

4541/2
Chemistry
Paper 2
August
2018
2 ½ hour

Name :

Index Number:

Class:



SIJIL PENDIDIKAN MRSM 2018

| | | | | | | |
|---|--|----------------------|----------|-----------|-------|--|
| <hr/> <hr/> CHEMISTRY <hr/> <hr/> Paper 2 <hr/> <hr/> <p>Two hours and thirty minutes</p> <hr/> <hr/> DO NOT OPEN THE QUESTION BOOKLET UNTIL BEING TOLD TO DO SO | | <i>Kod Pemeriksa</i> | | | | |
| | | Section | Question | Full mark | Marks | |
| 1. Write your name and index number in the space provided. <i>Tuliskan nama dan angka giliran anda pada ruang yang disediakan.</i> | | A | | 1 | 9 | |
| | | | | 2 | 9 | |
| | | | | 3 | 10 | |
| | | | | 4 | 10 | |
| | | | | 5 | 11 | |
| | | | | 6 | 11 | |
| 2. The question booklet is bilingual <i>Kertas soalan ini adalah dalam dwibahasa.</i> | | B | | 7 | 20 | |
| | | | | 8 | 20 | |
| 3. Candidate is required to read the information on the last page. <i>Calon dikehendaki membaca maklumat di halaman belakang</i> | | C | | 9 | 20 | |
| | | | | 10 | 20 | |
| TOTAL | | | | 100 | | |

Kertas peperiksaan ini mengandungi 32 halaman bercetak

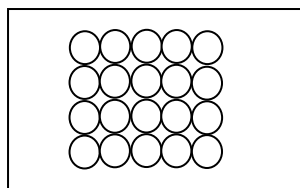
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Section A
Bahagian A

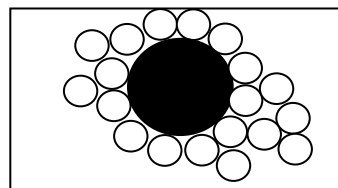
[60 marks]
[60 markah]

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

- 1 (a) Diagram 1.1 shows the arrangement of atoms in substance J and K.
Rajah 1.1 menunjukkan susunan atom-atom untuk bahan J dan K.



Substance J
Bahan J



Substance K
Bahan K

Diagram 1.1
Rajah 1.1

- (i) Identify which of the substance in Diagram 1.1 is a pure metal or alloy.
Tentukan bahan yang manakah dalam Rajah 1.1 adalah logam tulen atau aloi.

Pure metal / Logam Tulen:

Alloy / Aloi:

[1 mark]
[1 markah]

- (ii) Diagram 1.2 shows a Kacip Pinang which is used as areca nut scissor to be taken with betel leaves in a traditional Malay culture. The Kacip Pinang is made from brass which is harder than pure copper.
Rajah 1.2 menunjukkan Kacip Pinang yang digunakan untuk memotong buah pinang untuk dimakan bersama daun sirih dalam adat tradisi Melayu. Kacip Pinang ini diperbuat daripada loyang yang lebih keras daripada kuprum tulen.

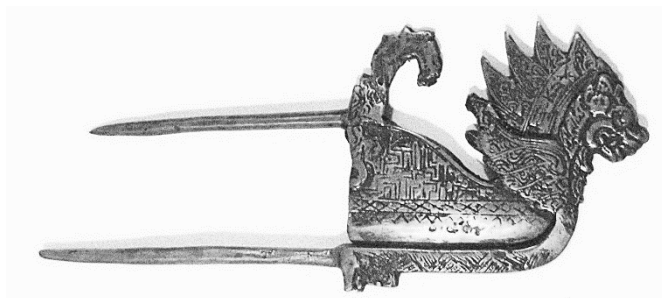


Diagram 1.2
Rajah 1.2

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| | |
|---------|---|
| 1(a)(i) | |
| | 1 |

Explain why brass is used instead of pure copper.
Terangkan mengapa loyang digunakan berbanding kuprum tulen.

1(a)(ii)

2

[2 marks]
[2 markah]

- (b) Diagram 1.3 shows some examples of modern medicine.
Rajah 1.3 menunjukkan beberapa contoh ubat moden.

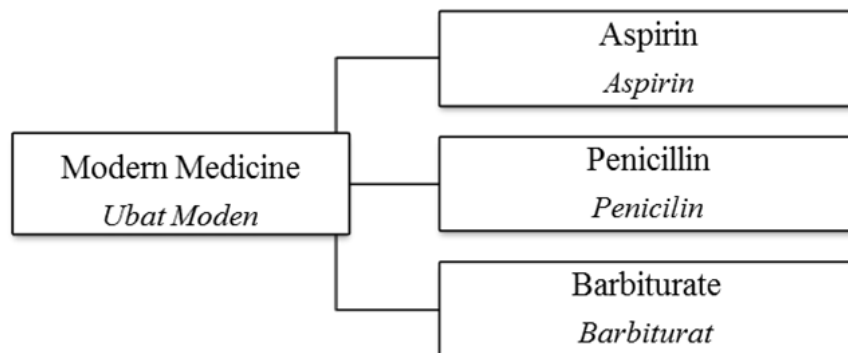


Diagram 1.3
Rajah 1.3

- (i) Which substance is produced by fungi?
Bahan yang manakah dihasilkan daripada kulat?

1(b)(i)

1

[1 mark]
[1 markah]

- (ii) What is the type of medicine for barbiturate?
Apakah jenis ubat untuk barbiturat?

1(b)(ii)

1

[1 mark]
[1 markah]

- (iii) Aspirin is not prescribed to a patient who has gastric problems.
Suggest a medicine that can be used to replace aspirin.
*Aspirin tidak diberikan kepada pesakit yang mempunyai masalah gastrik.
Cadangkan satu ubat yang boleh digunakan untuk menggantikan aspirin.*

1(b)(iii)

1

[1 mark]
[1 markah]

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- (iv) The following article shows the information about barbiturate.
Artikel berikut menunjukkan maklumat berkaitan barbiturat.

Barbiturates are synthetic drugs used in medicine to depress the central nervous system. The effects range from mild sedation to coma and they may be used as sedatives, hypnotics or as part of anaesthesia. Some barbiturates are used to relieve tension or anxiety prior to surgery.

Barbiturat adalah ubat sintetik yang digunakan dalam perubatan untuk menekan sistem saraf pusat. Kesannya berkisar dari penenang ringan hingga koma dan mereka boleh digunakan sebagai sedatif, hipnotis atau sebagai sebahagian daripada anestesia. Seseengah barbiturat digunakan untuk melegakan ketegangan atau kebimbangan sebelum pembedahan.

Resource/Sumber: <https://www.news-medical.net>

As a chemistry student, justify the usage of barbiturate for human health.
Sebagai pelajar kimia, pertimbangkan penggunaan barbiturat untuk kesihatan manusia.

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

[3 marks]
[3 markah]

| | |
|----------|---|
| 1(b)(iv) | |
| | 3 |

| | |
|-----------------|----------|
| TOTAL A1 | |
| | 9 |

2 Diagram 2.1 shows a part of the Periodic Table of Elements. W, X, Y and Z are not the actual symbols of the elements.

Rajah 2.1 menunjukkan sebahagian daripada Jadual Berkala Unsur. W, X, Y dan Z bukan simbol sebenar unsur tersebut.

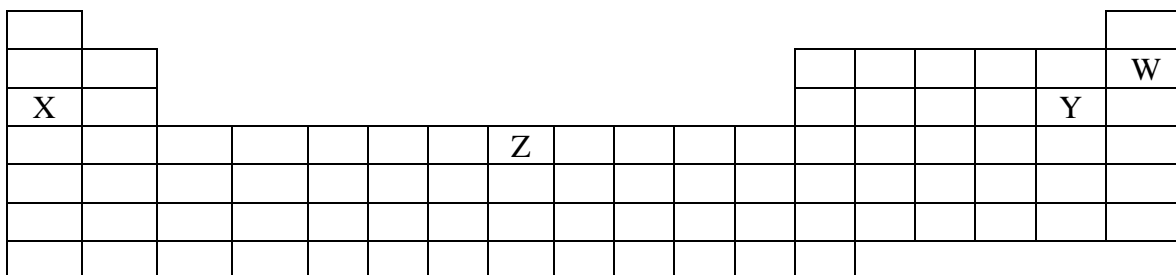


Diagram 2.1
Rajah 2.1

Based on Diagram 2.1,
Berdasarkan Rajah 2.1,

(a) (i) Write an electron arrangement of atom W.
Tuliskan susunan elektron bagi atom W.

| | |
|---------|---|
| 2(a)(i) | |
| | 1 |

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

(ii) Explain why atom W is chemically inert.
Terangkan mengapa atom W lengai secara kimia.

| | |
|----------|---|
| 2(a)(ii) | |
| | 1 |

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

(b) Which of the element is a halogen?
Unsur manakah adalah halogen?

| | |
|------|---|
| 2(b) | |
| | 1 |

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

- (c) Diagram 2.2 shows the special characteristics of an element.
Rajah 2.2 menunjukkan ciri-ciri istimewa bagi suatu unsur.

- | |
|--|
| <ul style="list-style-type: none"> • Can form complex ion. <i>Boleh membentuk ion kompleks.</i> • Have more than one oxidation number. <i>Mempunyai lebih daripada satu nombor pengoksidaan.</i> |
|--|

Diagram 2.2
Rajah 2.2

Which element shows the above characteristics?
Unsur manakah menunjukkan ciri-ciri di atas?

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

- (d) When a small piece of element X is put in water, alkaline solution is formed and hydrogen gas is released.
Apabila satu ketulan kecil unsur X dimasukkan ke dalam air, larutan beralkali terhasil dan gas hidrogen terbebas.

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

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

- (ii) If 2.0 mol of X react with water, calculate the volume of gas released at room condition.
[The molar volume of gas is $24 \text{ dm}^3 \text{ mol}^{-1}$ at room condition]
Jika 2.0 mol X bertindak balas dengan air, hitungkan isipadu gas yang terbebas pada keadaan bilik.
[Isipadu molar bagi gas ialah $24 \text{ dm}^3 \text{ mol}^{-1}$ pada keadaan bilik]

[2 marks]
[2 markah]

- (e) Element R is located below element X in Diagram 2.1.
Unsur R berada di bawah unsur X dalam Rajah 2.1.

Compare the reactivity of element R and element X when react with water.
Bandingkan kereaktifan unsur R dan unsur X apabila bertindak balas dengan air.

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

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| | |
|------|---|
| 2(c) | |
| | 1 |

| | |
|---------|---|
| 2(d)(i) | |
| | 2 |

| | |
|----------|---|
| 2(d)(ii) | |
| | 2 |

| | |
|------|---|
| 2(e) | |
| | 1 |

| | |
|-----------------|----------|
| TOTAL A2 | |
| | 9 |

- 3 (a) Diagram 3.1 shows the structural formula of substance M and N.
Rajah 3.1 menunjukkan formula struktur bahan M dan N.

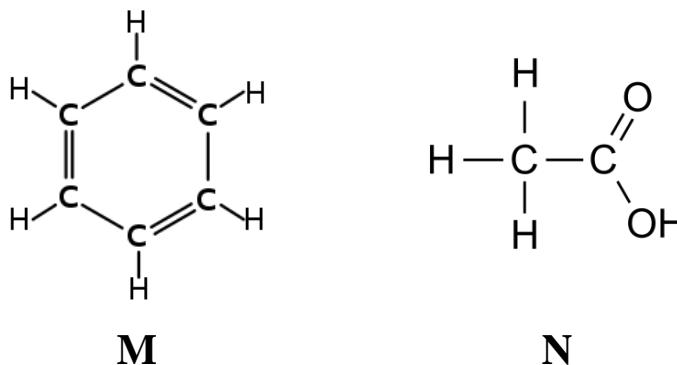


Diagram 3.1
Rajah 3.1

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

| | |
|---------|---|
| 3(a)(i) | |
| | 1 |

[1 mark]
[1 markah]

- (ii) State the empirical formula of substance M.
Nyatakan formula empirik bahan M.

| | |
|----------|---|
| 3(a)(ii) | |
| | 1 |

[1 mark]
[1 markah]

- (iii) State the molecular formula of substance N.
Nyatakan formula molekul bahan N.

| | |
|-----------|---|
| 3(a)(iii) | |
| | 1 |

[1 mark]
[1 markah]

- (b) Diagram 3.2 shows the apparatus set-up to determine the empirical formula for an oxide of copper.

Rajah 3.2 menunjukkan susunan radas untuk menentukan formula empirik bagi satu oksida kuprum.

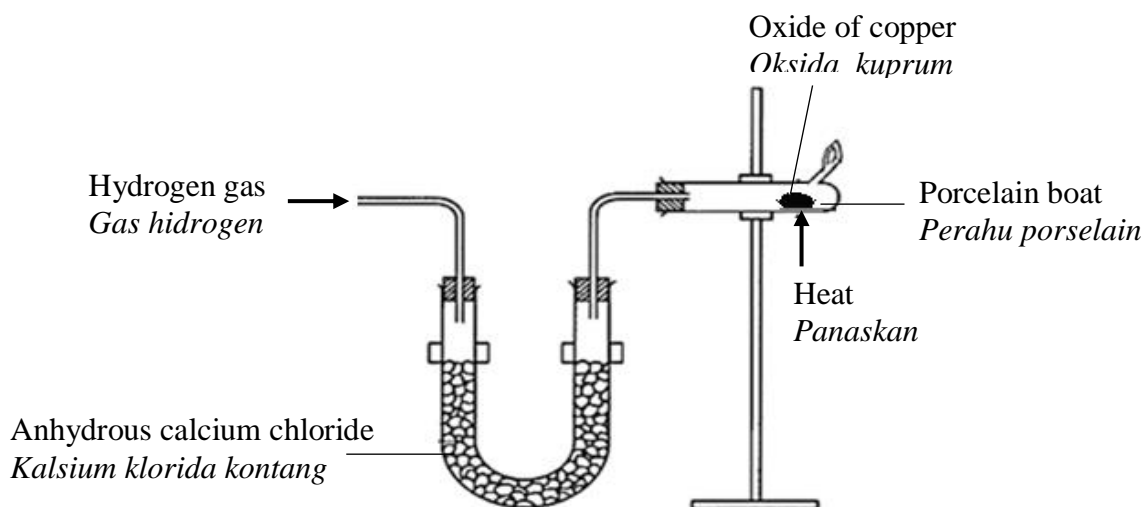


Diagram 3.2
Rajah 3.2

Table 3 shows the data obtained from the experiment.

Jadual 3 menunjukkan data yang diperolehi daripada eksperimen itu.

| Description <i>Penerangan</i> | Mass (g) <i>Jisim (g)</i> |
|--|------------------------------|
| Combustion tube + porcelain boat <i>Tiub pembakaran + perahu porselin</i> | 24.60 |
| Combustion tube + porcelain boat + oxide of copper <i>Tiub pembakaran + perahu porselin + oksida kuprum</i> | 27.00 |
| Combustion tube + porcelain boat + copper <i>Tiub pembakaran + perahu porselin + kuprum</i> | 26.52 |

Table 3
Jadual 3

- (i) Based on Table 3, calculate the empirical formula for the oxide of copper.

Berdasarkan Jadual 3, hitung formula empirik bagi oksida kuprum

[Relative atomic mass: Cu=64, O=16]

[Jisim atom relative: Cu=64, O=16]

| | |
|---------|---|
| 3(b)(i) | |
| | 4 |

[4 marks]
[4 markah]

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- (ii) How do you ensure all oxide of copper is reduced to copper?
Bagaimanakah anda memastikan semua oksida kuprum diturunkan kepada kuprum?

3(b)(ii)

1

[1 mark]

[1 markah]

- (iii) Can the empirical formula for magnesium oxide be determined by using this method? Explain your answer.

Bolehkah formula empirik bagi magnesium oksida ditentukan dengan menggunakan kaedah ini? Terangkan jawapan anda.

3(b)(iii)

2

[2 marks]

[2 markah]

TOTAL A3

10

- 4 (a) Diagram 4.1 shows the apparatus set-up to investigate the electrolysis of 1.0 mol dm^{-3} potassium chloride solution.
Rajah 4.1 menunjukkan susunan radas untuk mengkaji elektrolisis larutan kalium klorida 1.0 mol dm^{-3} .

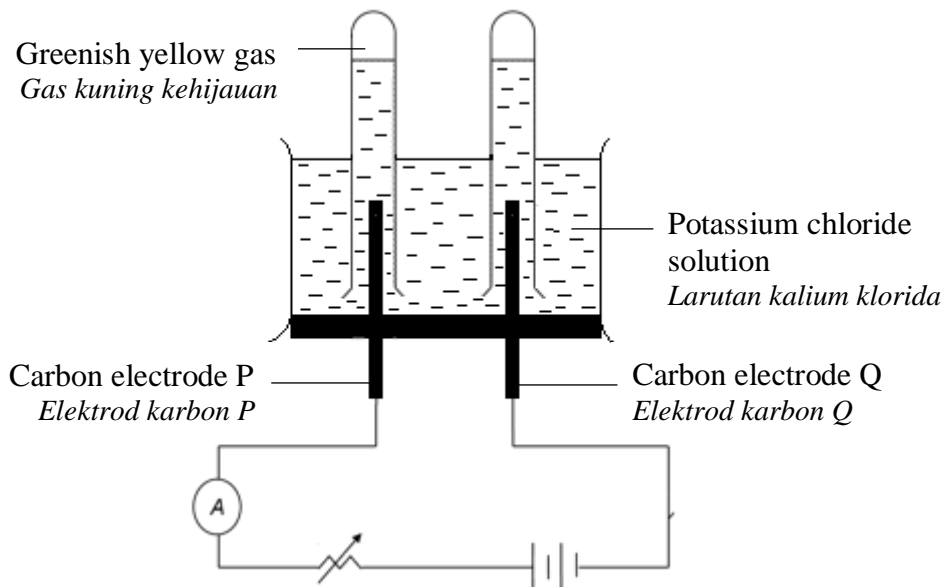


Diagram 4.1
Rajah 4.1

- (i) What is meant by electrolyte?
Apakah yang dimaksudkan dengan elektrolit?
-
- [1 mark]
[1 markah]
- (ii) State all anions that are present in potassium chloride solution.
Nyatakan semua anion yang hadir dalam larutan kalium klorida.
-
- [1 mark]
[1 markah]
- (iii) The gas collected at electrode P decolourises a moist blue litmus paper. Name the gas. Explain why the gas is released.
Gas yang terkumpul pada elektrod P melunturkan kertas litmus biru lembap. Namakan gas tersebut. Terangkan mengapa gas tersebut terhasil.
-
-
- [2 marks]
[2 markah]

| | |
|---------|---|
| 4(a)(i) | |
| | 1 |

| | |
|----------|---|
| 4(a)(ii) | |
| | 1 |

| | |
|-----------|---|
| 4(a)(iii) | |
| | 2 |

- (iv) Write the half equation to show the formation of gas in (a)(iii).
Tuliskan persamaan setengah untuk menunjukkan penghasilan gas di (a)(iii).

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

| | |
|----------|---|
| 4(a)(iv) | |
| | 1 |

- (v) What is the product formed at electrode Q?
Apakah produk yang akan terhasil di elektrod Q?

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

| | |
|---------|---|
| 4(a)(v) | |
| | 1 |

- (vi) Describe briefly a chemical test to verify the product formed in (a)(v).
Huraikan secara ringkas ujian kimia untuk mengesahkan hasil yang terbentuk di (a)(v)

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

| | |
|----------|---|
| 4(a)(vi) | |
| | 2 |

- (b) A group of students were given apparatus and chemicals listed in Table 4 to produce electrical energy from chemical energy.
Sekumpulan pelajar telah diberikan alat radas dan bahan kimia seperti yang tersenarai di dalam Jadual 4 untuk menghasilkan tenaga elektrik daripada tenaga kimia.

| | |
|--------------------------------|---|
| Apparatus <i>Alat radas</i> | Beaker, connecting wires, voltmeter. <i>Bikar, wayar penyambung, voltmeter.</i> |
| Material <i>Bahan kimia</i> | Sodium nitrate solution, a zinc strip, a copper strip, a magnesium strip <i>Larutan natrium nitrat, satu kepingan zink, satu kepingan kuprum, satu kepingan magnesium.</i> |

Table 4
Jadual 4

Based on Table 4,
Berdasarkan Jadual 4,

Draw a labeled diagram to show the formation of electrical energy from chemical energy that will produce highest potential difference.
Lukis gambar rajah berlabel untuk menunjukkan penghasilan tenaga elektrik daripada tenaga kimia yang akan menghasilkan beza keupayaan tertinggi.

| | |
|------|---|
| 4(b) | |
| | 2 |

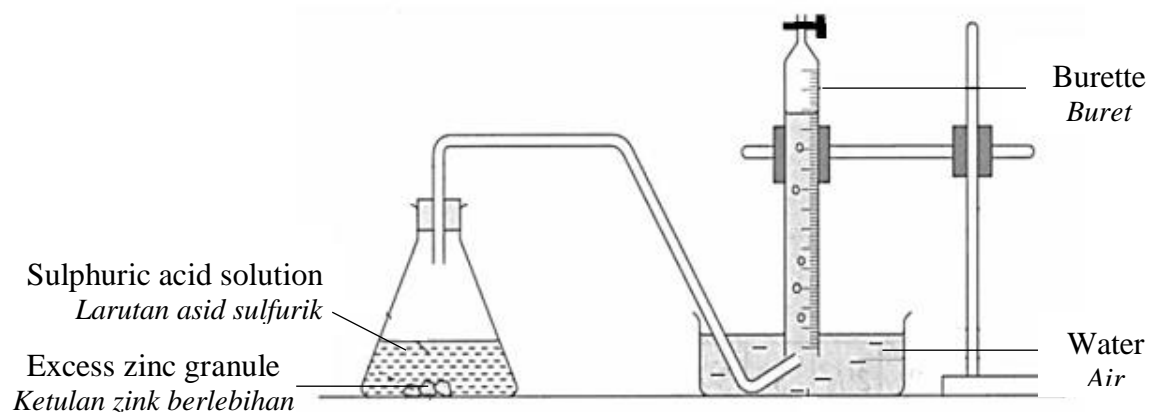
[2 marks]
[2 markah]

| | |
|-----------------|-----------|
| TOTAL A4 | |
| | 10 |

- 5 Diagram 5 shows two sets of experiment that are carried out to study the effect of catalyst on the rate of reaction between zinc and sulphuric acid.

Rajah 5 menunjukkan dua set eksperimen yang dijalankan untuk mengkaji kesan mangkin ke atas kadar tindakbalas antara logam zink dan asid sulfurik.

Set I



Set II

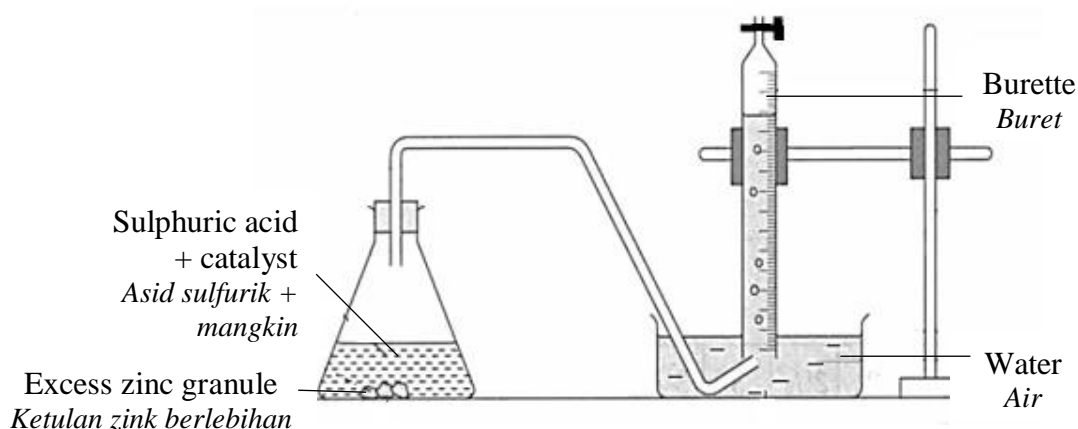


Diagram 5
Rajah 5

Table 5 shows the result obtained from the experiment.

Jadual 5 menunjukkan keputusan eksperimen tersebut.

| Set Set | Total volume of gas collected in 3 minutes / cm^3 <i>Isipadu gas terkumpul dalam 3 minit/ cm^3</i> | Temperature/ $^{\circ}\text{C}$ <i>Suhu/ $^{\circ}\text{C}$</i> |
|------------|---|---|
| I | 40.00 | 30.0 |
| II | 50.00 | 30.0 |

Table 5
Jadual 5

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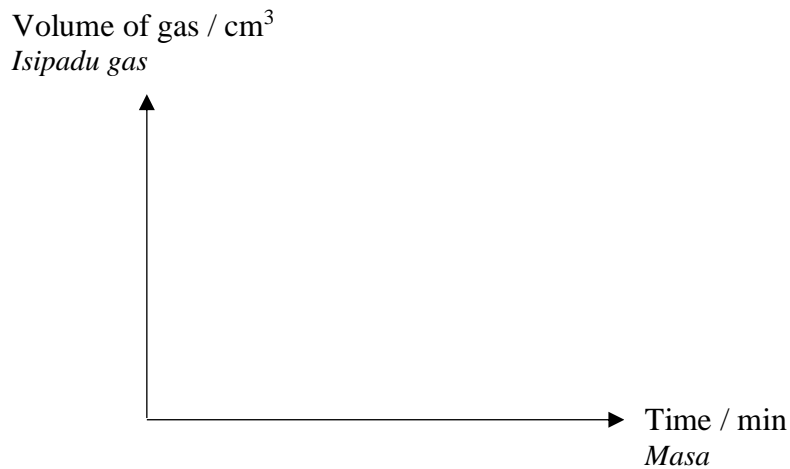
Based on Diagram 5 and Table 5, answer the following questions.
Berdasarkan Rajah 5 dan Jadual 5, jawab soalan berikut.

| | |
|------|---|
| 5(a) | |
| | 1 |

- (a) What is the meaning of catalyst?
Apakah maksud mangkin?

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

- (b) Sketch a graph of volume of gas collected against time for both sets on the same axis.
Lakarkan graf isipadu gas melawan masa bagi kedua-dua set pada paksi yang sama.



| | |
|------|---|
| 5(b) | |
| | 2 |

- (c) Calculate the average rate of reaction for the first 3 minutes for Set I and Set II.
Hitung kadar tindak balas purata bagi 3 minit pertama bagi Set I and Set II.

(i) Set I/*Set I*:

(ii) Set II/*Set II*

[2 marks]
[2 markah]

| | |
|-------------|---|
| 5(c)(i)(ii) | |
| | 2 |

[2 marks]
[2 markah]

- (iii) Compare the average rate of reaction for the first 3 minutes for Set I and Set II.
Bandingkan kadar tindak balas purata bagi 3 minit pertama bagi Set I and Set II.

| | |
|-----------|---|
| 5(c)(iii) | |
| | 1 |

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

- (iv) Explain how catalyst affects the rate of reaction by using the collision theory.
Terangkan bagaimana mangkin mempengaruhi kadar tindak balas dengan menggunakan teori perlanggaran.

| | |
|----------|---|
| 5(c)(iv) | |
| | 3 |

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

[3 marks]
[3 markah]

- (d) During the Master Chef Competition, an apprentice found that a piece of meat is still not tender after cooking for one hour.
Di dalam satu Pertandingan Master Chef, seorang pelatih mendapati ketulan daging yang di masak masih tidak lembut selepas satu jam.

State one method that should be taken to make the meat become tender in a shorter time.
Explain your answer.
*Nyatakan satu kaedah yang boleh diambil supaya daging itu menjadi lembut dalam masa yang singkat.
Terangkan jawapan anda.*

| | |
|------|---|
| 5(d) | |
| | 2 |

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

[2 marks]
[2 markah]

| | |
|-----------------|-----------|
| TOTAL A5 | |
| | 11 |

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- 6 Diagram 6.1 shows the apparatus set-up and materials to study the reactivity series of metals.
Rajah 6.1 menunjukkan susunan radas dan bahan untuk mengkaji siri kereaktifan logam.

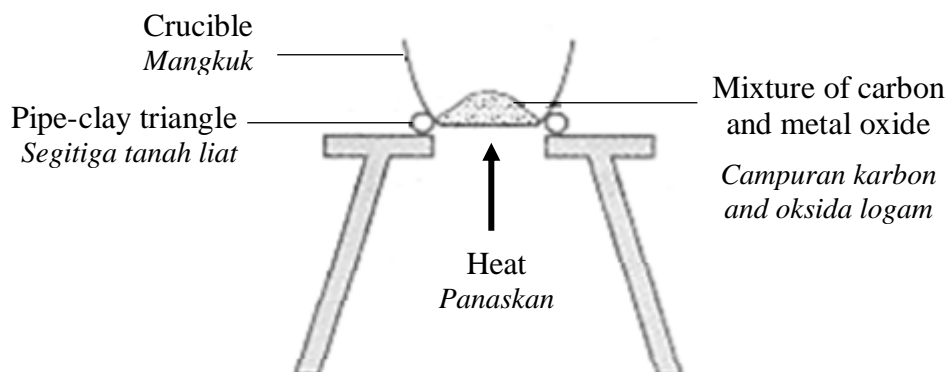


Diagram 6.1
Rajah 6.1

Table 6 shows the reactants and observations for three sets of experiment to construct the reactivity series of metals towards oxygen.
Jadual 6 menunjukkan bahan tindak balas dan pemerhatian bagi tiga set eksperimen untuk membina siri kereaktifan logam terhadap oksigen.

| Set Set | Reactants <i>Bahan tindak balas</i> | Observation <i>Pemerhatian</i> |
|------------|---|--|
| I | Carbon + Iron(III) oxide <i>Karbon + Ferum(III) oksida</i> | Grey solid is formed <i>Pepejal kelabu terbentuk</i> |
| II | Carbon + Magnesium oxide <i>Karbon + Magnesium oksida</i> | No change <i>Tiada perubahan</i> |
| III | Carbon + Oxide of metal X <i>Karbon + Oksida logam X</i> | Brown solid is formed <i>Pepejal perang terbentuk</i> |

Table 6
Table 6

- (a) Based on Set I,

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

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

- (ii) State the change in the oxidation number of iron.
Nyatakan perubahan nombor pengoksidaan bagi ferum.

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

| | |
|---------|---|
| 6(a)(i) | |
| | 2 |

| | |
|----------|---|
| 6(a)(ii) | |
| | 1 |

- (iii) State the substance that undergoes reduction.
Nyatakan bahan yang mengalami penurunan.

6(a)(iii)

1

[1 mark]

[1 markah]

- (b) Based on set II and set III, explain the difference in the observations.
Berdasarkan set II dan set III, terangkan perbezaan dalam pemerhatian itu.

6(b)

2

[2 marks]

[2 markah]

- (c) Arrange metal X, carbon, magnesium and iron in ascending order of reactivity towards oxygen.
Susun logam X, karbon, magnesium dan ferum dalam susunan menaik kereaktifan terhadap oksigen.

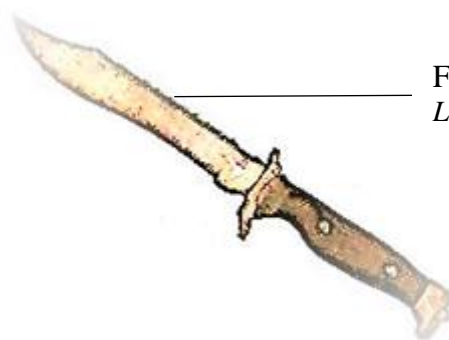
6(c)

1

[1 mark]

[1 markah]

- (d) Diagram 6.2 shows flaky brown solid layer which is porous formed on the surface of iron knife.
Rajah 6.2 menunjukkan lapisan kepingan perang yang telap air di atas permukaan pisau.



Flaky brown solid layer
Lapisan kepingan perang

Diagram 6.2
Rajah 6.2

- (i) Name the process for the formation of the brown solid.
Namakan proses pembentukan pepejal perang tersebut.

6(d)(i)

1

[1 mark]

[1 markah]

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- (ii) Draw a labeled diagram to show the mechanism of the process in d(i), the flow of electron and the half equation at the anode.
Lukiskan gambar rajah berlabel untuk menunjukkan mekanisma proses di d(i), pengaliran elektron dan persamaan setengah di anod.

| | |
|----------|---|
| 6(d)(ii) | |
| | 3 |

[3 marks]
[3 markah]

| | |
|----------|----|
| TOTAL A6 | |
| | 11 |

Section B
[Bahagian B]

[20 marks]
[20 markah]

Answer any **one** question.
*Jawab mana-mana **satu** soalan.*

- 7 Diagram 7.1 shows an article on Health Effects of Mothballs.

Health Effects of Mothballs

Mothballs are nearly 100% active ingredient, and the active ingredient may be either naphthalene or paradichlorobenzene. Each active ingredient can cause different health effects if the exposure is high enough. Mothballs slowly turn from solids to toxic vapour. When you smell mothballs, you are inhaling the insecticide.

Kandungan ubat gegat adalah hampir 100% bahan aktif yang merupakan sama ada naftalena atau paradiklorobenzena. Setiap bahan aktif ini boleh mendatangkan kesan kesihatan yang berlainan jika terdedah kepada kuantiti yang tinggi. Ubat gegat berubah daripada pepejal kepada wap beracun secara perlahan-lahan. Apabila terhidu bahan tersebut, seolah-olah anda menyedut insektisid.



Source / sumber : <http://npic.orst.edu/ingred/ptype/mothball/health.html>

Diagram 7.1
Rajah 7.1

- (a) (i) Based on article shown in Diagram 7.1, mothballs are commonly used as the main insecticide to repel cockroaches. Name the process involved and explain how the mothballs vapour act as insecticide by using Kinetic Theory of Matter.
Berdasarkan artikel dalam Rajah 7.1, ubat gegat kebiasaannya digunakan sebagai insektisid untuk menghalau lipas. Namakan proses yang terlibat dan terangkan bagaimana wap ubat gegat bertindak sebagai insektisid menggunakan Teori Kinetik Jirim.

[4 marks]
[4 markah]

- (ii) Solid mothballs melt into liquid when heated in water bath. Diagram 7.2 shows the heating curve of the solid mothballs. *Pepejal ubat gegat melebur menjadi cecair apabila dipanaskan dalam kukus air. Rajah 7.2 menunjukkan lengkungan pemanasan pepejal ubat gegat.*

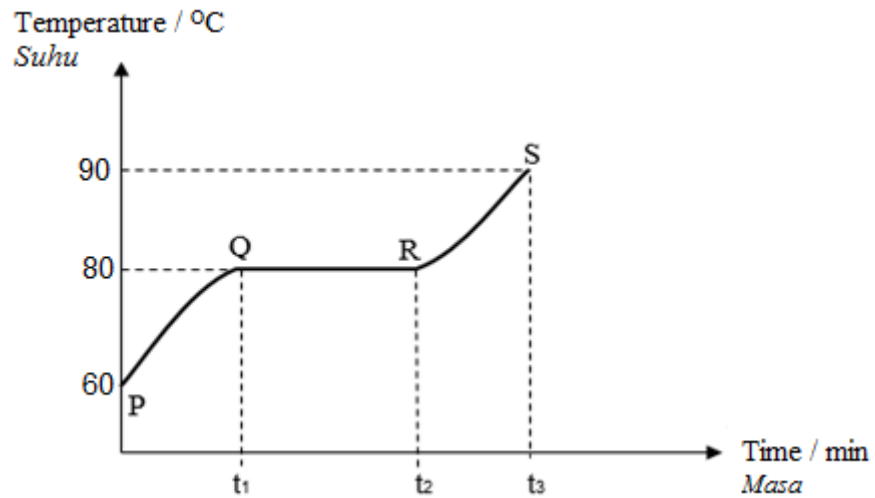


Diagram 7.2
Rajah 7.2

Based on Diagram 7.2, describe the curve from the region of P to Q and the region of R to S. In your description include:
Berdasarkan Rajah 7.2, huraikan lengkung dari bahagian P ke Q dan dari bahagian R ke S. Dalam huraian anda sertakan:

- state of matter
keadaan jirim
- movement of the particles
pergerakan zarah-zarah
- diagram of particles arrangement
gambarajah susunan zarah-zarah

[6 marks]
[6 markah]

- (b) Diagram 7.3 shows subatomic particles in the nucleus of three carbon atoms.
Rajah 7.3 menunjukkan zarah subatom di dalam nukleus bagi tiga atom karbon.

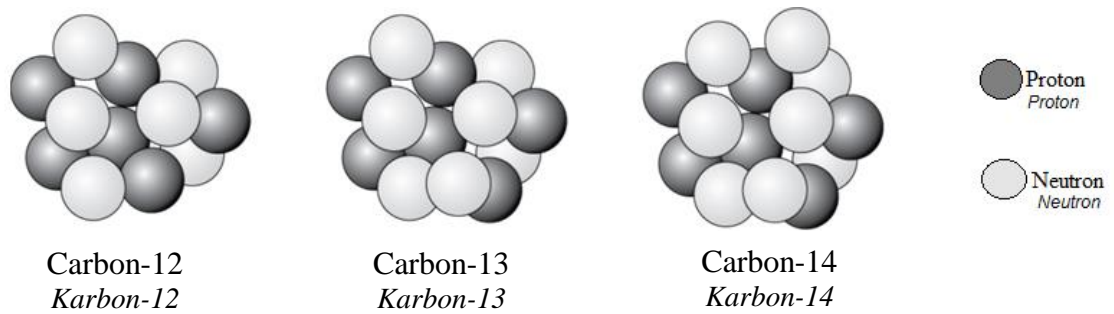


Diagram 7.3
Rajah 7.3

- (i) What can be deduced from Diagram 7.3?
 Explain your answer.

*Apakah kesimpulan berdasarkan Rajah 7.3?
 Terangkan jawapan anda.*

[2 marks]
 [2 markah]

- (ii) Compare and contrast the three carbon atoms in terms of:
Banding dan bezakan ketiga –tiga atom tersebut dari segi:

- Number of proton
Bilangan proton
- Number of neutron
Bilangan neutron
- Number of electron
Bilangan elektron
- Physical properties
Sifat fizikal
- Chemical properties
Sifat kimia

[5 marks]
 [5 markah]

- (iii) Draw the atomic structure of carbon-14.
Lukiskan struktur atom bagi karbon-14.

[3 marks]
 [3 markah]

- 8 (a) Diagram 8.1 shows two methods of preparing salts in the laboratory.
Rajah 8.1 menunjukkan dua kaedah penyediaan garam-garam di dalam makmal.

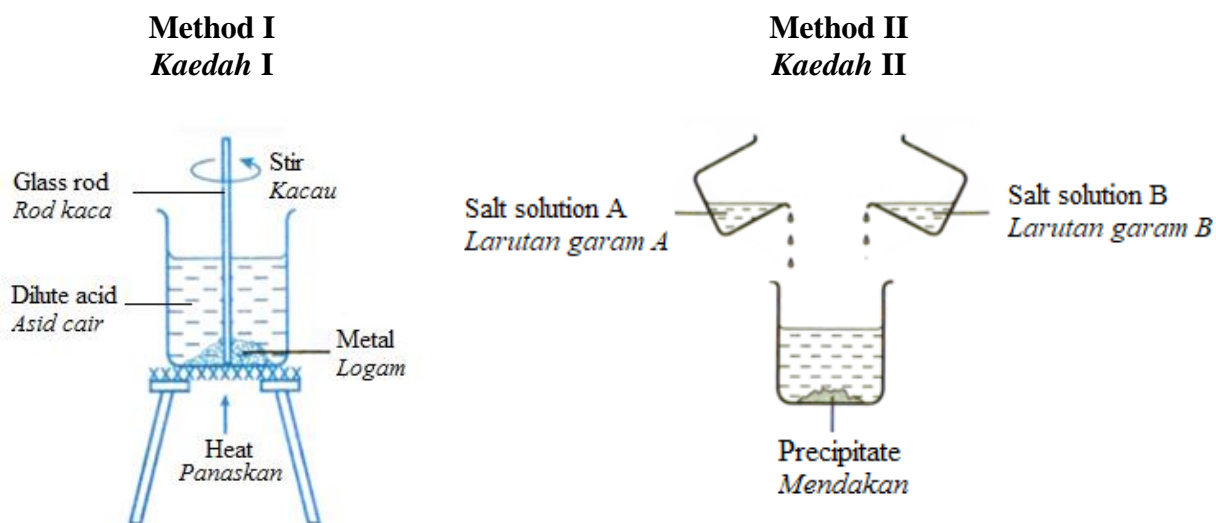


Diagram 8.1
Rajah 8.1

The following are three examples of salts that can be prepared using either Method I or Method II.

Berikut adalah tiga contoh garam yang boleh disediakan sama ada menggunakan Kaedah I atau Kaedah II.

| | | |
|--|---|---|
| Barium sulphate, BaSO ₄ Barium sulfat, BaSO ₄ | Copper(II) nitrate, Cu(NO ₃) ₂ Kuprum(II) nitrat, Cu(NO ₃) ₂ | Magnesium chloride, MgCl ₂ Magnesium klorida, MgCl ₂ |
|--|---|---|

- (i) From the given examples, identify the salts that can be prepared by using the methods as shown in Diagram 8.1.
Daripada contoh-contoh yang diberikan, kenalpasti garam-garam yang boleh disediakan melalui kaedah-kaedah seperti di dalam Rajah 8.1.

[2 marks]
[2 markah]

- (ii) State the reactants for the preparation of salt in Method II.
Nyatakan bahan tindak balas bagi penyediaan garam dalam Kaedah II.

[2 marks]
[2 markah]

[Lihat halaman sebelah
SULIT

- (b) Diagram 8.2 shows the graph of the height of precipitate against the volume of potassium iodide solution used to construct the ionic equation for the formation of lead(II) iodide through continuous variation method using 0.2 mol dm^{-3} potassium iodide solution and 5 cm^3 of 0.1 mol dm^{-3} salt **P** solution.

*Rajah 8.2 menunjukkan graf tinggi mendakan melawan isipadu larutan kalium iodida yang digunakan untuk membina persamaan ion bagi pembentukan plumbum(II) iodida melalui kaedah perubahan berterusan menggunakan larutan kalium iodida 0.2 mol dm^{-3} dan 5 cm^3 larutan garam **P** 0.1 mol dm^{-3} .*

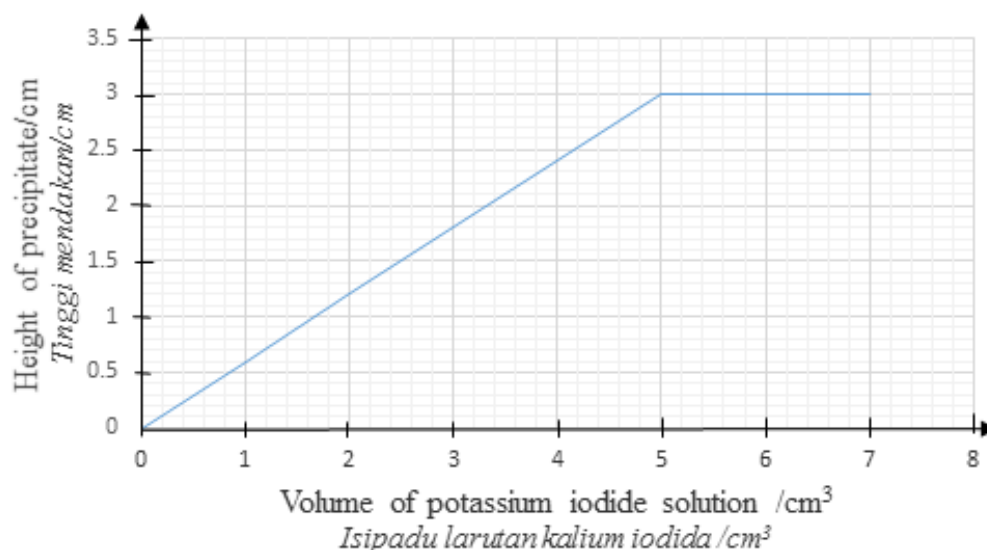


Diagram 8.2
Rajah 8.2

- (i) Name the salt **P** solution.
*Namakan larutan garam **P**.*
- [1 mark]
[1 markah]
- (ii) Based on Diagram 8.2 determine,
Berdasarkan Rajah 8.2 tentukan,
- the number of moles of Pb^{2+} ions and I^- ions that reacted completely in the reaction.
bilangan mol bagi ion Pb^{2+} dan ion I^- yang bertindak balas dengan lengkap dalam tindak balas itu.
 - the simplest mole ratio of Pb^{2+} ions to I^- ions in the reaction.
nisbah mol yang teringkas bagi ion Pb^{2+} kepada ion I^- dalam tindak balas itu.
 - ionic equation for the reaction.
persamaan ion bagi tindak balas itu

[5 marks]
[5 markah]

[Lihat halaman sebelah
SULIT

- (c) Diagram 8.3 shows the reaction scheme of white solid W.
Rajah 8.3 menunjukkan tindak balas bagi pepejal putih W.

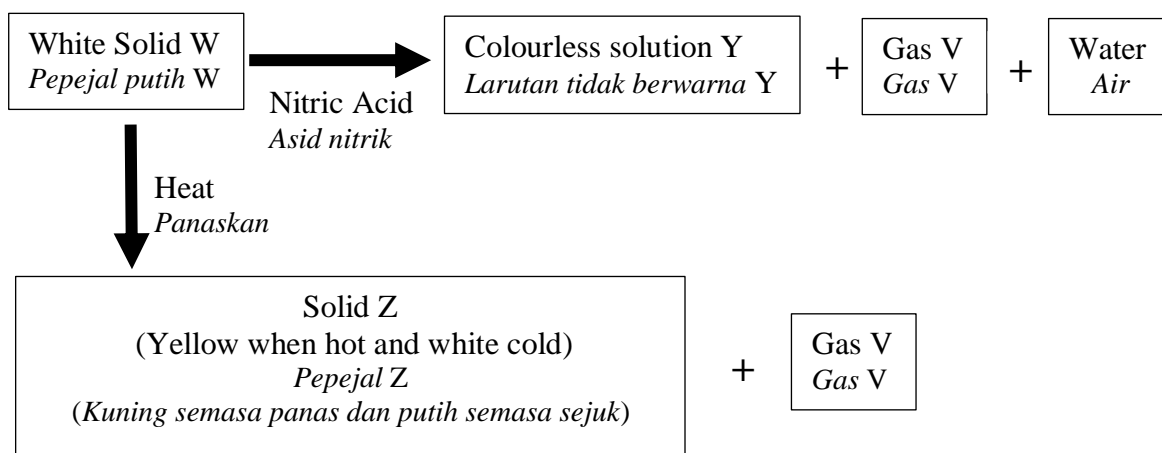


Diagram 8.3
Rajah 8.3

Based on diagram 8.3
Berdasarkan Rajah 8.3

- (i) Identify substances V, W, Y and Z
Kenalpasti bahan V, W, Y, dan Z

[4 marks]
 [4 markah]

- (ii) Describe a chemical test to verify the cation and anion in solution Y.
Huraikan ujian kimia untuk mengesahkan kehadiran kation dan anion di dalam larutan Y.

[6 marks]
 [6 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 Diagram 9.1 shows the three element cards, X, Y and Z. X and Y can react with Z to form different type of compounds.

Gambarajah 9.1 menunjukkan tiga kad unsur, X, Y dan Z. X dan Y boleh bertindakbalas dengan Z membentuk sebatian yang berbeza.




| X | Y |
|--|--|
|  |  |
| <p>State at 25 °C: Solid Colour: Grey/white Atomic mass: 22.99 Density: 0.968 g/cm³ Melting pt: 97.72 °C Boiling pt: 883 °C</p> | <p>State at 25 °C: Solid Colour: Black Atomic mass: 12.011 Density: 2.267 g/cm³ Melting pt: 352 °C Boiling pt: 4027 °C</p> |
| <ul style="list-style-type: none"> ▪ X is the 11th element in the Periodic Table ▪ It is store under oil ▪ When dropped into water it bursts into flames ▪ X is soft enough to be cut with a knife | <ul style="list-style-type: none"> ▪ Y is the 6th element in the Periodic Table ▪ Appear in many different forms in nature, e.g. black charcoal, diamonds and graphite ▪ Y forms the bulk of all living matter |
| Z | |
|  | |
| <p>State at 25 °C: Gas Colour: Greenish yellow Atomic mass: 35.453 Density: 2.898 g/cm³ Melting pt: -101.5 °C Boiling pt: -34.04 °C</p> | |
| <ul style="list-style-type: none"> ▪ Z is the 17th element in the Periodic Table ▪ Z is a toxic gas ▪ It is used in toilet cleaner to kill bacteria ▪ However, adding small amounts to drinking water kills water-borne disease such as cholera and typhoid | |

Diagram 9.1

Rajah 9.1

[Lihat halaman sebelah
SULIT

- (a) (i) Write the electron arrangement of atoms X, Y and Z.
Tuliskan susunan elektron bagi atom-atom X, Y dan Z.
- [3 marks]
[3 markah]
- (ii) Based on Diagram 9.1, suggest any two suitable elements that can react to form a compound.
State the type of bond formed and explain the formation of the compound.
*Berdasarkan Rajah 9.1, cadangkan dua unsur yang sesuai bertindak balas membentuk suatu sebatian.
Nyatakan jenis ikatan yang terbentuk dan terangkan pembentukan sebatian tersebut.*
- [7 marks]
[7 markah]

- (b) Diagram 9.2 shows the arrangement of particle for two types of compound.
Rajah 9.2 menunjukkan susunan zarah dua jenis sebatian.

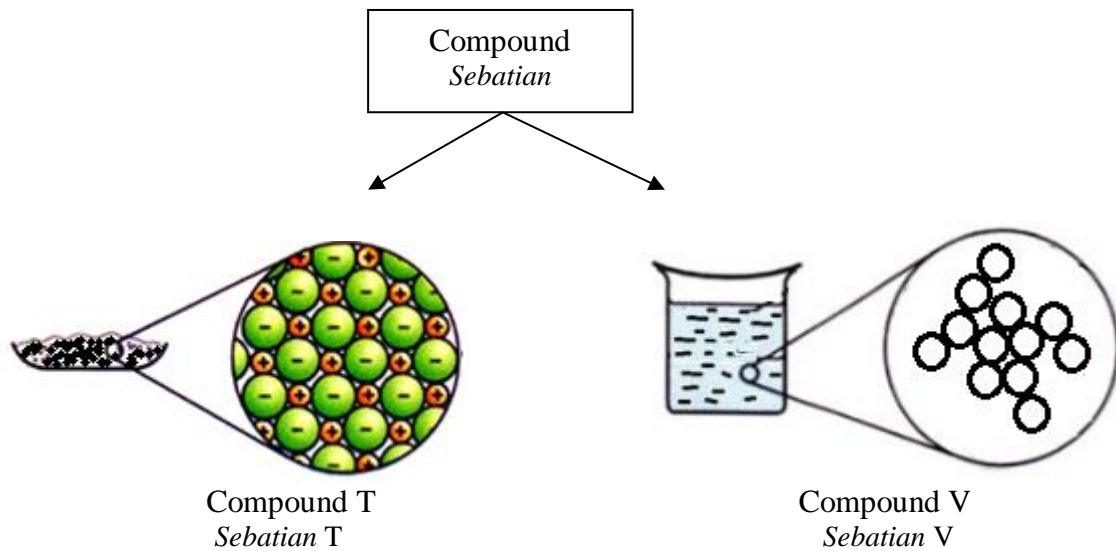


Diagram 9.2
Rajah 9.2

Describe an experiment to differentiate the compounds based on:
Huraikan eksperimen untuk membezakan kedua-dua sebatian tersebut berdasarkan:

- solubility in water
keterlarutan di dalam air
- melting point or boiling point
takat lebur atau takat didih.

In your description include:

Huraian anda haruslah mengandungi perkara berikut:

- Example of compound T and compound V
Contoh sebatian T dan sebatian V
- Procedure of experiment
Kaedah eksperimen
- Observation
Pemerhatian
- Conclusion
Kesimpulan

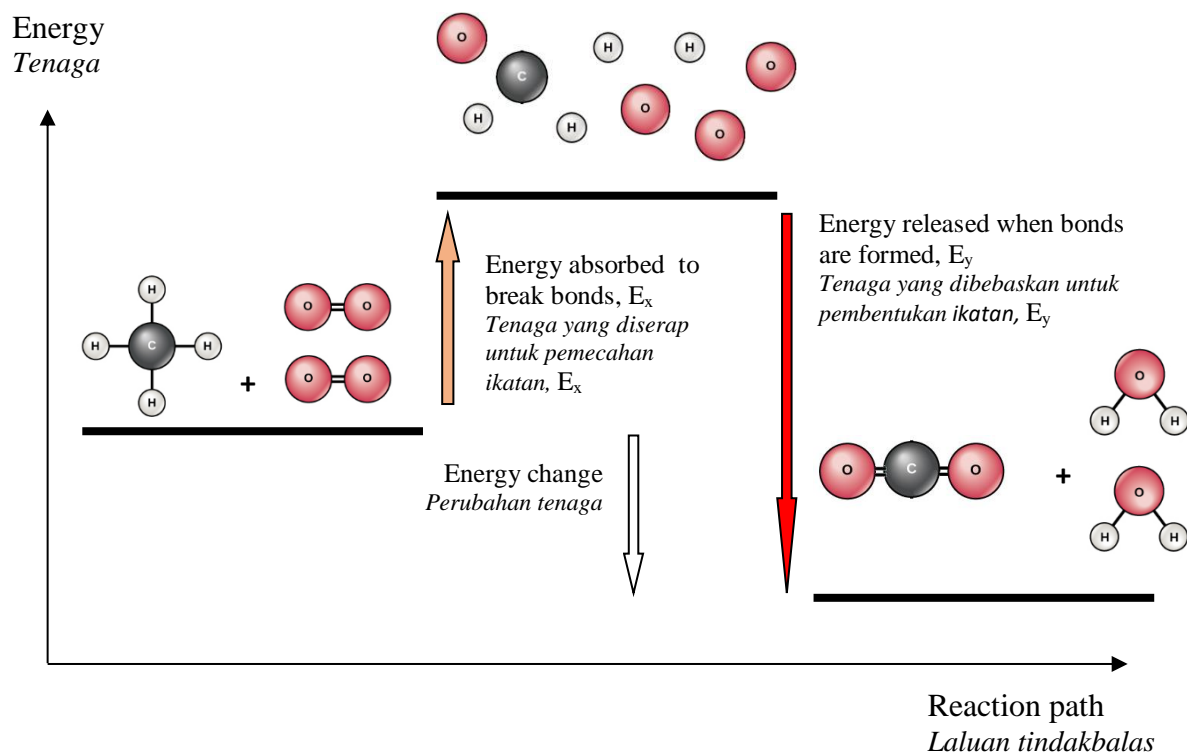
[10 marks]

[10 markah]

- 10 Diagram 10.1 shows the information about complete combustion of methane.
Rajah 10.1 menunjukkan maklumat berkenaan pembakaran lengkap metana.

ENERGY PROFILE DIAGRAM

RAJAH PROFIL TENAGA:



THERMOCHEMICAL EQUATION

PERSAMAAN TERMOKIMIA:

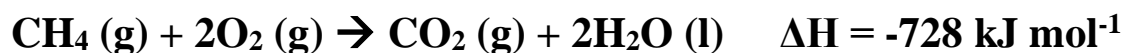


TABLE OF BOND ENERGY

JADUAL TENAGA IKATAN:

| Bond <i>Ikatan</i> | Bond energy / kJ mol ⁻¹ <i>Tenaga ikatan</i> | Total energy release or absorb / kJ |
|-----------------------|--|--|
| C-H | 435 | 1740 |
| O=O | 497 | 994 |
| C=O | 803 | 1606 |
| O-H | 464 | 1856 |

Diagram 10.1
Rajah 10.1

[Lihat halaman sebelah
SULIT

- (a) Based on Diagram 10.1, verify the heat of combustion of methane by using the following formula, Energy change, $\Delta H = E_x - E_y$ and identify the type of reaction.

Berdasarkan Rajah 10.1, tentusahkan haba pembakaran metana menggunakan formula, Perubahan tenaga, $\Delta H = E_x - E_y$ dan kenalpasti jenis tindak balas tersebut.

[4 marks]

[4 markah]

- (b) Diagram 10.2 shows the cross section of apparatus set-up for two sets of experiment to determine the heat of reaction.

Rajah 10.2 menunjukkan keratan rentas susunan radas bagi dua set eksperimen untuk menentukan haba tindakbalas.

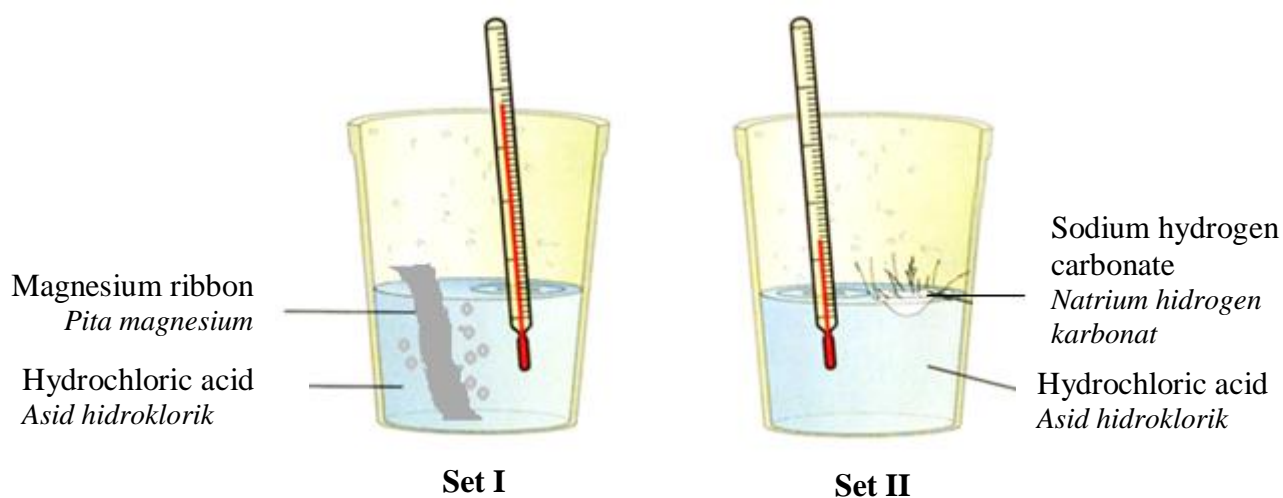


Diagram 10.2

Rajah 10.2

- (i) Based on Diagram 10.2, compare Set I and Set II in terms of:
- Berdasarkan Rajah 10.2, bandingkan antara Set I dan Set II dari segi:*
- Heat change in the reaction
Perubahan tenaga haba dalam tindakbalas
 - Change in total energy content of reactants and total energy content of products
Perubahan jumlah kandungan tenaga bagi bahan tindakbalas dan hasil tindakbalas.

[2 marks]

[2 markah]

[Lihat halaman sebelah

SULIT

- (ii) Hydrochloric acid in Set I is replaced with 100 cm³ of 1.0 mol dm⁻³ of copper(II) sulphate solution. The initial temperature of solution recorded is 28.0 °C and the highest temperature of the mixture is 40.0 °C.

Calculate the heat of reaction in this experiment.

[Specific heat capacity of solution, $c = 4.2 \text{ J g}^{-1} \text{ °C}^{-1}$]

Asid hidroklorik didalam Set I digantikan dengan 100 cm³ larutan kuprum(II) sulfat 1.0 mol dm⁻³. Suhu awal larutan direkodkan adalah 28.0 °C dan suhu tertinggi campuran adalah 40.0 °C.

Hitung haba tindakbalas bagi eksperimen ini.

[Muatan haba tentu bagi air, $c = 4.2 \text{ J g}^{-1} \text{ °C}^{-1}$]

[4 marks]

[4 markah]

- (c) A student carried out an experiment to determine the heat of precipitation of zinc carbonate.

Describe an experiment to determine the heat of precipitation of zinc carbonate. Your answer should include the following:

Seorang pelajar menjalankan satu eksperimen untuk menentukan haba pemendakan zink karbonat.

Huraikan eksperimen untuk menentukan haba pemendakan zink karbonat.

Jawapan anda perlu mengandungi perkara berikut:

- Suggest the suitable reactants required
Cadangkan bahan tindak balas yang sesuai
- Procedure
Prosedur
- Chemical equation
Persamaan kimia

[10 marks]

[10 markah]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

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 any **one** question from **Section B** and any **one** question from **Section C**. Write your answers for **Section B** and **Section C** on the ‘helaian tambahan’ provided by the invigilators. You may use equations, diagrams, tables, graphs and other suitable methods to explain your answer.
*Jawab mana-mana **satu** soalan daripada **Bahagian B** dan mana-mana **satu** soalan daripada **Bahagian C**. Tulis jawapan anda bagi **Bahagian B** dan **Bahagian C** dalam helaian tambahan yang dibekalkan oleh pengawas peperiksaan. 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 part question are 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 cancel any answer, neatly cross out the answer.
Sekiranya anda hendak membatalkan sesuatu jawapan, buat garisan di atas jawapan itu.
8. The Periodic Table of Elements is provided on page 31.
Jadual Berkala Unsur disediakan di halaman 31.
9. You may use a non – programmable scientific calculator.
Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogramkan.
10. The time suggested to complete **Section A** is 90 minutes, **Section B** is 30 minutes and **Section C** is 30 minutes
*Masa yang dicadangkan untuk menjawab **Bahagian A** ialah 90 minit, **Bahagian B** ialah 30 minit dan **Bahagian C** ialah 30 minit.*
11. Tie the ‘helaian tambahan’ together with the question paper and hand in to the invigilator at the end of the examination.
Ikat helaian tambahan bersama-sama kertas soalan ini dan serahkan kepada pengawas peperiksaan pada akhir peperiksaan.