

Section A
Bahagian A

[60 marks]

[60 markah]

Answer **all** the questions.Jawab **semua** soalan.

1. (a) Diagram 1 shows the standard representation of isotopes of carbon and oxygen atoms.

Rajah 1 menunjukkan perwakilan piawai bagi isotop atom karbon dan oksigen.

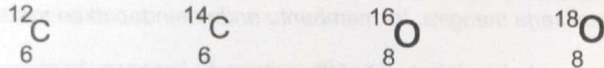


Diagram 1
Rajah 1

- (i) State the meaning of isotope.

Nyatakan maksud isotop

.....
.....

[1 mark/ markah]

- (ii) State one use of ${}^{14}_6\text{C}$ in our daily life.

Nyatakan satu kegunaan ${}^{14}_6\text{C}$ dalam kehidupan seharian.

.....

[1 mark/ markah]

- (b) Diagram 1.1 shows the standard representative of oxygen atom

Rajah 1.1 menunjukkan perwakilan piawai bagi atom oksigen

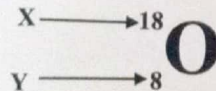


Diagram 1.1
Rajah 1.1

What represents X and Y?

Apakah yang mewakili X dan Y?

X :

Y :

[2 marks/ markah]

- (c) Carbon and oxygen react to form a compound.

Karbon dan oksigen bertindak balas membentuk satu sebatian.

- (i) Name the type of the compound.

Namakan jenis sebatian ini.

.....

[1 mark/ markah]

- (ii) Draw an electron arrangement for compound is formed in (c) (i).

Lukiskan susunan elektron bagi sebatian yang terbentuk pada (c)(i).

[2 marks/ markah]

- (d) An electron arrangement for atom of element X is 2.8.1. Element X reacts with oxygen to form a compound with the formula X_2O . X is not an actual symbol of an atom

Susunan elektron bagi atom unsur X ialah 2.8.1. Unsur X bertindak balas dengan oksigen untuk membentuk suatu sebatian yang berformula X_2O . X bukan simbol sebenar bagi atom

- (i) In which group is the element X placed in the Periodic Table of element?

Dalam kumpulan manakah unsur X ditempatkan dalam Jadual Berkala Unsur

.....

[1 mark/ markah]

- (ii) State the formula of ion X.

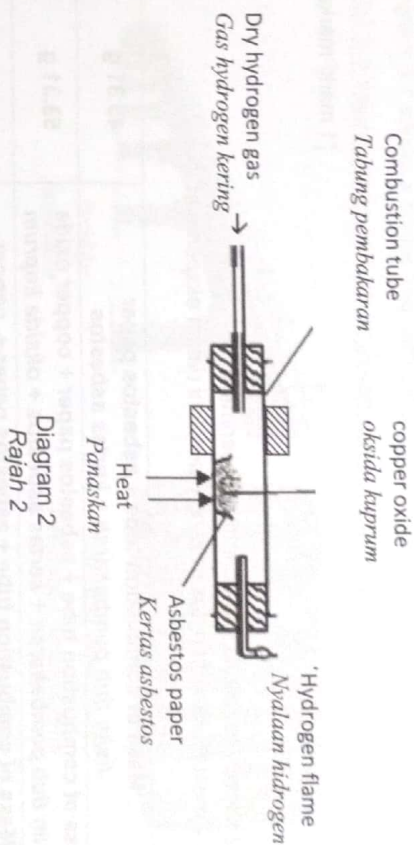
Nyatakan formula bagi ion X.

.....

[1 mark/ markah]

2. Diagram 2 shows the arrangement of the apparatus for experiments to determine the empirical formula of copper oxide

Rajah 2 menunjukkan susunan radas bagi eksperimen untuk menentukan formula empirik satu oksida kuprum.



- (a) State the meaning of empirical formula?

Nyatakan maksud formula empirik?

.....

[1 mark/ markah]

- (b) What is the function of the hydrogen gas in this experiment?

Apakah fungsi gas hidrogen dalam eksperimen ini?

.....

[1 mark/ markah]

- (c) Why the dry hydrogen gas is passed through combustion tubes for several times before copper oxide is heated?

Mengapa gas hidrogen kering dialirkan melalui tub pembakaran selama beberapa ketika sebelum oksida kuprum dipanaskan?

.....

[1 mark/ markah]

- (d) State an example of other metal oxide that can use the same method as copper oxide to determine its empirical formula.

Nyatakan satu contoh oksida logam lain yang boleh menggunakan kaedah yang sama seperti oksida kuprum untuk menentukan formula empiriknya.

[1 mark/ markah]

Table 2 shows the results gained in this experiment:

Jadual 2 menunjukkan keputusan yang diperolehi dalam eksperimen ini:

Mass of combustion tube + asbestos paper <i>Jisim tiub pembakaran + kertas asbestos</i>	45.31 g
Mass of combustion tube + asbestos paper + copper oxide <i>Jisim tiub pembakaran + kertas asbestos + oksida kuprum</i>	53.31 g
Mass of combustion tube + asbestos paper + copper <i>Jisim tiub pembakaran + kertas asbestos + kuprum</i>	52.51 g

Table 2
Jadual 2

- (e) Base on table 2,
Berdasarkan Jadual 2,

- (i) Calculate the mass of copper and the mass of oxygen that has reacted
Hitungkan jisim kuprum dan jisim oksigen yang telah bertindakbalas

Mass of copper: Mass of oxygen :
Jisim kuprum : Jisim oksigen :

[2 marks/ markah]

- (f) Calculate the molar ratio of copper atoms to oxygen atoms
Hitungkan nisbah mol bagi atom kuprum kepada atom oksigen.
[Relative atomic mass : O = 16 ; Cu = 64]
[Jisim atom relatif : O = 16 ; Cu = 64]

[2 marks/ markah]

- (g) Determine the empirical formula of copper oxide

Tentukan formula empirik oksida kuprum

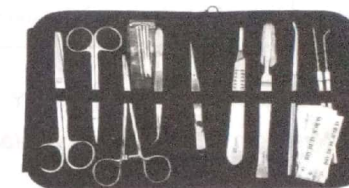
[1 mark/ markah]

3. Diagram 3.1 shows a bridge and surgical equipment

Rajah 3.1 menunjukkan sebuah jambatan dan peralatan pembedahan



Bridge
Jambatan



Surgical equipment
Peralatan pembedahan

Diagram 3.1
Rajah 3.1

- (a) The bridge is made of alloy Y while the surgical equipment is made of alloy Z. Both of these alloys use iron metal as the main element.

Jambatan diperbuat daripada aloi Y manakala peralatan pembedahan diperbuat daripada aloi Z. Kedua-dua jenis aloi ini menggunakan logam ferum sebagai unsur utama

- (i) Identify alloy Z
Kenal pasti aloi Z

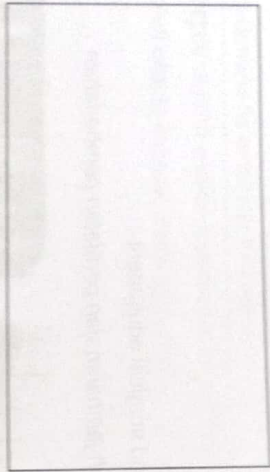
[1 mark/ markah]

- (ii) State two other elements in alloy Z
Nyatakan dua unsur lain dalam aloi Z

[2 marks/ markah]

(iii) Draw the arrangement of atoms in alloy Y

Lukiskan susunan atom dalam aloi Y



[2 marks/ markah]

(iv) State the aim of making alloy Y

Nyatakan satu tujuan pembuatan aloi Y

[1 mark/ markah]

(b) Diagram 3.2 shows of medicine A dan medicine B

Rajah 3.2 menunjukkan ubat A dan ubat B



Medicine A
Ubat A



Medicine B
Ubat B

Diagram 3.2
Rajah 3.2

(i) States the types of medicine A and B

Nyatakan jenis ubat A dan B

A :

B :

[2 marks/markah]

(ii) Why medicine A should be taken after meals?

Mengapa ubat A perlu diambil selepas makan?

[1 mark/markah]

(iii) What will happen if the patient does not complete the whole course of medicine B prescribed by doctor?

Apakah yang akan berlaku jika pesakit tidak menghabiskan semua ubat B yang dipreskripsikan oleh doktor?

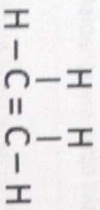


[1 mark/markah]

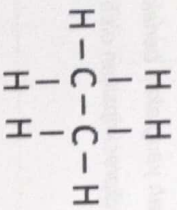


4. Compound W, X, Y and Z in Diagram 4 is the structural formulae of organic compound that belong to different homologous series.
- Sebatian W, X, Y, dan Z dalam Rajah 4 ialah formula struktur bagi sebatian organik dari siri homolog yang berbeza

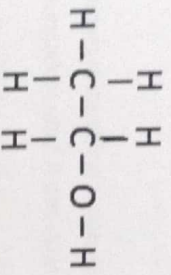
Compound W
Sebatian W



Compound X
Sebatian X



Compound Y
Sebatian Y



Compound Z
Sebatian Z

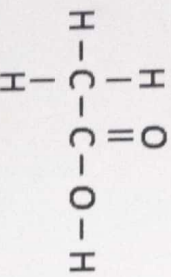


Diagram 4
Rajah 4

- (a) State the homologous series of compound W
Nyatakan siri homolog bagi sebatian W

.....
[1 mark/markah]

- (b) Which of the compounds undergo addition reaction? Explain your answer

Sebatian manakah mengalami tindak balas penambahan? Jelaskan jawapan anda

.....
[2 marks/markah]

- (c) (i) Compound X can be obtained from compound W. Describe briefly how this reaction occurred
- Sebatian X diperolehi daripada sebatian W. Huraikan dengan ringkas bagaimana tindak balas ini berlaku.

.....
[2 marks/ markah]

- (ii) State the conditions required for the reaction.
- Nyatakan keadaan yang diperlukan dalam tindak balas ini

.....
[2 marks/markah]

- d) Compound Y and Z can react to form a compound with a fruity smell.

Sebatian Y dan Z boleh bertindak balas membentuk satu sebatian yang berbau buah-buahan

- (i) Name the products formed
Namakan sebatian yang terbentuk

.....
[1 mark/markah]

- (ii) Draw the structural formulae for the product formed in d(i)
Lukiskan formula struktur bagi sebatian yang terbentuk di d(i)

.....
[1 mark/markah]

- (iii) Write the chemical equation for the reaction.

Tuliskan persamaan kimia bagi tindakbalas tersebut

.....
[1 mark/markah]

5. Diagram 5.1 shows the preparation of an insoluble salt. Rajah 5.1 menunjukkan penyediaan sejenis garam tak larut.

1.0 mol dm⁻³ lead (II) nitrate solution
Larutan plumbum(II) nitrat 1.0 mol dm⁻³

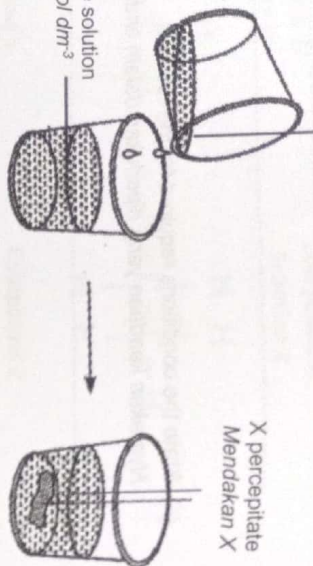


Diagram 5.1
Rajah 5.1

- (a) State the name of the method to prepare the salt.
Nyatakan nama kaedah penyediaan garam ini

[1 mark/markah]

- (b) What is the colour of precipitate X
Apakah warna mendakan X

[1 mark/markah]

- (c) Ali has used 1.0 mol dm⁻³ lead(II) nitrate solution and 1.0 mol dm⁻³ sodium sulphate solution in order to perform an experiment using continuous variation method as stated in the diagram 5.2.

All telah menggunakan 1.0 mol dm⁻³ larutan Plumbum(II) nitrat dan 1.0 mol dm⁻³ larutan natrium sulfat untuk menjalankan satu eksperimen dengan menggunakan kaedah perubahan berterusan seperti dalam rajah 5.2.

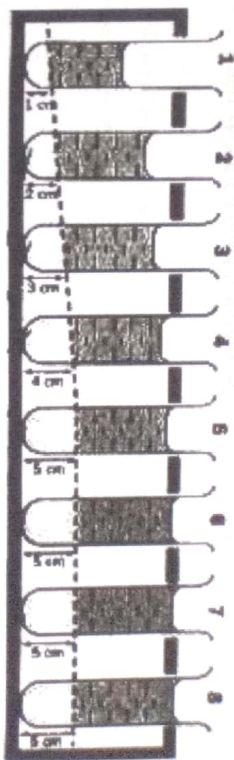


Diagram 5.2
Rajah 5.2

- Table 5.2 shows the result of Ali's experiment. Jadual 5.2 menunjukkan keputusan daripada eksperimen Ali.

Test tube Tabung uji	Volume of Lead(II) nitrate solution (cm ³) Isipadu Plumbum(II) nitrat (cm ³)	Volume of Sodium sulphate solution (cm ³) Isipadu Natrium sulfat (cm ³)	Height of precipitate (cm) Ketinggian mendakan (cm)
1	5.00	1.00	1.0
2	5.00	2.00	2.0
3	5.00	3.00	3.0
4	5.00	4.00	4.0
5	5.00	5.00	5.0
6	5.00	6.00	5.0
7	5.00	7.00	5.0
8	5.00	8.00	5.0

Table 5.1
Jadual 5.1

- (i) State in which test tube the reaction is completed.
Nyatakan pada tabung uji yang manakah tindak balas telah lengkap.

[1 mark/markah]

(ii) Calculate the number of mol of lead(II) ion that has reacted.

Tentukan bilangan mol ion plumbum(II) yang bertindak balas.

[1 mark/markah]

(iii) Calculate the number of mol of sulphate ion that has reacted.

Tentukan bilangan mol ion sulfat yang telah bertindak balas.

[1 mark/markah]

(iv) State the ratio number of mol lead(II) ion to sulphate ion

Nyatakan nisbah bilangan mol ion plumbum(II) kepada ion sulfat

[1 mark/markah]

(v) Base on the result obtained in (c) (iv) write the ionic equation for the formation of precipitate X.

Berdasarkan keputusan di (c) (iv) tuliskan persamaan ion bagi pembentukan mendakan X

[1 mark/ markah]

(vi) Calculate the mass of the precipitate X form when the reaction has completed.

[Relative Atomic Mass : Pb = 210; S = 32; O = 16]

Tentukan jisim mendakan X yang terbentuk apabila tindak balas telah selesai.

[Jisim Atom Relatif : Pb = 210; S = 32; O = 16]

[3 marks/markah]

(vii) Write ions that present above the precipitate at test tube 1.

Tuliskan ion yang hadir dalam larutan atas mendakan pada tabung uji 1.

[1 mark/ markah]

Test tube 1 :

Tabung uji 1 :

(P) Pb^{2+} / Pb^{2+} ion	(P) SO_4^{2-} / SO_4^{2-} ion
.....

3. Diagram 6.1 shows the apparatus set-up to determine the heat of displacement between excess magnesium powder with 200 cm^3 of $0.2 \text{ molar copper(II) sulphate solution}$.
Rajah 6.1 menunjukkan susunan alat radas untuk menentukan haba penyesaran bagi tindak balas antara serbuk magnesium berlebihan dengan 200 cm^3 larutan kuprum(II) sulfat 0.2 molar .

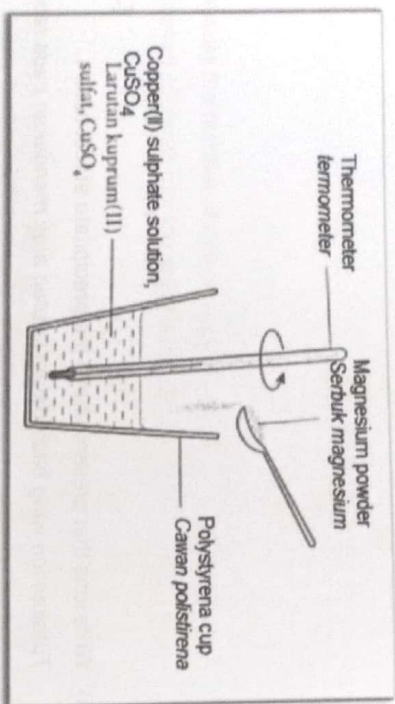


Diagram 6.1
Rajah 6.1

Table 6.1 shows the results obtained.

Jadual 6.1 menunjukkan keputusan yang diperolehi.

Description Penerangan	Temperature (°C) Suhu (°C)
Initial temperature of copper(II) sulphate solution Suhu awal larutan kuprum(II) sulfat	28.0
The highest temperature of the mixture Suhu tertinggi campuran	43.0

Table 6.1
Jadual 6.1

- (a) Why polystyrene cup is used in this experiment?
Mengapa cawan polistirena digunakan dalam eksperimen ini?

[1 mark/markah].

- (b) Why is excess magnesium powders used in this experiment?
Mengapa serbuk magnesium dicampurkan secara berlebihan dalam eksperimen ini?

[1 mark/ markah]

- (c) The chemical equation for the reaction is as follow :
Persamaan kimia bagi tindak balas adalah seperti berikut :



Calculate,

Hitungkan,

- (i) the heat change in the reaction

[Specific heat capacity, $c = 4.2 \text{ J g}^{-1} \text{ }^\circ\text{C}^{-1}$; Density of solution = 1 g cm^{-3}]

perubahan haba dalam tindak balas itu

[Muatan haba tentu, $c = 4.2 \text{ J g}^{-1} \text{ }^\circ\text{C}^{-1}$; Ketumpatan larutan = 1 g cm^{-3}]

[1 mark/ markah]

- (ii) the heat of displacement for the reaction

haba penyesaran bagi tindak balas

[3 marks/ markah]

- (d) Draw the energy level diagram for the reaction.
 Lukiskan gambar rajah aras tenaga bagi tindak balas itu.

[3 marks/ markah]

- (e) The experiment is repeated by using zinc powder to replace the magnesium powder.
 Eksperimen itu diulangi dengan menggunakan serbuk zink menggantikan serbuk magnesium.

- (i) Predict the heat of displacement for this experiment.
 Ramalkan haba penyesaran bagi eksperimen ini

[1 mark/ markah]

- (ii) Give your reason for the answer in (e) (i).
 Berikan alasan anda bagi jawapan di (e) (i).

[1 mark/ markah]

Section B
 Bahagian B

[20 marks]
 [20 markah]

Answer one question.
 Jawab satu soalan.

7. Diagram 7 shows the reaction between a burning metal X with carbon dioxide gas in a gas jar.
 Rajah 7 menunjukkan tindak balas antara logam X yang telah dibakar dimasukkan ke dalam balas gas yang berisi gas karbon dioksida.

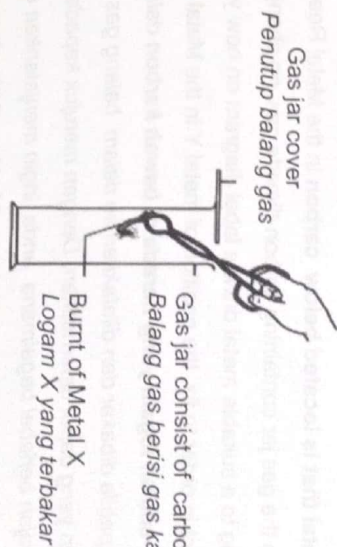


Diagram 7
 Rajah 7

- (a) X is a metal that located above carbon in the Metal Reactivity Series. When X is burnt, it is burnt with bright flame and produce white and black powder.
X adalah logam yang berada di atas karbon dalam Siri Kereaktifan Logam.
 Apabila dibakar, logam X terbakar dengan nyalaan terang dan menghasilkan serbuk berwarna putih dan hitam.

- (i) Suggest metal X and name the black powder.
 Cadangkan logam X dan namakan serbuk hitam
- [2 marks/markah]

- (ii) Explain redox reaction that occur in terms of oxygen transfer. In your answer include :

- Chemical equation
- Substance that undergo oxidation and reduction process
- Substance that become oxidation and reduction agent

Terangkan tindakbalas pengoksidaan dan penurunan yang telah berlaku berdasarkan pemindahan oksigen. Dalam jawapan anda sertakan :

- Persamaan kimia
- Bahan yang mengalami proses pengoksidaan dan penurunan
- Bahan yang menjadi agen pengoksidaan dan penurunan

[8 marks/ markah]

- (b) **Y is a metal that is located below carbon in the Metal Reactivity Series.** When Y is burnt in the gas jar containing carbon dioxide gas, no changes is observed. By referring to a suitable metal draw a label diagram on how you going to conduct an experiment in order to fix the position of metal Y in the Metal Reactivity Series.

Logam Y adalah logam yang berada di bawah karbon dalam Siri Kereaktifan logam. Apabila dibakar dan diletakkan ke dalam balang gas karbon dioksida, tiada perubahan yang dapat diperhatikan. Dengan merujuk kepada logam yang sesuai lukiskan rajah bertabel bagaimana anda ingin menjalankan eksperimen untuk menentukan kedudukan logam Y dalam Siri Kereaktifan logam.

[2 marks/ markah]

- (c) (i) The following are the formulae of two compounds of chromium oxide. Berikut adalah formula bagi dua sebatian kromium oksida.



Base on the formulae, state the name of the two compound according to IUPAC nomenclature and compare on how the names are given to both compounds.

Berdasarkan kepada formula itu, nyatakan nama sebatian mengikut sistem penamaan IUPAC dan bandingkan bagaimana penamaan kedua-dua sebatian itu dibuat.

[5 marks/ markah]

- (ii) The following is a list of three types of ore. Berikut adalah senarai tiga jenis bijih.

- Bauxite
- Bauxit
- Hematite
- Hematit
- Cassiterite
- Kaseterit

For each ore, state the method on how the metal can be extract from its ore. Bagi setiap bijih di bawah sila nyatakan kaedah bagaimana logamnya boleh diekstrakkan daripada bijihnya.

[3 marks/ markah]

8. The following is a statement related to the rate of reaction.
 Berikut adalah satu kenyataan yang berkaitan dengan kadar tindak balas.

" A fast reaction happens quickly and complete in a short time.
 The rate of reaction is high.
 A slow reaction happens slowly and it takes a long time as the reaction happens slowly. The rate of reaction is low."
 "Tindak balas cepat berlaku dengan pantas dan lengkap dalam masa yang singkat. Kadar tindak balas adalah tinggi.
 Tindak balas perlahan berlaku secara perlahan serta mengambil masa yang lama. Kadar tindak balas adalah rendah."

Based on the statement above,
 Berdasarkan pernyataan di atas,

(a) State one reaction involving high and low rate of reaction
 Nyatakan satu tindak balas yang melibatkan kadar tindak balas tinggi dan kadar tindak balas rendah.
 [2 marks/markah]

Experiment Eksperimen	Reactant Bahan tindak balas	Temperature (oC) Suhu (oC)	Time (s) Masa (s)
I	50.0 cm ³ Na ₂ S ₂ O ₃ 0.2 mol dm ⁻³ + 5.0 cm ³ H ₂ SO ₄ 1.0 mol dm ⁻³	30	60
II	50.0 cm ³ Na ₂ S ₂ O ₃ 0.2 mol dm ⁻³ + 5.0 cm ³ H ₂ SO ₄ 1.0 mol dm ⁻³	40	50
III	100.0 cm ³ Na ₂ S ₂ O ₃ 0.1 mol dm ⁻³ + 10.0 cm ³ H ₂ SO ₄ 0.05 mol dm ⁻³	30	

Table 8
 Jadual 8

(i) Compare and explain the expected results using collision theory if the students conduct an Experiment I and Experiment II as in Table 8
 Banding dan terangkan keputusan yang dijangkakan dengan menggunakan teori perlanggaran jika pelajar menjalankan Eksperimen I dan Eksperimen II sebagaimana dalam Rajah 8 [6 marks/markah]

(ii) If Experiment III is conducted, predict and explain what will happen to the rate of reaction.
 Jika Eksperimen III dijalankan, ramalkan dan terangkan apa yang berlaku pada kadar tindak balas [2 marks/markah]

(iii) Sketch and label the graph to show the rate of reaction for both experiment in a)(i).
 Lakarkan dan labelkan graf untuk menunjukkan kadar tindak balas bagi kedua-dua eksperimen di a)(i) [3 marks/markah]

Bahan tindak balas	Hasil tindakbalas	Pemerhatian
Zink + 50cm ³ asid K 2.0 mol/dm ³ + larutan kuprum(II) sulfat	Zink klorida dan gas hidrogen	Suhu campuran meningkat

The table shows the data from the experiments conducted to study the rate of reaction between zinc and acid K.
 Jadual menunjukkan data daripada eksperimen yang dijalankan untuk mengkaji kadar tindakbalas diantara zink dengan asid K

(i) Name the acid K and state the role of copper(II) sulphate solution used in the experiment.
 Write the balance chemical equation for the reaction.
 Nyatakan nama asid K dan peranan larutan kuprum(II) sulfat yang digunakan dalam eksperimen tersebut.
 Tuliskan persamaan kimia seimbang bagi tindak balas itu [4 marks/markah]

(iii) Draw an energy profile diagram for the above reaction. On the diagram, label:

- Activation energy with catalyst, E_a
- Activation energy without catalyst, E_a'

Lukiskan gambarajah profil tenaga bagi tindakbalas dalam eksperimen di atas. Pada gambarajah, labelkan:

- Tenaga pengaktifan tanpa mangkin, E_a
- Tenaga pengaktifan dengan mangkin, E_a'

[3 marks/markah]

Section C
Bahagian C

[20 marks]
[20 markah]

Answer one question.
Jawab satu soalan.

9 Diagram 9 shows two type of cell, P and Q. Rajah 9 menunjukkan dua jenis sel, P dan Q

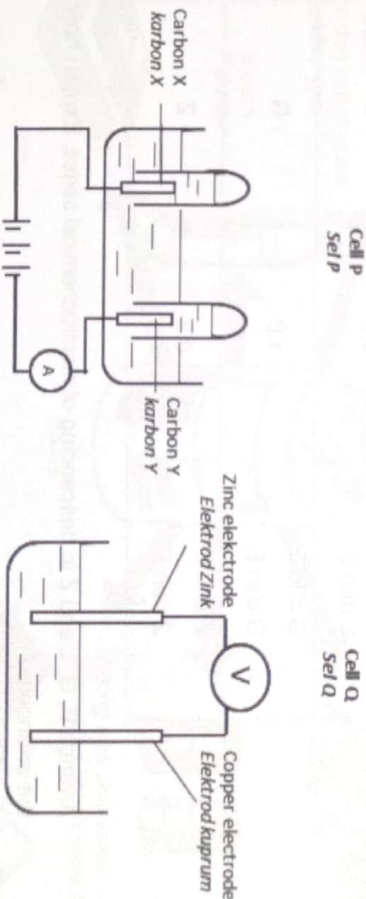


Diagram 9
Rajah 9

(a) Differentiate the two type of cell in terms of:

- Type of cell
 - Energy change
- Bezakan kedua-dua jenis sel di atas dari segi
- Jenis sel
 - Perubahan tenaga

[4 marks/markah]

(b) An experiment was carried out as in the diagram of cell Q using different metal pairs, the following result was obtained.
 Satu eksperimen sebagaimana gambarajah dalam sel Q dengan menggunakan pasangan logam yang berlainan dijalankan, keputusan berikut diperolehi:

Pairs of metal Pasangan logam	Potential difference/V Perbezaan voltan/V	Negative terminal Terminal negatif
L and G L dan G	0.7	G
G and E G dan E	1.9	G
Z and E Z dan E	0.3	Z

Arrange E, G, L and Z in descending of electrochemical series. Explain how you build the arrangement.

Susunkan E, G, L dan Z mengikut siri elektrokimia secara menurun. Huraikan cara bagaimana anda membina susunan tersebut.

[6 marks/markah]

(c) Based on cell P, describe an experiment to investigate how the concentration of electrolyte influences the products formed in the electrolysis. Your experiment description must contain the following:

- Procedure
- Result
- Half equation at anode

Berdasarkan sel P, huraikan satu eksperimen untuk menyiasat bagaimana faktor kepekatan elektrolit mempengaruhi hasil yang terbentuk di dalam elektrolisis. Huraian eksperimen anda mestilah mengandungi perkara berikut:

- Kaedah
- Keputusan
- Persamaan setengah di anod

[10 marks/markah]

10. (a) Diagram 10.1 shows several uses of a kind of alkali with formula XOH. Rajah 10.1 menunjukkan beberapa kegunaan sejenis alkali yang berformula XOH.

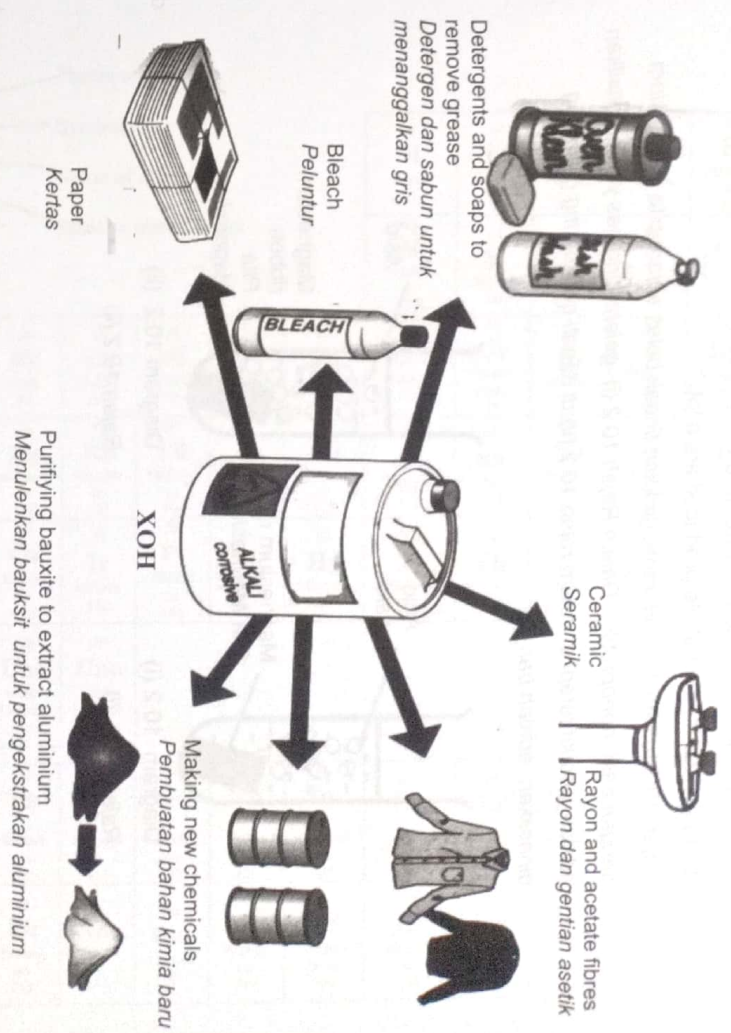


Diagram 10.1
Rajah 10.1

XOH is a chemical substance that can be found in the chemistry laboratory. By referring to a name chemical substance, explain steps how are you going to prepare a solution of 250 cm³ XOH, y mol dm⁻³ from solid XOH.

[Relative atomic mass : X = 23, O = 16, H = 1]

XOH adalah bahan kimia yang terdapat di dalam makmal kimia. Dengan merujuk kepada bahan kimia yang dinamakan, huraikan langkah-langkah bagaimana anda ingin menyediakan 250 cm³ larutan XOH, y mol dm⁻³ daripada pepejal XOH.
 [Jisim Atom Relatif : X = 23, O = 16, H = 1]

[10 marks/ markah]

- (b) Diagram 10.2 (i) and 10.2 (ii) shows the reaction between magnesium ribbon and monoprotic acid. In diagram 10.2 (i), a small amount of bubbles is produced but in diagram 10.2 (ii) the bubble produced are a lot.

Rajah 10.2 (i) dan 10.2 (ii) menunjukkan tindak balas antara pita magnesium dengan asid monoprotik. Dalam Rajah 10.2 (i) gelembung gas yang dihasilkan adalah sedikit tetapi di dalam rajah 10.2 (ii) di dapati gelembung gas yang dihasilkan adalah banyak.

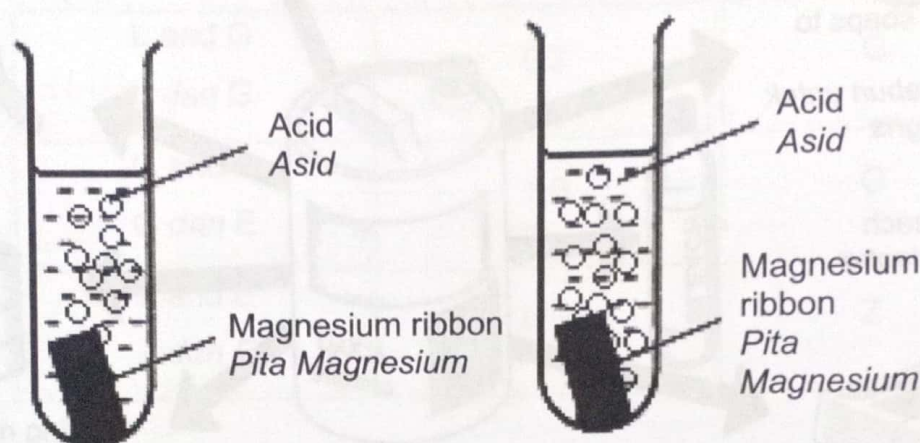


Diagram 10.2 (i)

Rajah 10.2 (i)

Diagram 10.2 (ii)

Rajah 10.2 (ii)

- (i) Write the ionic equation for the chemical reaction that has occurred.

Tuliskan persamaan ion bagi tindak balas yang telah berlaku

[2 marks/ markah]

- (ii) There are several factors that influence the observation in diagram 10.2 (i) and 10.2 (ii). Name suitable acids and explain the factor that influence the difference in observation between the two experiments.

Terdapat pelbagai faktor yang mempengaruhi pemerhatian di dalam rajah 10.2 (i) dan 10.2 (ii). Dengan menamakan asid yang sesuai nyatakan faktor dan terangkan kenapa terdapat perbezaan pemerhatian di antara kedua-dua eksperimen.

[8 marks/ markah]

**END OF QUESTION PAPER
KERTAS SOALAN TAMAT**