

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

[ 60 marks]

[ 60 markah ]

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

- 1 Table 1 shows the particulars of four different types of manufacture substances in the industries

*Rajah 1 menunjukkan butiran tentang empat jenis bahan buatan dalam industri.*

<b>Manufactured products</b> <i>Bahan buatan</i>	<b>Name of products</b> <i>Nama hasil</i>	<b>Components</b> <i>Kompenan</i>
Alloy <i>Aloi</i>	Brass <i>Loyang</i>	copper and X <i>kuprum dan X</i>
Glass <i>Kaca</i>	Lead glass <i>Kaca plumbum</i>	Y, sodium oxide and lead. <i>Y, natrium oksida dan plumbum</i>
Composite material <i>Bahan komposit</i>	Reinforced concrete <i>Konkrit yang diperkukuhkan</i>	Concrete (cement, sand and small pebbles) and Z <i>Konkrit (simen, pasir dan batu kerikil) dan Z</i>
Polymer <i>Polimer</i>	P	vinyl chloride <i>vinil klorida</i>

Table 1  
*Jadual 1*

- (a) (i) State the name of element X in brass.  
*Nyatakan nama bagi unsur X dalam loyang*

.....  
[1 mark]

- (ii) Describe how the present of element X increases the hardness of brass.  
*Terangkan bagaimana kehadiran unsur X meningkatkan kekerasan loyang.*

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

- (iii) Z is an example of another alloy that is used to manufacture reinforced concrete.  
What is Z?  
*Z adalah satu contoh lain aloi yang digunakan dalam pembuatan konkrit yang diperkukuhkan.*  
*Apakah Z ?*

.....  
[1 mark]

- (b) Substance Y is part of components in borosilicate glass.  
*Bahan Y adalah sebahagian daripada komponen dalam kaca borosilikat.*

- (i) State the name of substance Y.  
*Nyatakan nama bagi bahan Y itu.*

.....  
[1 mark]

- (ii) Borosilicate glass is usually used as laboratory glassware.  
State one characteristic of borosilicate glass compare to the other types of glasses.  
*Kaca borosilikat lazimnya digunakan sebagai peralatan makmal.*  
*Nyatakan satu sifat kaca borosilikat berbanding dengan kaca jenis yang lain*

.....  
[1 mark]

- (c) The chemical formula of monomer P is  $C_2H_3Cl$ .  
*Formula kimia bagi monomer P ialah  $C_2H_3Cl$ .*

- (i) Draw the structural formula of monomer P.  
*Lukiskan formula struktur bagi monomer P.*

[1 mark]

- (ii) State the name of compound P.  
*Nyatakan nama bagi sebatian P.*

.....  
[1 mark]

- (iii) State the name of process that change monomer to polymer.  
*Nyatakan nama bagi proses untuk menukar monomer kepada polimer.*

.....  
[1 mark]

- 2 Table 2 shows the elements in period 3 of the Periodic Table of elements.

*Jadual 2 menunjukkan unsur-unsur dalam kala 3 bagi Jadual Berkala Unsur*

Element <i>Unsur</i>	Na	Mg	Al	Si	P	S	Cl	Ar
Proton number <i>Nombor proton</i>	11	12	13	14	15	16	17	18

Table 2.1  
*Jadual 2.1*

- (a) What is meant by *period*?

*Apakah yang dimaksudkan dengan kala?*

.....  
[1 mark]

- (b) Why these elements are place in period 3?

*Mengapakah unsur-unsur ini terletak dalam kala 3?*

.....  
[1 mark]

- (c) Sodium and chlorine can react with water to form a solution.

*Natrium dan klorin boleh bertindak balas dengan air membentuk suatu larutan.*

- (i) Write the chemical equation for the reaction of chlorine with water in Table 2.2.

*Tulis persamaan kimia bagi tindak balas klorin dengan air dalam Jadual 2.2*

[2 marks]

Element <i>Unsur</i>	Chemical equation <i>Persamaan kimia</i>	Colour change of litmus paper when dip into the solution <i>Perubahan warna kertas litmus apabila dicelupkan ke dalam larutan</i>
Sodium <i>Natrium</i>	$2\text{Na} + 2\text{H}_2\text{O} \rightarrow 2\text{NaOH} + \text{H}_2$	..... .....
Chlorine <i>Klorin</i>	.....	..... .....

Table 2.2  
*Jadual 2.2*

(ii) Litmus paper is placed into the solution formed.

State the colour change of the litmus paper in Table 2.2

*Kertas litmus dimasukkan ke dalam larutan yang terhasil.*

*Nyatakan perubahan warna kertas litmus dalam Jadual 2.2*

[2 marks]

(d) (i) State the changes in the atomic size of the elements across period from left to right.

*Nyatakan perubahan saiz atom bagi unsur-unsur ini merentasi kala dari kiri ke kanan.*

.....  
[1 mark]

Explain your answer in (d)(i)

*Terangkan jawapan anda di (d)(i).*

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

3. Diagram 3 shows the apparatus set-up of a chemical cell.  
*Rajah 3 menunjukkan susunan radas bagi sel kimia.*

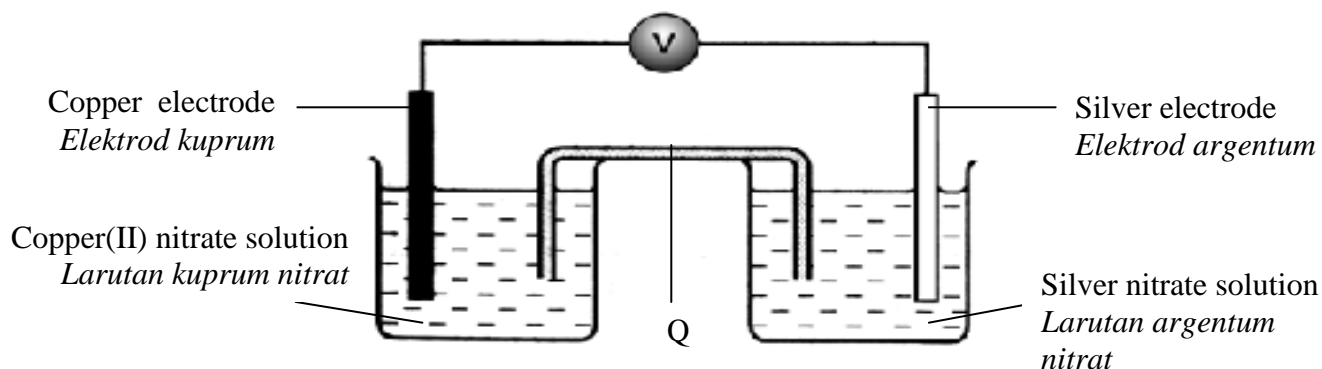


Diagram 3  
*Rajah 3*

- (a) What is the process that takes place at copper electrode?  
*Apakah proses yang berlaku di elektrod kuprum?*

.....  
 [1 mark]

- (b) (i) State the function of Q.  
*Nyatakan fungsi Q.*

.....  
 [1 mark]

- (ii) Name a chemical substance that can be used as Q.  
*Namakan satu bahan kimia yang boleh digunakan sebagai Q.*

.....  
 [1mark]

- (c) In Diagram 3, mark the direction of the electron flow.  
*Dalam Rajah 3, tandakan arah pengaliran elektron .*

[1 mark]

- (d) State the colour change of copper(II) nitrate solution . Give a reason for your answer.  
*Nyatakan perubahan warna larutan kuprum(II) nitrat. Berikan satu sebab bagi jawapan anda.*

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

- (e) Write the half equation for the reaction at the negative terminal.  
*Tuliskan setengah persamaan bagi tindak balas di terminal negatif.*

.....  
[2 marks]

- (f) If copper electrode and copper(II) nitrate solution are replaced with zinc electrode and zinc nitrate solution,  
*Jika elektrod kuprum dan larutan kuprum(II) nitrat digantikan dengan elektrod zink dan larutan zink nitrat,*

- (i) what happened to the voltmeter reading?  
*apakah yang berlaku kepada bacaan voltmeter?*

.....  
[ 1 mark]

- (ii) give a reason for your answer.  
*beri satu sebab bagi jawapan anda.*

.....  
[1 mark]

4. The following information is about a sample of compound Q.  
*Maklumat berikut adalah berkaitan dengan satu sampel sebatian Q.*

- ❖ Black solid  
*Pepejal berwarna hitam*
- ❖ Contains 2.56g copper and 0.64g oxygen  
*Mengandungi 2.56g kuprum dan 0.64g oksigen.*

- (a) What is the meaning of empirical formula?  
*Apakah maksud formula empirik?*

.....  
 [ 1 mark ]

- (b) Diagram 4 shows an incomplete equation which is one of the steps involved in determining the empirical formula.  
 Complete this equation.  
*Rajah 4 menunjukkan persamaan tak lengkap yang merupakan satu daripada langkah dalam menentukan formula empirik.  
 Lengkapkan persamaan itu.*

Number of mole = $\frac{\quad\quad\quad}{\text{Relative atomic mass}}$
------------------------------------------------------------------------

<i>Bilangan mol</i> = $\frac{\quad\quad\quad}{\text{Jisim atom relatif}}$
---------------------------------------------------------------------------

Diagram 4  
*Rajah 4*

[ 1 mark ]

- (c) Based on the information of the sample of compound Q,  
 calculate  
 [ Relative atomic mass : Cu = 64 ; O = 16 ]  
*Berdasarkan maklumat tentang sampel sebatian Q,  
 hitungkan  
 [ Jisim atom relatif : Cu = 64 ; O = 16 ]*

- (i) Number of mole of copper =  
*Bilangan mol kuprum*

[ 1 mark ]

- (ii) Number of mole of oxygen =  
*Bilangan mol oksigen*

[ 1 mark ]

(d) Determine the empirical formula of the compound Q.

*Tentukan formula empirik bagi sebatian Q.*

.....  
[ 1 mark ]

(e) Compound Q reacts completely with hydrogen gas to form copper and compound R.  
*Sebatian Q bertindakbalas lengkap dengan gas hydrogen untuk menghasilkan kuprum dan sebatian R.*

(i) Name two substances that can be used to prepare hydrogen gas.

*Namakan dua bahan yang digunakan untuk menyediakan gas hidrogen.*

.....  
[ 1 mark ]

(ii) Write a balanced chemical equation for the reaction that takes place.

*Tulis persamaan kimia yang seimbang bagi tindak balas itu.*

.....  
[ 2 marks ]

(iii) State one observation for the reaction.

*Nyatakan satu pemerhatian bagi tindakbalas itu.*

.....  
[ 1 mark ]

(iv) Name compound R

*Namakan sebatian R.*

.....  
[ 1 mark ]



5. A student carried out two experiments to investigate the effects of the factor influencing the rate of reaction. Table 5 shows the results of the experiments.

*Seorang pelajar menjalankan dua eksperimen untuk mengkaji kesan faktor yang mempengaruhi kadar tindak balas. Jadual 5 menunjukkan keputusan bagi eksperimen itu.*

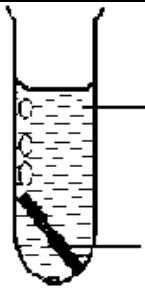
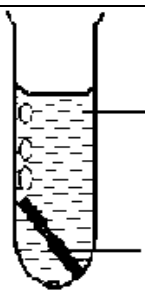
Experiment <i>Eksperimen</i>	Set up of the apparatus <i>Susunan radas</i>	Temperature / °C <i>Suhu / °C</i>	Time taken for all the magnesium to dissolve / s <i>Masa yang diambil untuk semua magnesium melarut / s</i>
I	 <p>Excess hydrochloric acid <i>Asid hidroklorik berlebihan</i></p> <p>0.24 g magnesium ribbon <i>0.24 g pita magnesium</i></p>	30	50
II	 <p>Excess hydrochloric acid <i>Asid hidroklorik berlebihan</i></p> <p>0.24 g magnesium ribbon <i>0.24 g pita magnesium</i></p>	40	20

Diagram 5  
*Rajah 5*

- (a) (i) What is the factor that influences the rate of reaction in both experiment.

*Apakah faktor yang mempengaruhi kadar tindak balas dalam kedua-dua eksperimen.*

.....  
[ 1 mark ]

- (ii) Calculate the maximum volume of hydrogen gas produced.

[Relative atomic mass : Mg = 24 ; molar gas volume = 24 dm<sup>3</sup> mol<sup>-1</sup> at room condition]

*Hitung isipadu maksimum gas hidrogen yang terhasil.*

*[ Jisim atom relatif : Mg = 24 ; isipadu molar gas : 24 dm<sup>3</sup> mol<sup>-1</sup> pada keadaan bilik ]*

[ 2 marks ]

(b) Calculate the average rate of reaction in  
*Hitung kadar tindak balas purata dalam*

(i) Experiment I :  
*Eksperimen I*

(ii) Experiment II :  
*Eksperimen II*

[ 2 marks ]

(c) (i) Compare the rate of reaction between Experiment I and Experiment II.  
*Bandingkan kadar tindak balas bagi Eksperimen I dan Eksperimen II.*

.....  
[ 1 mark ]

(ii) Explain the answer in (c)(i) with reference to the collision theory.  
*Jelaskan jawapan di (c)(i) dengan merujuk kepada teori perlanggaran.*

.....  
.....  
.....  
[ 3 marks ]

(d) Sketch the graphs for the volume of hydrogen gas against time for Experiment I and Experiment II on the same axes.  
*Lakarkan graf isipadu gas hydrogen melawan masa bagi Eksperimen I dan Eksperimen II pada paksi yang sama.*

[ 2 marks ]

6. A student carried out an experiment to determine the value of heat of displacement.

Diagram 6 shows the set up of the apparatus used in the experiment.

*Seorang pelajar telah menjalankan satu eksperimen untuk menentukan nilai haba penyesaran.*

*Rajah 6 menunjukkan susunan radas yang digunakan dalam eksperimen itu.*

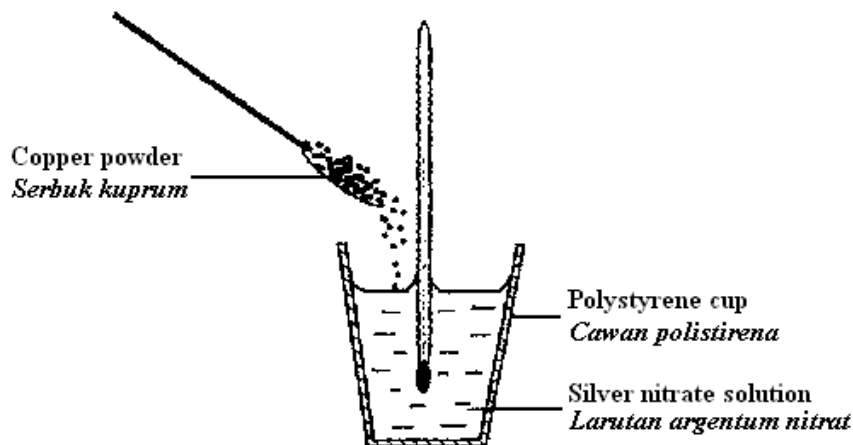


Diagram 6

*Rajah 6*

(a) Why is a polystyrene cup used in the experiment?

*Mengapakah cawan polistirena digunakan dalam eksperimen itu?*

.....  
[ 1 mark ]

(b) (i) State one observation in the experiment.

*Nyatakan satu pemerhatian dalam eksperimen itu.*

.....  
[ 1 mark ]

(ii) State one reason for the observation in (b)(i).

*Nyatakan satu sebab bagi pemerhatian di (b)(i).*

.....  
[ 1 mark ]

(iii) State the name of the substance that is oxidised during the reaction.

Explain your answer in terms of the change in oxidation number.

*Nyatakan nama bahan yang mengalami pengoksidaan dalam tindak balas ini.*

*Terangkan jawapan anda berdasarkan perubahan nombor pengoksidaan.*

.....  
[ 2 marks ]

- (c) In this experiment, excess copper is added to  $100 \text{ cm}^3$  of  $0.5 \text{ mol dm}^{-3}$  silver nitrate solution. The heat of displacement in this experiment is  $-105 \text{ kJmol}^{-1}$ .  
[ Specific heat capacity of the solution is  $4.2 \text{ Jg}^{-1}\text{C}^{-1}$  ; the density of the solution is  $1.0 \text{ gcm}^{-3}$  ]

*Dalam eksperimen ini, zink berlebihan ditambah kepada  $100 \text{ cm}^3$  larutan kuprum(II)sulfat  $0.5 \text{ mol dm}^{-3}$ . Haba penyesaran dalam eksperimen itu ialah  $-105 \text{ kJmol}^{-1}$ .*

*[ Muatan haba tentu larutan ialah  $4.2 \text{ Jg}^{-1}\text{C}^{-1}$  dan ketumpatan larutan ialah  $1.0 \text{ gcm}^{-3}$  ]*

- (i) Calculate the heat energy released in this experiment.

*Hitung tenaga haba yang dibebaskan dalam eksperimen ini.*

[ 2 marks ]

- (ii) Calculate the temperature change in this experiment.

*Hitung perubahan suhu dalam eksperimen ini.*

[ 1 mark ]

- (d) Draw the energy level diagram for the reaction.

*Lukiskan gambar rajah aras tenaga bagi tindakbalas itu.*

[ 3 marks ]

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

[ 20 marks]

[ 20 markah ]

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

7. (a) Carbon-14 is one isotope of carbon. It has 8 neutrons.  
(i) Draw and describe the atomic structure of carbon-14.

*Karbon-14 adalah satu isotop karbon. Ia mempunyai 8 neutron.  
Lukis dan huraikan struktur atom bagi karbon-14.*

[4 marks]

- (ii) Give one example of another isotope of carbon.  
State the number of neutron in the isotope.  
Write the symbol of the isotope in the form



*Berikan satu contoh lain isotop karbon.  
Nyatakan bilangan neutron dalam isotop itu.  
Tuliskan symbol bagi isotop itu dalam bentuk*



[3 marks]

- (b) Diagram 7 shows the set-up of apparatus to determine the melting point of naphthalene.

*Rajah 7 menunjukkan susunan radas untuk menentukan takat lebur naftalena.*

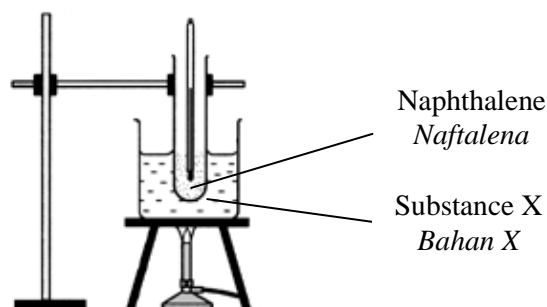


Diagram 7  
*Rajah 7*

Table 7 shows the melting point and boiling point of naphthalene, substance P and substance Q.

Jadual 7 menunjukkan takat lebur dan takat didih bagi naftalena, bahan P dan bahan Q.

Substance Bahan	Melting point Takat lebur ( $^{\circ}\text{C}$ )	Boiling point Takat didih ( $^{\circ}\text{C}$ )
Naphthalene Naftalena	80	218
P	0	100
Q	-97	65

Table 7  
Jadual 7

(i) Which substance P or Q is suitable to be used as substance X in Diagram 7?

Explain your answer.

Bahan yang manakah P atau Q adalah sesuai digunakan sebagai bahan X dalam Rajah 7?

Terangkan jawapan anda.

[ 2 marks]

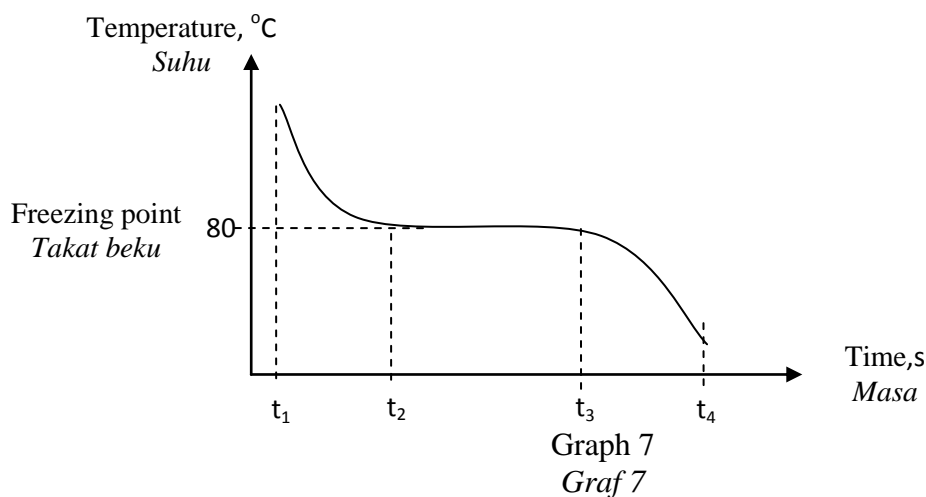
(ii) Explain why naphthalene is not heated directly with a bunsen burner.

Terangkan mengapa naftalena tidak dipanaskan secara terus dengan penunu bunsen.

[ 1 mark ]

(c) Graph 7 shows the cooling curve of naphthalene.

Graf 7 menunjukkan lengkung penyejukan bagi naftalena.



Describe Graph 7 in terms of states of matter, particle arrangements and changes in energy.

Huraikan graf 7 dari segi keadaan jirim, susunan zarah dan perubahan tenaga yang berlaku semasa proses penyejukan.

[10 marks]

8. (a) Diagram 8 shows the apparatus set up of Experiment I, Experiment II and the observations when copper(II) oxide is added into hydrochloric acid in two different solvents.

*Rajah 8 menunjukkan susunan radas bagi Eksperimen I, Eksperimen II dan pemerhatian apabila kuprum(II) oksida ditambah ke dalam asid hidroklorik dalam dua pelarut yang berlainan*

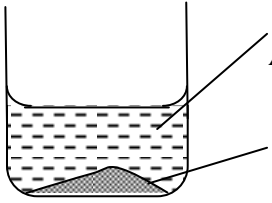
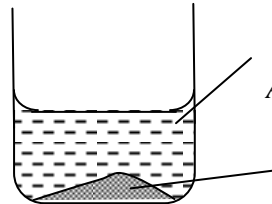
Experiment <i>Eksperimen</i>	Apparatus set up <i>Susunan radas</i>	Observation <i>Pemerhatian</i>
I	 <p>Hydrochloric acid in solvent X <i>Asid hidroklorik dalam pelarut X</i></p> <p>Copper(II) oxide <i>Kuprum(II) oksida</i></p>	<ul style="list-style-type: none"> <li>- Black solid dissolves <i>Pepejal hitam larut</i></li> <li>- Colourless solution turns blue <i>Larutan tanpa warna menjadi biru</i></li> </ul>
II	 <p>Hydrochloric acid in solvent Y <i>Asid hidroklorik dalam pelarut Y</i></p> <p>Copper(II) oxide <i>Kuprum(II) oksida</i></p>	<ul style="list-style-type: none"> <li>- No change <i>Tiada perubahan</i></li> </ul>

Diagram 8  
*Rajah 8*

Based on the information in Diagram 8  
*Berdasarkan maklumat dalam Rajah 8*

- (i) Name one suitable example of each solvent X and solvent Y.  
*Namakan satu contoh yang sesuai bagi setiap pelarut X dan pelarut Y.* [2 marks]
- (ii) Compare observations in Experiment I and Experiment II. Explain your answer and include an ionic equation that involved.  
*Banding pemerhatian dalam Eksperimen I dan Eksperimen II. Terangkan jawapan anda dan sertakan persamaan ion yang terlibat.* [8 marks]

(iii) Referring to the observation in Experiment I,

- state the type of reaction that occur
- write the chemical equation for the reaction between hydrochloric acid and copper(II) oxide
- calculate the mass of copper(II) oxide needed to react completely with  $50 \text{ cm}^3$  of  $1.0 \text{ mol dm}^{-3}$  of hydrochloric acid  
[ Relative atomic mass : Cu = 64, O = 16 ]

*Merujuk kepada pemerhatian dalam Eksperimen I,*

- *nyatakan jenis tindakbalas yang berlaku*
- *tulis persamaan kimia bagi tindak balas antara asid hidroklorik dan kuprum(II) oksida*
- *Hitungkan jisim kuprum(II) oksida yang diperlukan untuk bertindakbalas lengkap dengan  $50 \text{ cm}^3$  asid hidroklorik  $1.0 \text{ mol dm}^{-3}$*   
*[Jisim atom relatif : Cu = 64, O = 16 ]*

[6 marks]

(b) Table 8 shows the concentrations and pH values of two different alkalis.  
*Jadual 8 menunjukkan kepekatan dan nilai pH bagi dua alkali yang berlainan.*

<b>Alkali</b> <i>Alkali</i>	<b>Concentration /mol dm<sup>-3</sup></b> <i>Kepekatan /mol dm<sup>-3</sup></i>	<b>pH</b> <i>pH</i>
Sodium hydroxide solution <i>Larutan natrium hidroksida</i>	0.1	13
Ammonia aqueous solution <i>Larutan akueus ammonia</i>	0.1	10

Table 8  
*Jadual 8*

Explain why the alkalis in Table 8 have different pH values.  
*Terangkan mengapa alkali dalam Jadual 8 mempunyai nilai pH yang berlainan.*

[4 marks]



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

[ 20 marks]

[ 20 markah ]

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

- 9 Diagram 9 shows a series of reactions involving hydrocarbon Y.  
*Rajah 9 menunjukkan satu siri tindak balas yang melibatkan hidrokarbon Y.*

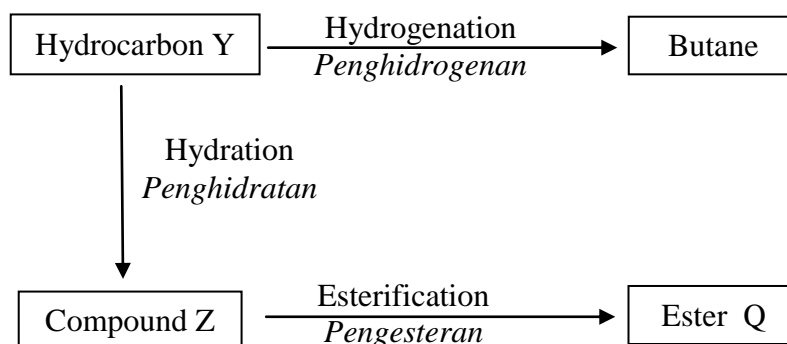


Diagram 9  
*Rajah 9*

- (a) Based on Diagram 9,

- state the general formula,
- state the functional group and
- draw the structural formula

of hydrocarbon Y.

*Berdasarkan Rajah 9,*

- *nyatakan formula am,*
- *nyatakan kumpulan berfungsi dan*
- *lukiskan formula struktur*

*bagi hidrokarbon Y.*

[3 marks]

- (b) Write the chemical equation to show the hydration process of hydrocarbon Y.  
State the conditions needed for the process that takes place.

*Tuliskan persamaan kimia bagi menunjukkan proses penghidratan hidrokarbon Y.  
Nyatakan keadaan yang diperlukan untuk tindak balas tersebut berlaku.*

[3 marks]

- (c) Table 9 shows the result of a chemical test to differentiate between hydrocarbon Y and butane.

*Jadual 9 menunjukkan keputusan ujian kimia untuk membezakan antara hidrokarbon Y dan butana.*

<b>Procedure</b> <i>Prosedur</i>	<b>Observation</b> <i>Pemerhatian</i>
Bromine water is added to hydrocarbon Y. <i>Air bromin ditambah ke dalam hidrokarbon Y.</i>	Brown bromine water decolourised. <i>Warna perang air bromin dilunturkan</i>
Bromine water is added to butane. <i>Air bromin ditambah ke dalam butana</i>	Brown bromine water remains unchange. <i>Warna perang air bromin tidak berubah.</i>

Table 9  
*Jadual 9*

Explain why there is difference in the observations.

*Terangkan mengapa terdapat perbezaan dalam pemerhatian itu.*

[4 marks]

- (d) A student intends to prepare an ester Q from the reaction between compound Z and named carboxylic acid.

Describe a laboratory experiment to prepare the ester.

Your answer should include the following :

- A list of material
- Procedure of the experiment
- Observation and chemical equation
- Name of the ester produced

*Seorang pelajar berhasrat menyediakan sejenis ester Q daripada tindak balas antara sebatian Z dan sejenis asid karboksilik yang dinamakan.*

*Huraikan satu eksperimen makmal untuk menyediakan ester tersebut.*

*Jawapan anda mesti mempunyai perkara berikut :*

- *Senarai bahan kimia*
- *Prosedur eksperimen*
- *Pemerhatian dan persamaan kimia.*
- *Nama ester yang terhasil*

[10 marks]

- 10 (a) Iron gates of houses situated near industrial areas becomes rusty faster than those situated far from industrial areas. Explain this phenomenon.

*Pagar besi rumah yang berdekatan dengan kawasan industri menjadi berkarat lebih cepat dari yang berada jauh dari kawasan industri. Jelaskan fenomena ini*

[2 marks]

- (b) Diagram 10.1 shows the chemical equation for Reaction I and Reaction II.  
*Rajah 10.1 menunjukkan persamaan kimia bagi Tindak balas I dan Tindak balas II.*

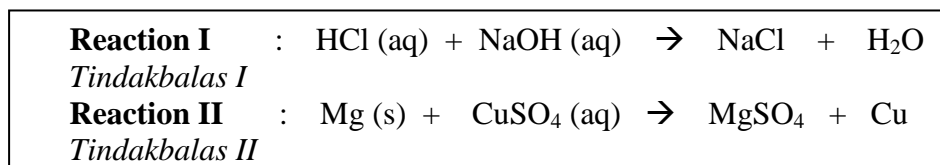


Diagram 10.1  
*Rajah 10.1*

Based on the chemical equations in Diagram 10, determine whether the reaction is redox reaction. Explain your answer.

*Berdasarkan tindak balas kimia dalam Rajah 10, tentukan sama ada tindak balas tersebut adalah tindak balas redoks . Jelaskan jawapan anda.*

[4 marks]

- (c) Diagram 10.2 shows the changes involving iron, iron(II) ion and iron(III) ions.  
*Rajah 10.2 menunjukkan perubahan yang melibatkan ferum, ion ferum(II) dan ion ferum(III).*

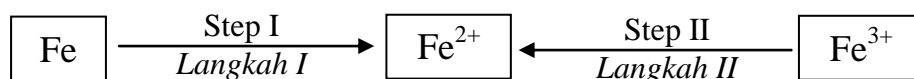


Diagram 10.2  
*Rajah 10.2*

By referring to Diagram 10.2, suggest a suitable chemical substance to carry out the changes in Steps I and II. Your answers should include the observation for each of the step involved.

*Dengan merujuk kepada Rajah 10.2, cadangkan bahan kimia yang sesuai untuk melaksanakan penukaran dalam langkah I dan II. Jawapan anda hendaklah disertakan dengan pemerhatian untuk setiap langkah yang terlibat.*

[4 marks]

(d) The following statement is about redox reaction.

*Pernyataan berikut adalah mengenai tindak balas redok.*

A redox reaction can occur between a reducing agent and oxidising agent without in contact with one another.

*Tindakbalas redoks boleh berlaku antara agen penurunan dan agen pengoksidaan tanpa bersentuh antara satu sama lain*

By using potassium iodide solution, dilute sulphuric acid and a suitable oxidising agent, describe an experiment to verify the above statement. Your answer should consist of the following :

- ▶ Labeled diagram
- ▶ Procedure
- ▶ Half-equations involved
- ▶ Observations

*Dengan menggunakan larutan kalium iodida, asid sulfurik cair dan air bromine, huraikan satu eksperimen untuk mengesahkan pernyataan di atas. Jawapan anda harus mengandungi perkara berikut:*

- ▶ *Gambarajah berlabel*
- ▶ *Kaedaaaxh*
- ▶ *Persamaan setengah yang terlibat*
- ▶ *Pemerhatian*

[10 marks]

**END OF QUESTION PAPER**  
***KERTAS SOALAN TAMAT***

THE PERIODIC TABLE OF ELEMENTS

1 <b>H</b> Hydrogen 1		10 <b>Ne</b> Neon 20										2 <b>He</b> Helium 4																			
3 <b>Li</b> Lithium 7		12 <b>Mg</b> Magnesium 24								9 <b>F</b> Fluorine 19		10 <b>Ne</b> Neon 20																			
11 <b>Na</b> Sodium 23		14 <b>Si</b> Silicon 28						15 <b>P</b> Phosphorus 31		16 <b>S</b> Sulfur 32		17 <b>Cl</b> Chlorine 35		18 <b>Ar</b> Argon 40																	
19 <b>K</b> Potassium 39		20 <b>Ca</b> Calcium 40				24 <b>Zn</b> Zinc 65		29 <b>Cu</b> Copper 64		30 <b>Zn</b> Zinc 65		35 <b>Br</b> Bromine 80		36 <b>Kr</b> Krypton 84																	
37 <b>Rb</b> Rubidium 86		38 <b>Sr</b> Strontium 88		40 <b>Zr</b> Zirconium 91		44 <b>Ru</b> Ruthenium 101		47 <b>Ag</b> Silver 108		48 <b>Cd</b> Cadmium 112		51 <b>Sb</b> Antimony 122		54 <b>Xe</b> Xenon 131																	
55 <b>Cs</b> Cesium 133		56 <b>Ba</b> Barium 137		72 <b>Hf</b> Hafnium 179		76 <b>Os</b> Osmium 190		79 <b>Au</b> Gold 197		80 <b>Hg</b> Mercury 201		82 <b>Pb</b> Lead 207		86 <b>Rn</b> Radon 222																	
87 <b>Fr</b> Francium 223		88 <b>Ra</b> Radium 226		104 <b>Uuq</b> Unnilquadium 257		108 <b>Uuo</b> Unniloctium 265		109 <b>Uue</b> Unnilennium 266		112 <b>Uub</b> Unnilbertium 268		115 <b>Uut</b> Unnilpentium 269		117 <b>Uuh</b> Unnilseptium 271																	
21 <b>Sc</b> Scandium 45		22 <b>Ti</b> Titanium 48		23 <b>V</b> Vanadium 51		24 <b>Cr</b> Chromium 52		25 <b>Mn</b> Manganese 55		26 <b>Fe</b> Iron 56		27 <b>Co</b> Cobalt 59		28 <b>Ni</b> Nickel 59		29 <b>Cu</b> Copper 64		30 <b>Zn</b> Zinc 65		31 <b>Ga</b> Gallium 70		32 <b>Ge</b> Germanium 73		33 <b>As</b> Arsenic 75		34 <b>Se</b> Selenium 79		35 <b>Br</b> Bromine 80		36 <b>Kr</b> Krypton 84	
39 <b>Y</b> Yttrium 89		40 <b>Zr</b> Zirconium 91		41 <b>Nb</b> Niobium 93		42 <b>Mo</b> Molybdenum 96		43 <b>Tc</b> Technetium 98		44 <b>Ru</b> Ruthenium 101		45 <b>Rh</b> Rhodium 103		46 <b>Pd</b> Palladium 106		47 <b>Ag</b> Silver 108		48 <b>Cd</b> Cadmium 112		49 <b>In</b> Indium 115		50 <b>Sn</b> Tin 119		51 <b>Sb</b> Antimony 122		52 <b>Te</b> Tellurium 128		53 <b>I</b> Iodine 127		54 <b>Xe</b> Xenon 131	
57 <b>La</b> Lanthanum 139		58 <b>Ce</b> Cerium 140		59 <b>Pr</b> Praseodymium 141		60 <b>Nd</b> Neodymium 144		61 <b>Pm</b> Promethium 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> Dysprosium 163		67 <b>Hb</b> Holmium 165		68 <b>Er</b> Erbium 167		69 <b>Tm</b> Thulium 169		70 <b>Yb</b> Ytterbium 173		71 <b>Lu</b> Lutetium 175			
89 <b>Ac</b> Actinium 227		90 <b>Th</b> Thorium 232		91 <b>Pa</b> Protactinium 231		92 <b>U</b> Uranium 238		93 <b>Np</b> Neptunium 237		94 <b>Pu</b> Plutonium 244		95 <b>Am</b> Americium 243		96 <b>Cm</b> Curium 247		97 <b>Bk</b> Berkelium 247		98 <b>Cf</b> Californium 249		99 <b>Es</b> Einsteinium 254		100 <b>Fm</b> Fermium 253		101 <b>Md</b> Mendelevium 256		102 <b>No</b> Nobelium 254		103 <b>Lr</b> Lawrencium 257			

Reference: Chang, Raymond (1991). Chemistry. McGraw-Hill, Inc.

**INFORMATION FOR CANDIDATES**  
**MAKLUMAT UNTUK CALON**

1. This question paper consists of three sections: **Sections A, B and C.**  
*Kertas soalan ini mengandungi tiga bahagian: Bahagian A, B dan 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. Tuliskan jawapan bagi Bahagian A dalam ruang yang disediakan dalam kertas soalan*
3. Answer one question from **Section B** and one question from **Section C.**  
Write your answers for **Section B** and **Section C** on the 'writing paper' provided by the invigilators.  
Answer questions in **Section B** and **Section C** in detail.  
You may use equations, diagrams, tables, graphs and other suitable methods to explain your answer.  
*Jawab satu soalan daripada Bahagian B dan satu soalan daripada Bahagian C. Tuliskan jawapan bagi Bahagian B dan Bahagian C pada helaian tambahan yang dibekalkan oleh pengawas peperiksaan. Jawab Bahagian B dan Bahagian C dengan terperinci. Anda boleh menggunakan persamaan, gambar rajah, jadual, graf dan cara lain yang sesuai untuk menjelaskan jawapan anda*
4. Show your working. It may help you to get marks.  
*Tunjukkan kerja mengira. Ini membantu anda mendapatkan markah.*
5. If you wish to change your answer, neatly cross out the answer that you have done. Then write down the new answer.  
*Sekiranya anda hendak membatalkan sesuatu jawapan, buat garisan di atas jawapan itu.*
6. The diagrams in the questions are not drawn to scale unless stated.  
*Rajah yang mengiringi soalan tidak dilukiskan mengikut skala kecuali dinyatakan*
7. Marks allocated for each question or part question are shown in brackets.  
*Markah yang diperuntukkan bagi setiap soalan atau ceraiian soalan ditunjukkan dalam kurungan*
8. The time suggested to answer **Section A** is 90 minutes, **Section B** is 30 minutes and **Section C** is 30 minutes.  
*Masa yang dicadangkan untuk menjawab Bahagian A ialah 90 minit, Bahagian B ialah 30 minit dan Bahagian C ialah 30 minit*
9. You may use a non-programmable scientific calculator.  
*Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogramkan.*
10. Hand in your answer sheets at the end of the examination.  
*Serahkan semua kertas jawapan anda di akhir peperiksaan*