

Chemistry
Kertas 2
October
2020
2 $\frac{1}{2}$ jam



MAKTAB RENDAH SAINS MARA

PEPERIKSAAN AKHIR SIJIL PENDIDIKAN MRSM 2020

CHEMISTRY

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 adalah dalam dwibahasa.
3. Soalan dalam bahasa Inggeris mendahului soalan yang sepadan dalam bahasa Melayu.
4. Calon dibenarkan menjawab keseluruhan atau sebahagian soalan sama ada dalam bahasa Inggeris atau bahasa Melayu.
5. Calon dikehendaki membaca maklumat di halaman belakang kertas peperiksaan ini.

Untuk Kegunaan Pemeriksa			
Bahagian	Soalan	Markah Penuh	Markah Diperoleh
A	1	9	
	2	9	
	3	10	
	4	10	
	5	11	
	6	11	
B	7	20	
	8	20	
C	9	20	
	10	20	
Jumlah			

Kertas peperiksaan ini mengandungi 31 halaman bercetak dan 1 halaman tidak bercetak

[Lihat halaman seterusnya]

Section A
Bahagian A

[60 marks]
[60 markah]

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

- (a) Table 1 shows the melting and boiling point of substance P, Q, R and S.
Jadual 1 menunjukkan takat lebur dan takat didih bagi bahan P, Q, R dan S.

Substance Bahan	Melting point (°C) Takat lebur (°C)	Boiling point (°C) Takat didih (°C)
P	-123	20
Q	-6	700
R	-77 liquid ^{solid}	-35
S	327	1749

0 123

Table 1

Jadual 1 room temperature = 24 °C

Based on Table 1,
Berdasarkan Jadual 1,

- (i) State the meaning of melting point.
Nyatakan maksud takat lebur.

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

- (ii) What is the physical state of substance R at room temperature?
Apakah keadaan fizik bahan R pada suhu bilik?

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

- (iii) State the changes of kinetic energy and forces of attraction between particles of substance Q when cooled from room temperature to -10 °C.
Nyatakan perubahan tenaga kinetik dan daya tarikan antara zarah bagi bahan Q apabila disejukkan dari suhu bilik ke -10 °C.

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

- (b) Diagram 1 shows the reaction of the first three elements of alkali metals with water in three beakers labeled as W, X and Y.
Rajah 1 menunjukkan tindak balas tiga unsur pertama logam alkali dengan air di dalam tiga bikar berlabel W, X dan Y.

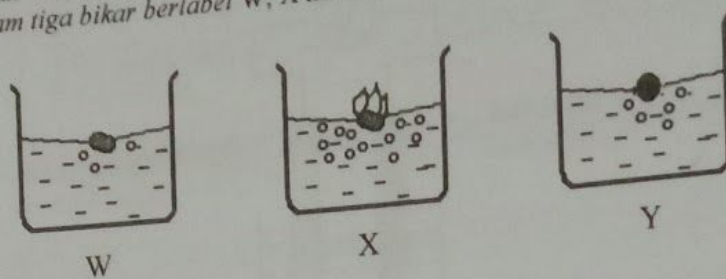


Diagram 1
Rajah 1

Based on Diagram 1,
Berdasarkan Rajah 1,

- (i) which beaker shows the reaction of potassium with water?
bikar manakah menunjukkan tindak balas kalium dengan air?

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

- (ii) name the gas evolved when the metals react with water.
namakan gas yang terbebas apabila logam bertindak balas dengan air.

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

- (iii) write the chemical equation for the reaction occurs in beaker W or Y.
tulis persamaan kimia bagi tindak balas yang berlaku dalam bikar W atau Y.

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

- (iv) what can you infer about the density of Group 1 metals compared to water?
apakah yang anda boleh simpulkan tentang ketumpatan logam Kumpulan 1 dengan air?

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

SULIT

2 Diagram 2 shows the apparatus set-up for a chemical cell.
Rajah 2 menunjukkan susunan radas bagi suatu sel kimia.

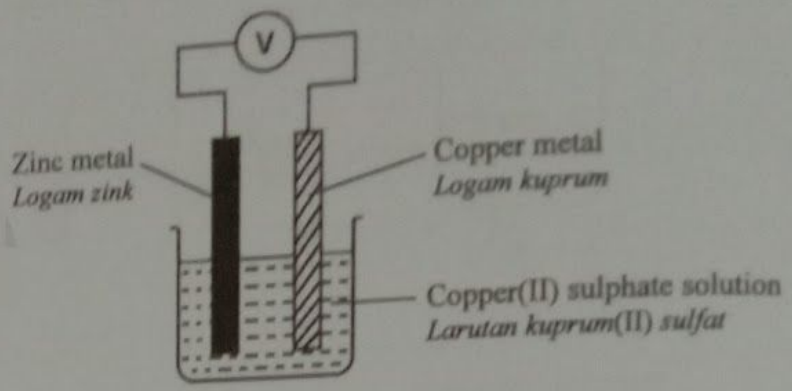
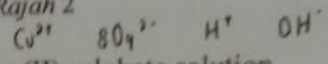


Diagram 2
Rajah 2



(a) State the ions present in copper(II) sulphate solution.
Nyatakan ion-ion yang hadir dalam larutan kuprum(II) sulfat.

2(a)
2

(+) Cation:
Kation

(-) Anion:
Anion

[2 marks]
[2 markah]

(b) State the negative terminal.
Nyatakan terminal negatif.

2(b)
1

.....
.....

[1 mark]
[1 markah]

(c) After 20 minutes,
Selepas 20 minit,

2(c)(i)
1

(i) state the observation at zinc.
nyatakan pemerhatian pada zink.

.....
.....

[1 mark]
[1 markah]

- (ii) write the half equation for the reaction occurred at zinc and copper electrodes.
tulis setengah persamaan bagi tindak balas yang berlaku di elektrod zink dan elektrod kuprum.

Zinc electrode : ...
Elektrod zink

Copper electrode : .
Elektrod kuprum

[2 marks]
 [2 markah]

- (iii) state the observation of the copper(II) sulphate solution.
 Explain your answer.
*nyatakan pemerhatian bagi larutan kuprum(II) sulfat.
 Terangkan jawapan anda.*

[2 marks]
 [2 markah]

- (d) A student wants to increase the voltage of the cell.
 Suggest a suitable metal to replace zinc.
*Seorang pelajar ingin meningkatkan voltan sel tersebut.
 Cadangkan satu logam yang sesuai bagi menggantikan zink.*

[1 mark]
 [1 markah]

3

Diagram 3 shows a series of chemical reactions.
Rajah 3 menunjukkan satu siri tindak balas kimia.

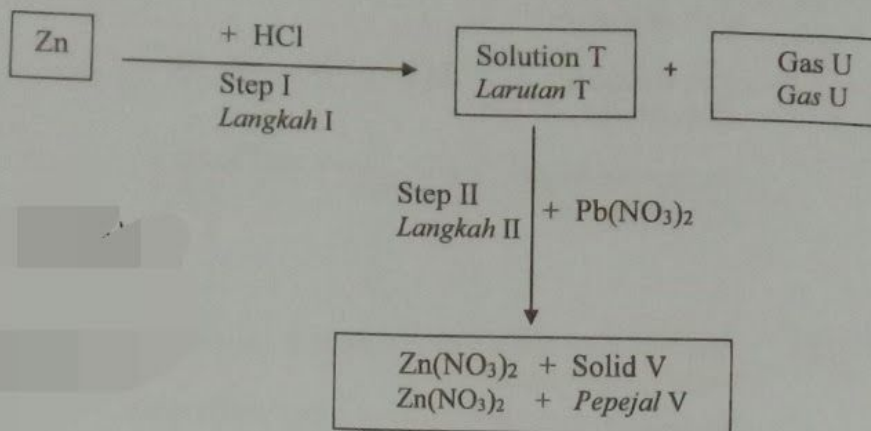


Diagram 3
Rajah 3

- (a) Name solution T.
Namakan larutan T.

[1 mark]
[1 markah]

- (b) Gas U produced is a colourless gas.
Explain how to identify the presence of gas U.
Gas U yang terhasil adalah tidak berwarna.
Terangkan bagaimana mengenalpasti kehadiran gas U.

[2 marks]
[2 markah]

- (c) In step I, 20 cm^3 of 1.0 mol dm^{-3} hydrochloric acid is reacted with excess zinc powder.
Dalam langkah I, 20 cm^3 asid hidroklorik 1.0 mol dm^{-3} bertindak balas dengan serbuk zink berlebihan.

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

[2 marks]
[2 markah]

- (ii) Calculate the maximum volume of gas U that can be produced at room condition.

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

Hitungkan isipadu maksimum gas U yang terbebas pada keadaan bilik
[Isipadu molar gas = $24 \text{ dm}^3 \text{ mol}^{-1}$ pada keadaan bilik]

3(c)(ii)

[3 marks]

[3 markah]

3

- (d) Explain how can you obtained pure solid V from the reaction mixture.

Terangkan bagaimana anda mendapatkan pepejal V tulen daripada campuran tindak balas.

.....

.....

3(d)

[2 marks]

[2 markah]

2

TOTAL A

4

10

SULIT

- 4 Diagram 4.1 shows the formation of rust on the surface of iron gate.
 Diagram 4.1 menunjukkan pembentukan karat di atas permukaan pagar besi.

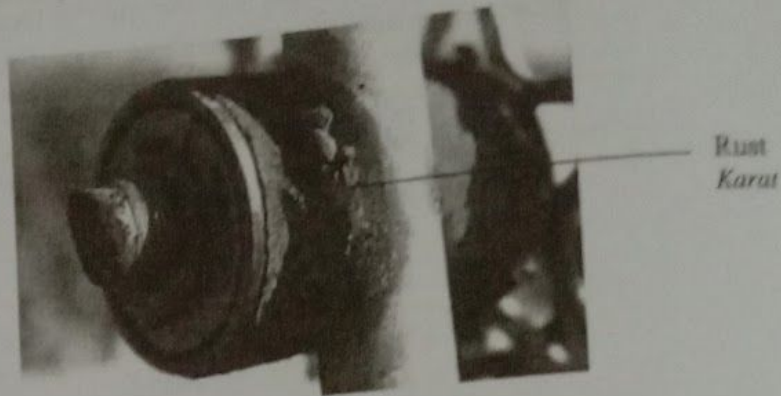


Diagram 4.1
 Rajah 4.1

- (a) State the condition for the rusting of iron.
 Nyatakan keadaan yang diperlukan untuk pengurangan besi.

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

- (b) The rusting of iron is a redox reaction.
 Pengurangan besi merupakan tindak balas redoks.

- (i) Name the substance that is oxidised.
 Namakan bahan yang mengalami pengoksidaan.

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

- (ii) Write the half equation for b(i).
 Tuliskan persamaan setengah untuk b(i).

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

- (c) Iron gate rust faster in coastal areas.
 Pagar besi di kawasan pantai lebih cepat berkarat.

- (i) Explain this phenomenon.
 Terangkan fenomena ini.

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

- (ii) Suggest one way to prevent the rusting of the iron gate.
 Cadangkan satu kaedah untuk menghalang pengkaratan pagar besi itu.

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

- (d) Diagram 4.2 shows the apparatus set up to construct reactivity series of metals.
 Rajah 4.2 menunjukkan susunan radas untuk membina siri kereaktifan logam.

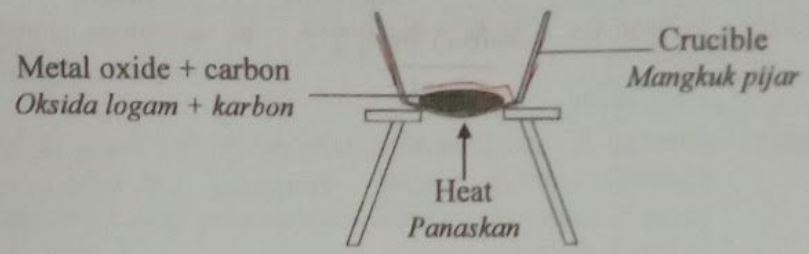


Diagram 4.2
 Rajah 4.2

Table 2 shows the information for two sets of the experiment.
 Jadual 2 menunjukkan maklumat bagi dua set eksperimen tersebut.

Set	Reactants <i>Bahan tindak balas</i>	Observation <i>Pemerhatian</i>
I	Carbon + Aluminium oxide <i>Karbon + Aluminium oksida</i>	No changes <i>Tiada perubahan</i>
II	Carbon + Oxide of X <i>Karbon + Oksida X</i>	Brown solid formed <i>Pepejal perang terbentuk</i>

Table 2
 Jadual 2

- (d) (i) Suggest metal X.
 Cadangkan logam X.

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

- (ii) Based on Set I and Set II, explain the differences in the observations.
Berdasarkan Set I dan Set II, terangkan perbezaan dalam pemerhatian itu.



[2 markah]

- (iii) Arrange X, carbon and aluminium in ascending order based on the reactivity towards oxygen. *less reactive to more r.*
Susun X, karbon dan aluminium dalam tertib menaik berdasarkan kereaktifan terhadap oksigen.



.....
[1 mark]

[1 markah]

3

- 8 Two sets of experiment were carried out to study the rate of reaction between magnesium powder and nitric acid at room temperature. Table 5 shows the results of the experiments.

Dua set eksperimen telah dijalankan untuk mengkaji kadar tindak balas antara serbuk magnesium dan asid nitrik pada suhu bilik. Jadual 5 menunjukkan keputusan eksperimen.


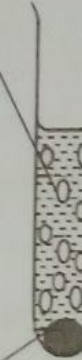
Set	I	II
Apparatus set up <i>Susunan radas</i>	<p>50 cm³ of 0.8 mol dm⁻³ nitric acid 50 cm³ asid nitrik 0.8 mol dm⁻³</p>  <p>0.4 g magnesium powder 0.4 g serbuk magnesium</p>	<p>50 cm³ of 0.8 mol dm⁻³ nitric acid + copper(II) sulphate solution 50 cm³ asid nitrik 0.8 mol dm⁻³ + larutan kuprum(II) sulfat</p>  <p>0.4 g magnesium powder 0.4 g serbuk magnesium</p>
Time taken for magnesium powder to completely dissolve (s) <i>Masa yang diambil untuk serbuk magnesium melarut sepenuhnya (s)</i>	30.0	12.0

Table 5
Jadual 5

SULIT

- (a) Based on Table 5, state the meaning of rate of reaction.
Berdasarkan Jadual 5, nyatakan maksud bagi kadar tindak balas

[1 mark]
[1 markah]

- (b) Calculate the average rate of reaction for Set I and Set II.
Hitung kadar tindak balas purata bagi Set I dan Set II.

(i) Set I :

[1 mark]
[1 markah]

(ii) Set II :

[1 mark]
[1 markah]

- (iii) Diagram 5.1 shows the energy profile diagram for Set I.
Sketch the energy profile diagram for Set II in the diagram.
*Rajah 5.1 menunjukkan rajah profil tenaga bagi Set I.
Lakarkan rajah profil tenaga bagi Set II dalam rajah tersebut.*

Energy
Tenaga



Diagram 5.1
Rajah 5.1

[1 mark]
[1 markah]

- (c) Compare the rate of reaction between Set I and Set II.
Explain why there is a difference in the rate of reaction based on the collision theory.
*Bandingkan kadar tindak balas antara Set I dan II.
Terangkan mengapa terdapat perbezaan kadar tindak balas berdasarkan teori perlanggaran.*

[4 marks]
[4 markah]

SULIT

- (d) Diagram 5.2 shows two different condition of storing foods.
Rajah 5.2 menunjukkan dua keadaan berbeza penyimpanan makanan.



Condition A
Keadaan A



Condition B
Keadaan B

Diagram 5.2
Rajah 5.2

In which condition will the foods last longer?

Explain.

Dalam keadaan manakah makanan akan bertahan lebih lama?

Terangkan.

[3 marks]
 [3 markah]

6

Diagram 6 shows the formation of compound X from glucose and its conversion to several other carbon compounds.
Rajah 6 menunjukkan penghasilan sebatian X daripada glukosa dan perubahannya kepada sebatian karbon yang lain.

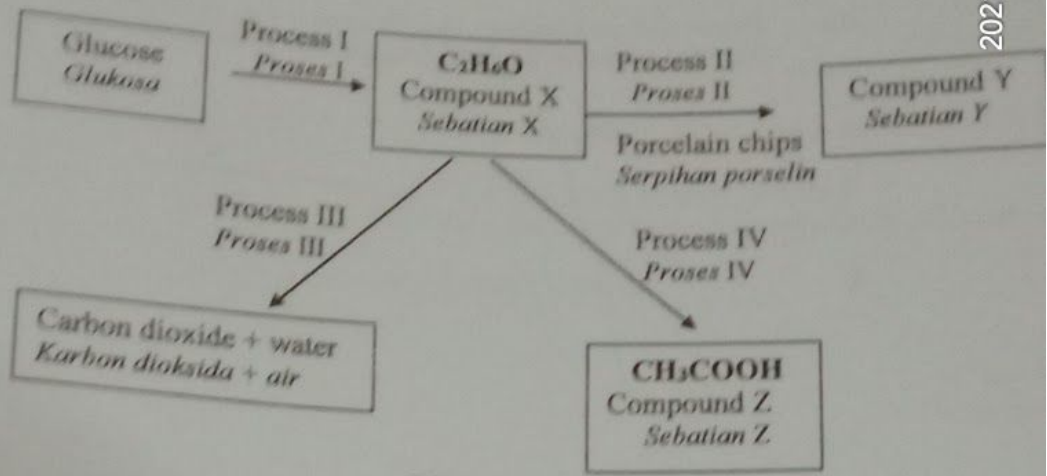


Diagram 6
Rajah 6

- (a) Name the enzyme produced by yeast in Process I.
Namakan enzim yang dihasilkan oleh yis dalam Proses I.

.....

[1 mark]
[1 mark]

- (b) Draw the structural formula of compound X.
Lukiskan formula struktur sebatian X.



[1 mark]
[1 mark]

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(c) Compound Y is formed when the vapour of compound X is passed over the heated porcelain chips in Process II.

Sebatian Y terbentuk apabila wap sebatian X dialirkan melalui serpihan porselin panas dalam Proses II.

(i) Draw a labelled diagram how Process II can be carried out.

Lukiskan gambarajah berlabel bagaimana Proses II boleh dijalankan.

[2 marks]

[2 markah]

(ii) Suggest a chemical test to identify compound Y.

Cadangkan satu ujian kimia untuk mengenalpasti sebatian Y.

.....
.....

[2 marks]

[2 markah]

(d) Write a chemical equation for the reaction in Process III.

Tuliskan persamaan kimia untuk tindak balas Proses III.

.....

[2 marks]

[2 markah]

(e) Compound Z liberates carbon dioxide gas when calcium carbonate is added to it.

Bahan Z membebaskan gas karbon dioksida apabila kalsium karbonat dicampur kepadanya.

(i) State the functional group of compound Z.

Nyatakan kumpulan berfungsi bagi sebatian Z.

.....
[1 mark]

[1 markah]

- (ii) Name a reagent that is suitable to be used in Process IV.
Namakan suatu reagen yang sesuai untuk digunakan dalam Proses IV.

.....

.....

[1 mark]

[1 markah]

- (iii) Compound Z reacts with compound X to produce a substance with a pleasant smell.

Write the molecular formula of the substance produced.

Sebatian Z bertindak balas dengan sebatian X menghasilkan suatu bahan yang berbau wangi.

Tuliskan formula molekul bahan terhasil.

...

.....

[1 mark]

[1 markah]

[20 marks]

[20 markah]

Answer any **one** question.

Jawab mana-mana **satu** soalan.

- (a) Diagram 7.1 shows the structural formula of chloroethene or vinyl chloride which can be used to produce synthetic polymer.

Rajah 7.1 menunjukkan formula struktur kloroetena atau vinil klorida yang boleh digunakan sebagai polimer sintetik.

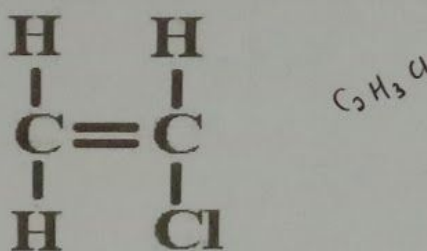


Diagram 7.1

Rajah 7.1

- (i) State the polymer formed and write the chemical equation for the polymerisation of chloroethene.

Nyatakan polimer yang terbentuk dan tuliskan persamaan kimia bagi pempolimeran kloroetena.

[2 marks]

[2 markah]

- (ii) Explain how the usage of synthetic polymer substances can cause environmental pollution.

In your explanation, include the following aspects:

- ✓ Source
- ✓ Process
- ✓ Effect

Terangkan bagaimana penggunaan bahan-bahan polimer sintetik boleh menyebabkan pencemaran alam sekitar.

Dalam penerangan anda sertakan aspek-aspek berikut:

- ✓ Sumber
- ✓ Proses
- ✓ Kesan

[3 marks]

[3 markah]

- (b) Diagram 7.2 shows bicycle's wheel rim made from two different materials. The iron rim is easily bend whereas alloy rim does not easily bend.
Rajah 7.2 menunjukkan rim basikal yang diperbuat daripada dua jenis bahan berbeza. Rim besi mudah bengkok manakala rim aloi susah bengkok.

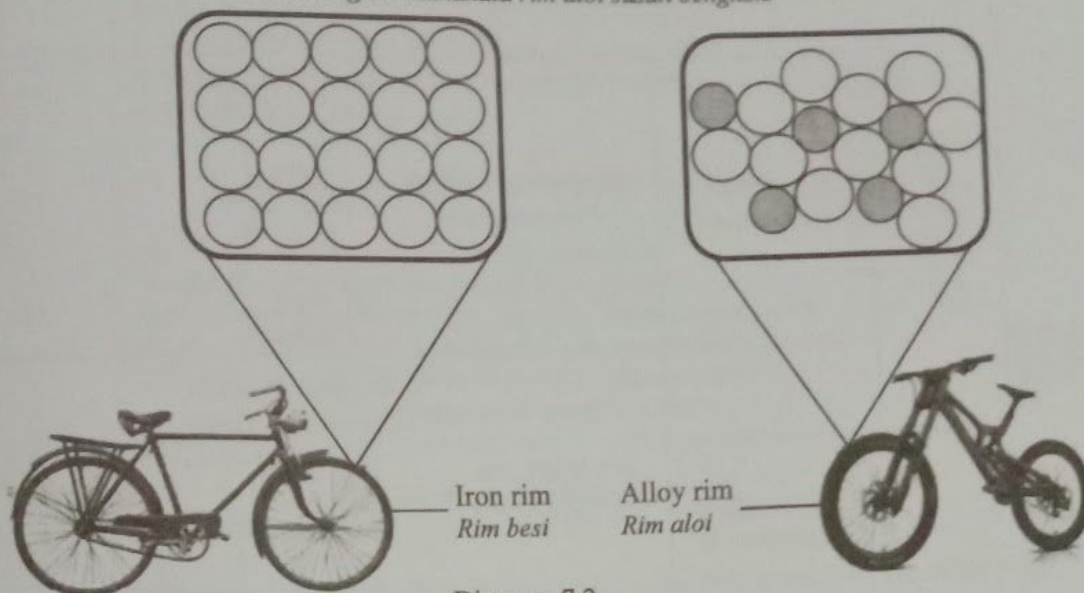
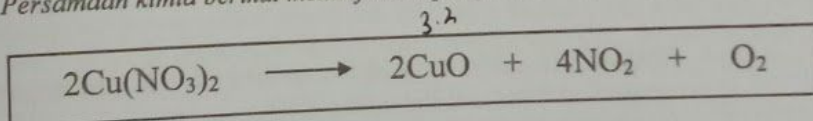


Diagram 7.2
Rajah 7.2

Based on Diagram 7.2, explain in terms of arrangement of atoms why alloy rim is better than iron rim.
Berdasarkan Rajah 7.2, terangkan dari segi susunan atom mengapa rim aloi lebih baik berbanding dengan rim besi.

[5 markah]

- (c) The following chemical equation shows the decomposition of copper(II) nitrate:
Persamaan kimia berikut menunjukkan penguraian kuprum(II) nitrat:



State the quantitative information that can be deduced from the equation.
Nyatakan maklumat kuantitatif yang boleh disimpulkan daripada persamaan tersebut.

Calculate the volume of oxygen gas evolved at room condition if 3.2 g of copper(II) oxide is produced during the heating process.
 [Relative atomic mass: N = 14, O = 16, Cu = 64]
 [Molar volume of gas at room condition = 24 dm³ mol⁻¹]

Hitung isipadu gas oksigen yang terbebas pada keadaan bilik jika 3.2 g kuprum(II) oksida dihasilkan semasa proses pemanasan.
 [Jisim atom relatif: N=14, O=16, Cu=64]
 [Isipadu molar gas pada keadaan bilik = 24 dm³ mol⁻¹]

[4 marks]

[4 markah]

- (d) Diagram 7.3 shows the apparatus set-up for two experiments to determine the empirical formulae for magnesium oxide and copper(II) oxide.
Rajah 7.3 menunjukkan susunan radas bagi dua eksperimen untuk menentukan formula empirik bagi magnesium oksida dan kuprum(II) oksida.

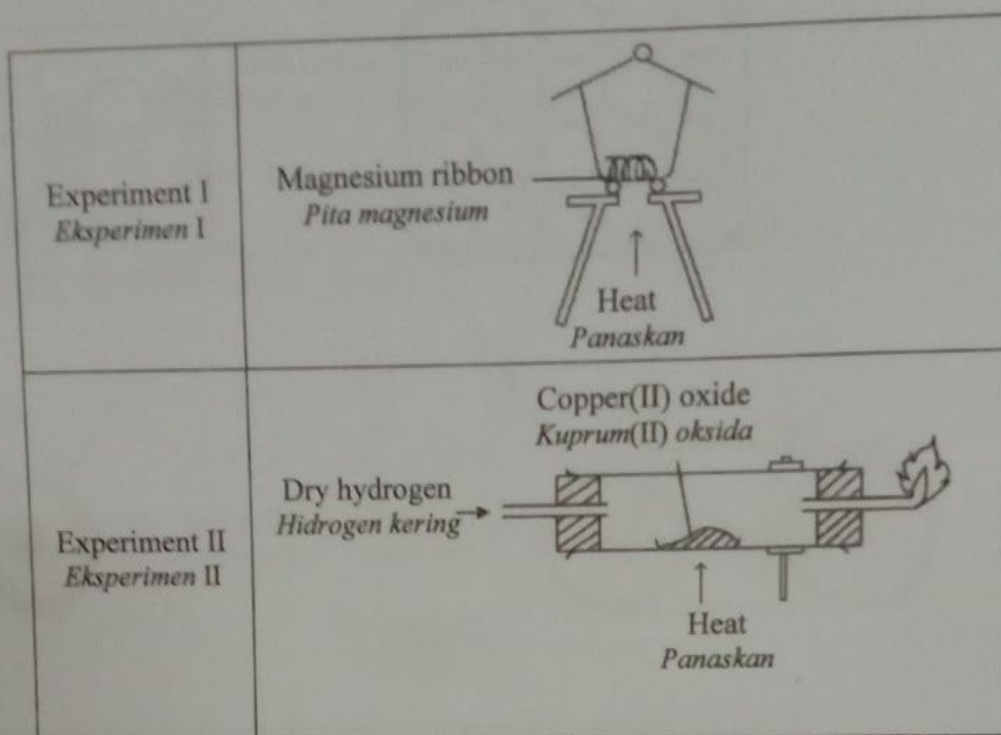


Diagram 7.3
Rajah 7.3

- (i) Write the chemical equation that occur in Experiment I.
Tuliskan persamaan kimia yang berlaku di Experimen I.

[2 marks]
 [2 markah]

- (ii) Explain the differences in the method used for the determination of the empirical formulae for both oxides.
Terangkan perbezaan kaedah untuk menentukan formula empirik bagi kedua-dua oksida itu.

[4 marks]
 [4 markah]

- 8 (a) Diagram 8.1 shows information of jellyfish sting.
Rajah 8.1 menunjukkan maklumat sengatan obor-obor.

Jellyfish have tiny stinging cells in their tentacles to stun or paralyse their prey before they eat them. Alkaline jellyfish stings can be painful to humans and sometimes can be deadly.

-National Geographic Kids-

Obor-obor mempunyai sel-sel menyengat pada tentakelnya yang boleh menyebabkan mangsanya terkaku atau lumpuh, sebelum obor-obor memakannya. Sengatan obor-obor yang beralkali boleh menyebabkan kesakitan dan adakalanya boleh menyebabkan kematian.

-National Geographic Kids-



Diagram 8.1
Rajah 8.1

Suggest one substance that can be applied to the skin to relieve pain of jelly fish sting without causing further injury.
Give two reasons for your suggestion.
Cadangkan satu bahan yang boleh disapu pada kulit untuk mengurangkan sakit tanpa menyebabkan kecederaan seterusnya.
Berikan dua sebab bagi cadangan anda.

[3 marks]

[3 markah]

- (b) Table 8.1 shows concentration and volume of two different types of strong acid, X and Y which are used to neutralise 20.0 cm³ of 0.5 mol dm⁻³ potassium hydroxide solution.
Jadual 8.1 menunjukkan kepekatan dan isipadu dua jenis asid kuat yang berbeza, X dan Y, yang digunakan untuk meneutralkan 20.0 cm³ larutan kalium hidroksida 0.5 mol dm⁻³.

Acid Asid	X	Y
Concentration (mol dm ⁻³) Kepekatan (mol dm ⁻³)	0.5	0.5
Volume (cm ³) Isipadu (cm ³)	V cm ³	2V cm ³

Table 8.1
Jadual 8.1

- (i) Based on the information in Table 8.1, suggest acid X and acid Y.
Berdasarkan maklumat dalam Jadual 8.1, cadangkan asid X dan asid Y.

[2 marks]

[2 markah]

- (ii) Write the chemical equation between the acid X suggested in b(i) with potassium hydroxide solution.
Tuliskan persamaan kimia bagi tindak balas antara asid X yang dicadangkan dalam b(i) dengan larutan kalium hidroksida.

[2 marks]

[2 markah]

- (c) A group of students are doing an experiment between an acid and an alkali when they notice the labels of the two substances are detached from the bottles. Describe one chemical test that can be used to verify acid or alkali for both bottles.

Sekumpulan pelajar sedang menjalankan eksperimen antara suatu asid dan alkali apabila mereka menyedari label pada botol bahan-bahan tersebut telah tertanggal. Huraikan satu ujian kimia yang boleh dijalankan untuk mengesahkan asid atau alkali pada kedua-dua botol.

[4 marks]

[4 markah]

- (d) Diagram 8.2 shows the apparatus set-up for an experiment to determine the heat of neutralisation.

Rajah 8.2 menunjukkan susunan radas bagi dua set eksperimen untuk menentukan haba peneutralan.

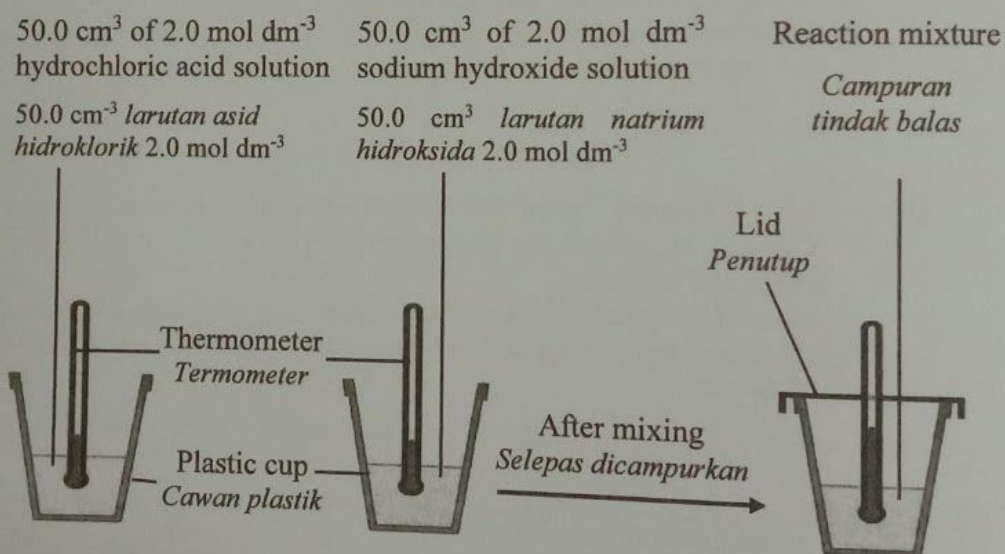


Diagram 8.2
 Rajah 8.2

Jadual 8.2 menunjukkan suhu yang diperolehi dalam eksperimen.

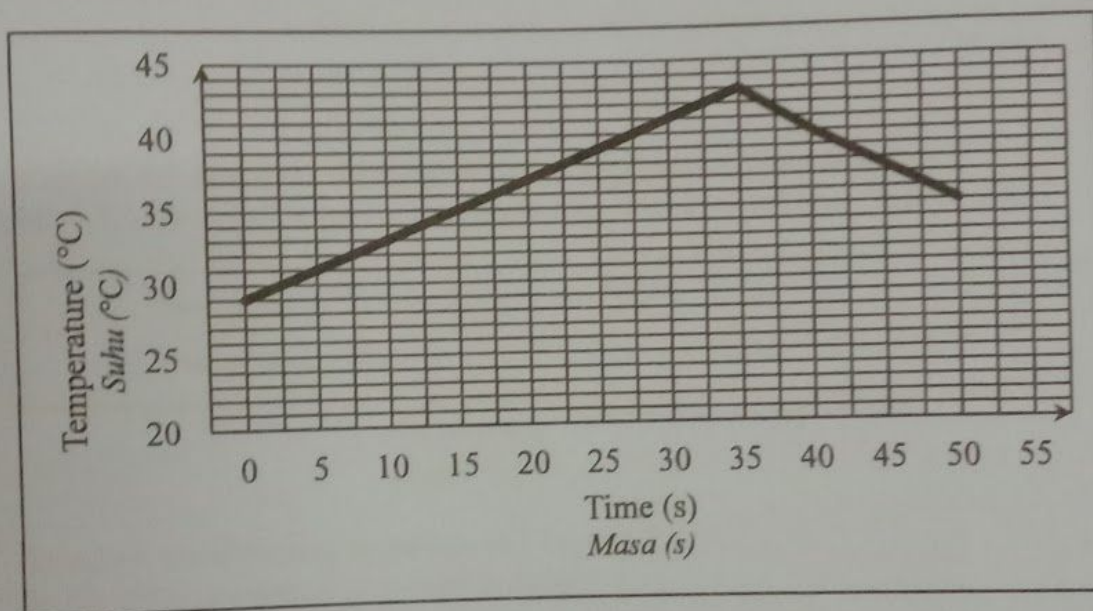
Initial temperature of hydrochloric acid solution ($^{\circ}\text{C}$) <i>Suhu awal larutan asid hidroklorik ($^{\circ}\text{C}$)</i>	x
Initial temperature of sodium hydroxide solution ($^{\circ}\text{C}$) <i>Suhu awal larutan natrium hidroksida ($^{\circ}\text{C}$)</i>	28.0
Highest temperature of mixture ($^{\circ}\text{C}$) <i>Suhu tertinggi campuran ($^{\circ}\text{C}$)</i>	y

Table 8.2

Jadual 8.2

Graph 8 shows the temperature measured in plastic cup containing hydrochloric acid before and after mixing with sodium hydroxide solution.

Graf 8 menunjukkan suhu yang diukur dalam cawan plastik mengandungi asid hidroklorik sebelum dan selepas larutan natrium hidroksida dicampurkan.



Graph 8

Graf 8

- (i) Based on Table 8.2 and Graph 8, state the:
Berdasarkan Jadual 8.2 dan Graf 8, nyatakan:

- Temperature of x and y
Suhu x dan y
- Calculate the heat of neutralisation in this experiment.
[Specific heat capacity of solution, $c = 4.2 \text{ J g}^{-1} \text{ }^{\circ}\text{C}^{-1}$]
Hitung haba peneutralan bagi eksperimen ini.
[Muatan haba tentu bagi air, $c = 4.2 \text{ J g}^{-1} \text{ }^{\circ}\text{C}^{-1}$]

[6 marks]

- i) Predict the heat of neutralisation if acid used is replaced with ethanoic acid.
Explain your answer.
Ramalkan haba peneutralan jika asid yang digunakan diganti dengan asid etanoik.
Jelaskan jawapan anda.

[3 marks]

[3 markah]

Section C
Bahagian C

[20 marks]
[20 markah]

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



- 9 (a) An ionic compound is produced when Group 1 element reacts with Group 17 element.
By using a suitable example of the elements, explain how the formation of the bond is formed.
Sebatian ion dihasilkan apabila unsur Kumpulan 1 bertindak balas dengan unsur Kumpulan 17.
Menggunakan contoh unsur-unsur yang sesuai, terangkan bagaimana pembentukan ikatan sebatian tersebut.

[4 marks]
[4 markah]

- (b) Diagram 9.1 shows the chemical equation for Reaction I and Reaction II.
Rajah 9.1 menunjukkan persamaan kimia bagi Tindak balas I dan Tindak balas II.

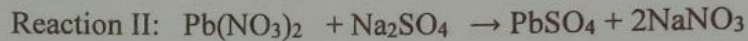
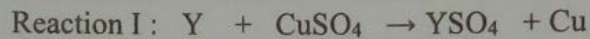


Diagram 9.1
Rajah 9.1

Based on the chemical equations in Diagram 9.1,
Berdasarkan persamaan kimia dalam Rajah 9.1,

- (i) Suggest metal Y.
Cadangkan logam Y.
- (ii) Determine whether Reaction I and Reaction II is a redox reaction.
Explain your answer.
Tentukan sama ada Tindak balas I dan Tindak balas II adalah tindak balas redoks. Jelaskan jawapan anda.

[1 mark]
[1 markah]

[5 marks]
[5 markah]

- 10 Table 10.1 shows the type of rubber and their properties.
Jadual 10.1 menunjukkan jenis getah dan ciri-cirinya.

Type of rubber <i>Jenis getah</i>	Properties <i>Ciri-ciri</i>
A	More elastic <i>Lebih kenyal</i> High heat resistance <i>Rintangan haba yang tinggi</i>
B	Less elastic <i>Kurang kenyal</i> Low heat resistance <i>Rintangan haba yang rendah</i>

Table 10.1
Jadual 10.1

- (a) Based on Table 10.1, identify the type of rubber A and B.
Explain the difference in properties of rubber A and B in terms of:

- Elasticity
- Heat resistant

*Berdasarkan Jadual 10.1, kenalpasti jenis getah A dan B.
Terangkan perbezaan sifat antara getah A dan B berdasarkan:*

- *Kekenyalan*
- *Rintangan haba*

[6 mark
[6 marka

- (b) Table 10.2 shows the properties of non-hydrocarbons, compound P and compound Q which have less than four carbon atoms per molecule.

Jadual 10.2 menunjukkan sifat-sifat bagi sebatian bukan hidrokarbon, sebatian P dan sebatian Q yang mengandungi kurang daripada empat atom karbon per molekul.

Compound P <i>Sebatian P</i>	Compound Q <i>Sebatian Q</i>
<ul style="list-style-type: none">• Cannot conduct electricity in aqueous solution. <i>Tidak boleh mengkonduksi elektrik dalam larutan akueus</i>• Do not react with magnesium. <i>Tidak bertindak balas dengan magnesium.</i>• Burn with blue flame. <i>Terbakar dengan nyalaan biru.</i>	<ul style="list-style-type: none">• Can conduct electricity in aqueous solution. <i>Boleh mengkonduksi elektrik dalam larutan akueus.</i>• Reacts with magnesium to produce hydrogen gas. <i>Bertindak balas dengan magnesium untuk menghasilkan gas hidrogen.</i>• Non combustible. <i>Tidak terbakar.</i>

Table 10.2

Jadual 10.2

- (i) Suggest compound P and compound Q.
Cadangkan sebatian P dan sebatian Q.

[2 marks]
[2 markah]

- (ii) State the general formula and functional group for compound P and compound Q.
Nyatakan formula am dan kumpulan berfungsi bagi sebatian P dan sebatian Q.

[2 marks]
[2 markah]

- (iii) Diagram 10 shows reaction between compound P and compound Q to produce compound Z.

Rajah 10 menunjukkan tindak balas antara sebatian P dan sebatian Q untuk menghasilkan sebatian Z.

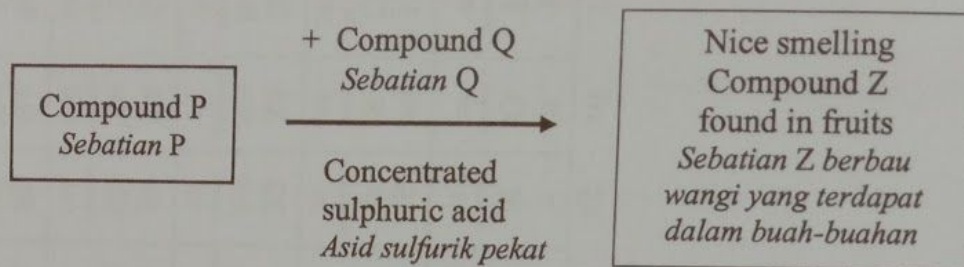


Diagram 10
Rajah 10

Describe a laboratory experiment to prepare compound Z.

Your answer should include the following:

- A list of materials
- Procedure of the experiment
- Observation and chemical equation
- Name of the compound Z produced

*Huraikan satu eksperimen makmal untuk menyediakan ester tersebut.
Jawapan anda mesti mempunyai perkara berikut:*

- *Senarai bahan kimia*
- *Prosedur eksperimen*
- *Pemerhatian dan persamaan kimia*
- *Nama sebatian Z yang terhasil*

[10 marks]
[10 markah]

Periodic Table of Elements

Key:

10	Proton Number
Ne	Symbol
20	Name of element
	Relative Atomic Mass

2	4	12	20	38	56	88	118	146	184	222	
Be	Ca	Sc	Y	La	Ac	He	Ne	Ar	Kr	Xe	Rn
Beryllium	Calcium	Scandium	Yttrium	Lanthanum	Actinium	Helium	Neon	Argon	Krypton	Xenon	Radon
9	40	45	89	139	227	4	20	35.5	84	131	222
Li	K	Rb	Cs	Fr	Na	2	10	17	36	54	86
Lithium	Potassium	Rubidium	Cesium	Francium	Sodium	4	18	35.5	84	131	222
7	19	85	137	223	11	18	36	54	86	131	222
Na	Rb	Cs	Fr	Li	19	36	54	86	131	222	222
Sodium	Rubidium	Cesium	Francium	Lithium	18	36	54	86	131	222	222
3	11	37	87	133	19	36	54	86	131	222	222
He	Li	Na	K	Rb	Cs	Fr	Li	19	36	54	86
Helium	Lithium	Sodium	Potassium	Rubidium	Cesium	Francium	18	36	54	86	131
4	12	38	88	138	20	36	54	86	131	222	222
Be	Mg	Ca	Strontium	Ba	La	Ac	Ne	Ar	Kr	Xe	Rn
Beryllium	Magnesium	Calcium	Strontium	Barium	Lanthanum	Actinium	Neon	Argon	Krypton	Xenon	Radon
9	24	40	88	137	139	227	20	35.5	84	131	222
B	Al	Sc	Y	La	Ac	He	10	17	36	54	86
Boron	Aluminum	Scandium	Yttrium	Lanthanum	Actinium	Helium	18	35.5	84	131	222
5	13	21	39	57	89	118	18	36	54	86	131
B	Al	Sc	Y	La	Ac	He	18	36	54	86	131
Boron	Aluminum	Scandium	Yttrium	Lanthanum	Actinium	Helium	36	54	86	131	222
6	14	22	40	72	118	146	18	36	54	86	131
C	Si	Ti	Zr	Hf	He	18	36	54	86	131	222
Carbon	Silicon	Titanium	Zirconium	Hafnium	Helium	18	36	54	86	131	222
12	14	22	40	72	118	146	18	36	54	86	131
C	Si	Ti	Zr	Hf	He	18	36	54	86	131	222
Carbon	Silicon	Titanium	Zirconium	Hafnium	Helium	18	36	54	86	131	222
7	15	23	41	73	119	147	18	36	54	86	131
N	P	V	Nb	Ta	He	18	36	54	86	131	222
Nitrogen	Phosphorus	Vanadium	Niobium	Tantalum	Helium	18	36	54	86	131	222
14	16	24	42	74	118	146	18	36	54	86	131
C	S	Cr	Mo	W	He	18	36	54	86	131	222
Carbon	Sulfur	Chromium	Molybdenum	Tungsten	Helium	18	36	54	86	131	222
12	16	24	42	74	118	146	18	36	54	86	131
C	S	Cr	Mo	W	He	18	36	54	86	131	222
Carbon	Sulfur	Chromium	Molybdenum	Tungsten	Helium	18	36	54	86	131	222
8	16	26	44	76	112	150	18	36	54	86	131
O	S	Fe	Ru	Os	He	18	36	54	86	131	222
Oxygen	Sulfur	Iron	Ruthenium	Osmium	Helium	18	36	54	86	131	222
16	16	26	44	76	112	150	18	36	54	86	131
O	S	Fe	Ru	Os	He	18	36	54	86	131	222
Oxygen	Sulfur	Iron	Ruthenium	Osmium	Helium	18	36	54	86	131	222
9	17	27	45	77	113	151	18	36	54	86	131
F	Cl	Co	Rh	Ir	He	18	36	54	86	131	222
Fluorine	Chlorine	Cobalt	Rhodium	Iridium	Helium	18	36	54	86	131	222
17	17	27	45	77	113	151	18	36	54	86	131
F	Cl	Co	Rh	Ir	He	18	36	54	86	131	222
Fluorine	Chlorine	Cobalt	Rhodium	Iridium	Helium	18	36	54	86	131	222
10	18	30	48	80	118	152	18	36	54	86	131
Ne	Ar	Zn	Cd	Hg	He	18	36	54	86	131	222
Neon	Argon	Zinc	Cadmium	Mercury	Helium	18	36	54	86	131	222
20	18	30	48	80	118	152	18	36	54	86	131
Ne	Ar	Zn	Cd	Hg	He	18	36	54	86	131	222
Neon	Argon	Zinc	Cadmium	Mercury	Helium	18	36	54	86	131	222
18	36	60	92	142	184	222	18	36	54	86	131
He	Kr	Cu	Ag	Au	He	18	36	54	86	131	222
Helium	Krypton	Copper	Silver	Gold	Helium	18	36	54	86	131	222
4	36	60	92	142	184	222	18	36	54	86	131
He	Kr	Cu	Ag	Au	He	18	36	54	86	131	222
Helium	Krypton	Copper	Silver	Gold	Helium	18	36	54	86	131	222