

Nama : Kelas:

Kimia
Kertas 2
Ogos
2026
2 $\frac{1}{2}$ jam



MAKTAB RENDAH SAINS MARA

PEPERIKSAAN AKHIR SIJIL PENDIDIKAN MRSM 2026

KIMIA

Kertas 2

Dua jam tiga puluh minit

JANGAN BUKA KERTAS PEPERIKSAAN INI SEHINGGA DIBERITAHU

1. Tuliskan **nama** dan **kelas** anda pada ruang yang disediakan.
2. Kertas peperiksaan ini mengandungi **tiga** bahagian: **Bahagian A, Bahagian B dan Bahagian C.**
3. Jawapan hendaklah ditulis pada ruang yang disediakan dalam kertas peperiksaan ini.
4. Kertas peperiksaan ini adalah dalam dwibahasa.
5. Jawapan boleh ditulis dalam bahasa Melayu atau bahasa Inggeris.
6. Rajah yang mengiringi soalan tidak dilukis mengikut skala kecuali dinyatakan.
7. Kerja mengira anda mesti ditunjukkan.
8. **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		100	

Kertas peperiksaan ini mengandungi **42** halaman bercetak dan **2** halaman tidak bercetak

Bahagian A

[60 markah]

Jawab semua soalan

- 1 Jadual 1 menunjukkan nombor proton dan nombor nukleon bagi atom magnesium dan atom klorin.

Table 1 shows proton number and nucleon number for magnesium atom and chlorine atom.

Atom <i>Atom</i>	Nombor proton <i>Proton number</i>	Nombor nukleon <i>Nucleon number</i>
Magnesium <i>Magnesium</i>	12	24
Klorin <i>Chlorine</i>	17	35

Jadual 1
Table 1

- (a) Berdasarkan Jadual 1,
Based on Table 1,

- (i) nyatakan maksud nombor nukleon.
state the meaning of nucleon number.

1(a)(i)

1

[1 markah]

- (ii) tulis perwakilan piawai bagi atom klorin dalam bentuk A_ZX .
write the standard representation for chlorine atom in the form of A_ZX .

1(a)(ii)

1

[1 markah]

- (iii) nyatakan bilangan neutron bagi atom klorin.
state the number of neutron for chlorine atom.

1(a)(iii)

1

[1 markah]



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- (b) Atom klorin bertindak balas dengan atom karbon menghasilkan sebatian W dengan takat didih 77°C .

Chlorine atom reacts with carbon atom to produce compound W with the boiling point of 77°C .

- (i) Nyatakan jenis zarah bagi sebatian W.
State the type of particle in compound W.

.....
[1 markah]

1(b)(i)	
	1

- (ii) Nyatakan keadaan fizik sebatian W pada suhu bilik.
State the physical state of compound W at room temperature.

.....
[1 markah]

1(b)(ii)	
	1

TOTAL A1	
	5

- 2 Jadual 2 menunjukkan jenis ubat moden, contoh dan fungsinya.
Table 2 shows the types of modern medicines, examples, and their functions.

Jenis ubat moden <i>Type of modern medicine</i>	Contoh <i>Example</i>	Fungsi <i>Function</i>
Analgesik <i>Analgesic</i>	Aspirin <i>Aspirin</i>	Melegakan sakit dalam keadaan sedar <i>Relieves pain while the patient remains conscious</i>
Antialergi <i>Antiallergy</i>	X	Melegakan hidung berair dan kegatalan <i>Relieves a runny nose and itching</i>
Kortikosteroid <i>Corticosteroid</i>	<i>Betamethasone valerate</i>	

Jadual 2
Table 2

Berdasarkan Jadual 2,
Based on Table 2,

- (a) (i) kenal pasti X.
identify X.

2(a)(i)	
	1

.....
 [1 markah]

- (ii) nyatakan **satu** fungsi bagi penggunaan *betamethasone valerate*.
*state **one** function of betamethasone valerate.*

2(a)(ii)	
	1

.....
 [1 markah]

- (iii) aspirin adalah salah satu contoh ubat jenis analgesik.
 Nyatakan **satu** contoh lain yang boleh menggantikan aspirin dan mempunyai fungsi yang sama.

2(a)(iii)	
	1

aspirin is an example of an analgesic.
*State **another** example that can replace aspirin and has the same function.*

.....
 [1 markah]

- (b) Encik Malik mengalami gejala penyakit mental seperti melihat, mendengar atau mempercayai perkara yang tidak nyata. Cadangkan **satu** jenis ubat moden dan terangkan bagaimana ubat tersebut dapat meredakan masalah yang dialaminya.

Encik Malik experiences mental illness symptoms such as seeing, hearing, or believing things that are not real.

*Suggest **one** type of modern medicine and explain how the medicine can relieve the problem experienced by him.*

.....

.....

.....

[2 markah]

2(b)	
	2

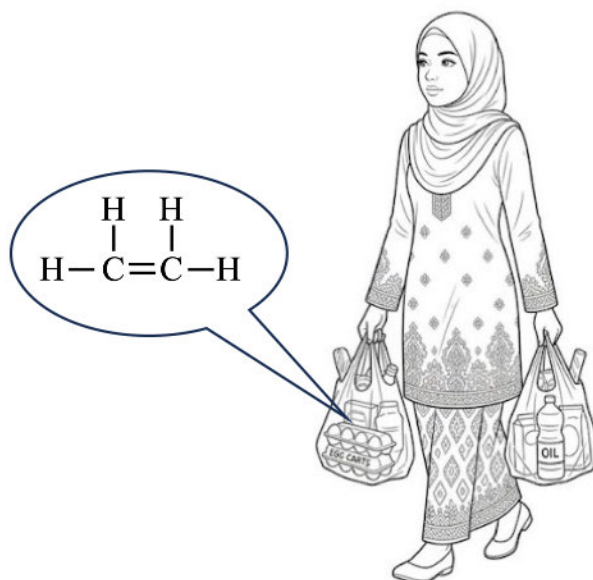
TOTAL A2	
	5



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- 3 Rajah 1 menunjukkan beg polimer P yang digunakan oleh Kamilia untuk membawa makanan. Formula struktur yang ditunjukkan adalah monomer bagi polimer P.

Diagram 1 shows polymer P bag used by Kamilia to carry food. The structural formula shown represents the monomer of polymer P.



Rajah 1
Diagram 1

- (a) (i) Nyatakan maksud polimer.
State the meaning of polymer.

3(a)(i)	
	1

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

- (ii) Namakan tindak balas pempolimeran bagi menghasilkan polimer P.
Name the polymerisation reaction to produce polymer P.

3(a)(ii)	
	1

.....
[1 markah]

- (iii) Tuliskan persamaan kimia bagi jawapan anda di 3(a)(ii).
Write the chemical equation for your answer in 3(a)(ii).

3(a)(iii)	
	2

.....
[2 markah]

- (b) Polimer P mengambil masa sehingga 500 tahun untuk terurai sepenuhnya dan menyebabkan lambakan di tempat pelupusan sampah. Cadangkan **satu** kaedah yang boleh dilaksanakan bagi mengatasi masalah tersebut. Terangkan jawapan anda.

Polymer P takes up to 500 years to fully decompose and causing accumulation in landfill sites.

*Suggest **one** method that can be implemented to overcome this problem. Explain your answer.*

.....

[2 markah]

3(b)	
	2

Total A3	
	6

- 4 Rajah 2 menunjukkan kedudukan beberapa unsur dalam Jadual Berkala Unsur. Huruf-huruf dalam jadual itu tidak mewakili simbol sebenar unsur.

Diagram 2 shows the position of few elements in the Periodic Table of Elements. Alphabets in the table do not represents the actual symbol of elements.

[illegible]

Rajah 2
Diagram 2

Berdasarkan Rajah 2,
Based on Diagram 2,

- (a) nyatakan unsur-unsur yang terletak dalam kumpulan yang sama.
state the elements that are in the same group.

4(a)	
	1

[1 markah]

- (b) tuliskan susunan elektron bagi ion R.
write the electron arrangement for ion R.

4(b)	
	1

[1 markah]

- (c) nyatakan kedudukan unsur S di dalam Jadual Berkala Unsur.
state the position of element S in the Periodic Table of Elements.

4(c)	
	1

[1 markah]



- (d) 0.5 mol unsur Q bertindak balas dengan unsur P yang berlebihan menghasilkan pepejal putih.
0.5 mol of element Q reacts with excess element P to produce a white solid.

- (i) Tuliskan persamaan kimia bagi tindak balas tersebut.
Write the chemical equation for the reaction.

[2 markah]

4(d)(i)	
	2

- (ii) Hitung jisim pepejal putih yang terhasil daripada tindak balas tersebut.

Calculate the mass of the white solid produced from the reaction.

[Jisim atom relatif: P = 16, Q = 23]

[Relative atomic mass: P = 16, Q = 23]

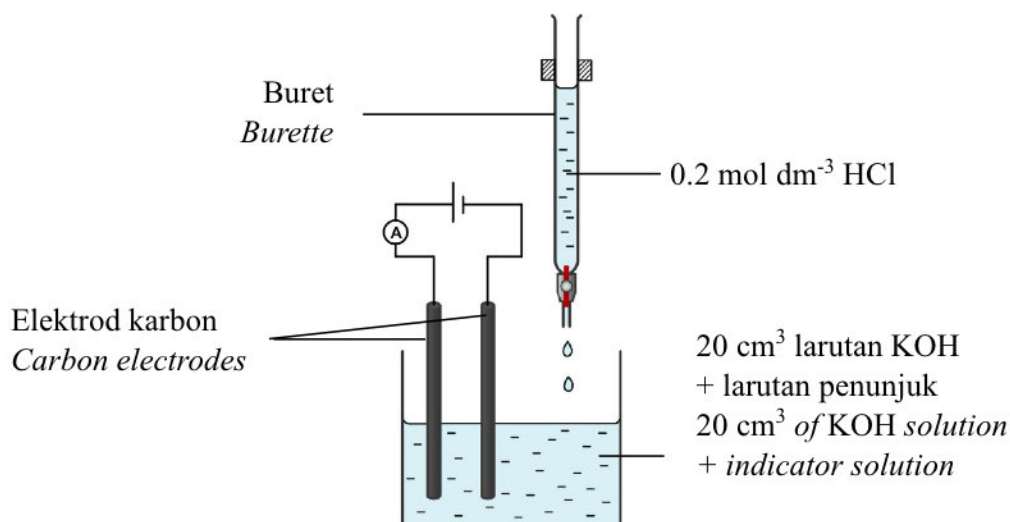
[2 markah]

4(d)(ii)	
	2

TOTAL A4	
	7

- 5 Rajah 3.1 menunjukkan satu eksperimen peneutralan antara asid hidroklorik dan larutan kalium hidroksida menggunakan kaedah pentitratan konduktometri untuk menentukan takat akhir. Dalam kaedah ini, takat akhir juga boleh ditentukan melalui bacaan ammeter.

Diagram 3.1 shows an experiment of neutralisation between hydrochloric acid and potassium hydroxide solution by using conductometry titration method. In this method, the end point can also be determined through ammeter reading.



- (a) (i) Namakan **satu** larutan penunjuk yang sesuai untuk ditambahkan ke dalam larutan kalium hidroksida bagi menentukan takat akhir tindak balas.

*Name **one** suitable indicator that can be added into the potassium hydroxide solution to determine the end point of the reaction.*

[1 markah]

- (ii) Berdasarkan jawapan anda di (a)(i), nyatakan perubahan warna yang dapat diperhatikan pada takat akhir.

Based on your answer in (a)(i), state the colour change that can be observed at the end point.

[1 markah]

5(a)(i)

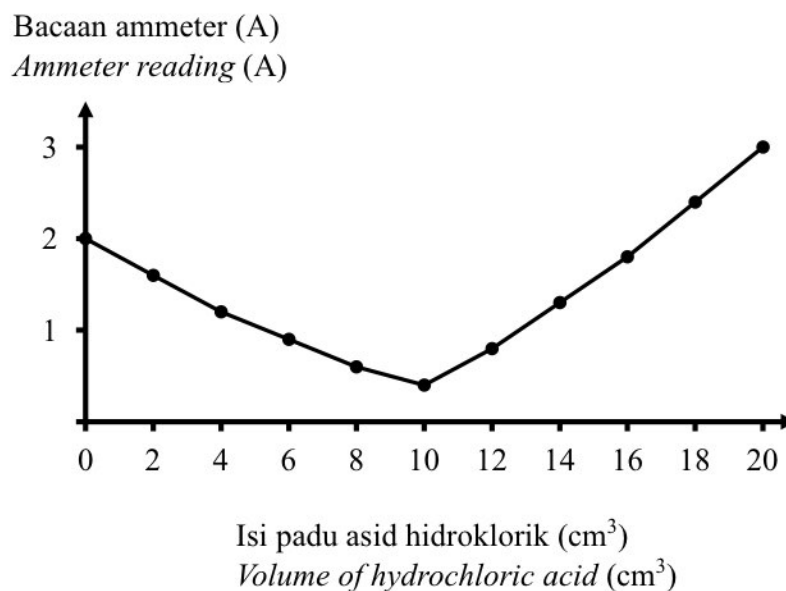
1

5(a)(ii)

1

- (b) Rajah 3.2 menunjukkan graf bacaan ammeter melawan isi padu asid hidroklorik bagi tindak balas dalam Rajah 3.1. Bacaan terendah ammeter menunjukkan takat akhir pentitratan.

Diagram 3.2 shows a graph of ammeter readings against the volume of hydrochloric acid for the reaction in Diagram 3.1. The lowest ammeter reading shows the end point of titration.



Rajah 3.2
Diagram 3.2

- (i) Tulis persamaan ion bagi mewakili tindak balas yang berlaku.
Write the ionic equation to represent the reaction occurred.

.....
[1 markah]

- (ii) Hitung kepekatan larutan kalium hidroksida yang digunakan dalam tindak balas tersebut.

Calculate the concentration of potassium hydroxide solution used in the reaction.

[3 markah]

5(b)(i)	
	1

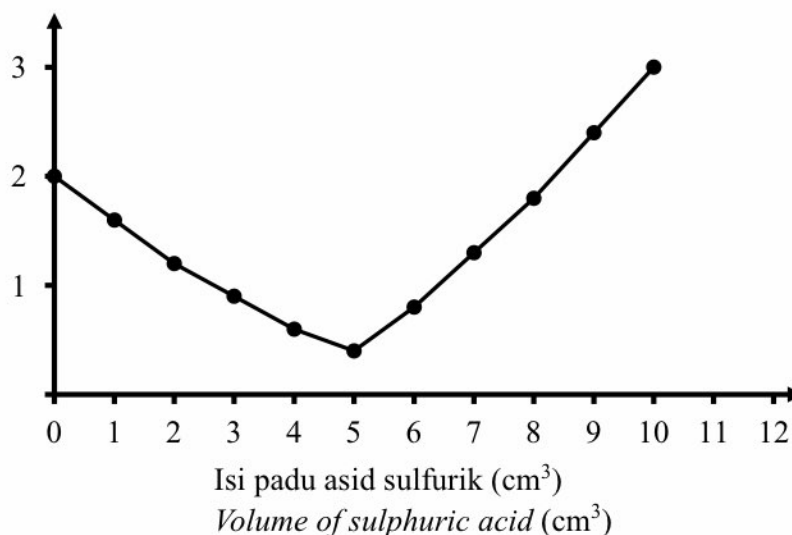
5(b)(ii)	
	3

[Lihat halaman sebelah

- (c) Rajah 3.3 menunjukkan graf yang terhasil apabila asid sulfurik digunakan bagi menggantikan asid hidroklorik.

Diagram 3.3 shows a graph produced when sulphuric acid is used to replace hydrochloric acid.

Bacaan ammeter (A)
Ammeter reading (A)



Rajah 3.3
Diagram 3.3

Berdasarkan Rajah 3.2 dan 3.3, terangkan mengapa terdapat perbezaan isi padu asid pada takat akhir.

Based on the Diagram 3.2 and 3.3, explain why there is a difference in the volume of acid at the end point.

.....

.....

.....

[2 markah]

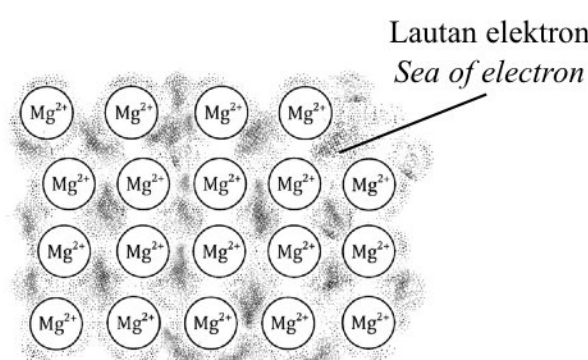
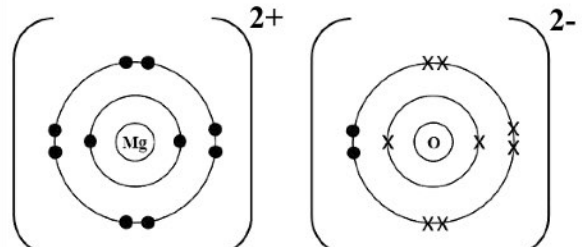
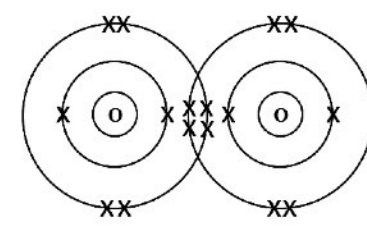
5(c)	
	2

TOTAL A5	
	8



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- 6 (a) Jadual 3 menunjukkan struktur bagi tiga jenis ikatan kimia yang berbeza.
Table 3 shows the structures for three different types of chemical bonds.

Bahan <i>Substance</i>	Struktur <i>Structure</i>
Logam magnesium <i>Magnesium metal</i>	
Magnesium oksida <i>Magnesium oxide</i>	
Gas oksigen <i>Oxygen gas</i>	

Jadual 3
Table 3

- (i) Nyatakan jenis ikatan dalam magnesium.
State type of bond in magnesium.
-
 [1 markah]
- (ii) Magnesium mempunyai takat lebur dan takat didih yang tinggi.
 Berikan satu sebab.
Magnesium has high melting and boiling point. Give a reason.
-

[1 markah]

6(a)(i)	
	1

6(a)(ii)	
	1

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SULIT

- (b) Salah satu sifat fizik logam magnesium adalah dapat menghantarkan elektrik. Terangkan secara ringkas bagaimana logam ini berupaya menghantarkan elektrik.

One of the physical properties of magnesium metal is the ability to conduct electricity. Explain how this metal can conduct electricity.

.....

.....

.....

.....

[4 markah]

- (c) Bandingkan takat lebur dan takat didih bagi magnesium oksida dan gas oksigen. Terangkan jawapan anda.

Compare the melting point and boiling point of magnesium oxide and oxygen gas. Explain your answer.

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[3 markah]

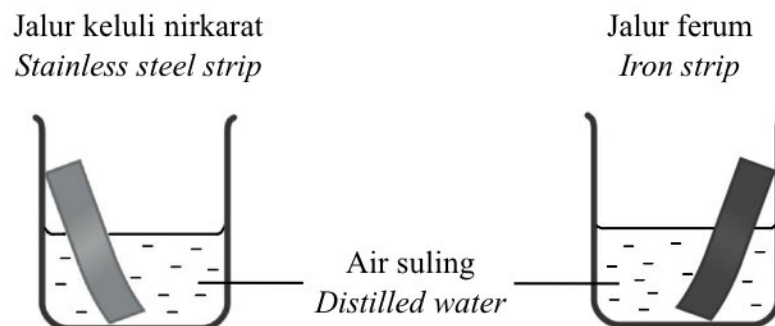
6(b)	
	4

6(c)	
	3

TOTAL A6	
	9

- 7 Rajah 4 menunjukkan susunan radas bagi mengkaji sifat aloi dan logam tulennya.

Diagram 4 shows the apparatus set-up to investigate the properties of an alloy and its pure metal.



Rajah 4
Diagram 4

Berdasarkan Rajah 4,
Based on Diagram 4,

- (a) (i) nyatakan **satu** atom asing dalam keluli nirkarat.
*state **one** foreign atom in a stainless steel.*
-
- [1 markah]
- (ii) jalur logam manakah yang menunjukkan perubahan selepas dibiarkan selama tiga hari?
which metal strip shows changes after being left for three days?
-

[1 markah]

7(a)(i)	
	1

7(a)(ii)	
	1

[Lihat halaman sebelah

- (iii) Majlis Daerah MRSM mendapati banyak bangku besi di sekitar pantai telah berkarat. Pada pendapat anda, bahan manakah yang paling sesuai digunakan untuk membina bangku besi yang baharu bagi mengatasi masalah yang berlaku?

Terangkan jawapan anda.

Majlis Daerah MRSM found that many iron benches in beach area have rusted. In your opinion, which material is the most suitable to be used to build the new iron benches to overcome the problem?

Explain your answer.

.....

.....

.....

.....

[3 markah]

7(a)(iii)	
	3

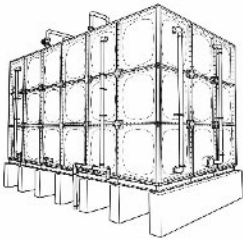


SERTAI TELEGRAM @exercise_students

- (b) Plastik adalah bahan matriks bagi bahan komposit Q.
 Jadual 4 menunjukkan maklumat tentang tangki plastik dan tangki bahan komposit Q.

Plastic is a matrix substance in a composite materials Q.

Table 4 shows information about plastic tank and composite material tank Q.

Jenis tangki simpanan air <i>Type of water storage tanks</i>	 Tangki plastik <i>Plastic tank</i>	 Tangki bahan komposit Q <i>Composite material tank Q</i>
Ketahanan haba <i>Heat resistance</i>	Kurang tahan haba <i>Less heat resistance</i>	Lebih tahan haba <i>More heat resistance</i>
Ketahanan cuaca <i>Weather resistance</i>	Retak dan rapuh dalam jangka masa panjang <i>Crack and become brittle over time</i>	Tahan perubahan cuaca <i>Resistant to weather changes</i>
Kekuatan <i>Strength</i>	Tinggi <i>High</i>	Lebih tinggi <i>Higher</i>

Jadual 4
 Table 4

- (i) Sebuah kilang pemprosesan minuman memerlukan tangki berkapasiti besar untuk menyimpan air dalam jangka masa panjang. Berdasarkan Jadual 4, nyatakan jenis tangki yang sesuai dan terangkan pilihan anda.

A beverage processing plant requires a large capacity tank to store water for a long period of time. Based on Table 4, state the type of suitable tank and explain your choices.

.....

.....

.....

.....

[3 markah]

- (ii) Bahan komposit Q juga digunakan dalam pembuatan papan litar tercetak. Wajarkan.

Composite material Q is also use in the manufacture of printed circuit boards. Justify.

.....

.....

.....

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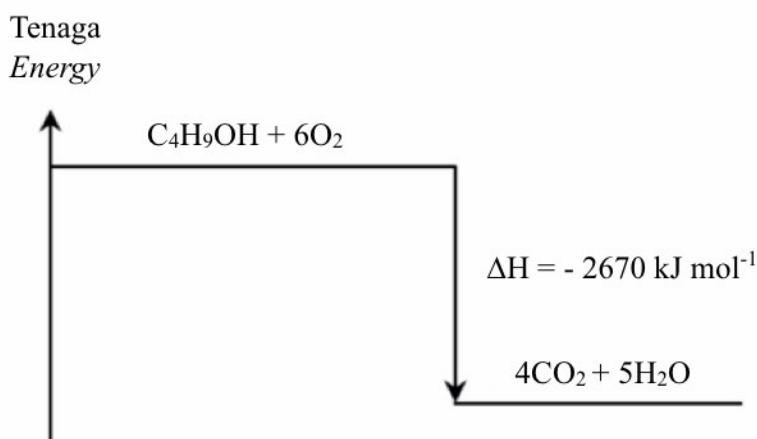
[2 markah]

7(b)(i)	
	3

7(b)(ii)	
	2

TOTAL A7	
	10

- 8 Rajah 5 menunjukkan gambar rajah aras tenaga bagi pembakaran butanol.
Diagram 5 shows the energy level diagram for the combustion of butanol.



Rajah 5
Diagram 5

- (a) (i) Nyatakan maksud haba pembakaran bagi tindak balas di atas.
State the meaning of heat of combustion for the reaction above.

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

8(a)(i)	
	1

- (ii) Nyatakan jenis tindak balas yang terlibat.
State the type of reaction involved.

.....
[1 markah]

8(a)(ii)	
	1



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- (b) Haba yang terbebas daripada pembakaran lengkap 1.0 g butanol digunakan untuk memanaskan 250 cm³ air.

Hitungkan perubahan suhu dalam tindak balas ini.

[Jisim atom relatif: H = 1, C = 12, O = 16;

Muatan haba tentu air = 4.2 J g⁻¹ °C⁻¹; Ketumpatan air = 1.0 g cm⁻³]

Heat released from complete combustion of 1.0 g butanol is used to heat 250 cm³ of water.

Calculate the temperature change in the reaction.

[Relative atomic mass : H = 1, C = 12, O = 16;

Specific heat capacity of water = 4.2 J g⁻¹ °C⁻¹ ;

Density of water = 1.0 g cm⁻³]

8(b)

3

[3 markah]

- (c) Eksperimen ini diulang dengan menggunakan propanol bagi menggantikan butanol. Bandingkan haba pembakaran bagi propanol dan butanol. Terangkan jawapan anda.

The experiment is repeated by using propanol to replace butanol. Compare the heat of combustion for propanol and butanol. Explain your answer.

.....

.....

.....

.....

[3 markah]

8(c)

3

- (d) Jadual 5 menunjukkan nilai haba pembakaran bagi dua jenis bahan api.
Table 5 shows the heat of combustion values for two types of fuels.

Bahan api <i>Fuel</i>	Haba pembakaran (kJ mol ⁻¹) <i>Heat of combustion (kJ mol⁻¹)</i>
Etanol <i>Ethanol</i>	- 1367
Gas hidrogen <i>Hydrogen gas</i>	- 286

Jadual 5
Table 5

Pernyataan berikut adalah berkenaan pembakaran gas hidrogen dan etanol.
The following statement is about the combustion of hydrogen gas and ethanol.

Pembakaran lengkap 1 gram gas hidrogen akan membebaskan haba yang lebih tinggi berbanding 1 gram etanol.

The complete combustion of 1 gram of hydrogen gas releases more heat compared to 1 gram of ethanol.

Dengan menggunakan rumus di bawah, buktikan pernyataan di atas.
By using the formula below, prove the above statement.

$$\text{Nilai bahan api} = \frac{\text{Haba pembakaran}}{\text{Jisim molar bahan}}$$

$$\text{Fuel value} = \frac{\text{Heat of combustion}}{\text{Molar mass of substance}}$$

[Jisim atom relatif: H = 1, C = 12, O = 16]

[Relative atomic mass: H = 1, C = 12, O = 16]

[2 markah]

8(d)	
	2

TOTAL A8	
	10

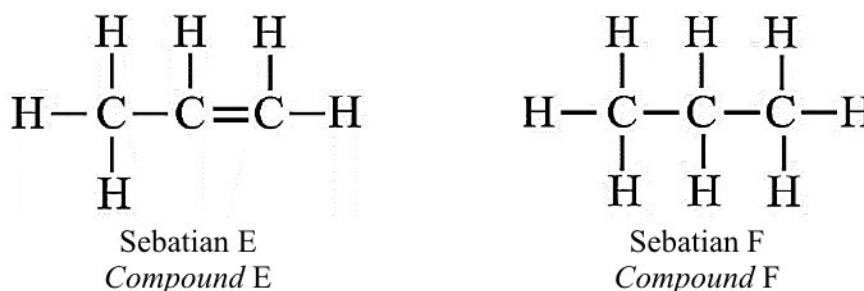
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Bahagian B

[20 markah]

Bahagian ini mengandungi dua soalan. Jawab satu soalan.

- 9 Rajah 6.1 menunjukkan dua formula struktur sebatian hidrokarbon.
Diagram 6.1 shows two structural formulae of hydrocarbon compounds.



Rajah 6.1
Diagram 6.1

Berdasarkan Rajah 6.1,
Based on Diagram 6.1,

- (a) (i) tentukan siri homolog bagi setiap sebatian dan namakan kedua-dua sebatian mengikut sistem penamaan IUPAC.

determine the homologous series of each compound and name both compounds according to the IUPAC nomenclature.

[4 markah]

- (ii) air bromin boleh digunakan untuk membezakan kedua-dua sebatian. Nyatakan pemerhatian dan tulis persamaan kimia bagi tindak balas yang berlaku.

bromine water can be used to differentiate both compounds. State the observation and write the chemical equation for the reaction occurred.

[3 markah]

- (iii) sebatian E dan F terbakar dengan lengkap di dalam oksigen berlebihan untuk menghasilkan karbon dioksida dan air. Bandingkan kejelagaan nyalaan bagi kedua-dua tindak balas tersebut dan terangkan jawapan anda.

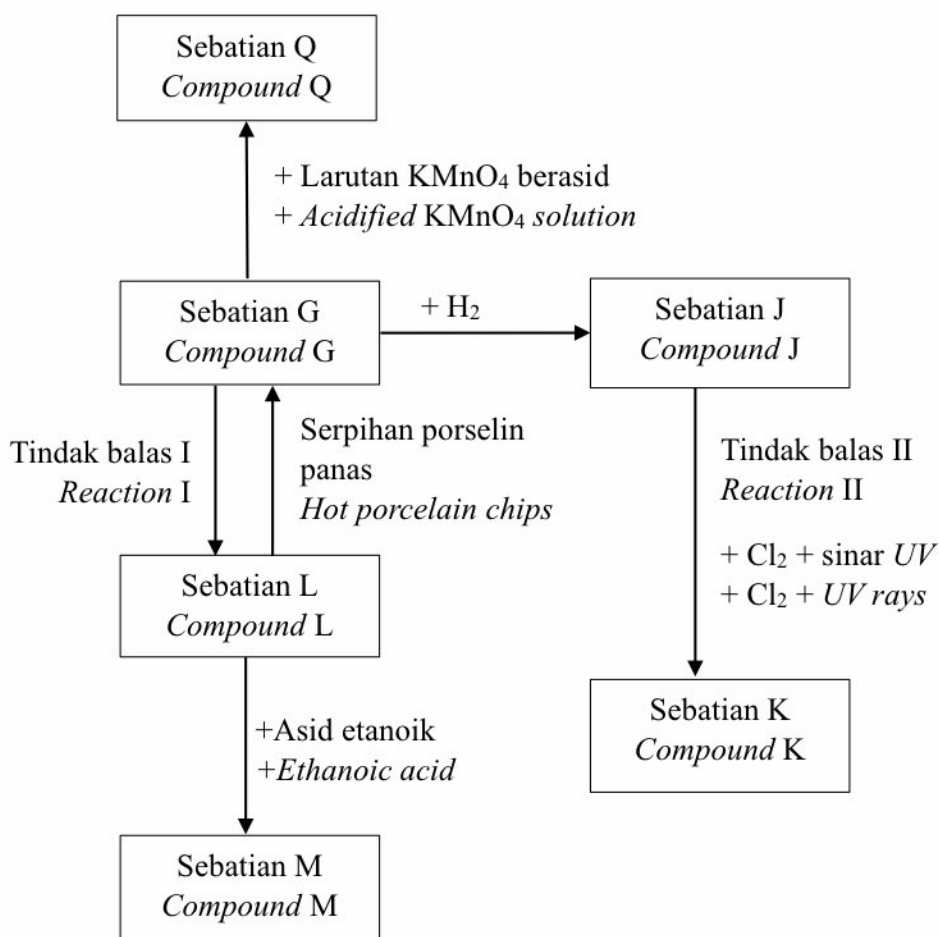
compound E and F burn completely in excess oxygen to produce carbon dioxide and water.

Compare the sootiness of the flame for both reactions and explain your answer.

[4 markah]

- (b) Rajah 6.2 menunjukkan carta alir bagi tindak balas yang melibatkan sebatian G. Sebatian G ialah suatu hidrokarbon tak tepu yang mempunyai empat atom karbon.

Diagram 6.2 shows the flow chart for the reaction involving compound G. Compound G is an unsaturated hydrocarbon that has four carbon atoms.



Rajah 6.2
Diagram 6.2

Berdasarkan Rajah 6.2, kenal pasti sebatian J, sebatian L dan sebatian Q. Namakan tindak balas I dan II. Nyatakan kumpulan berfungsi bagi sebatian M.

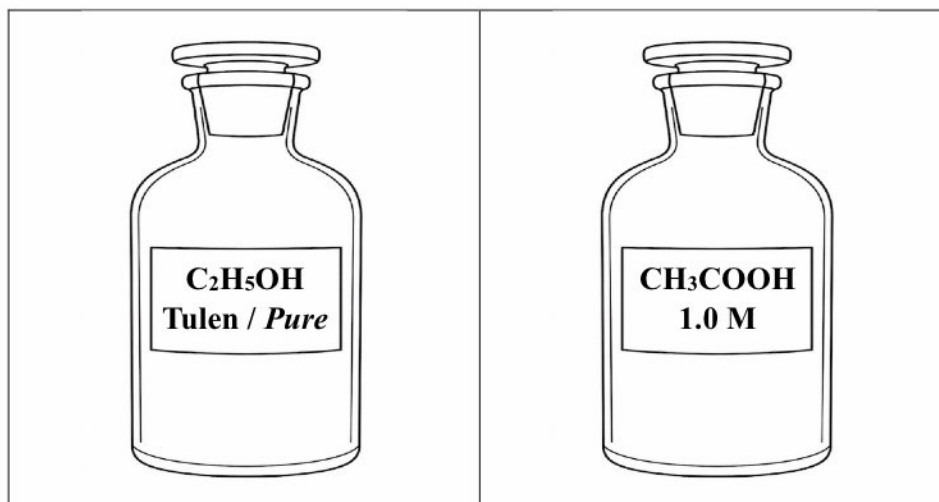
Based on Diagram 6.2, identify compounds J, compound L and compound Q. Name reaction I and II. State the functional group of compound M.

[6 markah]



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- (c) Rajah 6.3 menunjukkan dua botol reagen.
Diagram 6.3 shows two reagent bottles.



Rajah 6.3
Diagram 6.3

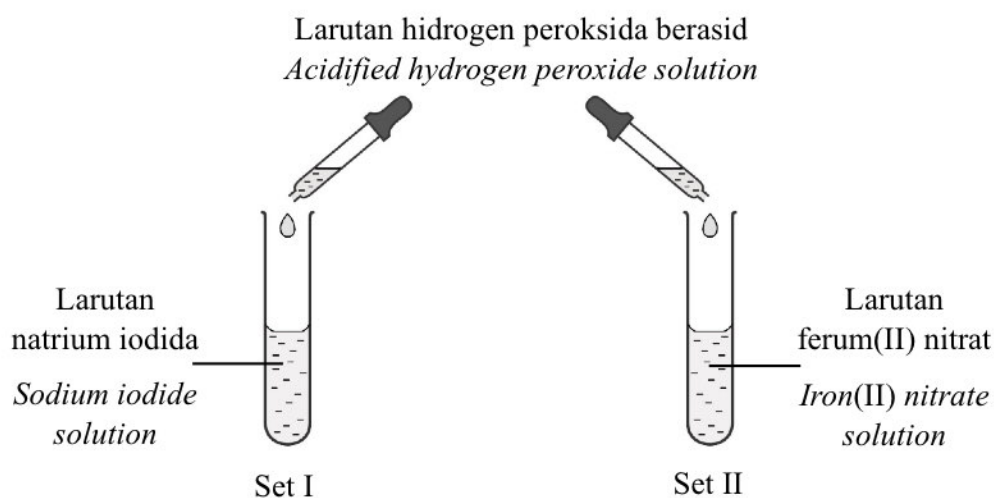
Berdasarkan Rajah 6.3, bandingkan kekonduksian elektrik bagi kedua-dua sebatian. Terangkan jawapan anda.

Based on Diagram 6.3, compare the electrical conductivity of both compounds. Explain your answer.

[3 markah]



- 10 Rajah 7.1 menunjukkan susunan radas untuk mengkaji tindak balas redoks.
Diagram 7.1 shows the apparatus set-up to study a redox reaction.



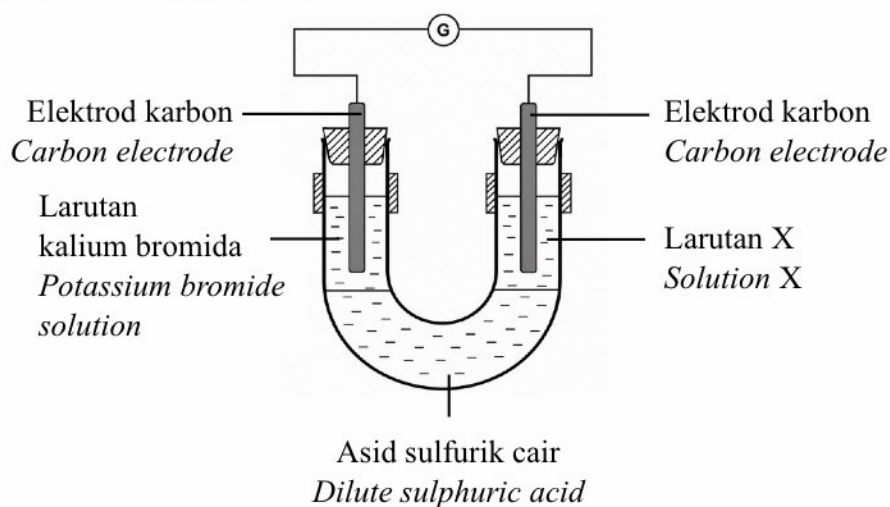
Rajah 7.1
Diagram 7.1

Berdasarkan Rajah 7.1,
Based on Diagram 7.1,

- (a) (i) nyatakan fungsi larutan hidrogen peroksida berasid.
state the function of acidified hydrogen peroxide solution.
- [1 markah]
- (ii) nyatakan pemerhatian dan tuliskan setengah persamaan bagi tindak balas pengoksidaan yang berlaku dalam Set I dan Set II.
Tentukan perubahan nombor pengoksidaan ferum bagi Set II.
state the observation and write half equation for the oxidation reaction occurs in Set I and Set II.
Determine the change in oxidation number of iron for Set II.
- [5 markah]

- (b) Rajah 7.2 menunjukkan susunan radas untuk mengkaji tindak balas yang melibatkan pemindahan elektron pada suatu jarak.

Diagram 7.2 shows the apparatus set-up to study a reaction that involve the transfer of electron at a distance.



Rajah 7.2
Diagram 7.2

Jadual 6 menunjukkan pemerhatian bagi Set I dan Set II menggunakan dua larutan X yang berbeza.

Table 6 shows the observations for Set I and Set II using two different X solution.

Set	Larutan X <i>Solution X</i>	Pemerhatian pada larutan kalium bromida <i>Observation at potassium bromide solution</i>
I	Larutan ferum(III) sulfat <i>Iron(III) sulphate solution</i>	Larutan tidak berwarna berubah kepada larutan perang <i>Colourless solution change to brown solution</i>
II	Larutan iodin <i>Iodine solution</i>	Larutan tidak berwarna kekal tidak berubah <i>Colourless solution remains unchanged</i>

Jadual 6
Table 6



Berdasarkan Rajah 7.2 dan Jadual 6,
Based on Diagram 7.2 and Table 6,

- (i) huraikan secara ringkas ujian pengesahan bagi hasil yang terbentuk di terminal negatif Set I.

describe briefly a confirmatory test for the product formed at negative terminal in Set 1.

[2 markah]

- (ii) terangkan perbezaan pemerhatian bagi larutan kalium bromida dalam Set II.

explain the difference in observation for potassium bromide solution in Set II.

Diberi,
Given,

Tindak balas sel setengah <i>Half-cell equation</i>	E^0 / V (298 K)
$I_2 + 2e^- \rightleftharpoons 2I^-$	+ 0.54
$Fe^{3+} + e^- \rightleftharpoons Fe^{2+}$	+ 0.77
$Br_2 + 2e^- \rightleftharpoons 2Br^-$	+ 1.07

[2 markah]

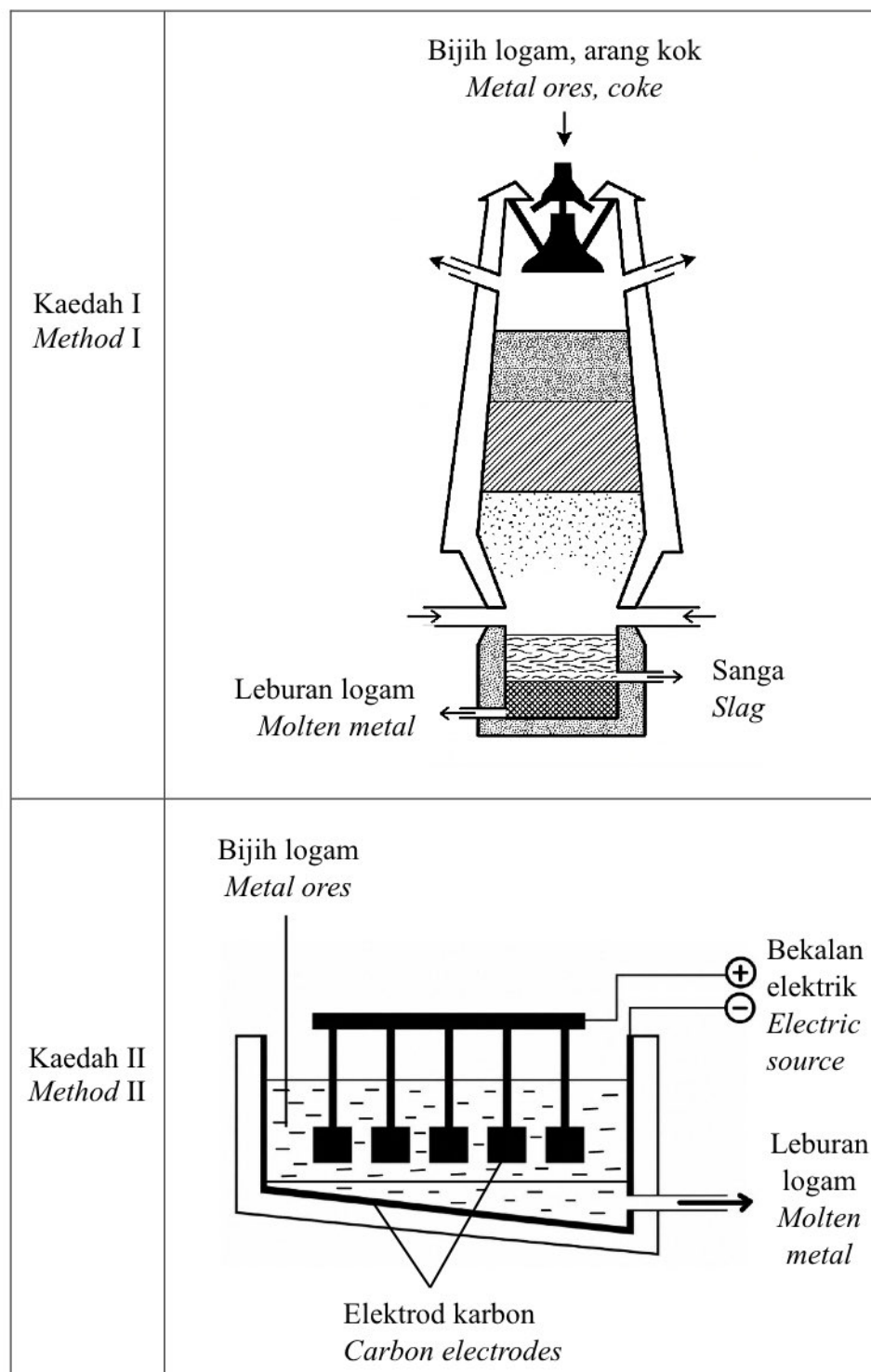


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- (c) Rajah 7.3 menunjukkan aplikasi tindak balas redoks dalam dua kaedah pengekstrakan logam.

Diagram 7.3 shows the application of a redox reaction in two metal extraction methods.



Rajah 7.3
Diagram 7.3

Berdasarkan Rajah 7.3,
Based on Diagram 7.3,

- (i) apakah fungsi arang kok dalam Kaedah I?
what is the function of coke in Method I?

[1 markah]

- (ii) banding beza proses pengekstrakan logam bagi Kaedah I dan Kaedah II.
compare and contrast metal extraction process for Method I and Method II.

[6 markah]

- (d) Persamaan kimia di bawah mewakili tindak balas bagi penghasilan logam W daripada bijihnya dalam Kilang Aminah Jaya.

Chemical equation below represents the reaction occurred during production of metal W from its ore in Kilang Aminah Jaya.



Hitung jisim logam W yang dihasilkan jika kilang tersebut mampu memproses sebanyak 160 kg bijih WO dalam sehari.

Calculate the mass of metal W produced if the factory could process 160 kg WO ores a day.

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

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

[3 markah]

Ruang jawapan soalan Bahagian B

No. soalan :

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[illegible]

[illegible]

4541/2 © 2026 Hak Cipta Bahagian Pendidikan Menengah MARA

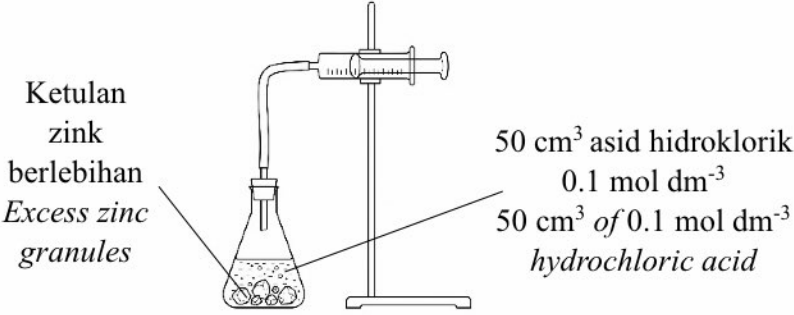
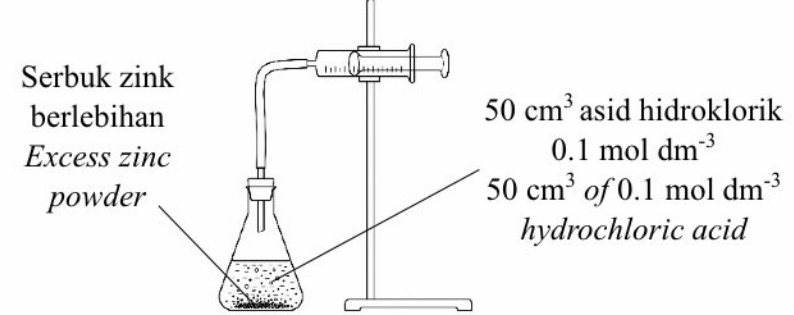
Bahagian C

[20 markah]

Soalan ini mesti dijawab.

- 11 Jadual 7 menunjukkan dua set eksperimen yang dijalankan untuk mengkaji faktor yang mempengaruhi kadar tindak balas.

Table 7 shows two sets of experiment carried out to study the factors that affects the rate of reaction.

Set	Susunan radas <i>Apparatus set-up</i>
I	 Ketulan zink berlebihan <i>Excess zinc granules</i> 50 cm³ asid hidroklorik 0.1 mol dm⁻³ 50 cm³ of 0.1 mol dm⁻³ hydrochloric acid
II	 Serbuk zink berlebihan <i>Excess zinc powder</i> 50 cm³ asid hidroklorik 0.1 mol dm⁻³ 50 cm³ of 0.1 mol dm⁻³ hydrochloric acid

Jadual 7
Table 7

- (a) Nyatakan satu faktor yang mempengaruhi kadar tindak balas.
State one factor that affects the rate of reaction.
- [1 markah]
- (b) Berdasarkan Jadual 7,
Based on Table 7,
- (i) nyatakan set eksperimen yang mengambil masa lebih singkat untuk mengumpulkan jumlah isi padu gas yang sama. Terangkan jawapan anda.
state the set of experiment that takes a shorter time to collect the same total volume of gas. Explain your answer.
- [2 markah]



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- (ii) tuliskan persamaan kimia bagi tindak balas yang terlibat. Lakarkan graf bagi isi padu gas yang terkumpul melawan masa bagi kedua-dua set eksperimen pada paksi yang sama.

write a chemical equation for the reaction involved. Sketch the graph of the volume of gas collected against time for both sets of the experiment on the same axis.

[4 markah]

- (c) Buah-buahan yang telah masak membebaskan hormon dalam bentuk gas yang dikenali sebagai etena. Gas ini boleh membantu mempercepat proses pematangan buah-buahan.

Ripe fruits release a hormone in the form of gas known as ethene. This gas helps accelerate the ripening process of fruits.

Rajah 8.1 menunjukkan dua kaedah penyimpanan pisang yang sedang masak.

Diagram 8.1 shows two storage methods for ripening bananas.



Kaedah I
Method I



Kaedah II
Method II

Rajah 8.1
Diagram 8.1

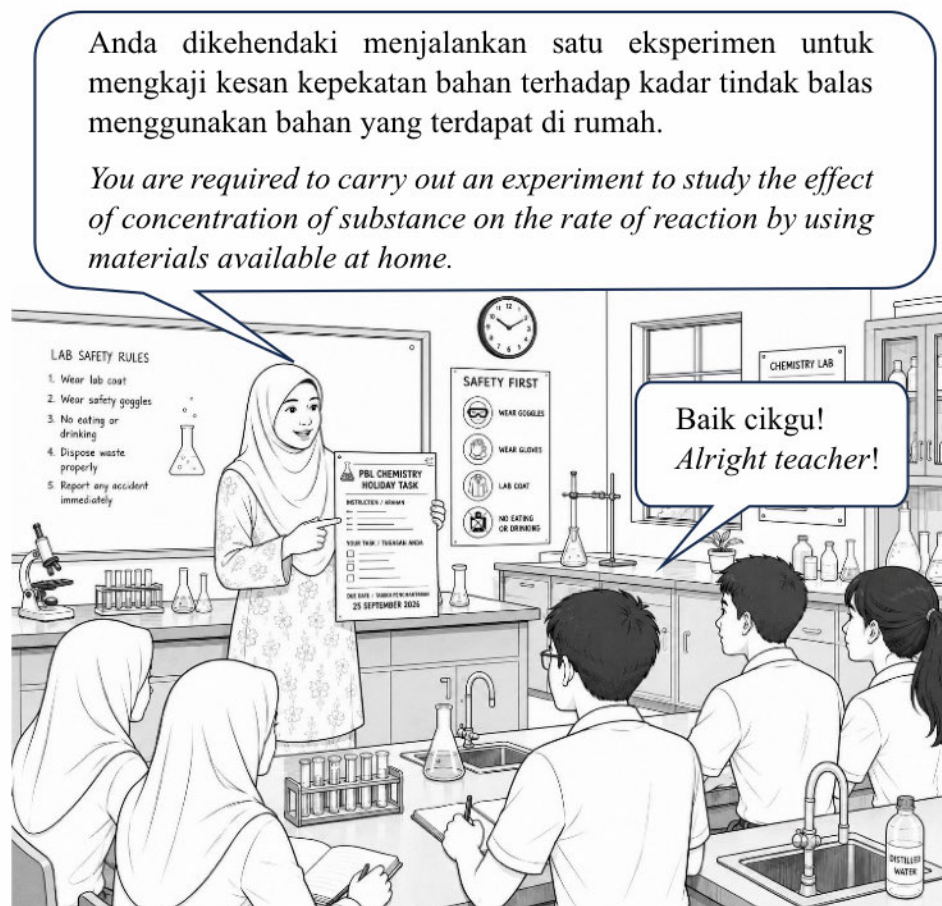
Puan Fauziah ingin melambatkan proses pematangan pisang untuk tujuan penyimpanan lebih lama. Bandingkan Kaedah I dan Kaedah II. Pilih kaedah penyimpanan yang paling sesuai dan cadangkan satu penambahbaikan bagi meningkatkan keberkesanan kaedah tersebut.

Puan Fauziah wants to slow down the ripening process of bananas for longer storage purposes. Compare Method I and Method II. Choose the most suitable storage method and suggest one improvement to enhance the effectiveness of the method.

[5 markah]

- (d) Rajah 8.2 menunjukkan perbualan antara guru dan pelajarnya semasa sesi pengajaran.

Diagram 8.2 shows a conversation between a teacher and her students during a lesson.



Rajah 8.2
Diagram 8.2

Berdasarkan perbualan dalam Rajah 8.2, huraikan satu eksperimen untuk mengkaji kesan kepekatan terhadap kadar tindak balas. Dalam perancangan anda, sertakan butiran berikut:

- Bahan yang akan digunakan
- Prosedur
- Penjadualan data

Based on the conversation in Diagram 8.2, describe an experiment to study the effect of concentration on the rate of reaction. In your description, include the following aspects:

- *Substances to be used*
- *Procedure*
- *Tabulation of data*

[8 markah]



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Ruang jawapan soalan Bahagian C

No. soalan : 11

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[illegible]

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KERTAS PEPERIKSAAN TAMAT

JADUAL BERKALA UNSUR

1 H Hidrogen 1																	2 He Helium 4	
3 Li Litium 7	4 Be Berilium 9															8 O Oksigen 16	9 F Flourin 19	10 Ne Neon 20
11 Na Natrium 23	12 Mg Magnesium 24															16 S Sulfur 32	17 Cl Klorin 35	18 Ar Argon 40
19 K Kalium 39	20 Ca Kalsium 40	21 Sc Skandium 45	22 Ti Titanium 48	23 V Vanadium 51	24 Cr Kromium 52	25 Mn Mangan 55	26 Fe Feram 56	27 Co Kobalt 59	28 Ni Nikel 59	29 Cu Kuprum 64	30 Zn Zink 65	31 Ga Gallium 70	32 Ge Germanium 73	33 As Arsenik 75	34 Se Selenium 79	35 Br Bromin 80	36 Kr Kripton 84	
37 Rb Rubidium 86	38 Sr Strontium 88	39 Y Itrium 89	40 Zr Zirkonium 91	41 Nb Niobium 93	42 Mo Molibdenum 96	43 Tc Teknetium 98	44 Ru Rutenium 101	45 Rh Rodium 103	46 Pd Paladium 106	47 Ag Argentum 108	48 Cd Kadmium 112	49 In Indium 115	50 Sn Stanum 119	51 Sb Antimoni 122	52 Te Telurium 128	53 I Iodin 127	54 Xe Xenon 131	
55 Cs Sesium 133	56 Ba Barium 137	57 – 71 Lantanida	72 Hf Hafnium 179	73 Ta Tantalum 181	74 W Tungsten 184	75 Re Renium 186	76 Os Osmium 190	77 Ir Iridium 192	78 Pt Platinum 195	79 Au Aurum 197	80 Hg Merkuri 201	81 Tl Tallium 204	82 Pb Plumbum 207	83 Bi Bismut 209	84 Po Polonium 210	85 At Astatin 210	86 Rn Radon 222	
87 Fr Fransium 223	88 Ra Radium 226	89 – 103 Aktinida	104 Rf Rutherfordium 257	105 Db Dubnium 260	106 Sg Siborgium 263	107 Bh Bohrium 262	108 Hs Hassium 265	109 Mt Meitnerium 266	110 Ds Darmstadtium 281	111 Rg Roentgenium 280	112 Cn Kopernisium 285	113 Nh Nihonium 286	114 Fl Flerovium 289	115 Mc Moscovium 288	116 Lv Livermorium 293	117 Ts Tennessine 294	118 Og Oganeson 294	
- - - - -																		
57 La Lanthanum 139	58 Ce Sesium 140	59 Pr Praseodimium 141	60 Nd Neodimium 144	61 Pm Prometium 147	62 Sm Samarium 150	63 Eu Europium 152	64 Gd Gadolium 157	65 Tb Terbium 159	66 Dy Dysprosium 163	67 Ho Holmium 165	68 Er Erbium 167	69 Tm Tulium 169	70 Yb Iterbium 173	71 Lu Lutetium 175				
89 Ac Aktinium 227	90 Th Torium 232	91 Pa Proaktinium 231	92 U Uranium 238	93 Np Neptunium 237	94 Pu Plutonium 244	95 Am Americium 243	96 Cm Kuriom 247	97 Bk Berkelium 247	98 Cf Kalifornium 249	99 Es Einsteinium 254	100 Fm Fermium 253	101 Md Mendelevium 256	102 No Nobelium 254	103 Lr Lawrensium 257				

10

Ne

Neon

20

Nomor proton

Simbol

Nama unsur

Jisim atom relatif

10	20
Ne	Ne
Neon	Neon
Nombor proton	Jisim atom relatif
Simbol	Nama unsur

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THE PERIODIC TABLE OF ELEMENTS

1 H Hydrogen 1																	2 He Helium 4
3 Li Lithium 7	4 Be Beryllium 9															9 F Flourine 19	10 Ne Neon 20
11 Na Sodium 23	12 Mg Magnesium 24															17 Cl Chlorine 35	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 – 71 Lanthanide	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 – 103 Actinide	104 Rf Rutherfordium 257	105 Db Dubnium 260	106 Sg Seaborgium 263	107 Bh Bohrium 262	108 Hs Hassium 265	109 Mt Meitnerium 266	110 Ds Darmstadtium 281	111 Rg Roentgenium 280	112 Cn Copernicium 285	113 Nh Nihonium 286	114 Fl Flerovium 289	115 Mc Moscovium 288	116 Lv Livermorium 293	117 Ts Tennessine 294	118 Og Oganesson 294
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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 Lawrencium 257			

10	Ne	20
Proton number	Symbol	Relative atomic mass
	Name of element	