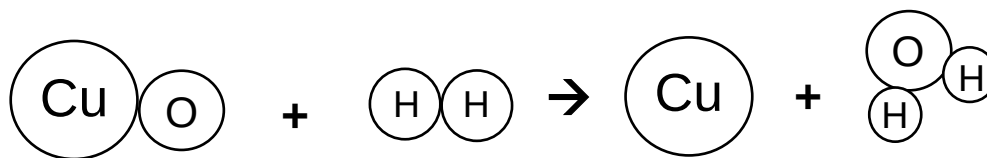


Bahagian A
[60 markah]
Jawab **semua** soalan.

- 1 Rajah 1 menunjukkan tindak balas antara kuprum(II) oksida dan gas hidrogen.
Diagram 1 shows reaction between copper(II) oxide and hydrogen gas.



Rajah 1
Diagram 1

- (a) Nyatakan formula kimia bagi kuprum(II) oksida dan gas hidrogen.
State the chemical formula of copper(II) oxide and hydrogen gas.

Kuprum(II) oksida :
Copper(II) oxide
Gas hidrogen :
Hydrogen gas

[2 markah/ marks]

- (b) Nyatakan warna bagi kuprum(II) oksida.
State the colour of copper(II) oxide.

.....

[1 markah/ mark]

- (c) Nyatakan maklumat kualitatif dan kuantitatif berdasarkan Rajah 1.
State the qualitative and quantitative information based on Diagram 1.

.....

.....

[2 markah/ marks]

- 2 (a) Jadual 1 adalah dua pasang cermin mata yang dibuat daripada dua jenis kaca berbeza.

Table 1 shows two pairs of spectacles made from two different type of glasses.

Kaca Glass	Maklumat Information
A	- Dibuat daripada kaca silika terlakur <i>Made from fused silica glass</i> - Kekal lutsinar apabila terdedah kepada matahari <i>Remains transparent when exposed to sunlight</i>
B	- Dibuat daripada kaca fotokromik <i>Made from photochromic glass</i> - Bertukar gelap apabila terdedah kepada matahari <i>Turns dark when exposed to sunlight</i>

Jadual 1

Table 1

- (i) Nyatakan dua bahan pengukuhan yang digunakan dalam kaca fotokromik.
State two strengthening substances used in photochromic glass.

.....

.....

[2 markah/ marks]

- (ii) Nyatakan kelebihan kaca fotokromik tersebut.
State the advantage of the photochromic glass.

.....

[1 markah/ mark]

- (b) Rajah 2 menunjukkan kereta api Maglev. Kereta api jenis elektrik ini boleh mencapai kelajuan sehingga 581 km/j.
Diagram 2 shows a Maglev train. This type of electric train can reach speeds of up to 581 km/h.



Rajah 2
Diagram 2

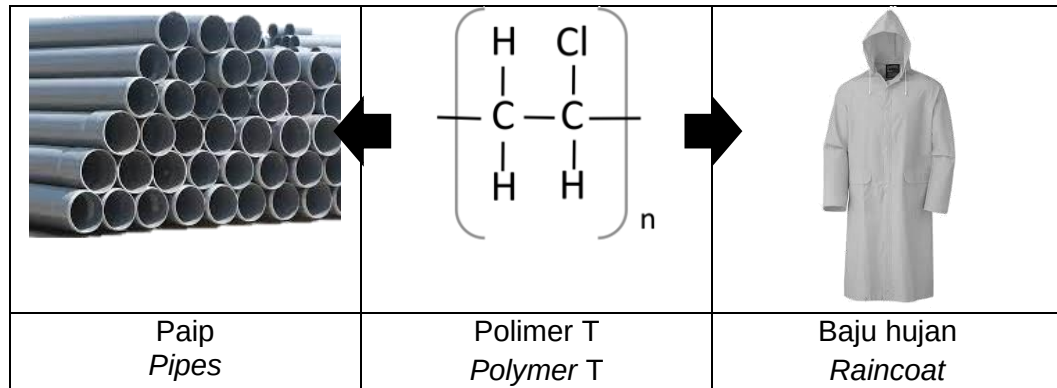
- (i) Nyatakan aloi yang digunakan dalam kereta api ini.
State the alloy used in this train.

.....
[1 markah/ mark]

- (ii) Mengapakah aloi di 2(b)(i) sesuai digunakan?
Why alloy in 2(b)(i) is suitable to use?

.....
[1 markah/ mark]

- 3 (a) Paip dan baju hujan diperbuat daripada polimer T. Formula struktur bagi polimer T ditunjukkan dalam Rajah 3.1.
Pipes and raincoats are made from polymer T. The structural formula of polymer T is shown in Diagram 3.1.



Rajah 3.1
Diagram 3.1

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

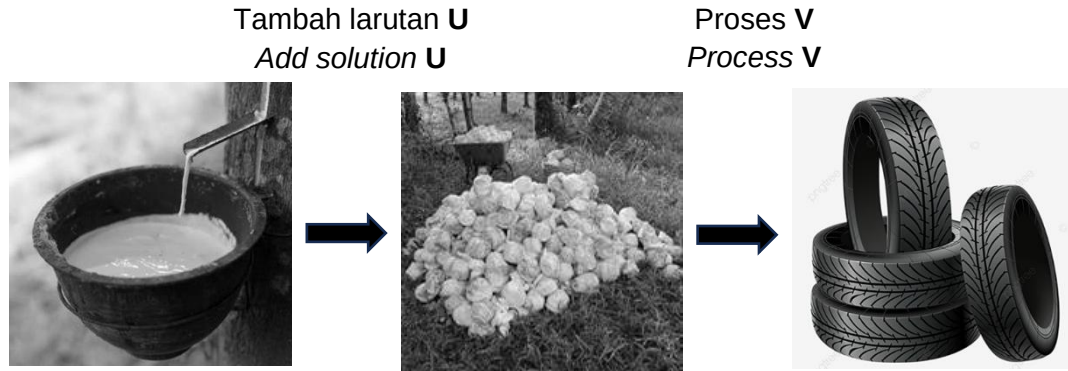
.....

 [1 markah/ mark]

- (ii) Nyatakan nama bagi monomer yang membentuk polimer T.
State the name of the monomer that makes up polymer T.

.....
 [1 markah/ mark]

- (b) Rajah 3.2 menunjukkan carta alir untuk penghasilan tayar kereta. Proses **V** dijalankan untuk meningkatkan kekenyalan getah asli.
*Diagram 3.2 shows a flow chart for the production of car tyres. Process **V** is carried out to increase the elasticity of natural rubber.*



Rajah 3.2
Diagram 3.2

- (i) Cadangkan larutan **U** dan nyatakan namakan proses **V**.
*Suggest solution **U** and state the name of process **V**.*

Larutan **U** :
 Solution **U**
 Proses **V** :
 Process **V**

[2 markah/ marks]

- (ii) Bagaimanakah proses **V** boleh meningkatkan kekenyalan getah asli?
*How process **V** can increase the elasticity of natural rubber?*

.....

[2 markah/ marks]

- 4 (a) Persamaan berikut menunjukkan tindak balas penyediaan sabun di dalam makmal.

The following equation shows the reaction in preparation of soap in the laboratory.

Asid palmitik + Larutan J → Sabun K + Gliserol

Palmitic acid + Solution J → Soap K + Glycerol

- (i) Nyatakan nama bagi tindak balas penyediaan sabun.

State the name of the reaction to prepare soap.

.....

[1 markah/ mark]

- (ii) Nyatakan nama larutan **J** jika sabun **K** ialah natrium palmitat.

State the name of solution J if soap K is sodium palmitate.

.....

[1 markah/ mark]

- (iii) Pn Salmiah mendapati kotoran pada seluar sukan anaknya masih belum hilang selepas dicuci menggunakan sabun **K** dan air di rumahnya.

Nyatakan nama bahan pencuci yang boleh digunakan bagi mengatasi masalahnya.

Pn. Salmiah found that the dirt on her son's sports pants still remained after washing with soap K and water at her house. State the name of the cleaning agent that can be used to overcome the problem.

.....

[1 markah/ mark]

- (b) Seorang pesakit yang berusia 12 tahun mengalami sakit kepala. Anda mempunyai dua pilihan ubat seperti Rajah 4 yang boleh diberikan kepada pesakit itu.

A patient aged 12 experiencing headache. You have two options of medicine as shown in Diagram 4 that could be given to the patient.



Rajah 4
Diagram 4

- (i) Pilih ubat manakah yang lebih sesuai diberikan kepada pesakit itu dan nyatakan bagaimanakah ubat itu boleh diambil.

Choose which medicine is more suitable to be given to the patient and state how the medicine can be taken.

.....
.....

[2 markah/ marks]

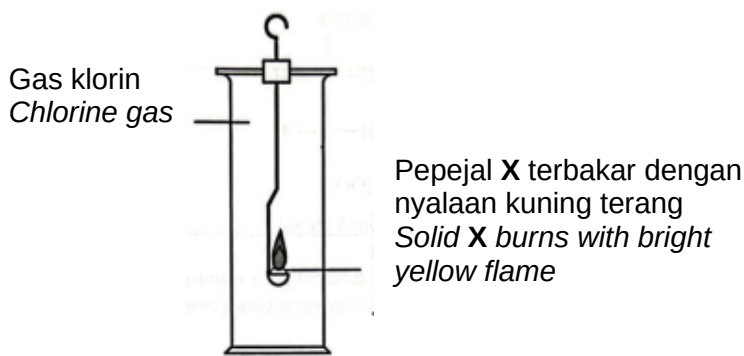
- (ii) Terangkan mengapa anda memilih ubat tersebut.

Explain why you choose the medicine.

.....
.....

[2 markah/ marks]

- 5 Unsur **X** terletak dalam Kumpulan 1 dan Kala 3 dalam Jadual Berkala Unsur. Rajah 5 menunjukkan susunan radas bagi satu eksperimen untuk mengkaji tindak balas antara unsur **X** dengan gas klorin.
- Element **X** is located in Group 1 and Period 3 in the Periodic Table of Elements. Diagram 5 shows the apparatus set-up for an experiment to study the reaction between element **X** with chlorine gas.*



Rajah 5
Diagram 5

- (a) Nyatakan warna bagi gas klorin.
State the colour of chlorine gas.
-
[1 markah/ mark]
- (b) Nyatakan nama unsur **X**.
*State the name of element **X**.*
-
[1 markah/ mark]
- (c) Tuliskan persamaan kimia bagi tindak balas ini.
Write the chemical equation for this reaction.
-
[2 markah/ marks]
- (d) Hitungkan jisim hasil tindak balas yang terbentuk jika 0.5 mol **X** terbakar lengkap dalam gas klorin.
[Jisim molar hasil tindak balas : 58.5 g mol⁻¹]
*Calculate the mass of product formed if 0.5 mol of **X** burns completely in chlorine gas.*
[Molar mass of product : 58.5 g mol⁻¹]

[2 markah/ marks]

- (e) Unsur **X** dan klorin terletak dalam kala yang sama di dalam Jadual Berkala Unsur. Bandingkan keelektronegatifan bagi unsur **X** dan klorin. Berikan satu sebab.

*Element **X** and chlorine are located in the same period in the Periodic Table of Elements. Compare the electronegativity of element **X** and chlorine. Give a reason.*

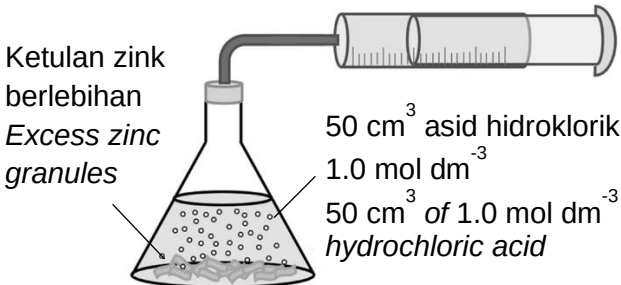
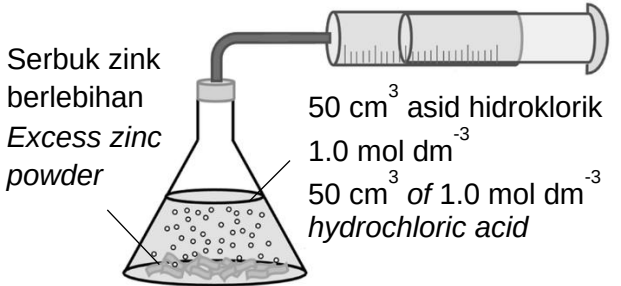
.....

.....

[2 markah/ marks]

- 6 Jadual 2 menunjukkan dua eksperimen yang dijalankan untuk mengkaji faktor yang mempengaruhi kadar tindak balas.

Table 2 shows two experiments carried out to study the factor that affects the rate of reaction.

Eksperimen <i>Experiment</i>	Susunan radas <i>Set-up of apparatus</i>	Masa yang diambil untuk mengumpul 60 cm³ gas (s) <i>Time taken to collect 60 cm³ gas (s)</i>
I	 Ketulan zink berlebihan <i>Excess zinc granules</i> 50 cm³ asid hidroklorik 1.0 mol dm⁻³ 50 cm³ of 1.0 mol dm⁻³ hydrochloric acid	80
II	 Serbuk zink berlebihan <i>Excess zinc powder</i> 50 cm³ asid hidroklorik 1.0 mol dm⁻³ 50 cm³ of 1.0 mol dm⁻³ hydrochloric acid	30

Jadual 2

Table 2

- (a) Berikan satu faktor yang boleh mempengaruhi kadar tindak balas.
Give one factor that can affects the rate of reaction.

.....
[1 markah/ mark]

- (b) Berdasarkan Jadual 2, nyatakan satu sebab mengapa isipadu akhir gas yang diperolehi dalam eksperimen I dan eksperimen II adalah sama.
Based on Table 2, state one reason why the final volume of gas obtained in experiments I and II are the same.

.....
[1 markah/ mark]

- (c) (i) Hitung kadar tindak balas purata bagi :
Calculate the average rate of reaction for :

Eksperimen I
Experiment I

Eksperimen II
Experiment II

[2 markah/ marks]

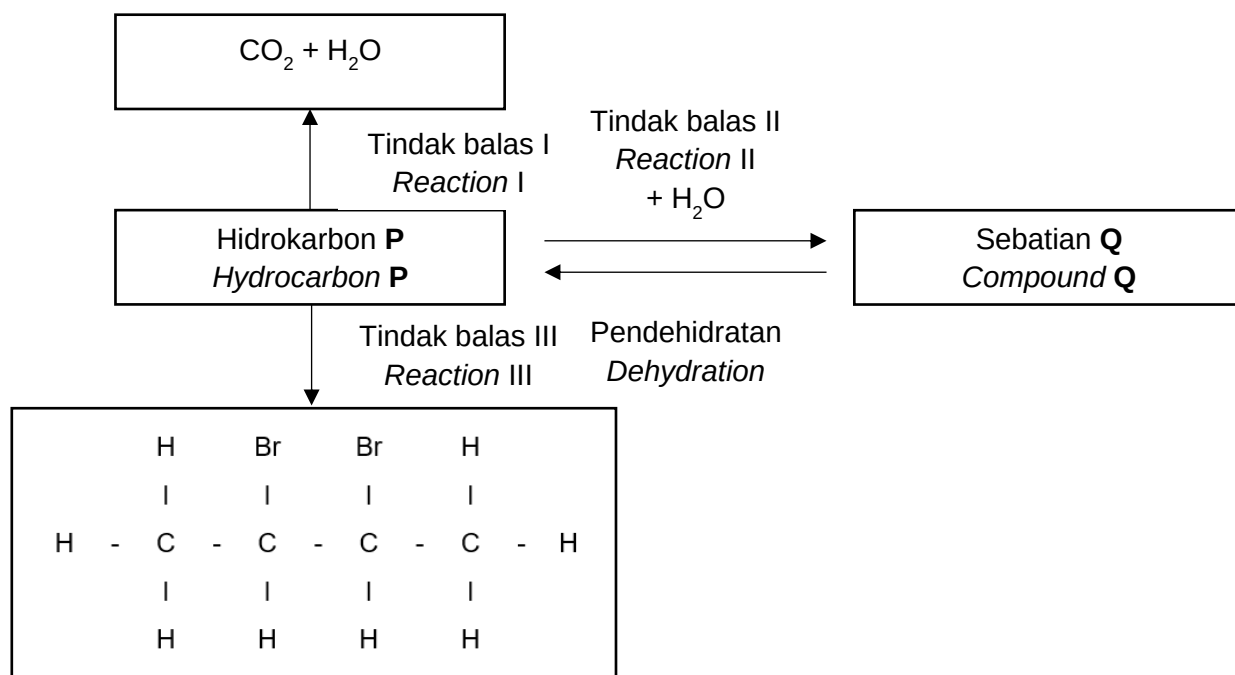
- (ii) Tuliskan persamaan kimia bagi eksperimen itu.
Write a chemical equation for the experiment.

.....
[2 markah/ marks]

- (iii) Bandingkan kadar tindak balas bagi Eksperimen I dan Eksperimen II. Terangkan jawapan anda.
Compare the rate of reaction between Experiment I and Experiment II. Explain your answer.

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

- 7 Rajah 6 menunjukkan carta alir tindak balas kimia bagi hidrokarbon **P**.
Diagram 6 shows the flow chart for chemical reactions of hydrocarbon **P**.



Rajah 6
Diagram 6

- (a) Nyatakan maksud hidrokarbon.
State the meaning of hydrocarbon.
-
-
- [1 markah/ mark]
- (b) Nyatakan siri homolog bagi hidrokarbon **P**.
State the homologous series of hydrocarbon **P**.
-
- [1 markah/ mark]
- (c) (i) Hidrokarbon **P** terbakar dengan lengkap dalam oksigen pada Tindak balas I dan menghasilkan jelaga. Tuliskan persamaan kimia bagi tindak balas itu.
Hydrocarbon **P** is burnt completely in excess oxygen in Reaction I and produce soot. Write the chemical equation for the reaction.
-

[2 markah/ marks]



- (ii) Hitungkan peratus jisim karbon per molekul dalam hidrokarbon **P**.
[Jisim atom relatif : H=1; C=12]
Calculate the percentage of mass of carbon per molecule in hydrocarbon P.
[Relative atomic mass: H=1; C=12]

[1 markah/ mark]

- (d) Kenalpasti **P**, **Q** dan Tindak balas III.
Identify P, Q and Reaction III.

P :

Q :

Tindak balas III :
Reaction III

[3 markah/ marks]

- (e) Huraikan secara ringkas bagaimana tindak balas III boleh dijalankan di dalam makmal.
Describe briefly how reaction III can be carried out in the laboratory.

.....

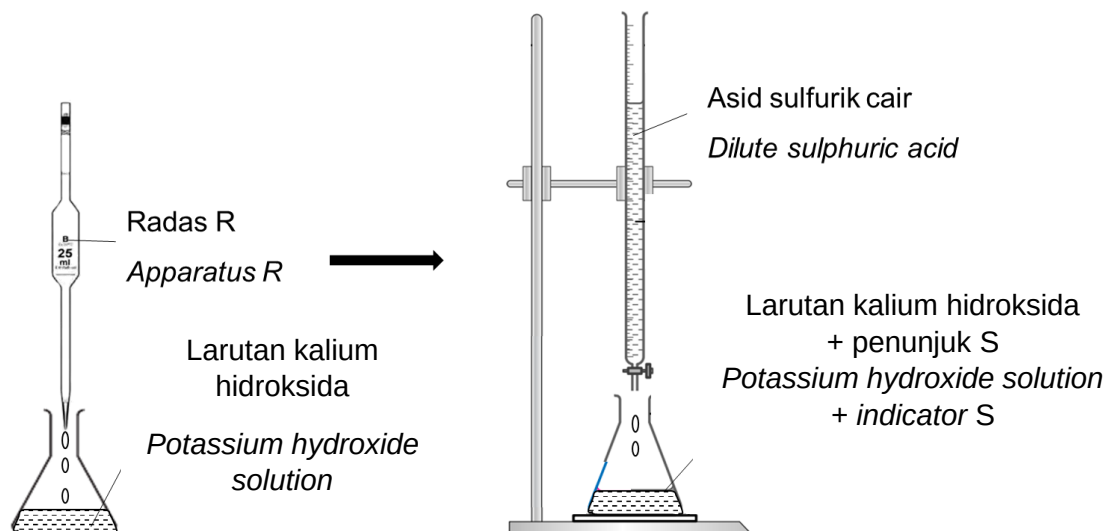
.....

.....

[2 markah/ marks]

- 8 Rajah 7 menunjukkan gambar rajah susunan radas pentitratan antara larutan kalium hidroksida dan asid sulfurik cair dengan menggunakan penunjuk S.

Diagram 7 shows the apparatus set-up of titration between potassium hydroxide solution and dilute sulphuric acid using indicator S.



Rajah 7
Diagram 7

- (a) Berdasarkan Rajah 7,
Based on Diagram 7,

- (i) nyatakan nama bagi radas R.
state the name of apparatus R.

.....

- (ii) Cadangkan **satu** penunjuk S.
*Suggest **one** indicator S.*

.....

[2 markah/ marks]

- (b) Dalam eksperimen ini, 10.00 cm^3 asid sulfurik cair diperlukan untuk meneutralkan dengan lengkap 25.0 cm^3 larutan kalium hidroksida 1.0 mol dm^{-3} . Hitung kemolaran asid sulfurik cair.

In this experiment, 10.00 cm^3 dilute sulphuric acid is needed to neutralize completely 25.0 cm^3 of 1.0 mol dm^{-3} potassium hydroxide solution. Calculate the molarity of the dilute sulphuric acid.

[4 markah/ marks]

- (c) Jadual 3 menunjukkan asid etanoik, CH_3COOH yang berada dalam tiga keadaan berbeza dan pemerhatian yang diperolehi apabila diuji dengan kertas litmus biru.

Table 3 shows ethanoic acid, CH_3COOH in three different states and the observations that obtained when it is tested with blue litmus paper.

Eksperimen <i>Experiment</i>	Keadaan asid etanoik <i>State of ethanoic acid</i>	Pemerhatian <i>Observation</i>
I	Asid etanoik dalam air <i>Ethanoic acid in water</i>	Kertas litmus biru bertukar merah <i>Blue litmus paper turns red</i>
II	Asid etanoik dalam propanon <i>Ethanoic acid in propanone</i>	Tiada perubahan <i>No change</i>

Jadual 3
Table 3

Bandingkan perbezaan pemerhatian dalam eksperimen I dan eksperimen II.
Compare the differences in observation in experiments I and II.

.....

.....

[2 markah/ marks]

- (d) Huraikan secara ringkas bagaimana garam yang terhasil dalam Rajah 7 dapat dihablurkan.

Describe briefly how salt formed in Diagram 7 can be crystallised.

.....

.....

.....

[2 markah/ marks]

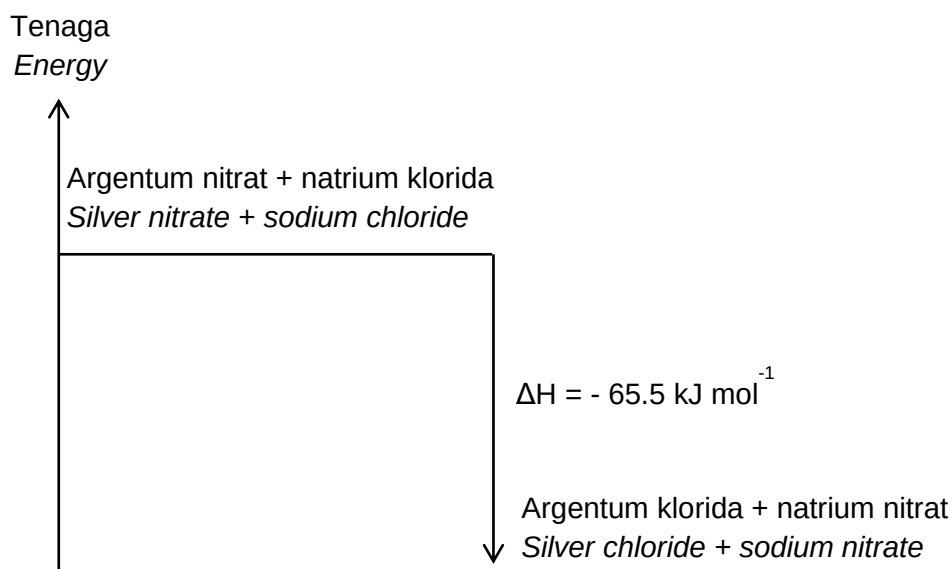
Bahagian B

[20 markah]

Bahagian ini mengandungi **dua** soalan. Jawab **satu** soalan.

- 9 (a) Rajah 8 menunjukkan gambarajah aras tenaga bagi tindak balas antara argentum nitrat dan natrium klorida.

Diagram 8 shows the energy level diagram for the reaction between silver nitrate and sodium chloride.



Rajah 8
Diagram 8

- (i) Tuliskan formula kimia bagi argentum klorida dan nyatakan keterlarutan argentum klorida dalam air.
Write the chemical formula for silver chloride and state the solubility of silver chloride in water.

[2 markah/ marks]

- (ii) Tuliskan dua pernyataan yang boleh ditafsir daripada Rajah 8.
Write two statements that can be interpreted from Diagram 8.

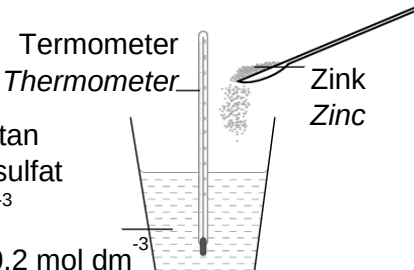
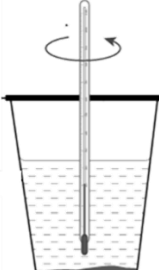
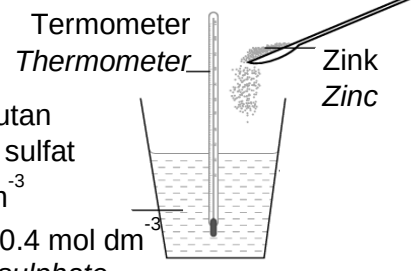
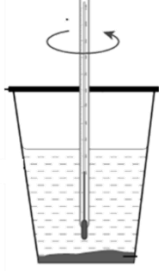
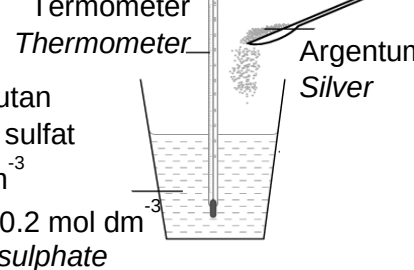
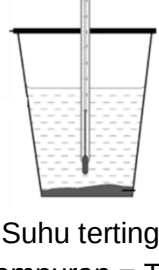
[2 markah/ marks]

- (iii) Cadangkan satu sebatian klorida yang lain untuk menggantikan natrium klorida untuk mendapatkan nilai haba pemendakan yang sama. Terangkan jawapan anda.
Suggest another chloride compound to replace sodium chloride to obtain the same value of heat of precipitation. Explain your answer.

[2 markah/ marks]

- (b) Jadual 4 menunjukkan keputusan bagi tiga eksperimen yang berlainan antara larutan kuprum(II) sulfat dan zink berlebihan dalam eksperimen I dan eksperimen II, dan dengan argentum berlebihan dalam eksperimen III.

Table 4 shows the results of three different experiments for the reaction between copper(II) sulphate solution and excess zinc in experiments I and II, and with excess silver in experiment III.

Eksperimen Experiment	Sebelum tindak balas Before reaction	Selepas tindak balas After reaction
I	25 cm³ larutan kuprum(II) sulfat 0.2 mol dm⁻³ 25 cm³ of 0.2 mol dm⁻³ copper(II) sulphate solution  Suhu awal = 28.0 °C Initial temperature = 28.0 °C	 Suhu tertinggi campuran = 33.0 °C Highest temperature of mixture = 33.0 °C
II	25 cm³ larutan kuprum(II) sulfat 0.4 mol dm⁻³ 25 cm³ of 0.4 mol dm⁻³ copper(II) sulphate solution  Suhu awal = 28.0 °C Initial temperature = 28.0 °C	 Suhu tertinggi campuran = T₁ °C Highest temperature of mixture = T₁ °C
III	25 cm³ larutan kuprum(II) sulfat 0.2 mol dm⁻³ 25 cm³ of 0.2 mol dm⁻³ copper(II) sulphate solution  Suhu awal = 28.0 °C Initial temperature = 28.0 °C	 Suhu tertinggi campuran = T₂ °C Highest temperature of mixture = T₂ °C

Jadual 4
Table 4

- (i) Dengan membandingkan,
- eksperimen I dan eksperimen II, ramalkan nilai T_1
Terangkan jawapan anda.
 - eksperimen I dan eksperimen III, ramalkan nilai T_2 .
Terangkan jawapan anda.

By comparing,

- *experiments I and II, predict the value of T_1 .
Explain your answer.*
- *experiments I and III, predict the value of T_2 .
Explain your answer.*

[6 markah/ marks]

- (ii) Cadangkan satu logam lain yang dapat menyesearkan ion kuprum(II), Cu^{2+} dalam eksperimen I.
Nyatakan **satu** pemerhatian dalam tindak balas yang berlaku.
Suggest another metal that can displace copper(II) ions, Cu^{2+} , in experiment I.
*State **one** observation in the reaction that occurs.*

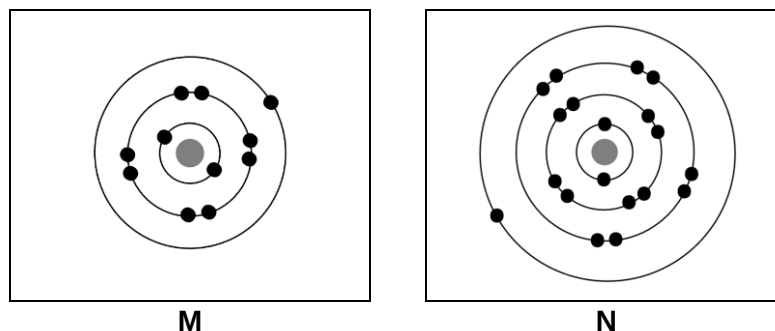
[2 markah/ marks]

- (iii) Hitung haba penyesaran kuprum oleh zink dalam eksperimen I.
Tulis persamaan kimia yang terlibat.
[Muatan haba tentu larutan ialah $4.2 \text{ J g}^{-1} \text{ }^\circ\text{C}^{-1}$ dan ketumpatan larutan ialah 1.0 g cm^{-3}]
Calculate the heat of displacement of copper by zinc in experiment I.
Write the chemical equation involved.
[Specific heat capacity of solution is $4.2 \text{ J g}^{-1} \text{ }^\circ\text{C}^{-1}$ and the density of the solution is 1.0 g cm^{-3}]

[6 markah/ marks]

- 10 (a) Rajah 9 menunjukkan susunan elektron bagi atom unsur **M** dan atom unsur **N** yang terletak dalam kumpulan yang sama tetapi kala yang berbeza dalam Jadual Berkala Unsur.

*Diagram 9 shows the electron arrangement for the atoms of elements **M** and **N** which are in the same group but different period in the Periodic Table of Elements.*



Rajah 9
Diagram 9

Berdasarkan Rajah 9,
Based on Diagram 9,

- (i) Nyatakan maksud bagi kumpulan dan kala. Nyatakan kumpulan dan kala di mana terletaknya unsur **N** dalam Jadual Berkala Unsur.

*State the meaning of group and period. State the group and period where element **N** are located in the Periodic Table of Elements.*

[4 markah/ marks]

- (ii) Tuliskan persamaan kimia bagi tindak balas antara unsur **M** dan gas oksigen. Hitungkan jisim hasil tindak balas yang diperoleh jika 1200 cm³ gas oksigen digunakan dalam tindak balas tersebut.

[Jisim atom relatif: O = 16, M = 23; Isi padu molar gas pada keadaan bilik = 24 dm³ mol⁻¹]

*Write the chemical equation for the reaction between element **M** 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, M = 23; Molar volume of gas at room condition = 24 dm³ mol⁻¹]

[6 markah/ marks]

- (b) Jadual 5 menunjukkan maklumat bagi atom unsur-unsur **P**, **Q** dan **R**.
Table 5 shows the information for atoms of elements P, Q and R.

Unsur <i>Elements</i>	P	Q	R
Nombor proton <i>Proton number</i>	6	11	8

Jadual 5
Table 5

Berdasarkan Jadual 5,
Based on Table 5,

Pilih **dua** unsur yang boleh bertindak balas untuk membentuk dua jenis sebatian:

- (i) Sebatian yang mempunyai takat lebur dan takat didih yang rendah,
- (ii) Sebatian yang boleh mengalirkan arus elektrik dalam keadaan leburan dan akueus,

dan huraikan pembentukan ikatan bagi kedua-dua sebatian itu.

*Choose **two** elements that can react to form two types of compounds:*

- (i) *Compound that has low melting and boiling points,*
- (ii) *Compound that can conduct electricity in molten and aqueous state,*

and describe the formation of the bond in both compounds.

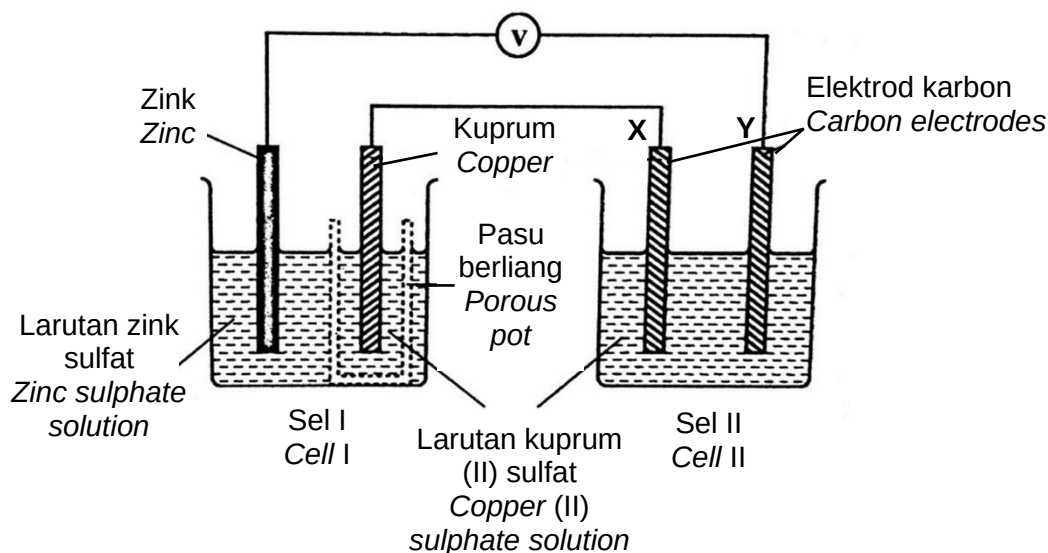
[10 markah/ 10 marks]

Bahagian C

[20 markah]

Soalan ini **mesti** dijawab.

- 11 Rajah 10 menunjukkan gabungan satu sel kimia dan sel elektrolisis.
Diagram 10 shows a combination of chemical cell and an electrolytic cell.



Rajah 10
Diagram 10

Jadual 6 menunjukkan sebahagian daripada nilai keupayaan elektrod piawai bagi beberapa jenis ion.

Diagram 6 shows part of the standard electrode potential values for a few types of ions.

Tindak balas sel setengah Reaction of half-cell	E^0 (V) (298K)
$\text{Zn}^{2+} + 2\text{e}^- \rightleftharpoons \text{Zn}$	-0.76
$2\text{H}^+ + 2\text{e}^- \rightleftharpoons \text{H}_2$	0.00
$\text{Cu}^{2+} + 2\text{e}^- \rightleftharpoons \text{Cu}$	+0.34
$\text{O}_2 + 2\text{H}_2\text{O} + 4\text{e}^- \rightleftharpoons 4\text{OH}^-$	+0.40
$\text{S}_2\text{O}_8^{2-} + 2\text{e}^- \rightleftharpoons 2\text{SO}_4^{2-}$	+2.01

Jadual 6
Table 6

- (a) Nyatakan warna larutan kuprum (II) sulfat. Berdasarkan Rajah 10 dan Jadual 6, kenal pasti terminal negatif dalam Sel I dan terangkan jawapan anda.
State the colour of copper (II) sulphate. Based on Diagram 10 and Table 6, identify the negative terminal in Cell I and explain your answer.

[3 markah/ marks]

- (b) Berdasarkan Sel I, tuliskan setengah persamaan bagi tindak balas yang berlaku di zink dan di kuprum. Dengan merujuk Jadual 6, hitungkan nilai voltan sel, E^0_{sel} bagi Sel I.

Based on Cell I, write the half-equations for the reaction that occurs at zinc and at copper. By referring to Table 6, calculate the cell voltage, E^0_{cell} in Cell I.

[4 markah/ marks]

- (c) Berdasarkan Sel II, terangkan tindak balas yang berlaku di elektrod X dari aspek-aspek berikut:

- Ion-ion yang tertarik ke elektrod X
- ion yang dioksidakan dan sebab
- pemerhatian
- hasil yang terbentuk

Based on Cell II, explain the reaction that occurs at electrode X based on the following aspects:

- *ions that are attracted to electrode X*
- *ion that is oxidized and reason*
- observation
- *product formed*

[5 markah/ marks]

- (d) Rajah 11 menunjukkan perbualan antara dua orang pelajar.
Diagram 11 shows the conversation between two students.



Rajah 11
Diagram 11

- (i) Gunakan maklumat diatas dan pilih kaedah yang lebih sesuai digunakan untuk mencegah pengaratan. Wajarkan jawapan anda.
Use the information above and choose the more appropriate method that could be used to prevent rusting. Justify your answer.
- [2 markah/ marks]

- (ii) Selepas beberapa bulan, Pelajar A mendapati kunci besinya sudah mula berkarat. Dengan mengubahsuai Sel II, huraikan secara ringkas satu kaedah lain yang boleh dijalankan oleh pelajar itu untuk menghalang proses pengaratan daripada terus berlaku. Sertakan rajah berlabel dalam jawapan anda.
After a few months, Student A found that his iron keys have started to rust. By modifying Cell II, describe briefly another method that could be carried out by the student to prevent the rusting process from continuing. Include a labelled diagram in your answer.
- [6 markah/ marks]