

NAMA:

KELAS:



MAJLIS PENGETUA SEKOLAH MALAYSIA (MPSM)

NEGERI PERAK

MODUL INTERVENSI
MENENGAH ATAS 2026

SET 1

KIMIA

KERTAS 2

2 JAM 30 MINIT

JANGAN BUKA MODUL INI SEHINGGA DIBERITAHU

ARAHAN:

1. Tulis nama dan kelas anda pada ruang yang disediakan.
2. Kertas soalan ini mengandungi tiga bahagian : Bahagian A, Bahagian B dan Bahagian C.
3. Jawab *semua* soalan daripada Bahagian A, pilih satu soalan daripada Bahagian B dan jawab *semua* soalan daripada Bahagian C.
4. Jawapan hendaklah ditulis pada ruang jawapan yang disediakan di dalam kertas peperiksaan ini.
5. Kertas peperiksaan ini adalah dalam dwibahasa.
6. Jawapan boleh ditulis sama ada dalam bahasa Melayu atau bahasa Inggeris.
7. Rajah yang mengiringi soalan tidak dilukis mengikut skala kecuali dinyatakan.
8. Kerja mengira anda mesti ditunjukkan.
9. Penggunaan kalkulator saintifik yang tidak boleh diprogramkan adalah dibenarkan.
10. Kertas peperiksaan ini hendaklah diserahkan kepada pengawas peperiksaan pada akhir peperiksaan.

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		100	

Modul ini mengandungi 35 halaman bercetak

SULIT

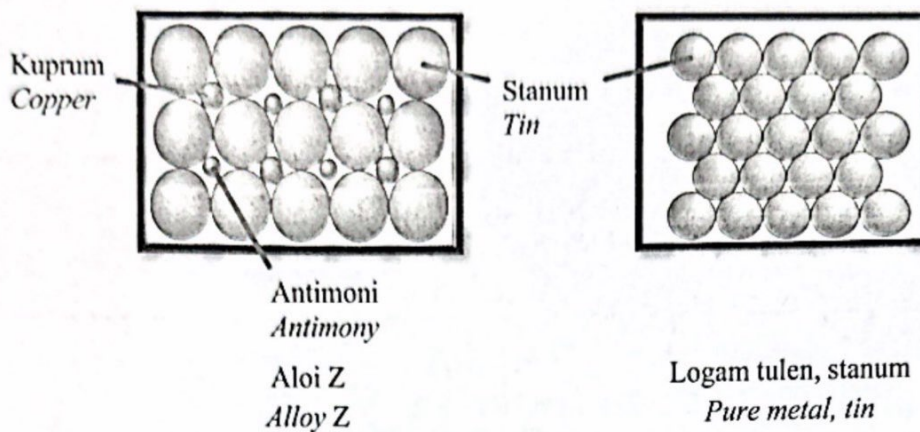
[LIHAT HALAMAN SEBELAH]

Bahagian A

[60 markah]

Jawab semua soalan.

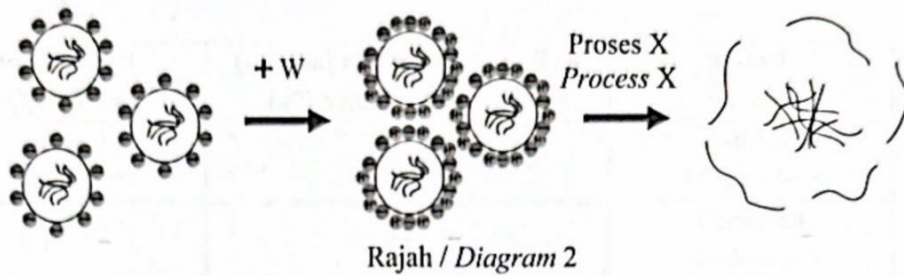
- 1 Rajah 1 menunjukkan susunan atom dalam aloi Z dan logam tulennya, stanum.
 Diagram 1 shows the arrangement of atoms in alloy Z and its pure metal, tin.



Rajah / Diagram 1

- (a) Namakan aloi Z.
 Name alloy Z.
-
- [1 markah / mark]
- (b) Berikan satu kegunaan aloi Z.
 Give one use of alloy Z.
-
- [1 markah / mark]
- (c) Terangkan perbezaan kekerasan antara aloi Z dan logam tulennya, stanum.
 Explain the difference of hardness between alloy Z and its pure tulennya metal, tin.
-
-
-
- [3 markah / marks]

- 2 (a) Rajah 2 menunjukkan suatu proses yang berlaku apabila bahan W ditambahkan ke dalam lateks.
Diagram 2 shows a process occurs when substance W is added into latex.



- (i) Nyatakan proses X.
State the process X.

.....
[1 markah / mark]

- (ii) Namakan bahan W.
Name substance W.

.....
[1 markah / mark]

- (iii) Apakah peranan bahan W dalam proses itu?
What is the role of substance W in the process?

.....
[1 markah / mark]

- (b) Seorang penoreh getah menambahkan larutan ammonia ke dalam lateks untuk memudahkan pemprosesan di kilang.
A rubber tapper adds ammonia solution into latex to ease the processing at the factory.

- (i) Nyatakan tujuan tindakan tersebut.
State the purpose of this action.

.....
[1 markah / mark]

- (ii) Ramalkan keadaan fizikal lateks jika dibiarkan terdedah kepada udara tanpa penambahan ammonia.
Predict the physical state of the latex if it is left exposed to the air without the addition of ammonia.

.....
[1 markah / mark]

- 3 Jadual 1 menunjukkan maklumat tentang isotop klorin.
Table 1 shows information about isotopes of chlorine.

Isotop <i>Isotope</i>	Kelimpahan semula jadi (%) <i>Natural abundance (%)</i>	Bilangan proton <i>Number of protons</i>
Klorin-35 <i>Chlorine-35</i>	75.0	17
Klorin-37 <i>Chlorine-37</i>	25.0	17

Jadual / Table 1

- (a) Nyatakan maksud isotop.
State the meaning of isotopes.

.....
[1 markah / mark]

- (b) Mengapakah atom klorin-35 dan atom klorin-37 mempunyai jisim yang berlainan?
Why do the chlorine-35 and chlorine-37 atoms have different masses?

.....
[1 markah / mark]

- (c) Hitungkan jisim atom relatif bagi klorin.
Calculate the relative atomic mass for chlorine.

$$\begin{aligned} \text{Jisim atom relatif} &= \frac{\Sigma (\% \text{ isotop} \times \text{jisim isotop})}{100} \\ \text{Relative atomic mass} &= \frac{\Sigma (\% \text{ isotope} \times \text{mass of isotope})}{100} \end{aligned}$$

.....
[2 markah / marks]



SERTAI TELEGRAM @exercise_students

- (d) Lukis struktur atom bagi isotop klorin-37.
Draw the atomic structure for chlorine-37 isotope.



[2 markah / marks]

- 4 (a) Jadual 2 menunjukkan persamaan kimia bagi penyediaan agen pencuci P dan Q.
 Table 2 shows the chemical equations for the preparation of cleaning agents P and Q.

Agen pencuci P Cleaning agent P	Agen pencuci Q Cleaning agent Q
$\text{CH}_3(\text{CH}_2)_n\text{CH}_2\text{OH}$ $\downarrow \text{H}_2\text{SO}_4$ $\text{CH}_3(\text{CH}_2)_n\text{CH}_2\text{O}-\text{S}(=\text{O})_2\text{OH}$ Proses peneutralan Neutralisation process $\downarrow$ $\text{CH}_3(\text{CH}_2)_n\text{CH}_2\text{O}-\text{S}(=\text{O})_2\text{O}-\text{Na}^+$ Bahan X Substance X	$\begin{array}{c} \text{O} \\ \parallel \\ \text{CH}_2-\text{O}-\text{C}-(\text{CH}_2)_{14}\text{CH}_3 \\ \\ \text{CH}_2-\text{O}-\text{C}(=\text{O})-(\text{CH}_2)_{14}\text{CH}_3 \\ \\ \text{CH}_2-\text{O}-\text{C}(=\text{O})-(\text{CH}_2)_{14}\text{CH}_3 \end{array}$ $\downarrow$ $\begin{array}{c} \text{CH}_2-\text{OH} \\ \\ \text{CH}_2-\text{OH} \\ \\ \text{CH}_2-\text{OH} \end{array} + 3\text{CH}_3(\text{CH}_2)_{14}-\text{C}(=\text{O})-\text{O}-\text{Na}^+$ Bahan X Substance X

Jadual / Table 2

- (i) Nyatakan jenis agen pencuci P.
 State the type of cleaning agent P.

.....

[1 markah / mark]

- (ii) Seorang murid mendapati kesan lumpur pada bajunya masih tidak hilang sepenuhnya selepas dicuci menggunakan sejenis agen pencuci. Agen pencuci yang manakah digunakan oleh murid itu? Terangkan.
 A student found that the mud stains on his shirt is not completely removed after washing it with a cleaning agent. Which cleaning agent is used by the student.
 Explain.

.....

.....

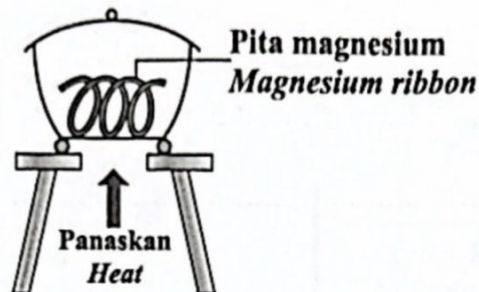
.....

[3 markah / marks]

- (b) Seorang murid mendapati bau badannya kuat.
Cadangkan kosmetik yang sesuai digunakan dan terangkan bagaimana kosmetik tersebut membantu mengatasi masalah tersebut.
*A student finds that his body odour is strong.
Suggest the cosmetics that is suitable to use and explain how the cosmetics help to overcome the problem.*

[3 markah / marks]

- 5 Rajah 3 menunjukkan satu eksperimen yang dijalankan untuk menentukan formula empirik magnesium oksida.
Diagram 3 shows an experiment carried out to determine the empirical formula of magnesium oxide.



Rajah / Diagram 3

Keputusan yang diperolehi daripada eksperimen dicatatkan dalam Jadual 3
The results obtained from the experiment are recorded in Table 3

Perkara <i>Description</i>	Jisim (g) <i>Mass (g)</i>
Mangkuk pijar + penutup <i>Crucible + lid</i>	26.60
Mangkuk pijar + penutup + pita magnesium <i>Crucible + lid + magnesium ribbon</i>	27.20
Mangkuk pijar + penutup + magnesium oksida <i>Crucible + lid + magnesium oxide</i>	27.60

Jadual / Table 3

- (a) Nyatakan maksud formula empirik.
State the meaning of empirical formula.
-
-
- [1 markah / mark]
- (b) Semasa eksperimen, mengapakah penutup mangkuk pijar dibuka sekali-sekala dan ditutup semula dengan cepat?
During the experiment, why is the lid of the crucible open occasionally and quickly closed again?
-
-
- [1 markah / mark]

- (c) Berdasarkan keputusan eksperimen dalam Jadual 3, tentukan formula empirik bagi magnesium oksida.

[Jisim atom relatif: O = 16, Mg = 24]

Based on the experimental results in Table 3, determine the empirical formula for magnesium oxide.

[Relative atomic mass: O = 16, Mg = 24]

[3 markah / marks]

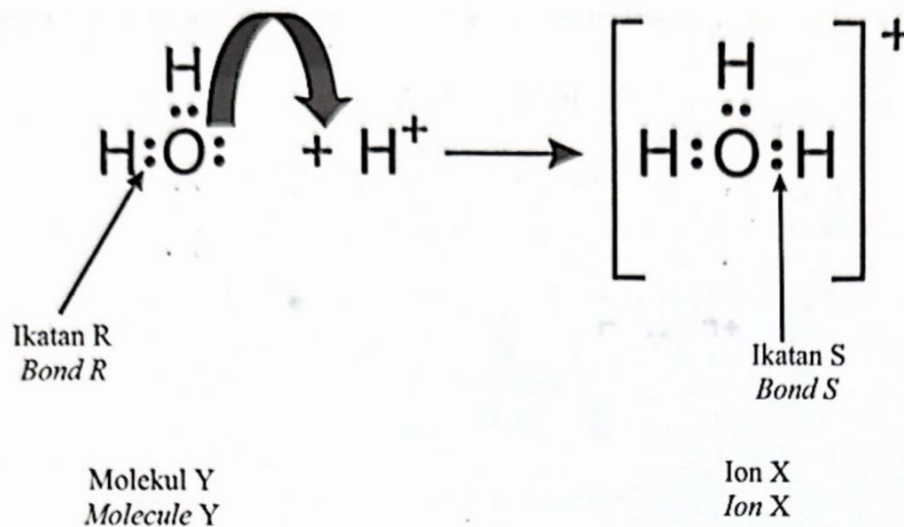
- (d) Wajarkan penggunaan kaedah ini untuk menentukan formula empirik plumbum(II) oksida. Terangkan.

Justify the use of this method to determine the empirical formula of lead(II) oxide. Explain.

.....
.....

[3 markah / marks]

- 6 Rajah 4 menunjukkan pembentukan ion X daripada molekul Y.
Diagram 4 shows the formation of X ion from molecule Y.



Rajah / Diagram 4

- (a) Namakan ion X.
Name ion X.

.....
[1 markah / mark]

- (b) Namakan ikatan R dan ikatan S.
Name bond R and bond S.

Ikatan R:
Bond R:

Ikatan S:
Bond S:

[2 markah / marks]

- (c) Terangkan perbezaan antara ikatan R dan ikatan S.
Explain the difference between bonds R and S.

.....
.....
.....

[2 markah / marks]

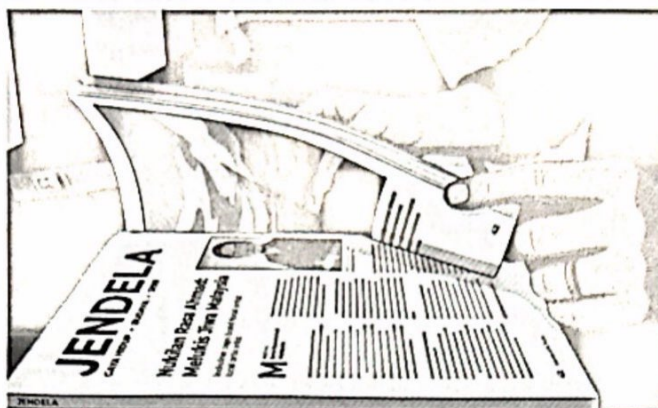


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SULIT
[LIHAT HALAMAN SEBELAH]

- (d) Rajah 5 menunjukkan seorang pelajar mengalami kesukaran untuk menyelak salah satu halaman dalam majalah.

Diagram 5 shows a student having difficulty flipping through one of the pages in the magazine.



Rajah / Diagram 5

Berdasarkan pengetahuan anda tentang ikatan kimia, cadangkan bagaimana pelajar itu dapat mengatasi masalah tersebut. Terangkan jawapan anda.

Based on your knowledge about chemical bond, suggest how the student can overcome the problem. Explain your answer.

.....

.....

.....

.....

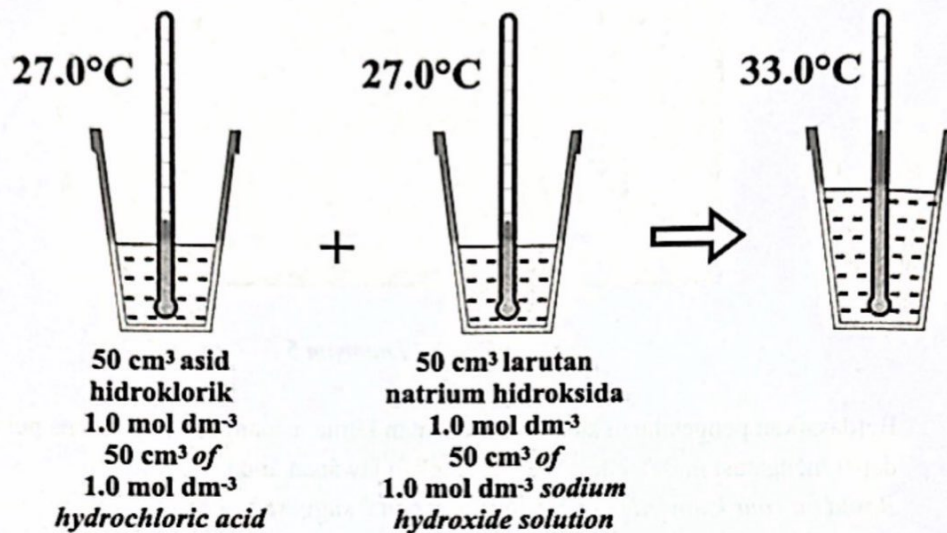
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[4 markah / marks]

- 7 Seorang murid menjalankan eksperimen untuk mengkaji haba peneutralan antara asid hidroklorik dan larutan natrium hidroksida. Rajah 6 menunjukkan susunan radas dan perubahan suhu bagi eksperimen yang dilaksanakan.

A student carries out an experiment to study the heat of neutralisation between hydrochloric acid and sodium hydroxide solution. Diagram 6 shows the apparatus set up and the temperature change for the experiment carried out.



Rajah / Diagram 6

- (a) Nyatakan jenis tindak balas berdasarkan perubahan suhu dalam tindak balas ini.
State the type of reaction based on temperature change in this reaction.

.....
[1 markah / mark]

- (b) Nyatakan maksud haba peneutralan.
State the meaning of heat of neutralisation.

.....
[1 markah / mark]

- (c) Tindak balas ini sesuai digunakan dalam pek makanan pemanas sendiri. Terangkan.
This reaction is suitable for use in self-heating food packs. Explain.

.....
[3 markah / marks]

- (d) Hitung haba peneutralan bagi tindak balas ini.
Calculate the heat of neutralisation for this reaction.
[Muatan haba tentu larutan = $4.2 \text{ J g}^{-1} \text{ }^{\circ}\text{C}^{-1}$, Ketumpatan = 1 g cm^{-3}]
[Specific heat capacity of solution = $4.2 \text{ J g}^{-1} \text{ }^{\circ}\text{C}^{-1}$, Density = 1 g cm^{-3}]

$$Q = mc\theta$$

[3 markah / marks]

- (e) Nilai teori haba peneutralan bagi asid kuat dan alkali kuat ialah -57 kJ mol^{-1} .
Cadangkan dua sebab mengapa nilai eksperimen berbeza daripada nilai teori.
The theoretical value of heat of neutralisation for a strong acid and strong alkali is -57 kJ mol^{-1} .
Suggest two reasons why the experimental value differs from the theoretical value.

[2 markah / marks]

- 8 Jadual 4 menunjukkan maklumat bagi dua set eksperimen untuk mengkaji kesan mangkin terhadap kadar penguraian hidrogen peroksida.

Table 4 shows the information for two sets of experiment to investigate the effect of catalyst on the rate of decomposition of hydrogen peroxide.

Set Set	Bahan Material	Isi padu gas terkumpul dalam 2 minit (cm ³) <i>Volume of gas collected in 2 minutes (cm³)</i>
I	50 cm ³ hidrogen peroksida 1.0 mol dm ⁻³ <i>50 cm³ of 1.0 mol dm⁻³ hydrogen peroxide</i>	30.00
II	50 cm ³ hidrogen peroksida 1.0 mol dm ⁻³ + mangkin X <i>50 cm³ of 1.0 mol dm⁻³ hydrogen peroxide + catalyst X</i>	50.00

Jadual / Table 4

- (a) Nyatakan mangkin X yang boleh digunakan dalam Set II.

State catalyst X that can be used in Set II.

.....

[1 markah / mark]

- (b) Tuliskan persamaan kimia bagi tindak balas yang berlaku dalam eksperimen ini.

Write the chemical equation for the reaction that occur in this experiment.

.....

[2 markah / marks]

- (c) (i) Hitung kadar tindak balas purata dalam
Calculate the average rate of reaction in

Set I :

Set II :

[2 markah / marks]

- (ii) Bandingkan kadar tindak balas antara Set I dan Set II.
Compare the rate of reaction between Set I and Set II.

.....
[1 markah / mark]

- (iii) Terangkan jawapan anda di 8(c)(ii) berdasarkan teori perlanggaran.
Explain your answer in 8(c)(ii) based on collision theory.

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

- (d) Sebagai seorang murid kimia, lukiskan susunan radas berlabel untuk mengumpul gas yang dibebaskan dalam Set I.
As a chemistry student, draw the labelled apparatus set-up to collect the gas released in Set I.

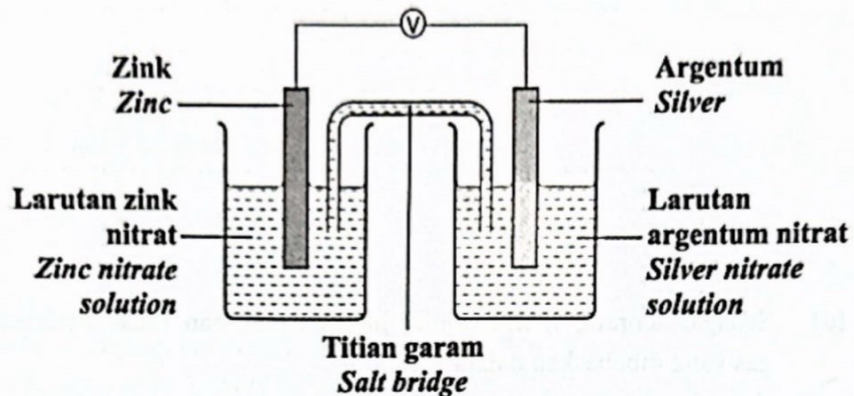
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.....
[2 markah / marks]

Bahagian B

[20 markah]

Bahagian ini mengandungi dua soalan. Jawab satu soalan.

- 9 (a) Rajah 7 menunjukkan susunan radas satu sel kimia.
Diagram 7 shows the apparatus set-up of a chemical cell.



Rajah / Diagram 7

- (i) Kertas turas dicelupkan ke dalam larutan X untuk menghasilkan titian garam.
Cadangkan larutan X.
Filter paper is dipped into solution X to make the salt bridge.
Suggest solution X.

[1 markah / mark]

- (ii) Nyatakan perubahan tenaga dalam sel kimia.
State the energy change in a chemical cell.

[1 markah / mark]



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- (iii) Jadual 5 menunjukkan nilai keupayaan elektrod piawai sel setengah.
Table 5 shows the values of standard electrode potential.

Tindak balas sel setengah <i>Reaction of half-cell</i>	E° (V)
$\text{Zn}^{2+} + 2\text{e}^{-} \rightleftharpoons \text{Zn}$	- 0.76
$2\text{H}^{+} + 2\text{e}^{-} \rightleftharpoons \text{H}_2$	0.00
$\text{O}_2 + 2\text{H}_2\text{O} + 4\text{e}^{-} \rightleftharpoons \text{H}_2\text{O}$	+0.40
$\text{Ag}^{+} + \text{e}^{-} \rightleftharpoons \text{Ag}$	+0.80

Jadual / Table 5

Berdasarkan Rajah 7 dan Jadual 5, terangkan tindak balas redoks yang berlaku.
 Penerangan anda hendaklah mengandungi perkara berikut :

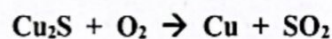
*Based on Diagram 7 and Table 5, explain the redox reaction that occurred.
 Your explanation should include the following:*

- Terminal negatif dan terminal positif
Negative and positive terminals
- Persamaan ion
Ionic equation
- Agen pengoksidaan dan agen penurunan
Oxidising agent and reducing agent
- Nilai voltan sel
Cell voltage

[8 markah / marks]

- (b) Dalam proses industri, kuprum diekstrak daripada kuprum(I) sulfida melalui tindak balas berikut:

In industrial process, copper is extracted from copper(I) sulphide through the following reaction:



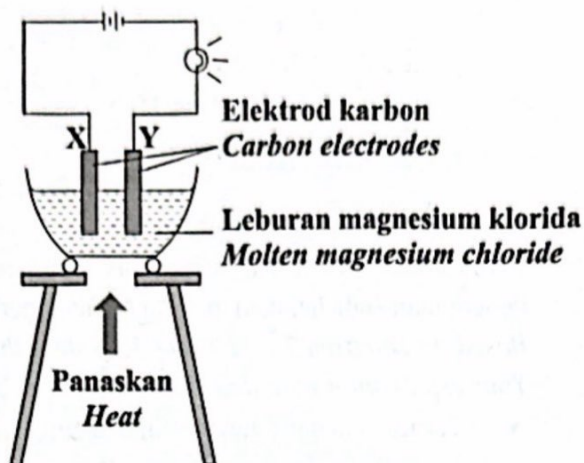
Nyatakan peranan ion sulfida dalam Cu_2S berdasarkan perubahan nombor pengoksidaan. Terangkan

State the role of sulphide ion in Cu_2S based on the change in oxidation number. Explain.

[4 markah / marks]

- (c) Rajah 8 menunjukkan susunan radas bagi proses elektrolisis leburan magnesium klorida.

Diagram 8 shows the apparatus set-up for the electrolysis process of molten magnesium chloride.



Rajah / Diagram 8

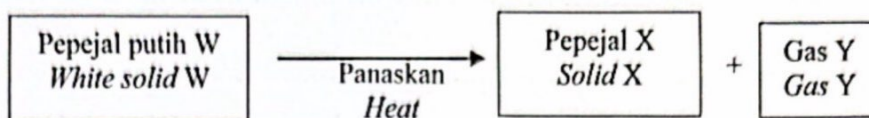
Terangkan proses elektrolisis tersebut. Penerangan anda hendaklah mengandungi perkara berikut:

Explain the electrolysis process. Your explanation should include the following:

- Setengah persamaan di elektrod X dan Y
Half-equations at electrodes X and Y
- Pemerhatian di elektrod X dan Y
Observations at electrodes X and Y
- Ujian pengesahan hasil di elektrod X
Confirmatory test of product formed at electrode X

[6 markah / marks]

- 10 Rajah 9 menunjukkan tindak balas bagi garam, W.
Diagram 9 shows reaction of a salt, W.



Rajah / Diagram 9

Berdasarkan Rajah 9,
Based on Diagram 9,

- (a) Nyatakan maksud garam.
State the meaning of salt. [1 markah / mark]
- (b) (i) Selepas pemanasan, pepejal X yang perang ketika panas dan kuning apabila sejuk terhasil. Kenal pasti W, X dan Y.
After the heating, solid X which is brown when hot and yellow when it is cool is formed. Identify W, X and Y. [3 markah / marks]
- (ii) Lukiskan susunan radas untuk mengesahkan gas Y. Terangkan.
Draw the apparatus set-up to verify gas Y. Explain. [4 markah / marks]
- (c) Apabila 4.46 g pepejal X ditambahkan kepada 50 cm³ asid nitrik, suatu larutan tanpa warna Z terhasil. Tuliskan persamaan kimia bagi tindak balas yang berlaku. Namakan tindak balas itu. Hitung kepekatan asid nitrik yang digunakan.
[Jisim molar pepejal X = 223 gmol⁻¹]
When 4.46 g of solid X is added to 50 cm³ of nitric acid, a colourless solution Z is produced. Write the chemical equation for the reaction occur. Name the reaction. Calculate the concentration of acid nitric used.
[Molar mass of solid X = 223 gmol⁻¹] [6 markah / marks]
- (d) Larutan Z yang terhasil di 10 (c) diuji secara kualitatif. Terangkan prosedur, nyatakan pemerhatian yang dijangkakan dan kenal pasti kation yang berkemungkinan hadir dalam larutan Z.
Solution Z produced in 10 (c) is tested qualitatively. Explain the procedure, state expected observation and identify the possible cation present in solution Z. [6 markah / marks]

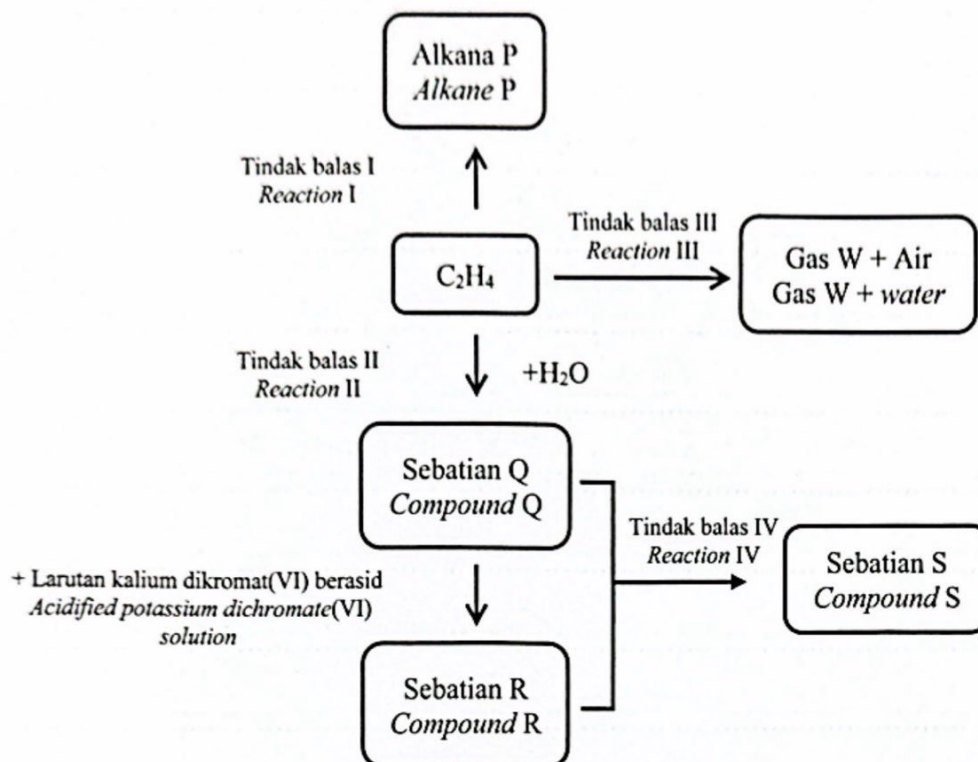
Bahagian C

[20 markah]

Soalan ini mesti dijawab.

- 11 Rajah 10 menunjukkan penukaran sebatian organik daripada satu siri homolog kepada siri homolog yang lain.

Diagram 10 shows the changes of organic compounds from one homologous series to another homologous series.



Rajah / Diagram 10

- (a) Nyatakan maksud hidrokarbon. Berikan satu contoh siri homolog yang terdiri daripada hidrokarbon tak tepu.

State the meaning of hydrocarbon. Give an example of homologous series which consists of unsaturated hydrocarbons.

[2 markah / marks]

- (b) Berdasarkan Diagram 10,
Based on Diagram 10,

- (i) Kenal pasti alkana P, sebatian Q dan sebatian R. Namakan tindak balas I, II dan IV.

Identify alkane P, compound Q and compound R. Name the reaction I, II and IV.

[6 markah / marks]

- (ii) Tuliskan persamaan kimia bagi tindak balas III. Hitung isi padu maksimum gas W yang terbebas apabila 2.8 g etena terbakar lengkap di dalam udara.
[Jisim atom relatif: H = 1, C = 12]
[Isi padu molar gas: $24 \text{ dm}^3 \text{ mol}^{-1}$ pada keadaan bilik]

Write a chemical equation for reaction III. Calculate the maximum volume of gas W released when 2.8 g ethene is completely burnt in air.

[Relative atomic mass: H = 1, C = 12]

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

[5 markah / marks]

- (c) Sebatian S digunakan sebagai pelarut dalam losyen, varnis kuku, lakuer dan gam. Namakan sebatian S dan huraikan bagaimana sebatian S dapat dihasilkan di makmal sekolah.

Dalam huraian anda, sertakan butiran berikut:

- Prosedur
- Persamaan kimia bagi tindak balas IV

Compound S is used as a solvent in lotions, nail varnishes, lacquers and glue. Name compound S and describe how compound S can be produced in a school laboratory.

In your description, include the following aspects:

- Procedure
- Chemical equation for reaction IV

[7 markah / marks]