

SULIT

NAMA : .....

KELAS : .....

**PEPERIKSAAN PERCUBAAN  
SIJIL PELAJARAN MALAYSIA 2015**

**4541/2**

**CHEMISTRY**

**Kertas 2**

**September**

**2 ½ jam**

**2 jam 30 minit**

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JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU**

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<i>Untuk Kegunaan Pemeriksa</i>			
Bahagian	Soalan	Markah Penuh	Markah diperoleh
<b>A</b>	<b>1</b>	<b>9</b>	
	<b>2</b>	<b>9</b>	
	<b>3</b>	<b>10</b>	
	<b>4</b>	<b>10</b>	
	<b>5</b>	<b>11</b>	
	<b>6</b>	<b>11</b>	
<b>B</b>	<b>7</b>	<b>20</b>	
	<b>8</b>	<b>20</b>	
<b>C</b>	<b>9</b>	<b>20</b>	
	<b>10</b>	<b>20</b>	
<b>JUMLAH</b>			

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**Kertas soalan ini mengandungi 33 halaman bercetak**

**Section A**  
**Bahagian A**  
 [60 marks]  
 [60 markah]

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

1. Diagram 1.1 shows the observation of an experiment when solid iodine is put into a gas jar to prove the kinetic theory of matter.

*Rajah 1.1 menunjukkan pemerhatian satu eksperimen apabila pepejal iodin diletakkan di dalam satu balang gas bagi membuktikan teori kinetik jirim.*

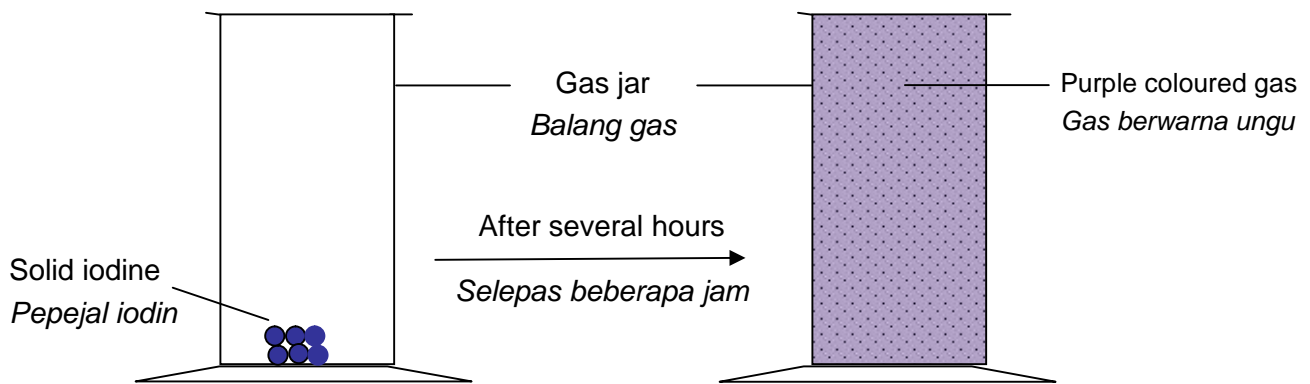


Diagram 1.1  
 Rajah 1.1

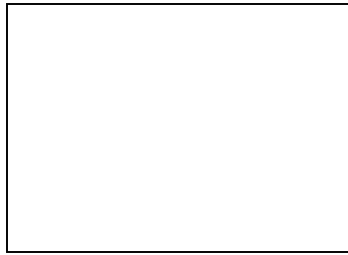
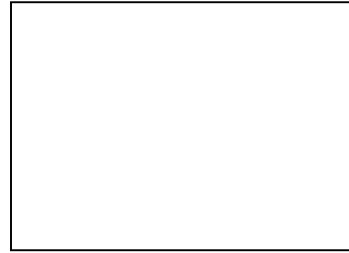
- (a) (i) Name the process in this experiment.  
 Namakan proses dalam eksperimen itu.

.....

[1 mark]

[1 markah]

- (a) (ii) Draw the arrangement of the iodine particles in the solid and gaseous state.  
*Lukiskan susunan zarah-zarah iodin dalam keadaan pepejal dan gas.*

Solid / *Pepejal*

Gas/Gas

[2 marks]  
 [2 markah]

- (a) (iii) State the type of particles in gaseous iodine.  
*Nyatakan jenis zarah dalam gas iodin.*

.....

[1 mark]  
 [1 markah]

- (b) Diagram 1.2 shows the setup of the apparatus used in an experiment to determine the empirical formula of an oxide of copper.  
*Rajah 1.2 menunjukkan radas yang digunakan dalam eksperimen untuk menentukan formula empirik kuprum oksida.*

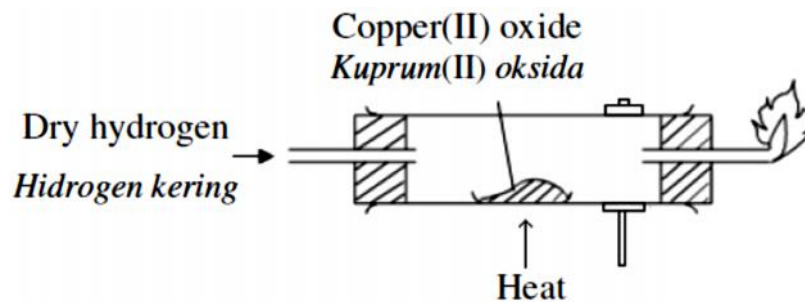


Diagram 1.2  
 Rajah 1.2

- (i) What is meant by empirical formula?  
*Apakah yang dimaksudkan dengan formula empirik?*

.....

.....

[1 mark]

[1 markah]

- (ii) State the name of two reactants to prepare hydrogen gas in the laboratory.  
*Nyatakan nama bagi dua bahan tindak balas untuk menyediakan gas hidrogen di dalam makmal.*

.....

.....

[2 marks]

[2 markah]

- (iv) State how to determine that the reaction between copper(II) oxide with hydrogen gas has been completed.  
*Nyatakan bagaimana untuk menentukan bahawa tindak balas yang berlaku antara kuprum(II) oksida dengan gas hidrogen telah lengkap.*

.....

[1 mark]

[1 markah]

- (iii) State another metal oxide whose empirical formula can be determined using the same method.  
*Nyatakan satu oksida logam lain yang formula empiriknya boleh ditentukan dengan menggunakan kaedah yang sama.*

.....

[1 mark]

[1 markah]

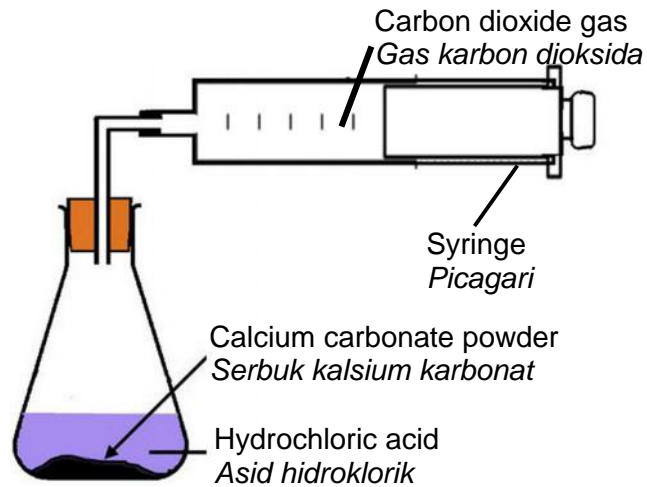


Diagram 2.1  
Rajah 2.1

- 2 Diagram 2.1 shows the set up apparatus of an experiment to investigate the reaction between calcium carbonate and hydrochloric acid. A student collect the gas released by using a syringe.  $30 \text{ cm}^3$  of carbon dioxide gas was collected at room condition.  
*Rajah 2.1 menunjukkan susunan radas satu eksperimen bagi mengkaji tindak balas di antara kalsium karbonat dan asid hidroklorik. Seorang pelajar mengumpul gas yang terbebas dengan menggunakan picagari.  $30 \text{ cm}^3$  gas karbon dioksida telah dikumpulkan pada keadaan bilik.*

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

.....  
[2 marks]

[2 markah]

- (ii) Calculate the number of moles of carbon dioxide gas in the syringe.  
*Hitungkan bilangan mol gas karbon dioksida yang terdapat dalam picagari tersebut.*

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

[Isipadu molar =  $24 \text{ dm}^3 \text{ mol}^{-1}$  pada keadaan bilik]

[1 mark]

[1 markah]

- (iii) Calculate the number of molecule of carbon dioxide gas in the syringe  
*Hitungkan bilangan molekul gas karbon dioksida dalam picagari.*  
[Avogadro Constant:  $6.02 \times 10^{23} \text{ mol}^{-1}$ ]  
[Pemalar Avogadro :  $6.02 \times 10^{23} \text{ mol}^{-1}$ ]

[1 mark]

[1 markah]

- (iv) Calculate the maximum mass of calcium carbonate needed to produce carbon dioxide gas in the syringe.  
*Hitungkan jisim maksimum kalsium karbonat yang diperlukan untuk menghasilkan gas karbon dioksida di dalam picagari tersebut.*  
[Relative atomic mass: Ca=40, C=12, O=16]  
[Jisim atom relatif: Ca=40, C=12, O=16]

[2 marks]

[2 markah]

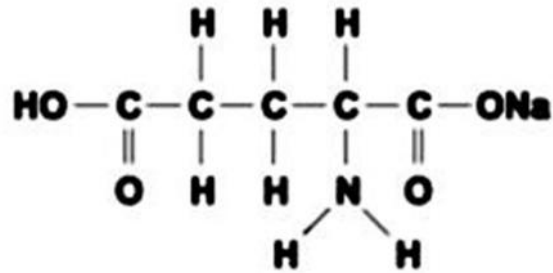


Diagram 2.2  
Rajah 2.2

- (b) Diagram 2.2 shows the structural formula of monosodium glutamate (MSG). Monosodium glutamate is food additives usually added into the food to make it more delicious.  
*Rajah 2.2 menunjukkan formula struktur bagi mononatrium glutamat (MSG). Mononatrium glutamat adalah bahan tambah makanan yang biasanya ditambahkan ke dalam makanan untuk menyedapkan rasanya.*
- (i) Write the molecular formula of MSG.  
*Tuliskan formula molekul bagi MSG.*
- .....
- [1 mark]  
[1 markah]
- (ii) State the types of compound for MSG.  
*Nyatakan jenis sebatian bagi MSG.*
- .....
- [1 mark]  
[1 markah]
- (iii) Calculate the relative formula mass of monosodium glutamate.  
*Hitungkan jisim formula relatif bagi mononatrium glutamat.*  
[Relative atomic mass of C=12, O=16, N=14, Na=23, H=1]  
[Jisim atom relatif C=12, O=16, N=14, Na=23, H=1]

[1 mark]  
[1 markah]

	1	2										13	14	15	16	17	18	
1	<b>P</b>																	
2																		
3	<b>Q</b>																<b>U</b>	
4									<b>W</b>									
5																		
6																		

Diagram 3.1

Rajah 3.1

- 3 Diagram 3.1 shows the Periodic Table of elements. The letters **P**, **Q**, **U** and **W** do not represent the actual symbols of the elements.

*Rajah 3.1 menunjukkan suatu Jadual Berkala Unsur. Huruf P, Q, U dan W tidak mewakili simbol sebenar unsur berkenaan.*

- (a) Table 3 shows one characteristic for each of elements R, S and T.  
*Jadual 3 menunjukkan satu ciri bagi setiap unsur R, S dan T.*

Element <i>Unsur</i>	Characteristic <i>Ciri</i>
<b>R</b>	Located in Period 2 and has 6 valence electrons <i>Terletak di kala 2 dan mempunyai 6 elektron valens</i>
<b>S</b>	Has electron arrangement of 2.8.8.1 <i>Mempunyai susunan elektron 2.8.8.1</i>
<b>T</b>	Has a stable duplet electron arrangement <i>Mempunyai susunan elektron duplet yang stabil</i>

Table 3

Jadual 3

- (i) Referring to Table 3, indicate the positions of R, S and T by writing the letters in the correct boxes of the above Periodic Table  
*Merujuk kepada ciri dalam Jadual 3, tuliskan abjad R, S dan T pada kedudukan yang betul dalam Jadual Berkala Unsur di atas.*

[3 marks]  
[3 markah]



- (b) Which element among P, Q, R, S, T, U and W exists as a monoatomic gas?  
*Antara unsur P, Q, R, S, T, U dan W yang manakah wujud sebagai gas monoatom?*

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

- (c) Element P and R can react to form a liquid. Write the chemical formula of the compound formed.  
*Unsur P dan unsur R boleh bertindak balas menghasilkan suatu cecair. Tuliskan formula kimia bagi sebatian yang terbentuk.*

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

- (d) Both elements of Q and S can react with water.  
*Kedua-dua unsur Q dan S boleh bertindak balas dengan air.*

- (i) Which element reacts more vigorously ?  
*Unsur manakah menunjukkan tindak balas yang lebih cergas ?*

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

- (ii) Explain your answer in (d)(i).  
*Terangkan jawapan anda dalam (d) (i).*

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

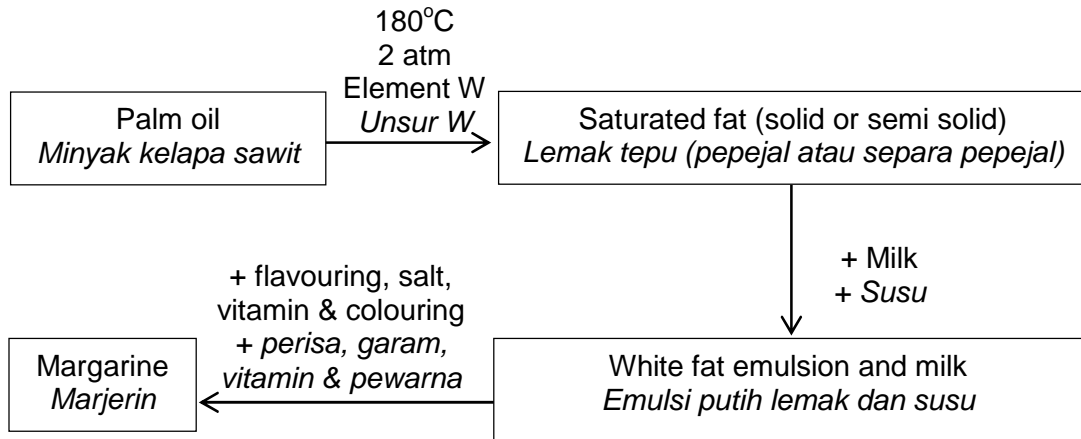


Diagram 3.2

Rajah 3.2

- (e) Diagram 3.2 shows the hydrogenation process of palm oil in manufacturing of margarine. Element W is used in the process. State one of the special characteristic of element W in the hydrogenation process.

*Rajah 3.2 menunjukkan proses penghidrogenan minyak kelapa sawit untuk menghasilkan marjerin. Unsur W digunakan di dalam proses tersebut. Nyatakan satu ciri istimewa unsur W di dalam proses tersebut.*

.....  
[1 mark]

[1 markah]

4 Diagram 4 shows two types of cell.  
*Rajah 4 menunjukkan dua jenis sel.*

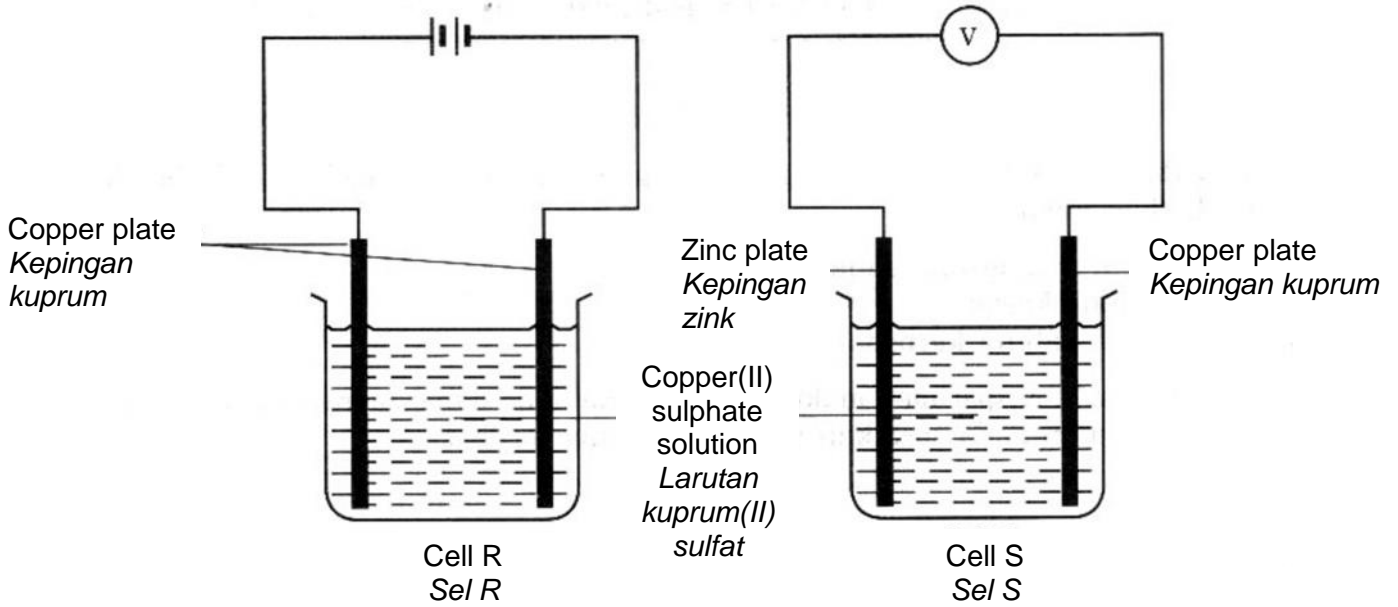


Diagram 4  
*Rajah 4*

(a) What is the meaning of cation?  
*Apakah maksud kation?*

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

(b) State all the cations present in copper(II) sulphate solution.  
*Nyatakan semua kation dalam larutan kuprum(II) sulfat.*

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

(c) Name the product formed at cathode in Cell R. Explain your answer.  
*Namakan produk yang terhasil pada katod dalam Sel R. Terangkan jawapan anda.*

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

- (d) Copper(II) sulphate solution in Cell R is replaced with dilute sulphuric acid. A colourless gas produced at the cathode is collected.

*Larutan kuprum(II) sulfat dalam Sel R digantikan dengan larutan asid sulfurik cair. Gas tidak berwarna yang terhasil di katod dikumpulkan.*

- (i) Name the gas produced.  
*Namakan gas yang terhasil.*

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

- (ii) Describe one chemical test to confirm the gas in (d)(i).  
*Terangkan satu ujian kimia untuk mengesahkan gas di (d)(i).*

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

- (e) State the metal used as negative terminal for Cell S.  
*Nyatakan logam yang digunakan sebagai terminal negatif di Sel S.*

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

- (f) Zinc electrode in Cell S is replaced with magnesium.  
*Elektrod zink di Sel S digantikan dengan magnesium.*

- (i) Compare the voltage reading of the cell.  
*Bandingkan bacaan voltan sel tersebut.*

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

- (ii) Explain your answer in (f)(i).  
*Terangkan jawapan anda di (f)(i).*

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

- 5 (a) A student conducted an experiment to study the reaction between sulphuric acid and  $0.1 \text{ mol dm}^{-3}$  of sodium hydroxide solution by using phenolphthalein as an indicator.

*Seorang pelajar menjalankan satu eksperimen untuk mengkaji tindakbalas antara asid sulfurik dan larutan natrium hidroksida  $0.1 \text{ mol dm}^{-3}$  dengan menggunakan fenolftalein sebagai penunjuk.*

- (i) Write a chemical equation to represent the reaction.

*Tuliskan persamaan kimia bagi tindak balas yang berlaku.*

.....

[2 marks]

[2 markah]

- (ii)  $25 \text{ cm}^3$  of  $0.1 \text{ mol dm}^{-3}$  sodium hydroxide solution is required to react completely with  $12.50 \text{ cm}^3$  of dilute sulphuric acid. Calculate the molarity of the dilute sulphuric acid used.

*$25 \text{ cm}^3$  larutan natrium hidroksida  $0.1 \text{ mol dm}^{-3}$  diperlukan untuk bertindak balas lengkap dengan  $12.50 \text{ cm}^3$  asid sulfurik cair. Hitungkan kemolaran asid sulfurik cair yang digunakan.*

[3 marks]

[3 markah]

- (iii) Draw a suitable diagram of the set-up of apparatus for the reaction between sulphuric acid and sodium hydroxide solution in the laboratory.  
*Lukiskan gambarajah susunan radas yang sesuai bagi tindakbalas antara asid sulfurik dengan larutan natrium hidroksida di dalam makmal.*

[2 marks]

[2 markah]

- (v) If sulphuric acid is replaced by hydrochloric acid with the same concentration, predict the volume of acid used. Explain your answer.  
*Jika asid sulfurik digantikan dengan asid hidroklorik dengan kepekatan yang sama, ramalkan isipadu asid yang digunakan. Terangkan jawapan anda.*

.....

.....

[2 marks]

[2 markah]

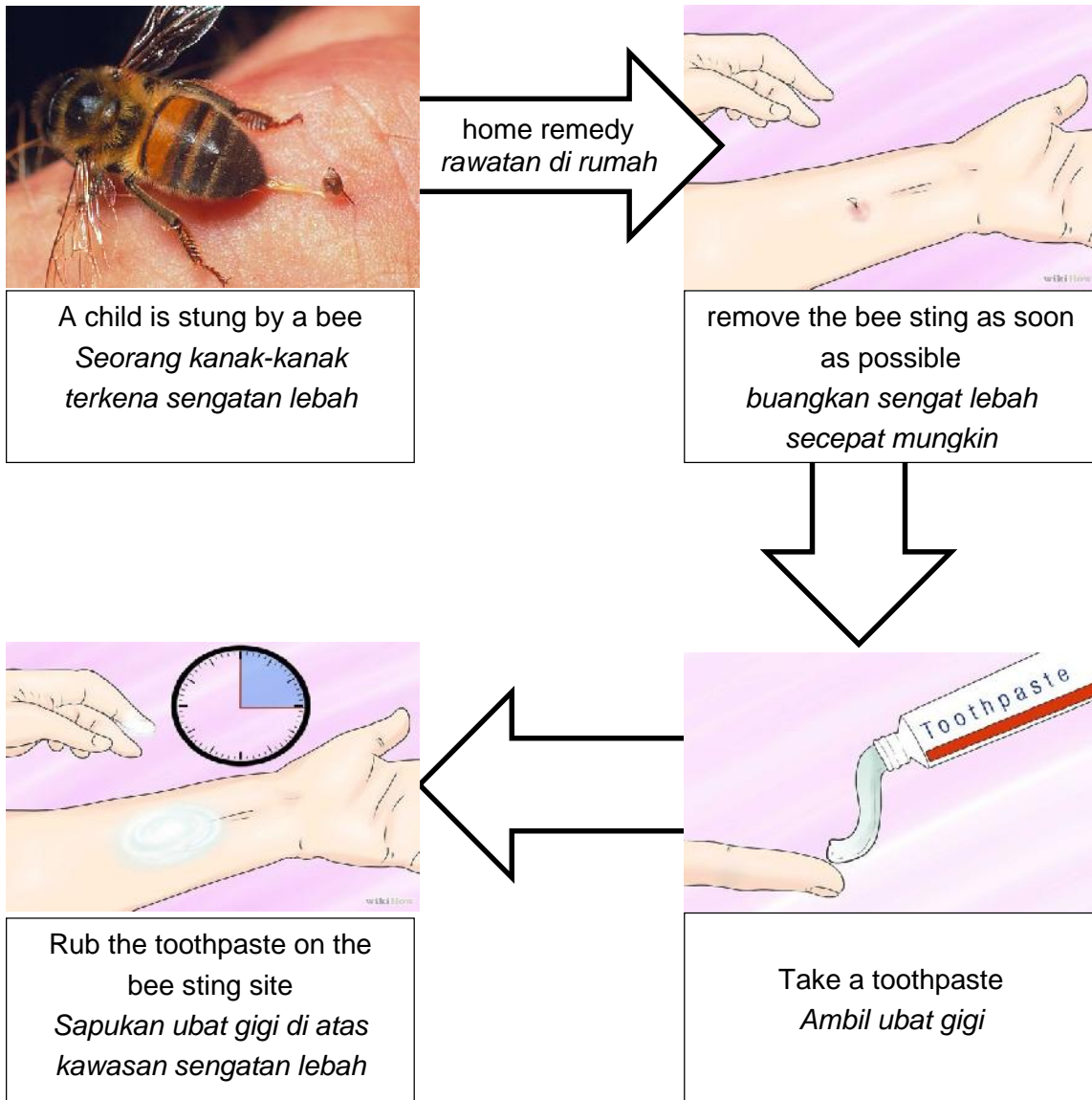


Diagram 5.1  
Rajah 5.1

- (b) Diagram 5.1 shows home remedy to treat a bee sting. In your opinion, give a rational reason why the toothpaste is apply on the bee sting site?  
*Rajah 5.1 menunjukkan rawatan di rumah untuk merawat sengatan lebah. Pada pandangan anda, mengapakah ubat gigi disapukan ke atas kawasan sengatan lebah tersebut?*

.....

.....

[2 marks]  
[2 markah]

6. Diagram 6.1 shows changes of a carbon compound involving a series of reactions.  
*Rajah 6.1 menunjukkan perubahan sebatian karbon yang melibatkan beberapa siri tindak balas.*

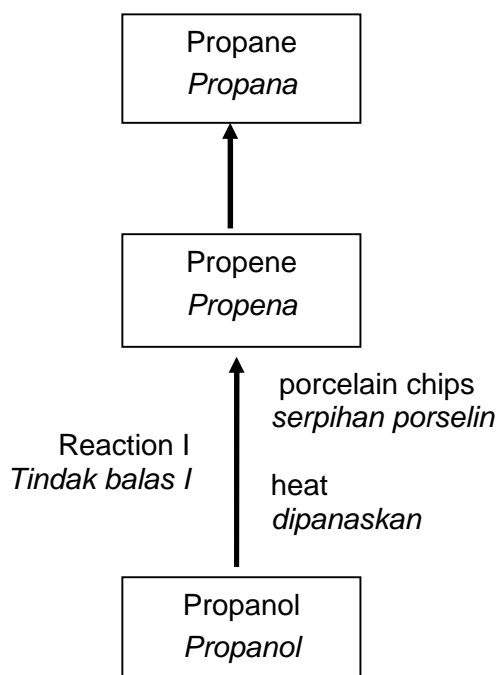


Diagram 6.1  
*Rajah 6.1*

- (a) State the functional group of propanol.  
*Nyatakan kumpulan berfungsi bagi propanol.*

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

- (b) Draw the structural formulae for two isomers of propanol.  
*Lukiskan formula struktur bagi dua isomer propanol.*

[ 2 marks ]  
 [ 2 markah ]



- (c) Propanol undergoes Reaction I to form propene.  
*Propanol mengalami tindak balas I membentuk propena.*

- (i) Name reaction I.  
*Namakan tindak balas I*

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

- (ii) Write the balanced chemical equation for the conversion of propanol to propene in reaction I.  
*Tuliskan persamaan kimia yang seimbang bagi penukaran propanol kepada propena dalam tindak balas I.*

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

- (d) Propane and propene are hydrocarbons. Compare the observation when acidified potassium manganate(VII) solution is added into propane and propene.  
*Propana dan propena adalah hidrokarbon. Bandingkan pemerhatian apabila larutan kalium manganat(VII) berasid ditambahkan ke dalam propana dan propena.*

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

[ 3 marks ]  
[ 3 markah ]



Diagram 6.2

Rajah 6.2

- (e) Diagram 6.2 shows the liquid car perfume that is usually placed inside the car to give a fragrance smell like apples. The liquid fragrance smell like apples contains ethyl pentanoate, with the molecular formula of  $C_4H_9COOC_2H_5$ .

*Rajah 6.2 menunjukkan cecair minyak wangi kereta yang biasanya diletakkan di dalam kereta untuk memberikan bau wangi seperti epal. Cecair wangi yang berbau epal ini mengandungi etil pentanoate, dengan formula molekul  $C_4H_9COOC_2H_5$ .*

- (i) Name the homologous series of the liquid car perfume.  
*Namakan siri homolog bagi cecair pewangi tersebut.*

.....

[ 1 mark ]

[ 1 markah ]

- (ii) Describe briefly how the liquid fragrance smell like apples can be prepared in the laboratory.

*Huraikan secara ringkas bagaimana cecair wangi yang berbau seperti epal boleh disediakan di dalam makmal.*

.....

.....

.....

[ 2 marks ]

[2 markah]

## Bahagian B

## Section B

[20 markah]

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

*Answer any one question from this section.*

7. Diagram 7.1 shows the flow map for the industrial manufactured of sulphuric acid.  
*Rajah 7.1 menunjukkan peta alir bagi pembuatan asid sulfurik dalam industri.*

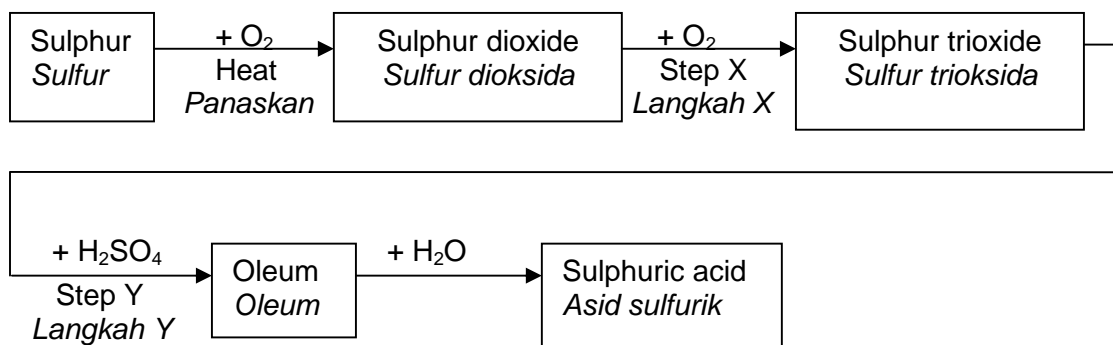


Diagram 7.1

Rajah 7.1

- (a) (i) Name the process of manufacturing sulphuric acid in industry and write a balanced chemical equation for Step X and Step Y.  
*Namakan proses pembuatan asid sulfurik dalam industri dan tuliskan persamaan kimia yang seimbang bagi langkah X dan langkah Y.*

[5 marks]  
 [5 markah]

- (iii) Excess gas that produced during the manufacture of sulphuric acid can cause environmental pollution. Explain how.  
*Gas berlebihan yang dibebaskan semasa pembuatan asid sulfurik boleh menyebabkan pencemaran alam sekitar. Terangkan bagaimana.*

[2 marks]  
 [2 markah]

- (b) Diagram 7.2 shows the steps to produce fertilizers X from the reaction between sulphuric acid and the product of Haber Process.

*Rajah 7.2 menunjukkan langkah-langkah untuk menghasilkan baja X daripada tindak balas di antara asid sulfurik dan produk proses Haber.*

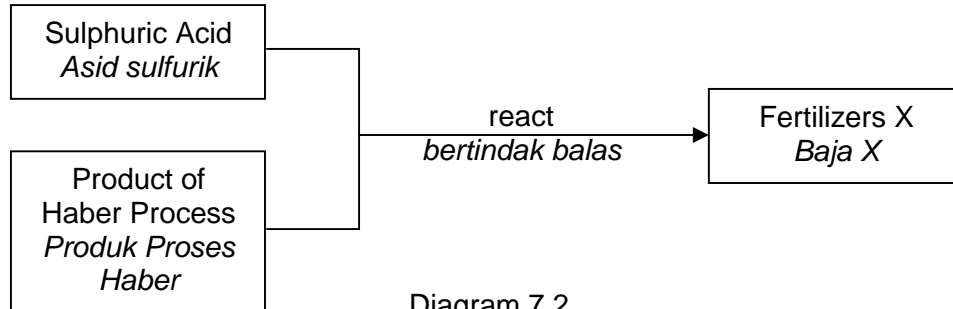


Diagram 7.2  
*Rajah 7.2*

- (i) State the chemical formula of fertilizers X.  
*Nyatakan formula kimia bagi baja X.*

[ 1 mark ]  
[ 1 markah ]



Diagram 7.3  
*Rajah 7.3*

- (ii) A farmer found that the crops in his farm is infertile as shown in Diagram 7.3. His friend suggested two fertilizers to improve the fertility of the soil, urea,  $\text{CO}(\text{NH}_2)_2$  and fertilizers X. Choose the best fertilizer for the growth of the plants. Explain your answer.

[Relative atomic mass: C=12, O=16, N=14, S=32, H=1]

*Seorang petani mendapati tanaman di kebunnya tidak subur seperti yang ditunjukkan dalam rajah 7.3. Rakannya telah mencadangkan dua jenis baja yang boleh menambah kesuburan tanah, urea,  $\text{CO}(\text{NH}_2)_2$  dan baja X.*

*Pilih baja yang terbaik untuk penanaman tumbuhan. Terangkan jawapan anda.*

[Jisim atom relatif: C=12, O=16, N=14, S=32, H=1]

[ 4 marks ]  
[ 4 markah ]

- (c) Table 7.1 shows five different manufactured substances in industry, P, Q, R, S and T and their uses.

*Jadual 7.1 menunjukkan lima bahan buatan berbeza dalam industri, P, Q, R, S, T dan kegunaannya*

<b>Manufactured substances in industry Bahan buatan dalam industri</b>	<b>Uses Kegunaan</b>
P	To make boats and badminton racket <i>Membuat bot dan reket badminton</i>
Q	To make medals and statues <i>Membuat medal dan tugu</i>
R	To make the body of aeroplanes <i>Membuat badan kapal terbang</i>
S	To make kitchen ware and internal wall of furnace <i>Membuat peralatan dapur dan dinding relau</i>
T	To make prism and lenses <i>Membuat prisma dan kanta</i>

Table 7.1  
*Jadual 7.1*

Based on Table 7.1, state the names of P,Q,R,S and T  
*Berdasarkan Jadual 7,1, nyatakan nama bagi P,Q, R, S dan T*

[5 marks ]  
[5 markah]

- (d) Polyethene is one of the polymer widely use in daily life.  
State two properties and one use of polyethene in daily life.  
*Polietena adalah salah satu polimer yang digunakan dengan meluas dalam kehidupan harian.*  
*Nyatakan dua sifat dan satu kegunaan polietena dalam kehidupan seharian.*

[3 marks]  
[3 markah]

8. (a) A student has carried out an experiment to construct an ionic equation for the formation of lead (II) iodide. Seven test tubes of the same size were labelled 1 to 7. A fixed volume of  $5.0 \text{ cm}^3$  of  $1.0 \text{ mol dm}^{-3}$  potassium iodide solution was poured in each test tube. The volume of  $1.0 \text{ mol dm}^{-3}$  lead (II) nitrate solution that added is shown in Table 8. The height of precipitate formed in each test tube was measured. The results are shown in Table 8.

*Seorang pelajar telah menjalankan eksperimen untuk membina persamaan ion bagi pembentukan plumbum (II) iodida. Tujuh tabung uji yang sama saiz dilabelkan dengan nombor 1 hingga 7. Isipadu tetap larutan kalium iodida  $1.0 \text{ mol dm}^{-3}$  sebanyak  $5 \text{ cm}^3$  dituangkan ke dalam setiap tabung uji. Isipadu larutan plumbum (II) nitrat  $1.0 \text{ mol dm}^{-3}$  ditambahkan ke dalam tabung uji seperti yang ditunjukkan di dalam Jadual 8. Tinggi mendakan yang terbentuk dalam setiap tabung uji diukur. Keputusan eksperimen ditunjukkan di dalam Jadual 8.*

Test tube Tabung uji	1	2	3	4	5	6	7
Volume of $1.0 \text{ mol dm}^{-3}$ lead(II) nitrate solution / $\text{cm}^3$ Isipadu $1.0 \text{ mol dm}^{-3}$ plumbum(II) nitrat / $\text{cm}^3$	0.5	1.0	1.5	2.0	2.5	3.0	3.5
Height of precipitate /cm Tinggi mendakan / cm	1.1	2.2	3.4	4.4	5.5	5.5	5.5

**Table 8**  
**Jadual 8**

- (i) Based on Table 8, plot a graph of the height of precipitate against volume of lead (II) nitrate solution.

*Berdasarkan Jadual 8, plotkan graf tinggi mendakan melawan isipadu larutan plumbum(II) nitrat.*

[3 marks]

[3 markah]

- (ii) Determine the number of moles of lead (II) ions and iodide ions that are required for the formation of lead (II) iodide. Your answer should consist of the following:

*Tentukan bilangan mol bagi ion plumbum (II) dan ion iodida yang diperlukan bagi pembentukan plumbum (II) iodida. Jawapan anda hendaklah mengandungi perkara berikut :*

- The volume of lead (II) nitrate solution that had reacted completely with 5.0 cm<sup>3</sup> of 1.0 mol dm<sup>-3</sup> potassium iodide  
*Isipadu larutan plumbum(II) nitrat yang bertindak balas lengkap dengan 5.0 cm<sup>3</sup> 1.0 moldm<sup>-3</sup> larutan kalium iodida.*
- Calculate the number of moles of lead(II) ions and iodide ions  
*Kirakan bilangan mol plumbum(II) ion dan ion iodida*
- Calculate the number of moles of iodide ions that has reacted with 1 mol of lead(II) ions.  
*Kirakan bilangan mol ion iodida yang bertindak balas dengan 1 mol ion plumbum(II)*
- Write the ionic equation for the formation of lead(II) iodide.  
*Tuliskan persamaan ion bagi pembentukan plumbum(II) iodide*

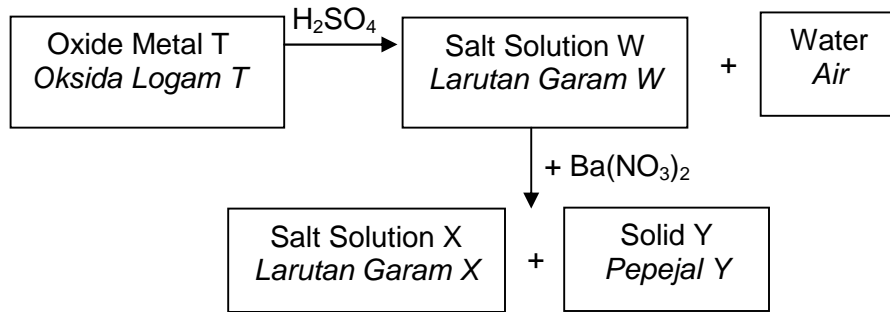
[7 marks]

[7 markah]

- (b) Diagram 8 shows the reaction between oxide metal T which is black in colour with sulphuric acid to form blue salt solution of compound W.  
Salt solution W reacts with barium nitrate solution to form salt solution X and insoluble salt, Solid Y.

*Rajah 8 menunjukkan tindak balas di antara oksida logam T yang berwarna hitam dengan asid sulfurik untuk membentuk larutan garam W yang berwarna biru.*

*Larutan garam W bertindak balas dengan larutan barium nitrat menghasilkan larutan garam X dan pepejal Y.*



**Diagram 8**  
**Rajah 8**

Based on Diagram 8 :

*Berdasarkan Rajah 8 :*

- (i) Identify oxide metal T, salt W, salt X and solid Y.  
*Kenal pasti oksida logam T, garam W, garam X dan pepejal Y.*

[4 marks]

[4 markah]

- (ii) State **one** observation when salt solution W reacts with barium nitrate solution and name the type of reaction occurred.

*Nyatakan **satu** pemerhatian apabila larutan garam W bertindak balas dengan larutan barium nitrat dan namakan jenis tindak balas yang berlaku.*

[2 marks]

[2 markah]



- (iii) Salt solution W reacts with  $50 \text{ cm}^3$  of  $1.0 \text{ mol dm}^{-3}$  barium nitrate solution.  
Write the chemical equation for the reaction and calculate the mass of solid Y produced.

[Relative formula mass of solid Y: 233]

*Larutan garam W bertindak balas dengan  $50 \text{ cm}^3$   $1.0 \text{ mol dm}^{-3}$  larutan barium nitrat. Tuliskan persamaan kimia bagi tindak balas tersebut dan kirakan jisim pepejal Y yang terhasil.*

*[Jisim formula relatif bagi pepejal Y : 233]*

[4 marks]

[4 markah]

**SECTION C**  
**Bahagian C**  
[20 markah]

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

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

9. Table 9 shows the experiments which are carried out to investigate factors that affect the rate of reaction of zinc powder with acid X and acid Y.

*Jadual 9 menunjukkan eksperimen yang dijalankan untuk mengkaji faktor-faktor yang mempengaruhi kadar tindak balas antara serbuk zink dengan asid X dan asid Y.*

Experiment Eksperimen	Reactants Bahan Tindak balas	Products Hasil Tindak balas
I	2 g zinc powder + 50.0 cm <sup>3</sup> of 0.5 mol dm <sup>-3</sup> acid X <i>2 g serbuk zink + 50.0 cm<sup>3</sup> of 0.5 mol dm<sup>-3</sup> asid X</i>	Zinc chloride and gas Z <i>Zink klorida dan gas Z</i>
II	2 g zinc powder + 50.0 cm <sup>3</sup> of 0.5 mol dm <sup>-3</sup> acid Y <i>2 g serbuk zink + 50.0 cm<sup>3</sup> of 0.5 mol dm<sup>-3</sup> asid Y</i>	Zinc sulphate and gas Z <i>Zink sulfat dan gas Z</i>
III	2 g zinc powder + 50.0 cm <sup>3</sup> of 0.5 mol dm <sup>-3</sup> acid Y + 5 drops copper(II) sulphate solution. <i>2 g serbuk zink + 50.0 cm<sup>3</sup> of 0.5 mol dm<sup>-3</sup> asid Y + 5 titis larutan kuprum(II) sulfat</i>	Zinc sulphate and gas Z <i>Zink sulfat dan gas Z</i>

**Table 9**  
**Jadual 9**

- (a) (i) Name acid X, acid Y and gas Z.  
Describe a chemical test to identify gas Z.

*Namakan asid X, asid Y dan gas Z.*  
*Huraikan ujian kimia untuk mengenal pasti gas Z.*

[5 marks]  
[5 markah]

- (ii) Calculate the maximum volume of gas Z produced at room condition in experiment II.  
[Relative atomic mass: Zn, 65. volume of 1 mol of gas at room condition = 24 dm<sup>3</sup>]  
*Kirakan isipadu maksimum gas Z yang terhasil pada keadaan bilik dalam eksperimen II.*  
*[Jisim atom relatif: Zn, 65. Isipadu 1 mol gas pada keadaan bilik = 24 dm<sup>3</sup>]*

[3 marks]

[3 markah]

- (iii) Sketch a graph volume of gas Z against time for experiment I, II and III on the same axes.  
*Lakarkan graf isipadu gas Z melawan masa bagi eksperimen I, II dan III pada paksi yang sama.*

[ 4 marks]

[4 markah]

- (iv) Compare the rate of reaction in experiment II and III . Explain your answer based on collision theory  
*Bandingkan kadar tindak balas dalam eksperimen II dan III. Terangkan jawapan anda berdasarkan teori perlanggaran.*

[ 5 marks]

[5 markah]



**Diagram 9**  
**Rajah 9**

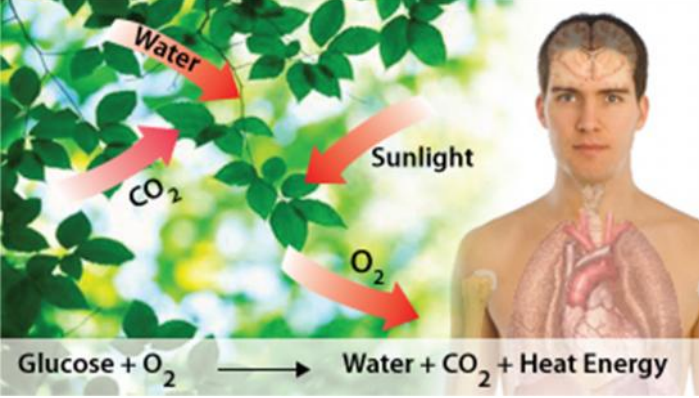
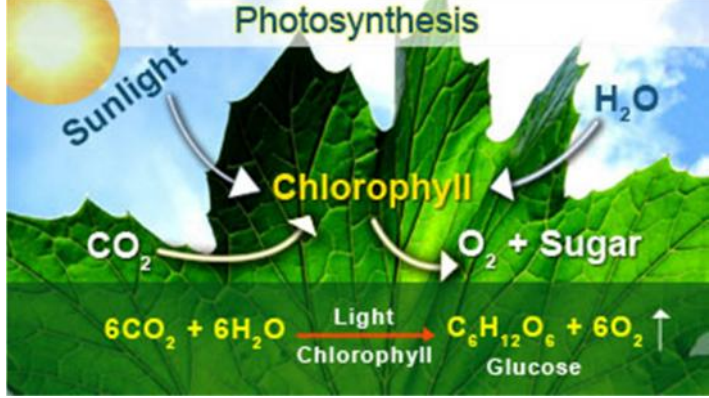
- (b) Diagram 9 shows a baker making his dough in order to make bread. The baker discovers that the bread dough rises faster in a warm place than in a cool place. From the situation above, identify the factor that affects the rate of rising of dough and explain how the factor affects the rate of rising of the dough.

*Rajah 9 menunjukkan seorang tukang masak membuat adunan roti. Tukang masak tersebut mendapati bahawa adunan roti menaik dengan lebih cepat di tempat yang panas berbanding tempat yang sejuk.*

*Dari situasi di atas, kenal pasti faktor yang mempengaruhi kadar kenaikan doh dan terangkan bagaimana faktor tersebut mempengaruhi kadar kenaikan doh tersebut.*

[ 3 marks ]

[3 markah]

Respiration Process <i>Proses Respirasi</i>	Photosynthesis Process <i>Proses Fotosintesis</i>
	
<p>Diagram 10.1 <i>Rajah 10.1</i></p>	<p>Diagram 10.2 <i>Rajah 10.2</i></p>
<p>Diagram 10.1 shows the respiration process. Cellular respiration is the set of metabolic reactions and processes that take place in the cells of organisms to convert biochemical energy from nutrients into adenosine triphosphate (ATP), and then release waste products. The chemical equation may be simplified as:</p> $\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \rightarrow 6\text{H}_2\text{O} + 6\text{CO}_2 + \text{energy}$ $\Delta H = -x \text{ kJmol}^{-1}$ <p><i>Rajah 10.1 menunjukkan proses respirasi sel. Respirasi sel adalah satu set tindak balas metabolik dan proses yang berlaku di dalam sel organisma untuk menukarkan tenaga biokimia daripada nutrien kepada adenosin trifosfat (ATP), dan kemudian membebaskan hasil buangan. Persamaan kimia boleh diringkaskan seperti berikut :</i></p> $\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \rightarrow 6\text{H}_2\text{O} + 6\text{CO}_2 + \text{tenaga}$ $\Delta H = -x \text{ kJmol}^{-1}$	<p>Diagram 10.2 shows the photosynthesis process. In plants, photosynthesis occurs mainly within the leaves. Photosynthesis requires carbon dioxide, water, and sunlight. All of these substances must be obtained by or transported to the leaves to produce glucose and release oxygen gas. The chemical equation may be simplified as:</p> $6\text{CO}_2 + 6\text{H}_2\text{O} + \text{sunlight} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$ $\Delta H = +y \text{ kJmol}^{-1}$ <p><i>Rajah 10.2 menunjukkan proses fotosintesis. Dalam tumbuh-tumbuhan, fotosintesis berlaku dengan banyak pada bahagian daun. Fotosintesis memerlukan karbon dioksida, air dan cahaya matahari. Kesemua bahan-bahan ini mesti diperolehi atau dipindahkan kepada bahagian daun untuk menghasilkan glukosa dan membebaskan oksigen. Persamaan kimia boleh diringkaskan seperti berikut :</i></p> $6\text{CO}_2 + 6\text{H}_2\text{O} + \text{cahaya matahari} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$ $\Delta H = +y \text{ kJmol}^{-1}$

- 10 (a) Based on Diagram 10.1 and 10.2, compare and contrast both processes above. Your explanation should include the following :
- types of chemical reactions
  - energy content of reactants and products
  - draw the energy level diagrams

Berdasarkan Rajah 10.1 dan Rajah 10.2, banding bezakan kedua-dua proses di atas. Penerangan anda perlu memasukkan perkara-perkara berikut :

- jenis tindak balas kimia
- kandungan tenaga bahan dan hasil tindak balas
- lukis gambarajah aras tenaga

[ 8 marks ]

[8 markah]

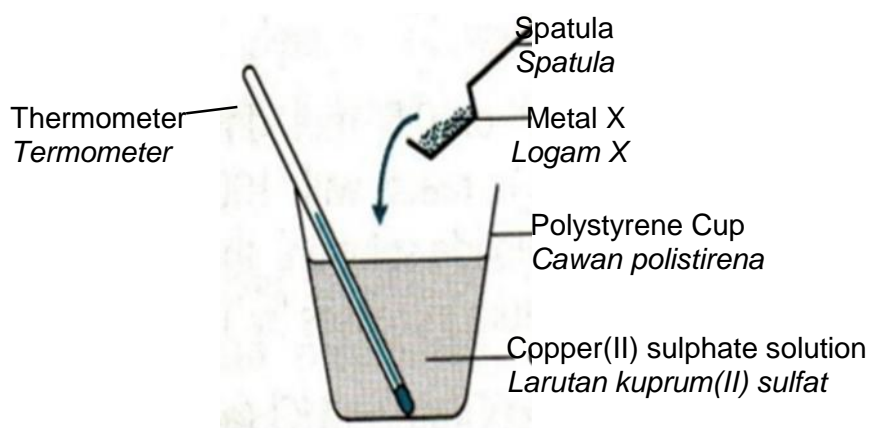


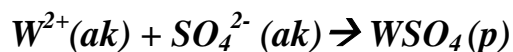
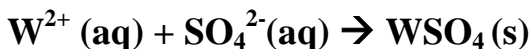
Diagram 10.3  
Rajah 10.3

- (b) Excess metal X powder is added to  $50 \text{ cm}^3$  of  $0.1 \text{ mol dm}^{-3}$  copper (II) sulphate solution produce  $210 \text{ kJ mol}^{-1}$  heat energy. Based on diagram 10.3, suggest metal X. Calculate the change in temperature of the solution. [Given that Specific heat capacity of solution :  $4.2 \text{ J g}^{-1} \text{ } ^\circ\text{C}^{-1}$ ]

Serbuk logam X berlebihan ditambahkan kepada  $50 \text{ cm}^3$   $0.1 \text{ mol dm}^{-3}$  larutan kuprum (II) sulfat menghasilkan  $210 \text{ kJ mol}^{-1}$  tenaga haba. Berdasarkan rajah 10.3, cadangkan logam X. Hitungkan perubahan suhu larutan. [Muatan haba tentu larutan :  $4.2 \text{ J g}^{-1} \text{ } ^\circ\text{C}^{-1}$ ]

[ 4 marks ]

[4 markah]



- (c) Based on ionic equation above, describe a laboratory experiment to determine the heat of precipitation of solid  $WSO_4$ . In your description, include the following aspects :

*Berdasarkan persamaan ion di atas, huraikan satu eksperimen makmal untuk menentukan haba pemendakan bagi pepejal  $WSO_4$ . Dalam huraian anda, sertakan aspek-aspek berikut.*

- Materials needed  
*Bahan-bahan yang diperlukan*
- Procedure of experiment  
*Prosedur eksperimen*
- A table to collect data  
*Jadual untuk mengumpul data*

[ 8 marks ]  
[8 markah]

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

## THE PERIODIC TABLE OF ELEMENTS

Proton number	Symbol	Name of element	Relative atomic mass
1	<b>H</b>	Hydrogen	1
2	<b>He</b>	Helium	4
3	<b>Li</b>	Lithium	7
4	<b>Be</b>	Beryllium	9
5	<b>B</b>	Boron	11
6	<b>C</b>	Carbon	12
7	<b>N</b>	Nitrogen	14
8	<b>O</b>	Oxygen	16
9	<b>F</b>	Flourine	19
10	<b>Ne</b>	Neon	20
11	<b>Na</b>	Sodium	23
12	<b>Mg</b>	Magnesium	24
13	<b>Al</b>	Aluminium	27
14	<b>Si</b>	Silicon	28
15	<b>P</b>	Phosphorus	31
16	<b>S</b>	Sulphur	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
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
37	<b>Rb</b>	Rubidium	86
38	<b>Sr</b>	Strontium	88
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
55	<b>Cs</b>	Cesium	133
56	<b>Ba</b>	Barium	137
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>Ho</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
72	<b>Hf</b>	Hafnium	179
73	<b>Ta</b>	Tantalum	181
74	<b>W</b>	Tungsten	184
75	<b>Re</b>	Rhenium	186
76	<b>Os</b>	Osmium	190
77	<b>Ir</b>	Iridium	192
78	<b>Pt</b>	Platinum	195
79	<b>Au</b>	Gold	197
80	<b>Hg</b>	Mercury	201
81	<b>Tl</b>	Thallium	204
82	<b>Pb</b>	Lead	207
83	<b>Bi</b>	Bismuth	209
84	<b>Po</b>	Polonium	210
85	<b>At</b>	Astatine	210
86	<b>Rn</b>	Radon	222
87	<b>Fr</b>	Francium	223
88	<b>Ra</b>	Radium	226
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
104	<b>Uuq</b>	Unnilquadium	257
105	<b>Uup</b>	Unnilpentium	260
106	<b>Uuh</b>	Unnilhexium	263
107	<b>Uus</b>	Unnilseptium	262
108	<b>Uuo</b>	Unniloctium	265
109	<b>Uue</b>	Unnilennium	266

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



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

1. This question paper consists of three sections: **Section A**, **Section B** and **Section C**.  
*Kertas soalan ini mengandungi tiga bahagian: Bahagian A, Bahagian B dan Bahagian C.*
2. Answer **all** questions in Section A. Write your answers for **Section A** in the spaces provided in the question paper.  
*Jawab semua soalan dalam Bahagian A. 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 'answer sheet' 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 kertas tulis 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. The diagrams in the questions are not drawn to scale unless stated.  
*Rajah yang mengiringi soalan tidak dilukiskan mengikut skala kecuali dinyatakan*
5. Marks allocated for each question or sub-part of the question is shown in brackets.  
*Markah yang diperuntukkan bagi setiap soalan atau ceraihan soalan ditunjukkan dalam kurungan.*
6. Show your working. It may help you to get marks.  
*Tunjukkan kerja mengira. Ini membantu anda mendapatkan markah.*
7. If you wish to change your answer, 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.*
8. You may use a non-programmable scientific calculator.  
*Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogramkan.*
9. You are advised to spend 90 minutes to answer questions in **Section A**, 30 minutes for **Section B** and 30 minutes for **Section C**.  
*Anda dicadangkan mengambil masa 90 minit untuk menjawab soalan dalam Bahagian A, 30 minit untuk Bahagian B dan 30 minit untuk Bahagian C.*
10. Tie together your answer sheets at the end of the examination.  
*Ikat semua kertas jawapan anda di akhir peperiksaan.*