NAMA : _____

KELAS : _____

JABATAN PELAJARAN NEGERI SABAH

SIJIL PELAJARAN MALAYSIA 2010 **4541/1**
EXCEL 2
CHEMISTRY
Kertas 1
OGOS 2010

1 Jam 15 minit Satu jam lima belas minit

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1. *Kertas soalan ini adalah dalam dwibahasa.*
2. *Soalan dalam Bahasa Inggeris mendahului soalan yang sepadan dalam Bahasa Malaysia.*
3. *Calon dikehendaki membaca dengan teliti arahan di dalam kertas soalan ini.*

DO NOT OPEN THE QUESTION PAPER UNTIL INSTRUCTED

(*JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU*)

1. This question paper consists of 50 questions. (Kertas soalan ini mengandungi 50 soalan).
2. Answer all questions. (Jawab semua soalan).
3. Answer each question by blackening the correct space on the objective sheet. (Jawab setiap soalan dengan menghitamkan ruangan yang betul pada kertas jawapan).
4. Blacken only one space for each question. (Hitamkan satu ruangan sahaja bagi setiap soalan).
5. If you wish to change your answer, erase the blackened mark that you have made. Then blacken the space for the new answer.
6. (Sekiranya anda hendak menukarkan jawapan, padamkan tanda yang telah dibuat dan hitamkan jawapan yang baru).
7. The diagrams in the question provided are not drawn to scale unless stated. (Rajah yang mengiringi soalan tidak dilukiskan mengikut skala kecuali dinyatakan).
8. You may use a non-programmable scientific calculator. (Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogram.

Kertas soalan ini mengandungi 28 halaman berrcetak.

[Lihat sebelah]
SULIT

Instructions: *For* **Question 1** *to* **Question 50**, *each question is followed by four options,* **A**, **B**, **C** *and* **D**. *Choose* **one** *correct answer for each question.*

1. Which of the following substances only contains atoms?
Antara bahan yang berikut, yang manakah hanya mengandungi atom?

A Copper / *Kuprum*
B Glucose / *Glukosa*
C Lead (II) Iodide / *Plumbum* (II) *Iodida*
D Magnesium oxide / *Magnesium oksida.*

2. Which of the following statements is **true** about Chlorine atoms and Chloride ions ?
Antara pernyataan berikut, yang manakah benar mengenai atom Klorin dan ion klorida ?

A Are isotopes of chlorine.
Merupakan isotop Klorin.
B Are chemically identical.
Mempunyai sifat-sifat kimia yang sama.
C Have same number of protons.
mempunyai bilangan nombor proton yang sama.
D Have same physical properties.
Mempunyai sifat-sifat fizikal yang sama.

3 Which of the following is true about atoms *P* and *Q* if the number of protons, electrons and neutrons for atom *P* and *Q* are as shown in Table 1?
Yang manakah antara berikut benar mengenai atom P dan Q jika nombor proton, elektron dan neutron untuk atom P dan Q seperti yang ditunjukkan dalam Jadual 1.

Atom *Atom*	**Number of protons** *Nombor proton*	**Number of electrons** *Bilangan elektron*	**Number of neutrons** *Bilangan neutron*
P	17	17	18
Q	17	17	20

Table 1 / *Jadual 1*

A P and Q are isotopes
P dan Q adalah isotop.
B P and Q have different properties
P dan Q tidak mempunyai sifat-sifat yang sama.
C P and Q can react to form ionic bonds.
P dan Q boleh bertindakbalas membentuk ikatan ionic.
D P is a radioactive material.
P adalah bahan radioaktif.

4. Which of the following statements is **true** for one mole of a substance?
Antara pernyataan berikut, yang manakah benar bagi satu mol bahan?

A 1 mol copper contains 6.02 X 10^{23} molecules.
1 mol kuprum mengandungi 6.02 X 10^{23} molekul.

B 1 mol oxygen gas contains 6.02 X 10^{23} atoms.
1 mol gas oksigen mengandungi 6.02 X 10^{23} atom.

C 1 mol of water contains the same number of atoms as in 12 g of carbon-12.
1 mol air mengandungi bilangan atom yang sama dengan bilangan atom dalam 12 g karbon-12.

D 1 mol of carbon dioxide gas contains the same number of molecules as the number of atoms in 12 g of carbon-12.
1 mol karbon dioksida mengandungi bilangan molekul yang sama dengan bilangan atom dalam 12 g karbon-12.

5 Why is argon unable to react with oxygen at room temperature?
Mengapakah argon tidak bertindak balas dengan oksigen pada suhu bilik?

A It is an inert gas
Ia adalah gas lengai

B It has 10 electrons
Ia menpunyai 10 elektron

C It has two occupied electron shells
Ia mempunyai dua petala yang penuh diisi dengan electron

D It has 8 valence electrons in the outermost shell
Ia mempunyai 8 elektron valens pada petala terluar

6 Which substance reacts with ethanoic acid to release hydrogen gas?
Bahan yang manakah bertindak balas dengan asid etanoik untuk membebaskan gas hidrogen?

A Zinc / *Zink*
B Chlorine gas / *Gas klorin*
C Magnesium oxide / *Magnesium oksida*
D Calcium carbonate / *Kalsium karbonat*

7 Diagram 1 shows a structure of an atom. Which of these show the correct number of electrons, proton number and the nucleon number of atom?

Rajah 1 menunjukkan struktur suatu atom. Antara berikut, yang manakah menunjukkan bilangan elektron, nombor proton dan nombor nukleon atom dengan betul?

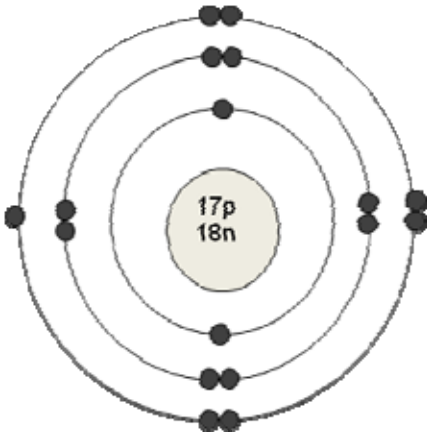


Diagram 1 / Rajah 1

	Number of electrons *Bilangan elektron*	Proton number *Nombor proton*	Nucleon number *Nombor nukleon*
A	17	18	35
B	17	17	35
C	18	17	18
D	18	18	17

8 Which of the following particles contain same number of electrons with **Al^{3+} ion**?

Antara berikut, zarah manakah mengandungi bilangan elektron yang sama dengan ion aluminium?

[Proton number *(Nombor proton)*: Al = 13; F = 9; Na = 11; Mg = 12; Cl = 17]

A F

B Na^+

C Mg

D Cl^-

9 Table 2 shows the number of subatomic particles in the atoms of elements oxygen, sodium and calcium. What are the values of *X*, *Y* and *Z*?
Jadual 2 menunjukkan bilangan subatom dalam atom unsur oksigen, natrium dan kalsium. Apakah nilai X, Y and Z?

Atom of element ***Atom unsur***	**Number of proton** ***Bilangan proton***	**Number of neutron** ***Bilangan neutron***	**Nucleon number** ***Nombor nukleon***
Oxygen / *Oksigen*	*X*	8	16
Sodium / *Natrium*	11	*Y*	23
Calcium / *Kalsium*	20	20	*Z*

Table 2 / *Jadual 2*

	X	***Y***	***Z***
A	8	12	40
B	8	13	40
C	9	12	40
D	9	13	40

10 Which statements is **not true** about acids?
*Mana antara pernyataan berikut yang **tidak benar** mengenai asid?*

A Acids contain hydrogen ions.
Asid mengandungi ion hidrogen.

B Acids produce hydrogen ions when they dissolve in water.

Asid menghasilkan ion hidrogen bila larut dalam air.

C Acids react with alkalis to produce salts and hydrogen gas.

Asid bertindakbalas dengan alkali untuk menghasilkan garam dan gas hidrogen.

D Acids react with carbonates to produce salts, water and carbon dioxide gas.

Asid bertindakbalas dengan garam karbonat untuk menghasilkan garam, air dan karbon dioksida.

11 The rate of chemical reaction **cannot** be determined by measuring

*Kadar tindak balas **tidak boleh** ditentukan dengan mengukur*

A the volume of gas liberated per unit time

isipadu gas dibebaskan per unit masa.

B the formation of precipitate per unit time.

pembentukan mendakan per unit masa.

C the change of colour per unit time.

perubahan warna per unit masa.

D the change of the size of solid per unit time.

perubahan saiz pepejal per unit masa

12 Which particle causes an aqueous solution of ammonia to exhibit alkaline properties?

Zarah yang manakah menyebabkan larutan ammonia akues memperlihatkan sifat-sifat alkali?

A H_3O^+

B OH^-

C NH_4^+

D NH_3

13 From the position in the Periodic Table, we can predict many properties of an element and its compound. What property cannot be predicted?

Berdasarkan posisi dalam Jadual Berkala, kita boleh meramalkan pelbagai sifat suatu unsur dan sebatiannya. Apakah sifat yang tidak boleh diramalkan?

A The formula of its oxide / *Formula oksida*

B The number of isotopes it has / *Bilangan isotop*

C The melting point / *Takat lebur*

D The freezing point / *Takat beku*

14 A bowl of vegetable soup is found to be not very tasty. Which of the following food additives can be added to the soup?

Semangkuk sup sayur didapati kurang sedap. Antara bahan tambah makanan berikut, manakah yang boleh ditambah ke dalam sup itu?

A Stabiliser / *Penstabil*

B Colouring / *Pewarna*

C Flavouring / *Perisa*

D Antioxidant / *Pengantioksida*

15 Below are the symbols of element *X* and *Z*.

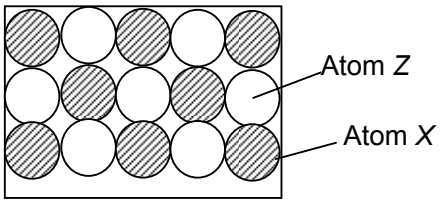
Simbol untuk unsur X dan Z ditunjukkan di bawah.

$^{27}_{13}X$ $^{12}_{6}Z$

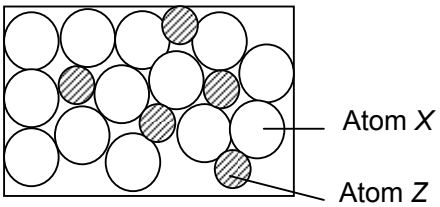
If elements *X* and *Z* combine together to form an alloy *Q*, what is the arrangement of atoms in alloy *Q*?

Jika unsur X dan Z bergabung bersama untuk membentuk aloi Q, apakah bentuk susunan atom-atom aloi Q tersebut?

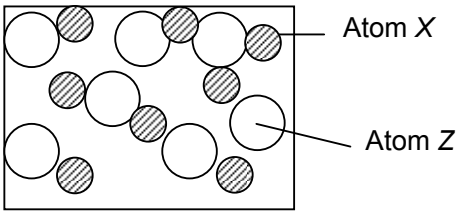
A



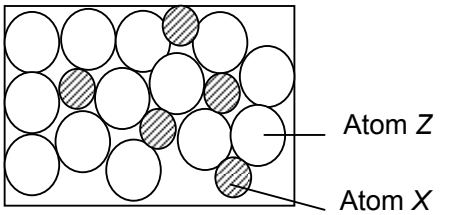
D



B



E



16 Diagram 2 shows the structure of a soap molecule.
Rajah 2 menunjukkan struktur bagi molekul sabun.

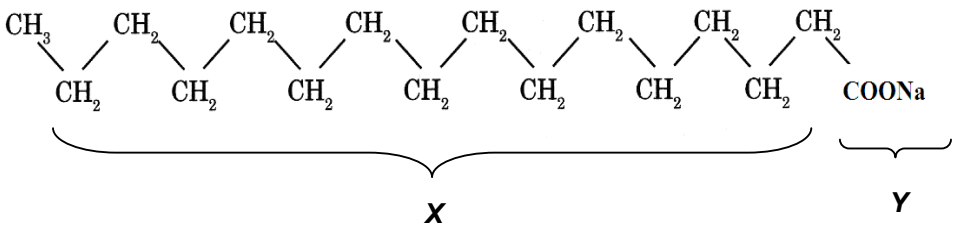


Diagram 2 / *Rajah 2*

In what medium can part X and part Y dissolve in?
Antara medium berikut, yang manakah bahagian X dan Y dapat larut?

	Part *X* / *Bahagian X*	Part *Y* / *Bahagian Y*
A	Oil / *Minyak*	Water / *Air*
B	Water / *Air*	Oil / *Minyak*
C	Water / *Air*	Water / *Air*
D	Oil / *Minyak*	Oil / *Minyak*

17 Which of the following solutions has the highest concentration of **hydroxide ions**?
Antara berikut, manakah larutan mempunyai kepekatan ion hidroksida yang paling tinggi?

A 50 cm^3 of 2.0 mol dm^{-3} sodium hydroxide solution.
50 cm^3 2.0 mol dm^{-3} Larutan sodium hidroksida.

B 50 cm^3 of 2.0 mol dm^{-3} ammonia solution.
50 cm^3 , 2.0 mol dm^{-3} larutan ammonia.

C 50 cm^3 of 2.0 mol dm^{-3} potassium hydroxide solution.
50 cm^3 of 2.0 mol dm^{-3} Larutan kalium hidroksida.

D 50 cm^3 of 2.0 mol dm^{-3} barium hydroxide solution.
50 cm^3, 2.0 mol dm^{-3} Larutan natrium hidroksida.

18 **Photochromic glass is a type of glass that is sensitive to light intensity.**
[Kaca fotokromik ialah sejenis kaca yang peka kepada keamatan cahaya]

Which chemical present in photochromic glass gives this property?
Bahan kimia yang manakah dalam kaca fotokromik memberi sifat tersebut?

A Boron oxide *[Boron oksida]*

B Silver chloride *[Argentum klorida]*

C Silver nitrate *[Argentum nitrat]*

D Aluminum oxide *[Aluminum oksida]*

19 Gas P has the following properties.

Gas P mempunyai ciri – ciri yang berikut.

Colourless gas	**Pungent smell**	**Very soluble in water**
Gas tidak berwarna	***Berbau tengik***	***Sangat larut dalam air***

Gas P is liberated when sodium hydroxide is heated together with

Gas p dibebaskan apabila natrium hidrosida dipanaskan bersama dengan

A nitric acid / *asid nitrik*

B zinc metal / *logam zink*

C ammonium sulphate / *ammonium sulfat*

D magnesium carbonate / *magnesium karbonat*

20 The chemical equation below shows the reaction between barium nitrate solution and sodium sulphate solution.
Persamaan kimia berikut menunjukkan tindak balas antara larutan barium nitrat dan larutan natrium sulfat.

$$\mathbf{Ba(NO_3)_2\,(aq) + Na_2SO_4\,(aq) \longrightarrow BaSO_4\,(aq) + 2NaNO_3\,(aq)}$$

What is the volume of barium nitrate 1.0 mol dm^{-3} solution that reacts completely with 50 cm^3 of 0.5 mol dm^{-3} of sodium sulphate solution?
Berapakah isipadu larutan barium nitrat 1.0 mol dm^{-3} yang bertindakbalas lengkap dengan 50 cm^3 larutan natrium sulfat 0.5 mol dm^{-3}?

A 5.0 cm^3
B 12.5 cm^3
C 25.0 cm^3
D 50.0 cm^3

21 The equation below represents the decomposition of hydrogen peroxide solution.
Persamaan bawah mewakili penguraian larutan hidrogen peroksida.

$$\mathbf{2H_2O_2\,(aq) \rightarrow 2H_2O\,(l) + O_2\,(g)}$$

If 1 mol of hydrogen peroxide is used, what is the volume of oxygen gas produced?
Jika 1 mol hidrogen peroksida digunakan, apakah isi padu gas oksigen yang dihasilkan?
[1 mole of gas occupies 24 dm^3 at room temperature]
[1 mol gas memenuhi 24 dm^3 pada suhu bilik]

A 8.4 dm^3
B 10.4 dm^3
C 12.0 dm^3
D 24.0 dm^3

22 Table 3 shows three elements and their respective relative atomic masses. The letters used are not actual symbols of the elements.
Jadual 3 menunjukkan tiga unsur dengan jisim atom unsur masing-masing. Huruf yang digunakan tidak menunjukkan unsure sebenar unsur tersebut.

Element / *Unsur*	**Relative atomic mass / *Jisim atom relatif***
X	12
Y	16
Z	24

Table 3 / Jadual 3

Which of the following about *X*, *Y* and *Z* are **true**?
Yang manakah di antara berikut adalah benar bagi X, Y dan Z?

I *Z* is heavier than *Y* by 1.5 times
Z 1.5 kali lebih berat berbanding Y

II 4 atoms of *X* have the same mass as 3 atoms of *Y* and 2 atoms of *Z*
4 atom X mempunyai jisim yang sama dengan 3 atom Y dan 2 atom Z

III *Y* is heavier than *X* by 4 times
Y 4 kali lebih berat berbanding X

IV *Z* is heavier than *X* by 2 times
Z 2 kali lebih berat berbanding X

A I and II only / *I dan II sahaja*

B I and III only / *I dan III sahaja*

C I, II and III only / *I, II dan III sahaja*

D I, II and IV only / *I, II dan IV sahaja*

23 The formula for sulphate ion is SO_4^{2-} and for a nitrate is NO_3^-. If the formula of the sulphate salt of *M* is MSO_4, what is the formula of the nitrate salt of *M*?
Formula bagi ion sulfat adalah SO_4^{2-} dan ion nitrat adalah NO_3^-. Jika formula garam sulfat bagi M ialah MSO_4, apakah formula garam nitrat bagi M?

A MNO_3

B M_2NO_3

C $M(NO_3)_2$

D $M(NO_3)_3$

24 Diagram 3 shows the dilution of 50 cm^3 of 0.1 mol dm^{-3} potassium hydroxide solution.

Rajah 3 menunjukkan pencairan 50 cm^3 of 0.1 mol dm^{-3} larutan kaium hidroksida.

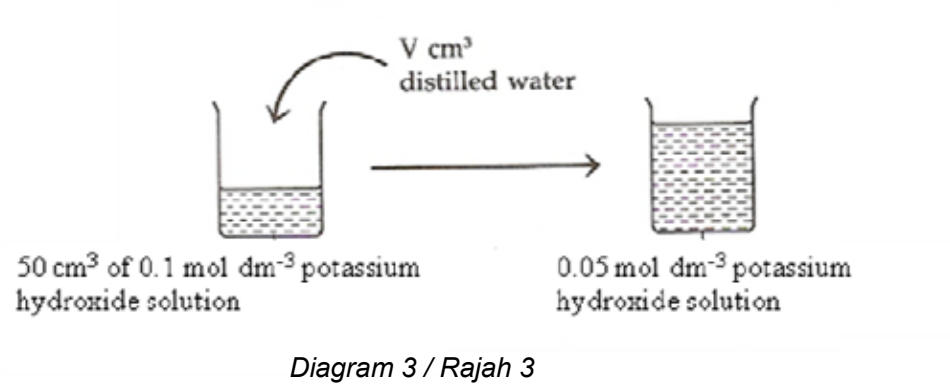


Diagram 3 / Rajah 3

V cm^3 of distilled water is added into the 0.1 mol dm^{-3} potassium hydroxide solution to obtain a 0.05 mol dm^{-3} potassium hydroxide solution; what is the value of V ?

A 10 cm^3

B 20 cm^3

C 50 cm^3

D 100 cm^3

25 8.1 g of a metal oxide with a formula of PO is completely reduced by excess carbon powder to 6.48 g of metal P. Which of the following is the relative atomic mass of P?

8.1 g oksida logam dengan formula PO telah terturun dengan lengkap oleh serbuk karbon berlebihan kepada 6.48 g logam P. Yang manakah diantara berikut merupakan jisim atom relatif bagi P?

[Relative atomic mass : O,16]

A 16

B 32

C 64

D 8

26 Which of the following ions forms a white precipitate that **does not** dissolve in excess Sodium hydroxide solution?
*Antara berikut, yang manakah membentuk mendakan putih yang **tidak** larut dalam larutan natrium hidroksida berlebihan?*

I Zn^{2+}
II Pb^{2+}
III Ca^{2+}
IV Mg^{2+}

A. I and II only
I dan II sahaja

B. I and III only
I dan III sahaja.

C. II and III only
II dan III sahaja.

D. III and IV only
III dan IV sahaja

27 Which of the following elements exists naturally as free elements in the earth's crust?
Yang manakah di antara unsur-unsur berikut wujud secara semulajadi sebagai unsur bebas?

A Silver / *Perak*
B Carbon / *Karbon*
C Copper / *Kuprum*
D Sodium / *Natrium*

28 Diagram 4 shows the electron arrangement of atoms P, Q and R.
Rajah 4 menunjukkan susunan elektron bagi atom P, Q dan R.

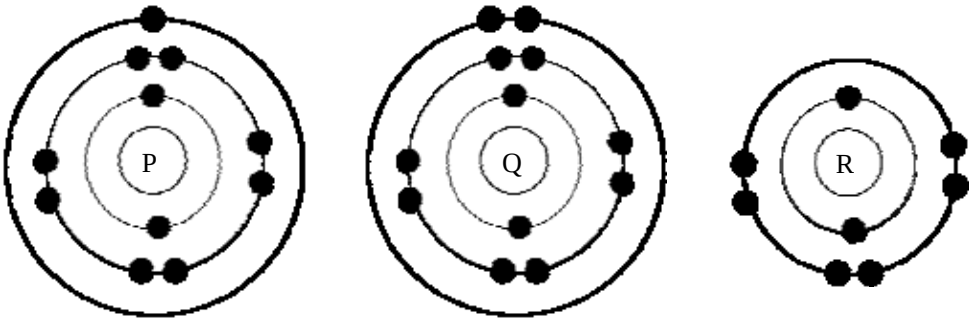


Diagram 4 / Rajah 4

R can react with P and Q to form two different compounds. What are the formulae of the compounds formed?

R boleh bertindak balas dengan P dan Q membentuk dua sebatian berbeza. Apakah formula sebatian yang terbentuk?

	P and R	**Q and R**
A	P_2R	QR_2
B	P_2R	QR
C	PR	QR_2
D	PR_2	Q

29 Which of the following compound can conduct electricitity in molten state?
Antara sebatian berikut, yang manakah boleh mengkonduksi elektrik dalam keadaan lebur.

A Naphthlane
Naftalena.
B Lead (II) bromide.
Plumbum (II) *bromida.*
C Glucose
Glukosa
D Carbon
Karbon.

30 Table 4 the concentration and pH value of hydrochloric acid and ethanoic acid.

Jadual 4 menunjukkan kepekatan dan nilai pH bagi asid hidroklorik dan asid etanoik.

Type of acid / *Jenis asid*	**Concentration/mol dm^{-3}** **_Kepekatan_/mol dm^{-3}**	**pH value** ***nilai pH***
Hydrochloric acid / *Asid hidroklorik*	0.1	1
Ethanoic acid / *Asid etanoik*	0.1	4

Table 4 / Jadual 4

Which of the following statements are **true** about both acids?

*Antara pernyataan berikut yang manakah **benar** tentang kedua-dua asid*?

I Hydrochloric acid is a stronger acid compared to ethanoic acid

Asid hidroklorik adalah asid lebih kuat berbanding asid etanoik.

II Concentration of hydrogen ions is higher in hydrochloric acid compared with ethanoic acid.

Kepekatan ion hidrogen dalam asid hidroklorik adalah lebih tinggi berbanding dengan asid etanoik.

III The degree of dissociation of hydrochloric acid in water is higher than ethanoic acid.

Darjah penceraian asid hidroklorik dalam air adalah ebih tinggi berbanding asid etanoik.

IV Both acids can neutralized an alkali to produce salt and water

Kedua-dua asid dapat meneutralkan alkali untuk menghasilkan garam dan air

A I and III only

B III and IV only

C I, II and III only

D I, II, III and IV

31 Diagram 5 shows a test to identify the chemical properties of group 17 elements when Bromine gas was passed through a tube that contains a burning aluminium.
Rajah 5 menunjukkan satu ujian untuk mengenalpasti sifat-sifat kimia unsur-unsur kumpulan 17 apabila gas Bromin itu disalurkan melalui satu tiub yang mengandungi aluminium yang sedang terbakar.

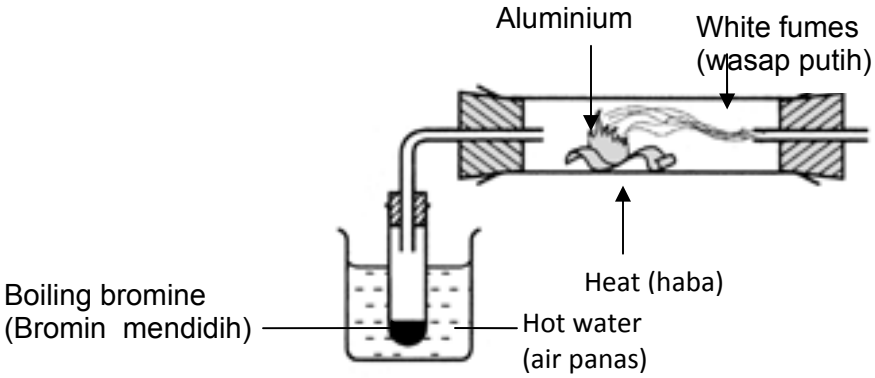


Diagram 5 / Rajah 5

The above experiment was repeated by replacing boiling bromine with boiling Chlorine and boiling Iodine, one at a time. Which of the following statement is true about the above experiment?
Eksperimen di atas diulangi dengan menggantikan Bromin mendidih dengan Klorin mendidih dan Iodin mendidih, setiap satu secara berasingan. Antara pernyataan berikut, yang manakah benar mengenai eksperimen di atas?

A. When Chlorine replaces Bromine, the reaction is the least reactive.
Apabila Klorin menggantikan Bromin, tindak balas menjadi paling tidak reaktif.

B. When Chlorine replaces Iodine, the reaction is the most reactive.
Apabila Klorin menggantikan Iodin, tindak balas menjadi paling reaktif.

C. When Iodine replaces Bromine, the reaction is more reactive.
Apabila Iodin menggantikan Bromin, tindak balas menjadi lebih reaktif.

D. When Bromine replaces Chlorine, the reaction is more reactive.

Apabila Bromin menggantikan Klorin, tindak balas menjadi lebih reaktif.

32 Two elements react to form compound *N* that has all the properties below.
Dua unsur bertindakbalas untuk membentuk sebatian N yang mempunyai unsur-unsur berikut.

Properties of compound N / *Sifat-sifat sebatian N*
• High melting point / *Takat lebur yang tinggi.*
• Conducts electricity in molten state. *Boleh mengkonduksikan elektrik dalam keadaan lebur.*
• Soluble in water / *Larut dalam air*

Which of the following is possible for both the elements that form *N* ?
Antara berikut, pasangan yang manakah boleh membentuk sebatian N ?

I Hydrogen and Chlorine / *Hidrogen dan Klorin.*
II Sodium and Oxygen / *Natrium dan Oksigen.*
III Magnesium and Oxygen / *Magnesium dan Oksigen.*
IV Lead and Bromin / *Plumbum dan Bromin*

A II and III only
II dan III sahaja
B III and IV only
III dan IV sahaja.
C I, II and III only
I,II dan III sahaja.
D II, III and IV only
II, III dan IV sahaja.

33 Diagram 6 shows the set-up of apparatus for electrolysis.
Rajah 6 menunjukkan susunan radas untuk elektrolisis.

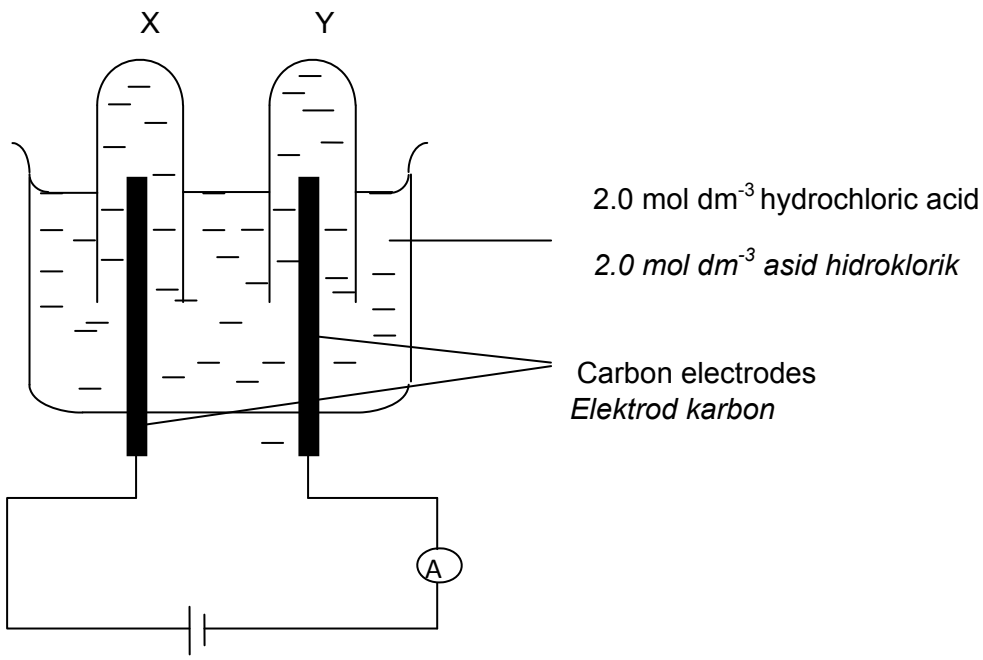


Diagram 6 / Rajah 6

What is the chemical test would you use to confirm the product formed in test tube Y after electrolysis has been carried out for some time?
Ujian kimia apakah yang digunakan untuk mengesahkan hasil yang terbentuk dalam tabung uji Y selepas elektrolisis dijalankan?

A A lighted wooden splinter
Kayu uji bernyala
B Lime water
Air kapur
C A glowing splinter
Kayu uji berbara
D A moist litmus paper
Kertas litmus lembap

34 Table 5 shows the readings of a voltmeter with each pair of metals, which are immersed in a solution of bivalence ions that are connected with one salt bridge to form a simple voltaic cell. From these results, what is the reading of the voltmeter of a voltaic cell that consists of a pair of Lead and Nickel metals?

Jadual 5 menunjukkan bacaan voltmeter dengan setiap pasangan logam direndamkan ke dalam sel larutan dwi ion yang disambung menggunakan titian garam, untuk membentuk sel kimia ringkas. Daripada keputusan berkenaan, apakah bacaan voltmeter untuk sel kimia berkenaan yang terdiri daripada pasangan terminal logam plumbum dan nikel ?

Positive terminal ***Terminal positif***	**Negative terminal** ***Terminal negatif***	**Reading of the voltmeter (V)** ***Bacaan voltmeter (V)***
Lead / *Plumbum*	Manganese / *Mangan*	1.05
Zinc / *Zink*	Manganese / *Mangan*	0.42
Nickel / *Nikel*	Zinc / *Zink*	0.51

Table 5 / Jadual 5

A 0.12 V
B 0.63 V
C 0.93 V
D 1.98 V

35 Based on the theory of ions, an electrolyte can conduct electricity because it
Berdasarkan teori ion, elektrolit boleh mengkonduksikan elektrik kerana

A is a metal / *ia adalah logam*
B contains ions that can move freely / *mengandungi ion yang bebas bergerak*
C allows electrons to flow through / *membenarkan elektron mengalir melaluinya*
D is a conductor of electricity in liquid state
ia adalah konduktor elektrik dalam keadaan cecair

36 Diagram 7 shows a simple voltaic cell.

Rajah 7 menunjukkan sel elektrokimia ringkas.

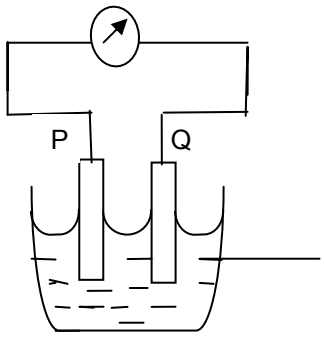


Diagram 7 / Rajah 7

The flow of electrons through the voltmeter is from metal P to Q. Which of the following is **true**?

Aliran elektron yang melalui voltmeter ialah daripada logam P ke Q. Manakah anatara berikut adalah benar?

	P	Q
A	Iron	Stanum
B	Lead	Stanum
C	Stanum	Zinc
D	Lead	Iron

37 *Manakah di antara berikut akan meningkatkan jumlah sulfur dioksida di dalam persekitaran?*

I The wide use of detergents. / *Penggunaan meluas detergen.*

II The combustion of petrol in vehicles. / *Pembakaran petrol dalam kenderaan.*

III Burning of plastic materials containing sulphur.

Pembakaran bahan plastik yang mengandungi sulfur.

IV The excessive use of ammonium sulphate as a chemical fertiliser in agriculture.

Penggunaan baja ammonium sulfat secara berlebihan dalam pertanian.

A II and III only / II dan III sahaja

B III and IV only / III dan IV sahaja

C I, II and IV only / I, II dan IV sahaja

D I, II and III only / I, II dan III sahaja

38 A substance is said to be oxidized if
Suatu bahan telah dioksidakan jika

A oxygen is lost *[oksigen dihilangkan]*

B hydrogen is added *[hydrogen ditambahkan]*

C electrons are lost *[elektron dihilangkan]*

D its oxidation number decreases *[nombor pengoksidaan berkurangan]*

39 Diagram 8 shows the structural formula of an ester.
Rajah 8 menunjukkan formula struktur ester.

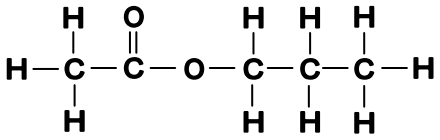


Diagram 8/ Rajah 8

What is the name of the above molecular structure?
Apakah nama formula struktur di atas?

A Ethyl propanoate / Etil propanoat

B Butyl propanoate / Butil propanoat

C Propyl ethanoate / Propil etanoat

D Propyl propanoate / Propil propanoat

40 Diagram 9 shows the production of a certain gas that can decolourise acidified potassium manganate(VII) solution when material *Y* is heated.

Rajah 9 menunjukkan penghasilan sesuatu gas yang boleh menyahwarnakan larutan kalium manganat(VII) berasid.

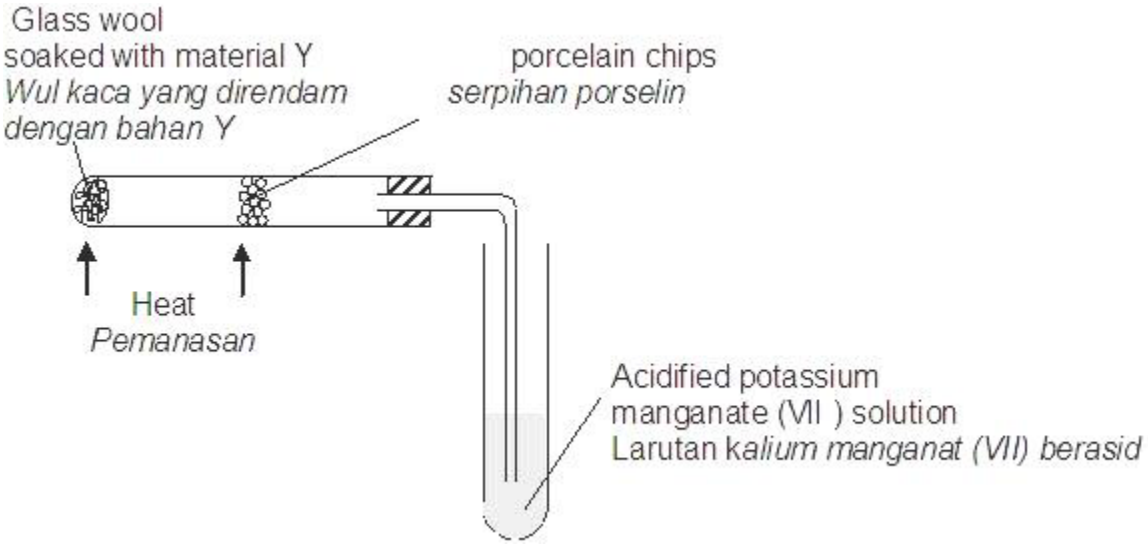
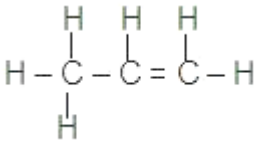


Diagram 9 / Rajah 9

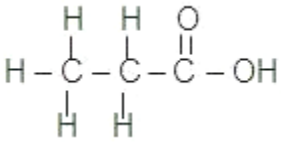
Which of organic compounds is material *Y* ?

Sebatian organik manakah bahan Y?

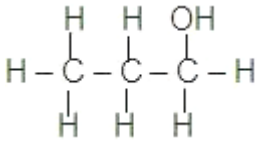
I



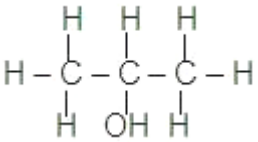
II



III



IV



A I only / *I sahaja*

B I and II only / *I dan II sahaja*

C III and IV only / *III dan IV sahaja*

D II, III and IV only / *II, III dan IV sahaja*

41 Diagram 10 shows the set up of apparatus for a chemical reaction.

Rajah 10 menunjukkan susunan radas bagi satu tindak balas kimia.

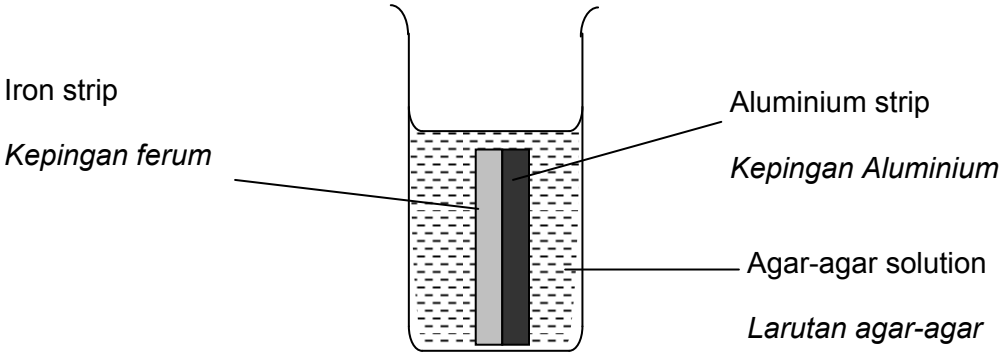


Diagram 10 / Rajah 10

Which of the following statements is **true** for the reaction?

Antara pernyataan berikut yang manakah benar mengenai tindak balas itu?

A Iron is reduced */ Ferum diturunkan*

B Aluminium releases electron */ Aluminium membebaskan elektron*

C Iron is an oxidising agent */ Ferum adalah agen pengoksidaan*

D The oxidation number of Aluminium decreases

Nombor pengoksidaan Aluminium berkurang

42 Which of the following underlined substances is an oxidizing agent?

Antara berikut manakah bahan yang bergaris adalah agen pengoksidaan?

A Magnesium react with hydrochloric acid

Tindak balas magnesium dengan asid hidroklorik

B Zinc reacts with copper(II) sulphate solution

Tindak balas zink dengan larutan kuprum(II) sulfat

C Bromine water react with iron(II) sulphate solution

Tindak balas air bromin dengan larutan ferum (II) sulfat

D Potassium iodide solution reacts with chlorine water

Tindak balas larutan kalium iodida dengan air klorin

43 The following equation shows the displacement of copper (II) ions using zinc metal.

$Zn(s) + Cu^{2+}(aq) \rightarrow Zn^{2+}(aq) + Cu(s)$ ΔH = - 210 kJ mol^{-1}

Which of the following is true about the reaction?

Persamaan kimia berikut menunjukkan penyesaran ion kuprum (II) menggunakan logam zink.

$Zn(s) + Cu^{2+}(aq) \rightarrow Zn^{2+}(aq) + Cu(s)$ ΔH = - 210 kJ mol^{-1}

Antara berikut, yang manakah adalah benar tentang tindak balas ini?

	Heat change / *Perubahan haba*	**Type of reaction / *Jenis tindak balas***
A	Heat is released / *Haba dibebaskan*	Endothermic / *Endotermik*
B	Heat is absorbed / *Haba diserap*	Exothermic / *Eksotermik*
C	Heat is released / *Haba dibebaskan*	Exothermic / *Eksotermik*
D	Heat is absorbed / *Haba diserap*	Endothermic / *Endotermik*

44 Zinc chloride solution and aluminium chloride solution are colourless solutions.

Which of the following can be used to differentiate the solutions?

Larutan zink klorida dan larutan aluminium klorida adalah larutan tidak berwarna.

Antara berikut, yang manakah boleh digunakan untuk membezakan larutan-larutan tersebut?

A Ammonia solution

Larutan ammonia

B Barium nitrate solution

Larutan barium nitrat

C Silver nitrate solution

Larutan argentum nitrat

D Sodium hydroxide solution

Larutan natrium hidroksida

45 Diagram 11 shows an energy level diagram.

Rajah 11 menunjukkan gambar rajah aras tenaga.

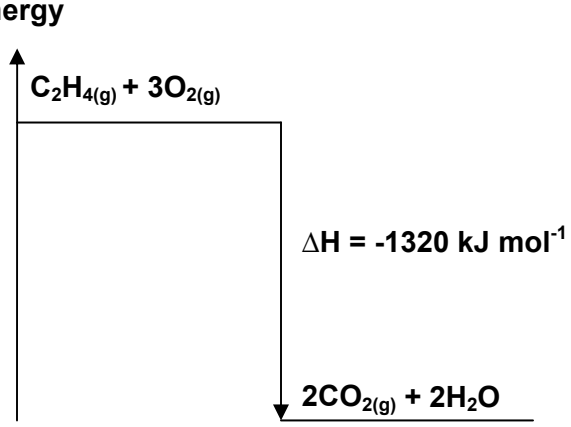


Diagram 11 / *Rajah 11*

Based on diagram 11, it can be concluded that

Berdasarkan Rajah 11, dapat disimpulkan bahawa

A The heat of combustion of ethene is – 1320 kJ mol^{-1}.

Haba pembakaran bagi etena ialah – 1320 kJ mol^{-1}.

B 1320 kJ of energy is required for the reaction to occur.

1320 kJ tenaga diperlukan bagi membolehkan tindak balas berlaku.

C The reactants contain less energy than the products of reaction.

Bahan tindak balas mengandungi tenaga yang kurang berbanding hasil tindak balas.

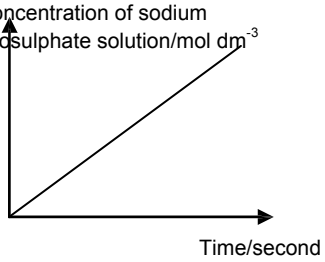
D The temperature at the end of the reaction is lower than that at the beginning of the reaction.

Suhu pada akhir tindak balas adalah lebih rendah berbanding suhu pada awal tindak balas.

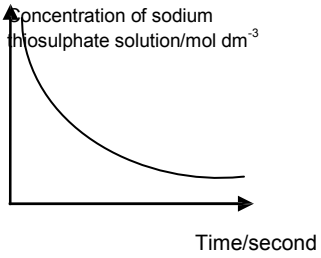
46 A reaction between sodium thiosulphate solution and dilute sulphuric acid will produce sulphur. Which of the following graphs show the relationship between the concentration of sodium thiosulphate solution and the time taken to form sulphur?

Tindak balas di antara larutan natrium tiosulfat dan larutan asid sulfurik akan menghasilkan sulfur. Yang manakah di antara graf berikut menunjukkan perhubungan di antara kepekatan larutan natrium tiosulfat dengan masa yang diambil untuk membentuk sulfur.

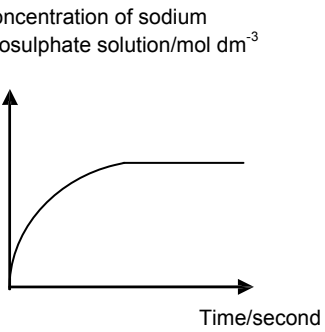
A



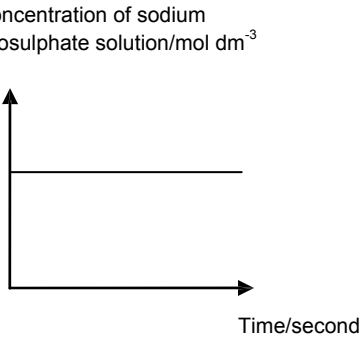
C



B



D



47 The following is a half equation for a redox reaction.

Berikut ialah setengah persamaan bagi suatu tindak balas redoks.

$$Cr_2O_7^{2-} + 14H^+ + qe^- \longrightarrow 2Cr^{3+} + 7H_2O$$

What is the value of q?

Apakah nilai q?

A 3

B 6

C 7

D 9

48 When a mixture of carbon and copper(II) oxide is heated strongly ...
Apabila satu campuran karbon dengan kuprum(II) oksida di panaskan dengan kuat …

I the oxide ion loses two electrons.
ion oksida melepaskan dua elektron.

II the oxidation number of carbon increases from 0 to +4.
nombor pengoksidaan karbon bertambah dari 0 kepada +4.

III the copper(II) oxide acts as the reducing agent.
kuprum(II) oksida bertindak sebagai agen penurunan.

IV the copper(II) ion accepts two electrons.
ion kuprum(II) menerima dua elektron.

A I and III only

B II and IV only

C II, III and IV only

D I, II, III and IV

49 The following are three reactions involving metals W, X, Y and Z.

Berikut adalah tiga tindak balas yang melibatkan logam W, X, Y dan Z..

Z oxide + X ⟶ Z + X oxide

Z oksida + X ⟶ *Z + X oksida*

Z oxide + W ⟶ No reaction

Z oksida + W ⟶ *Tiada tindak balas*

Y oxide + W ⟶ Y + W oxide

Y oksida + W ⟶ *Y + W oksida*

Arrange metals W, X, Y and Z in decreasing order of reactivity of metals.

Susun kereaktifan logam W, X, Y dan Z mengikut tertib menurun.

A X, Z, W, Y

B X, W, Z, Y

C Y, W, Z, X

D Y, Z, W, X

50 In an experiment to determine the heat of neutralization for the reaction between nitric acid and sodium hydroxide solution, 50cm^3 of 1.0 mol dm^{-3} nitric acid is added to 50 cm^3 of 1.0 mol dm^{-3} sodium hydroxide solution in a plastic cup. The temperature increases from 30.0°C to 36.5°C.
Calculate the heat of neutralization.
(Specific heat capacity of water = 4.2 J/g°C)

Dalam satu eksperimen untuk menentukan haba peneutralan untuk tindak balas di antara asid nitrik dan Natrium hidroksida, 50cm^3 asid nitrik berkepekatan 1.0 mol dm^{-3} ditambah kepada 50 cm^3 larutan natrium hidroksida berkepekatan 1.0 mol dm^{-3} dalam sebuah cawan plastic. Suhu meningkat dari 30.0 °C *kepada* 36. 5°C.
Kirakan haba peneutralan.
(Muatan haba tentu air = 4.2 J/g°C)

A. 18200 kJ

B. 27300 kJ

C. 36400 kJ

D. 54600 kJ

END OF QUESTION PAPER.

NAMA : _____

KELAS: _____ _____

JABATAN PELAJARAN NEGERI SABAH

SIJIL PELAJARAN MALAYSIA 2010 **4541/1**
EXCEL 2
CHEMISTRY
Kertas 2
OGOS 2010

2 Jam 30 minit Dua jam tiga puluh minit

DO NOT OPEN THE QUESTION PAPER UNTIL INSTRUCTED
(JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU)

1. Tuliskan No. Kad Pengenalan dan Angka Giliran anda pada ruangan yang disediakan.
2. Kertas soalan ini adalah dalam dwibahasa
3. Soalan dalam B. Inggeris mendahului soalan yang sepadan dalam B. Melayu
4. Calon dibenarkan menjawab keseluruhan atau sebahagian soalan samada dalam B. Inggeris atau B. Melayu
5. Calon dikehendaki membaca maklumat di halaman belakang kertas soalan ini

Untuk Kegunaan Pemeriksa			
Kod Pemeriksa :			
Bahagian	Soalan	Markah Penuh	Markah Diperolehi
A	1	10	
	2	8	
	3	12	
	4	9	
	5	10	
	6	11	
B	7	20	
	8	20	
C	9	20	
	10	20	
Total Marks / Jumlah			

THIS QUESTION PAPER CONSIST OF 23 PRINTED PAGES

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****. Tulis jawapan bagi* ***Bahagian A*** *dalam ruang yang disediakan dalam kertas soalan ini.*

3. Answer **one** question from **Section B** and one question from **Section C**. Write your answers for **Section B** and **Section C** on the lined pages at the end of the question paper. Answer questions in **Section B** and **Section C** in detail. You may use questions, diagrams, tables, graphs and other suitable methods to explain your answer.

   Jawab satu soalan daripada ***Bahagian B*** *dan satu soalan dari* ***Bahagian C****. Tulis jawapan bagi* ***Bahagian B*** *dan* ***Bahagian C*** *pada helaian tambahan yang dibekalkan oleh pengawas peperiksaan. Jawab soalan dalam* ***Bahagian B*** *dan* ***Bahagian C*** *dengan terperinci.*

   Anda boleh menggunakan persamaan, rajah, jadual, graf dan cara lain yang sesuai untuk menjelaskan jawapan anda.

4. Show your working. It may help you to get marks.

   Tunjukkan kerja mengira. Ini membantu anda mendapatkan markah.

5. If you wish to cancel any answer, neatly cross out the answer.

   Sekiranya anda hendak menukar jawapan, batalkan dengan kemas jawapan yang telah dibuat. Kemudian tulis jawapan yang baru.

6. The diagrams in the question are not drawn to scale unless stated.

   Rajah yang mengiringi soalan tidak dilukis mengikut skala kecuali dinyatakan.

7. Marks allocated for each question or part question are shown in brackets.

   Markah yang diperuntukkan bagi setiap soalan atau ceraian soalan ditunjukkan dalam kurungan.

8. The time suggested to answer **Section A** is 90 minutes, **Section B** is 30 minutes and **Section C** is 30 minutes.

   Masa yang dicadangkan untuk menjawab ***Bahagian A*** *ialah 90 minit,* ***Bahagian B*** *ialah 30 minit dan* ***Bahagian C*** *ialah 30 minit.*

9. You may use a non-programmable scientific calculator.
   Anda dibenarkan menggunakan kalkulatur saintifik yang tidak boleh deprogram.

10. Hand in this question paper at the end of the examination

    Serahkan kertas jawapan anda diakhir peperiksaan.

SECTION A
[60 marks]

Answer ALL Questions
Jawab SEMUA soalan

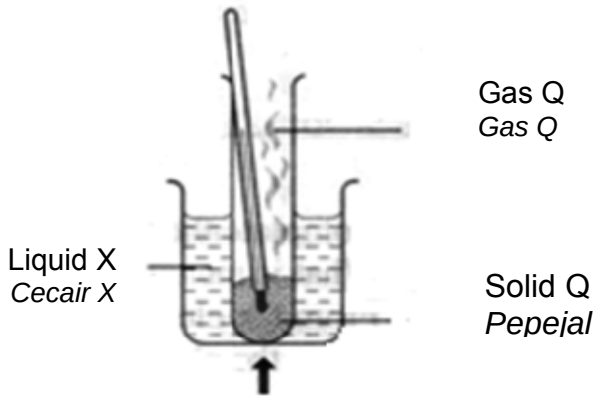


Diagram 1.1 / *Rajah 1.1*

1 Diagram 1.1 shows the apparatus used in an experiment to study the changes of physical state of *Q*. The black solid is heated from room temperature to 200^0C. At 180^0C, the solid *Q* changed directly into a purple gas.
Rajah 1.1 menunjukkan radas yang digunakan dalam eksperimen mengkaji perubahan fizikal pepejal Q. Pepejal hitam dipanaskan dari suhu bilik sehingga 200^0C.
Pada suhu 180^0C, pepejal Q berubah kepada gas berwarna ungu

(a) Name the process undergone by *Q* at 181°C.
Namakan proses yang dialami Q pada suhu 181^oC.

_____
[1 mark]

(b) State the changes of each the following when solid *Q* changes to gas *Q*.
Nyatakan perubahan bagi setiap yang berikut apabila pepejal Q berubah kepada gas Q.

(i) Kinetic energy
Tenaga kinetk

_____
[1 mark]

(ii) Arrangement of the particles
Susunan zarah-zarah

_____

[1 mark]

(c) (i) Can water bath be used in heating of the solid *Q*? Explain why.
Bolehkah air digunakan dalam pemanasan pepejal Q? Jelaskan mengapa?

_____

_____

[2 mark]

(ii) Suggest the suitable material for liquid *X* that is used in the heating of the solid *Q*.
Cadangkan bahan yang sesuai sebagai liquid X yang digunakan untukpemanasan pepejal Q.

_____

[1 mark]

(d) Diagram 1.2 shows both elements which are isotopes.
Rajah 1.2 menunjukkan dua unsur isotop.

$^{35}_{17}Y$ $^{37}_{17}Z$

Diagram 1.2 / *Rajah 1.2*

(i) What is meant by isotopes?
Apa yang dimaksudkan dengan isotop?

_____

[1 mark]

(ii) State **one** difference of the physical properties of two isotopes.
*Nyatakan **satu** perbezaan ciri fizikal bagi dua isotop*.

_____

[1 mark]

(iii) Based on the symbol given, determine the number of subatomic particles in the nucleus of each element.
Berdasarkan simbol yang diberi, tentukan bilangan zarah subatom dalam nuklues bagi setiap unsur.

_____

_____

[2 mark]

2 The symbols of the elements in Period 3 are given below:
Berikut ialah simbol-simbol unsur dalam kala 3:

Na, Mg, Al, Si, P, S, Cl, Ar

(a) Name an element that conduct electricity in Period 3.
Namakan unsur dalam kala 3 yang boleh mengalirkan arus elektrik.

_____

[1 mark]

(b) How does the atomic radius change across the period? Explain your answer.
Bagaimanakah jejari atom berubah merentasi kala? Jelaskan jawapan anda.

_____

_____

_____

[3 marks]

(c) (i) Name a basic oxide of Period 3 that can dissolve in water.
Namakan oksida bersifat bes dalam kala 3 yang boleh larut dalam air.

_____

[1 mark]

(ii) Write an equation for the reaction that takes place when its basic oxide in (c) (i) is dissolved in water.
Tuliskan persamaan tindakbalas yang berlaku apabila oksida bes dalam (c)(i) dilarutkan dalam air.

_____

[2 marks]

(d) Table 1 below shows three different transition elements exist in precious stones.
Jadual 1 di bawah menunjukkan tiga unsur peralihan yang wujud dalam batu permata.

Stones ***Batu Permata***	**Transition element** ***Unsur Peralihan***
Ruby *Delima*	Chromium *Kromium*
Sapphire *Nilam*	Iron and Titanium *Besi dan Titanium*
Amethyst *Kecubung*	Manganese *Mangan*

Table 1 / Jadual 1

What is the special characteristic of transition elements that can be deduced from Table 1 ?
Apakah ciri istimewa unsur peralihan yang boleh disimpulkan dari Jadual 1 di atas?

_____

[1 mark]

3. Diagram 3.0 shows part of the set up of apparatus of a chemical cell.
Rajah 3.0 menunjukkan sebahagian daripada susunan radas bagi suatu sel kimia.

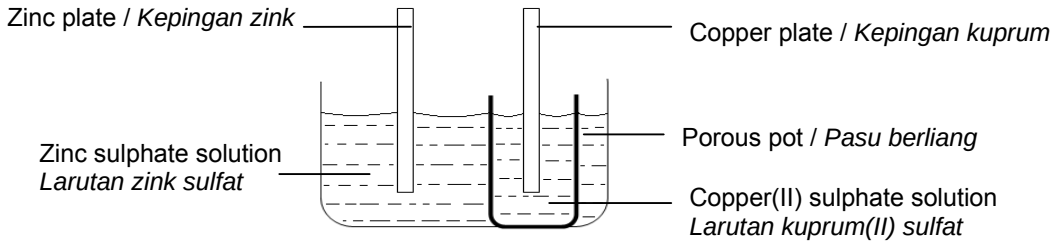


Diagram 3.0
Rajah 3.0

(a) Draw a complete set-up of apparatus for the chemical cell on Diagram 3.
Lengkapkan lukisan susunan radas bagi sel kimia pada Rajah 3.

[1 mark]

(b) Label the negative electrode as (-) and positive electrode as (+) on the completed chemical cell in Diagram 3.
Labelkan elektrod negatif sebagai (-) dan elektrod positif sebagai (+) pada rajah sel kimia yang telah dilengkapkan dalam Rajah 3.

[1 mark]

(c) State the flow of electron for the chemical cell in Diagram 3.
Nyatakan arah pengaliran elektron bagi sel kimia pada Rajah 3.

_____.

[1 mark]

(d) What is the function of the porous pot ?
Apakah fungsi pasu berliang yang digunakan dalam sel kimia di atas?

_____.

[1 mark]

(e) What can you observed at the negative electrode?
Apakah yang boleh anda perhatikan pada elektrod negatif?

_____.

[1 mark]

(f) What was observed in the change of intensity of blue aqueous copper(II) sulphate? Explain your answer.
Apakah yang berlaku pada warna biru larutan kuprum(II) sulfat? Terangkan jawapan anda.

_____

_____

[2 marks]

(g) Write half equation for the discharged of ions at positive electrode.
Tuliskan persamaan setengah bagi ion yang didiscas pada elektrod positif.

_____.

[1 mark]

(h) If the copper plate in the chemical cell above is replaced by silver metal, what will happen to the voltage reading of the cell? Explain your answer.
Jika kepingan kuprum di dalam sel kimia di atas digantikan dengan logam argentum, apakah yang berlaku kepada nilai voltan yang akan terhasil?

_____.

[2 marks]

(i) Table 3.0 shows the voltage of chemical cell using metals A, B and C as the electrode.
Jadual 3.0 menunjukkan nilai voltan bagi sel kimia menggunakan logam A, B dan C sebagai elektrod.

Pairs of metal *Pasangan logam*	Voltage (V) *Nilai voltan (V)*	Positive electrode *Elektrod positif*
B / C	0.1	C
A / C	0.8	C

Table 3.0 / *Jadual 3.0*

Based on the information given, calculate the voltage of a chemical cell using metal A and B as the electrode.
Berdasarkan kepada maklumat yang diberikan, hitungkan nilai voltan yang akan dihasilkan oleh sel kimia yang menggunakan logam A dan B sebagai elektrod.

[2 marks]

4 The flowchart in diagram 4.0 shows the result of a qualitative analysis that is carried out on a mixture of metal Q and a salt P solution.
Carta alir dalam Rajah 4.0 menunjukkan keputusan analisis kualitatif yang telah dijalankan ke atas campuran logam Q dan larutan garam P.

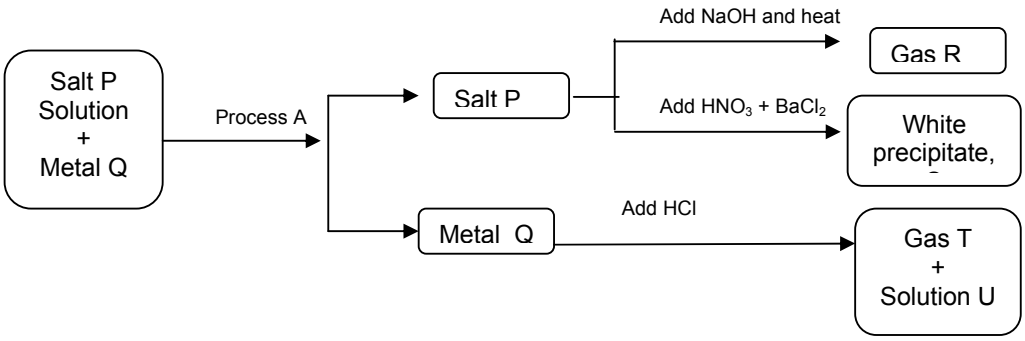


Diagram 4.0
Rajah 4.0

(a) Name the process A that is used to separate Salt P Solution and metal Q.
Namakan proses A yang digunakan untuk mengasingkan larutan garam P dan logam Q.

_____.
[1 mark]

(b) Gas R is a gas that can change red litmus paper to blue.Name gas R.
What is the cation present in Salt P Solution?
Gas R ialah gas yang boleh menukarkan kertas litmus merah kepada biru.Namakan gas R. Namakan kation yang hadir dalam larutan P.

_____

_____

[2 marks]

(c) Name the white precipitate S. What is the anion present in solution P?
Namakan mendakan putih S. Apakah anion yang hadir dalam larutan P?

_____

_____

[2 marks]

(d) When gas R is passed into solution U, a white precipitate is first formed but dissolves when excess gas R is passed through. Identify the cation present in solution U.
Apabila gas R dilalukan ke dalam larutan U, mendakan putih terbentuk pada mulanya tetapi larut apabila gas R dilalukan secara berlebihan. Kenalpasti kation yang hadir dalam larutan U.

_____.
[1 mark]

(e) (i) From your answer in (d), determine the identity of metal Q and gas T.
Daripada jawapan anda di (d), tentukan identiti logam Q dan gas T.

_____

_____
[2 marks]

(ii) Write a ionic equation for the reaction between metal Q in (e)(i) and hydrochloric acid.
Tuliskan persamaan ionik bagi tindak balas antara logam Q dalam (e)(i) dengan asid hidroklorik.

_____
.
[1 mark]

5 Diagram 5.0 shows the set- up of apparatus to investigate the reaction between potassium iodide solution and chlorine water through the transfer of electrons at a distance..
Rajah 5.0 *menunjukkan susunan radas untuk menyiasat tindak balas di antara larutan kalium iodide dan air klorin melalui pemindahan elektron pada satu jarak.*

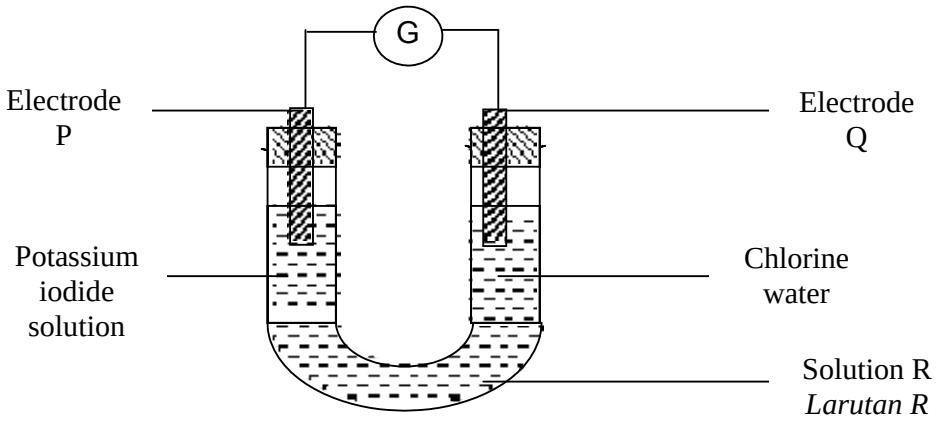


Diagram 5.0
Rajah 5.0

(a) Name the suitable solution R?
Namakan larutan R yang sesuai digunakan ?

_____
[1 mark]

(b) On the diagram 5, draw the direction of the flow of electrons.
Pada Rajah 5*, lukiskan arah pengaliran elektron*.

[1 *mark*]

(c) (i) What is the colour change in the solution around electrode P?
Apakah perubahan warna dalam larutan di sekitar elektrod?

_____
[1 mark]

(ii) Describe a chemical test to determine the product formed in the solution at electrode P.
Huraikan satu ujian kimia untuk menentukan hasil yang terbentuk dalam larutan di elektrod P.

_____

_____

[2 marks]

(d) State the name of the substance that is oxidised in the experiment? Give reason.
Nyatakan nama bahan yang dioksidakan dalam eksperimen itu? Berikan sebab.

___ _____ _____

__ _____ _____

[2 marks]

(e) Write a half equation for the reaction that occurs at electrode Q.
Tuliskan setengah persamaan bagi tindak balas yang berlaku di elektrod Q.

_____
[1 mark]

(f) Suggest another reagent that can replace chlorine water.
Cadangkan satu reagen lain yang boleh menggantikan air klorin

_____
[1 mark]

(g) What is the change in oxidation number of chlorine in the reaction?
Apakah perubahan nombor pengoksidaan bagi klorin dalam tindak balas?

_____
[1 mark]

6 Polyvinyl chloride (PVC) is the polymer produced from vinyl chloride.
Part of the structure of PVC is shown in Diagram 6.1 below:
Polivinil klorida (PVC) adalah polimer yang dihasilkan daripada vinil klorida
Bahagian struktur bagi PVC ditunjukkan dalam Rajah 6.1 di bawah.

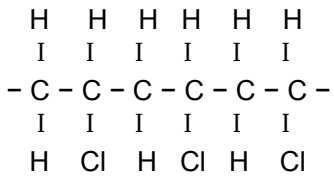


Diagram 6.1
Rajah 6.1

(a) (i) Draw the structure of the monomer of PVC.
Lukis struktur monomer bagi PVC.

[1 mark]

(ii) What type of polymerisation is used to form PVC?
Apakah jenis pempolimeran yang digunakan untuk membuat PVC?

_____

[1 mark]

(iii) PVC is used to make water pipes. Give **one** advantage of using PVC water pipes as compared to metal pipes.
PVC digunakan untuk membuat paip air. Berikan satu kelebihan menggunakan paip air PVC berbanding paip logam.

_____

[1 mark]

(b) New improved glass like photochromic glass is made of composite material.
Kaca baru yang diperbaharui seperti kaca fotokromik adalah bahan komposit.

(i) What is meant by composite materials?
Apakah yang dimaksudkan dengan bahan komposit?

_____

_____

[2 marks]

(ii) What are the materials used to make the photochromic glass?
Apakah bahan yang digunakan untuk membuat kaca fotokromik?

_____

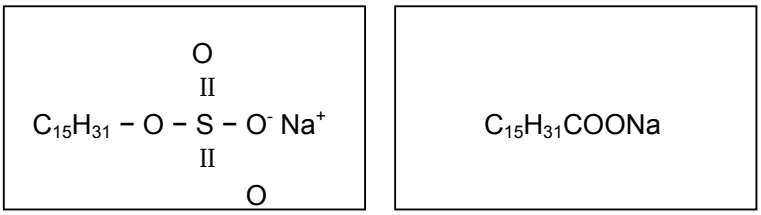
[1 mark]

(iii) What happens to the photochromic glass in the presence and absence of light?
Apakah yang berlaku kepada kaca fotokromik apabila cahaya hadir atau tidak?

_____

[1 mark]

(c) A student carried out an investigation to determine the cleaning property of the compounds P and Q shown in Diagram 6.2.
Seorang pelajar menjalankan penyelidikan untuk menentukan sifat pencucian sebatian P dan Q yang ditunjukkan dalam Rajah 6.2



P **Q**

Diagram 6.2 / *Rajah 6.2*

(i) State the type of compound P and Q
Nyatakan jenis sebatian P dan Q.

P :_____

Q :_____

[2 marks]

(ii) P is found to be more effective than Q under certain conditions during cleaning. What are the conditions?
P didapati lebih berkesan daripada Q di dalam keadaan yang tertentu semasa pencucian. Apakah keadaan tersebut?

_____

[1 mark]

(iii) Write an equation to show why Q is less effective than P.
Tulis persamaan untuk menunjukkan mengapa Q kurang berkesan berbanding P.

_____

[1 mark]

SECTION B
BAHAGIAN B

[20 *marks*]
[20 markah]

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

7 (a) (i) The proton number of Helium and Argon are 2 and 18 respectively. Write the electron arrangements of helium and argon. Explain why these two elements are chemically unreactive.

Nombor proton bagi Helium dan Argon masing-masing adalah 2 dan 18. Tuliskan susunan electron bagi helium dan argon. Terangkan mengapakah kedua-dua unsur ini tidak reaktif secara kimia.

[2 marks]

(ii) State the conditions for the formation of chemical bonds.
Nyatakan syarat pembentukan ikatan kimia.

[2 marks]

(b) Three compounds *P*, *Q* and *R* have the properties as shown in the Table 7.1. Explain the differences in electrical conductivity, melting point and solubility in water for *P*,*Q* and *R* based on the types of bonds and the types of particles in *P*,*Q* and *R*.

Tiga sebatian P, Q dan R mempunyai sifat-sifat yang ditunjukkan dalam Jadual 7.1. Terangkan perbezaan dalam kekondusian elektrik, takat lebur dan kelarutan dalam air untuk P, Q dan R berdasarkan bentuk ikatan dan bentuk zarah dalam P,Q dan R.

Properties *Sifat-sifat* / Compound *Sebatian*	Melting point *Takat lebur*	Electrical conductivity (Molten state) *Kekonduksian elektrik (Keadaan lebur)*	Solubility in water *Kelarutan dalam air*
P	Low *Rendah*	Does not conduct electricity *Tidak konduksikan elektrik*	Soluble *Larut*
Q	Low *Rendah*	Does not conduct electricity *Tidak konduksikan elektrik*	Insoluble *Tidak larut*
R	High *Tinggi*	Conduct electricity *Konduksi elektrik*	Soluble *Larut*

[8 marks]

Table 7.1 / *Jadual 7.1*

(c) Tetrachloromethane and carbohydrate both are covalent compounds. Explain why tetrachloromethane has lower melting and boiling point as compared to carbohydrate?

[4 *marks*]

Tetraklorometane dan karbohidrat kedua-duanya adalah sebatian kovalen. Terangkan mengapakah tetraklorometane mempunyai takat lebur dan takat didih yang rendah berbanding karbohidrat.

[4 markah]

(d) State the uses of the following organic solvents.
Nyatakan kegunaan pelarut organic yang berikut.

- Acetone
  Aseton
- Ether
  Eter
- Ethanol
  Etanol
- Turpentine
  Turpentin

[4 marks]

8 (a) Table 8.1 below shows the results of an experiment carried out to show the role of water in determining acids properties.
Jadual 8.1 di bawah menunjukkan keputusan satu eksperiment untuk menunjukkan peranan air terhadap sifat asid.

Substance ***Bahan***	**Observation** ***Pemerhatian***
Glacial ethanoic acid *Asid etanoik glasial*	Does not conduct electricity *Tidak mengkonduksi elektrik*
Ethanoic acid + water *Asid etanoik + air*	Conducts electricity *Boleh mengkonduksi elektrik*

Table 8.1 / Jadual 8.1

Explain the observations shown in the Table 8.1
Terangkan pemerhatian yang diperolehi berdasarkan Jadual 8.1

[2 marks]

(b) Table 8.2 below shows the results of an experiment carried out to compare the strength of acids.
Jadual 8.2 di bawah menunjukkan keputusan eksperimen untuk membandingkan kekuatan asid.

Acids **Acid**	**pH value** **Nilai pH**
0.1 mol dm^{-3} hydrochloric acid asid hidroklorik 0.1 mol dm^{-3}	1
0.1 mol dm^{-3} ethanoic acid asid etanoik 0.1 mol dm^{-3}	4

Table 8.2 / *Jadual 8.2*

Explain the difference in the pH values of both hydrochloric acid and ethanoic acid
Terangkan perbezaan nilai pH bagi kedua-dua asid hidroklorik dan asid etanoik.

[4 marks]

(c) Describe an experiment to show that hydrogen chloride atau sulphur dioxide gas only exhibits acidic properties when dissolved in water. Your answer should include a labelled diagram of the set-up of the apparatus for the preparation of hydrogen chloride gas and all the equations involved.
Huraikan satu eksperimen untuk menunjukkan sama ada gas hidrogen klorida atau gas sulfur dioksida hanya akan menunjukkan sifat keasidan apabila dilarutkan dalam air. Dalam penerangan anda hendaklah disertakan gambarajah berlabel radas bagi penyediaan gas hidrogen klorida atau sulfur dioksida dan termasuk persamaan kima yang terlibat.

[8 marks]

(d)

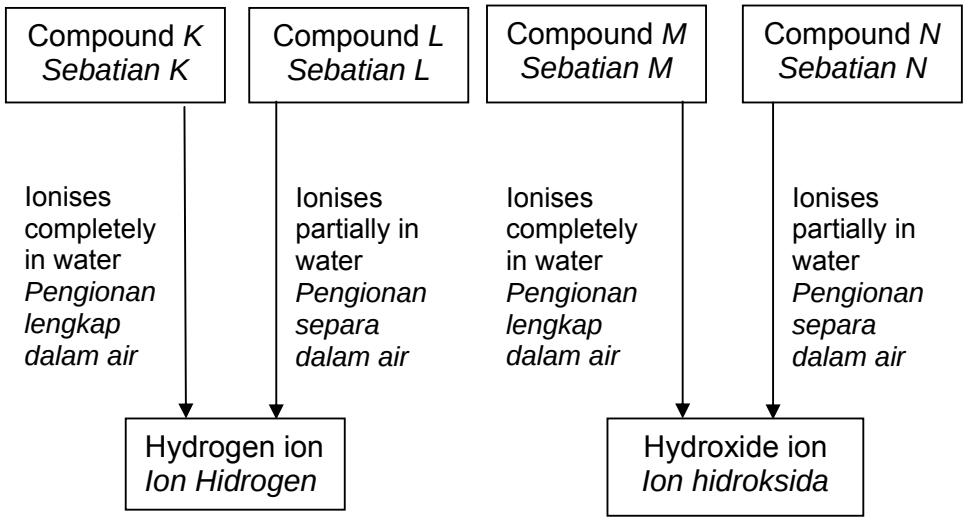


Diagram 8.0 / *Rajah 8.0*

(i) State the types of alkali of solution *M* and *N*.
Nyatakan jenis alkali bagi larutan M dan N

[2 marks]

(ii) By using zinc pieces only, state how you can differentiate solution *L* and solution *N*. State and explain the predicted observations.
Dengan menggunakan kepingan zink sahaja, nyatakan bagaimana anda boleh membezakan larutan L dan N. Nyatakan dan terangkan pemerhatian yang dijangkakan.

[4 marks]

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) Explain why food stored in refrigerator lasts longer than food stored in the kitchen cabinet?
Terangkan mengapa makanan yang disimpan di dalam peti sejuk tahan lebih lama daripada makanan yang disimpan di dalam kabinet dapur?

[4 marks/ *4 markah*]

(b) An experiment is conducted to determine the rate of a reaction between magnesium tape and dilute hydrochloric acid 0.1 mol dm^{-3}. The volume of hydrogen gas released is collected and measured at intervals of 15 seconds for 1.5 minutes and then at intervals of 30 seconds.
The results obtained are recorded in Table 9.0.

Satu eksperimen dijalankan untuk menentukan kadar tindak balas antara pita magnesium dan asid hidroklorik cair 0.1 mol dm^{-3}.. Isipadu gas hidrogen yang dibebaskan dikumpul dan diukur dalam sela masa 15 saat selama 1.5 minit dan kemudian pada sela masa 30 saat.
Keputusan yang diperolehi direkodkan dalam Jadual 9.0.

Time (s) *Masa (s)*	0	15	30	45	60	75	90	120	150	180	210	240
Volume of hydrogen gas (cm^3) *Isipadu gas hidrogen (cm^3)*	0	10	18	25	32	38	44	52.5	58	61	62	62

Table 9.0 / *Jadual 9.0*

(i) From the results in Table 6, draw a graph of volume of hydrogen gas against time on graph paper.

Daripada keputusan dalam Jadual 6, lukis graf isipadu gas hidrogen melawan masa pada kertas graf.

[3 marks/ *3 markah*]

(ii) Based on the graph that you have drawn in b(i), calculate

Berdasarkan graf yang anda lukis di b(i), kira

(a) The average rate of reaction, in the first 90 seconds

Kadar tindak balas pada saat ke 81.

(b) The rate of reaction at 81st seconds

Kadar tindak balas pada saat ke 81.

[3 marks/ *3 markah*]

(iii) What conclusion can be made from the graph drawn based on the experiment?

Apakah kesimpulan yang boleh dibuat daripada graf yang dilukis bedasarkan eksperimen?

[4 marks/ *4 markah*]

(c) (i) If the dilute hydrochloric acid 0.1 mol dm^{-3} replaced with dilute hydrochloric acid 0.1 mol dm^{-3} in this experiment. Explain how factor concentration of acids affect the rate of reaction in terms of collision of particles.

Jika asid hidroklorik 0.1 mol dm^{-3} digantikan dengan asid hidroklorik 0.2 mol dm^{-3} dalam eksperimen tersebut. Terangkan bagaiman faktor kepekatan asid yang berbeza mempengaruhi kadar tindak balas kimia berdasarkan perlanggaran zarah.

[4 marks/ *4 markah*]

(ii) State another **two** factor beside c(i) , that can affect the rate of reaction.
*Nyatakan dua **two** faktor selain daripada yang dinyatakan dalam c(i) yang boleh mempengaruhi kadar tindak balas.*

[2 marks/ *2 markah*]

10 (a) Diagram 8 below shows the conversion of carbon compound *X* to carbon compound *Y*.
Rajah 8 di bawah menunjukkan perubahan sebatian karbon X kepada sebatian karbon Y.

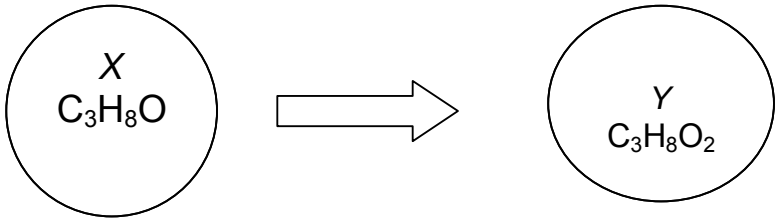


Diagram 8
Rajah 8

(i) Name carbon compound *Y*.
Namakan sebatian carbon Y.

[1 mark]

(ii) State **two** physical properties of *Y*.
*Nyatakan **dua** sifat fizikal bagi Y.*

[2 marks]

(iii) Explain the conversion of compound *X* to compound *Y*. Set up of apparatus, balanced equation and observation, must be included in the explaination.

Terangkan perubahan sebatian X ke sebatian Y. Susunan alatradas, persamaan kimia berimbangan serta pemerhatian haruslah disertakan dalam penerangan anda.

[5 marks]

(iv) State the confirmation test for compound *Y*.
Nyatakan ujian pengesahan untuk sebatian Y.

[2 marks]

(b)

Butan-1-ol	Pentanoic acid

(i) Butan-1-ol and pentanoic acid will reacts to form an ester.
Draw and name the ester according to IUPAC nomenclature, of the ester formed.
Butan-1-ol dan asid pentanoik bertindak balas dan membentuk ester.Lukis dan *namakan ester yang terhasil mengikut sistem penamaan IUPAC.*

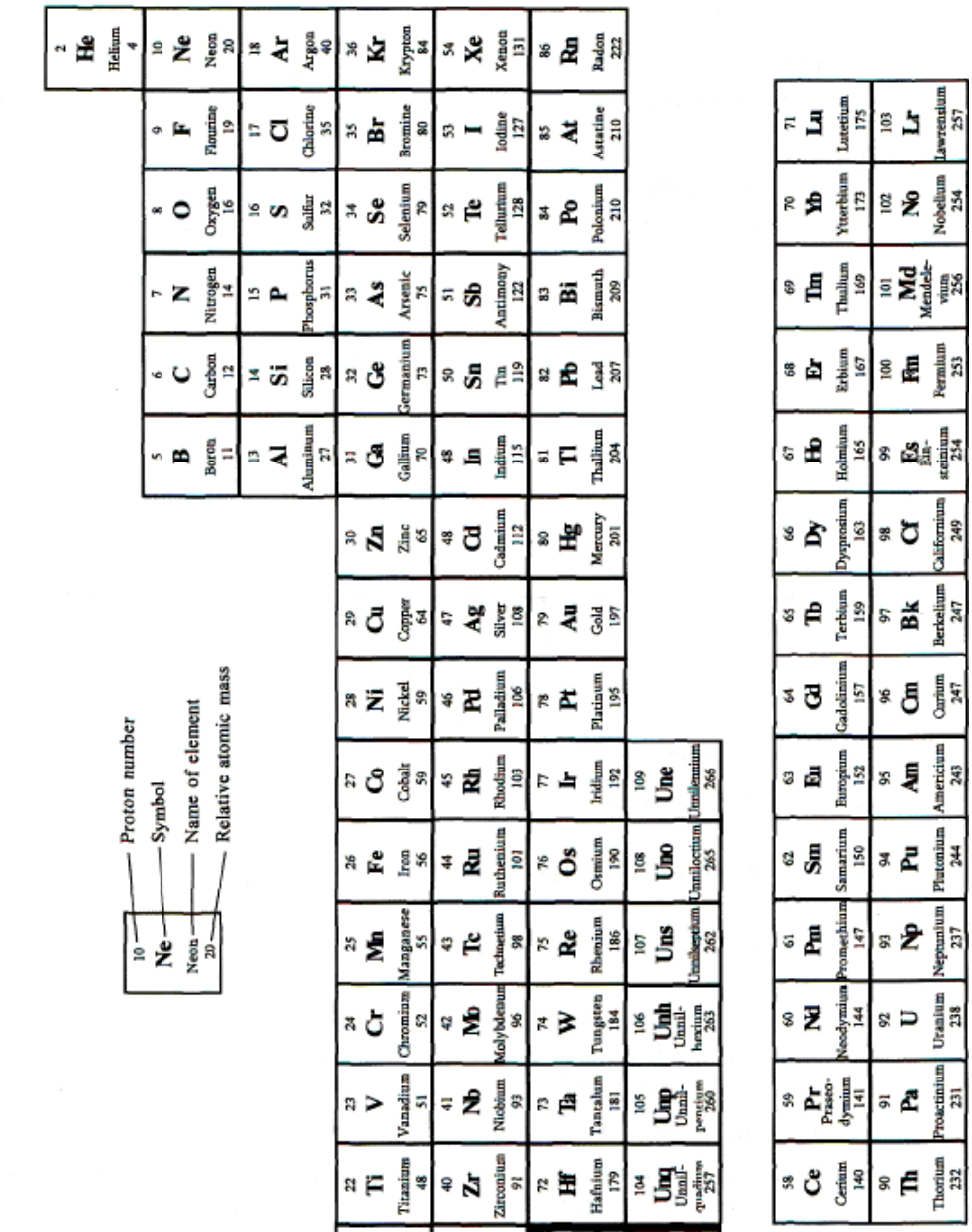
[2 marks]

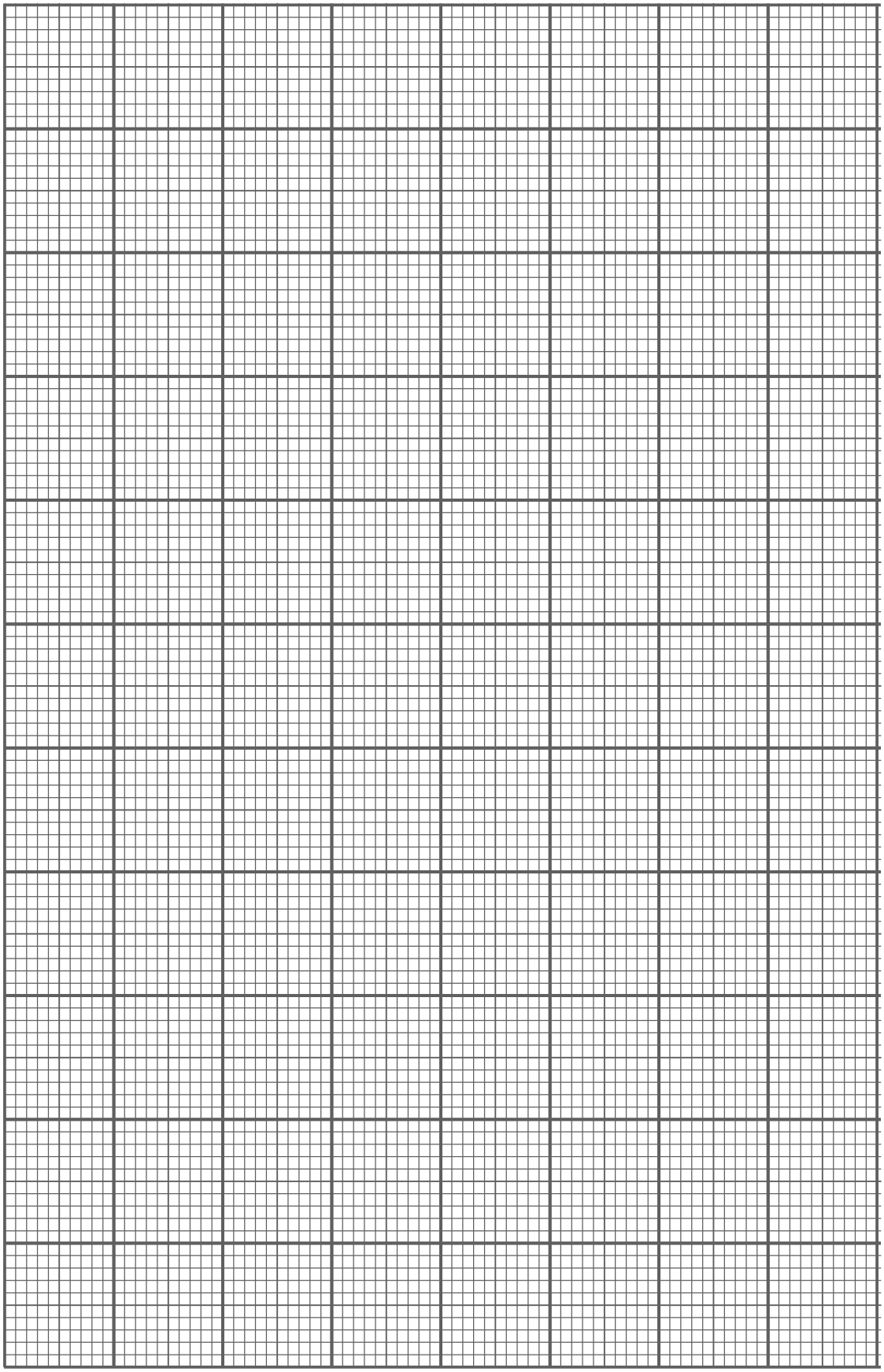
(ii) With the help of a labeled diagram, describe the esterification of the named ester at (*b*)(i).
Dengan bantuan gambarajah, terangkan proses esterifikasi ester yangterhasil di (*b*)*(i).*

[8 marks]

****** END OF QUESTION PAPER*****

THE PERIODIC TABLE OF ELEMENTS





SULIT

NAME :_____

KELAS :_____

JABATAN PELAJARAN NEGERI SABAH

SIJIL PELAJARAN MALAYSIA 2010 **4541/3**
EXCEL 2
CHEMISTRY
Kertas 3
OGOS 2010

1 ½ jam **Satu jam tiga puluh minit**

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Tuliskan* **nombor kad pengenalan** *dan* **angka giliran** *anda pada ruang yang disediakan.*
2. *Kertas soalan 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 2 kertas soalan ini.*

Untuk kegunaan Pemeriksa		
Kod Pemeriksa:		
Soalan	*Markah Penuh*	*Markah diperoleh*
1	***18***	
2	***15***	
3	***17***	
JUMLAH	***50***	

Kertas soalan ini mengandungi 10 halaman bercetak

[Lihat halaman sebelah

INFORMATION FOR CANDIDATES
MAKLUMAT UNTUK CALON

1. This question paper consists of **three** questions: Question 1, Question 2 and Question 3. Answer **all** questions.
*Kertas soalan ini mengandungi **tiga** soalan: Soalan 1, Soalan 2 dan Soalan 3.*

2. Answer all questions. Write your answers for **Question 1 and Question 2** in the spaces provided in this question paper.
*Jawab semua soalan. Tulis jawapan anda bagi **Soalan 1 dan Soalan 2** pada ruang yang disediakan dalam kertas soalan ini.*

3. Write your answer for **Question 3** on the 'helaian tambahan' provided by the invigilators. You may use equations, diagrams, tables, graphs and other suitable methods to explain your answers.
*Jawapan anda bagi **Soalan 3** hendaklah ditulis pada helaian tambahan yang dibekalkan oleh pengawas peperiksaan. Anda boleh menggunakan persamaan, rajah, jadual, graf dan cara lain yang sesuai untuk menjelaskan jawapan anda.*

4. Show your working. It may help you to get marks.
Tunjukkan kerja mengira, ini membantu anda mendapatkan markah.

5. The diagrams in the questions are not drawn to scale unless stated.
Rajah yang mengiringi soalan tidak dilukis mengikut skala kecuali dinyatakan.

6. The marks allocated for each question or sub-part of a question is shown in brackets.
Markah yang diperuntukkan bagi setiap soalan atau ceraian soalan ditunjukkan dalam kurungan.

7. If you wish to cancel any answer, cross out the answer that you have done. Then write down the new answer.
Jika anda hendak menukar jawapan, batalkan jawapan yang telah dibuat. Kemudian tulis jawapan yang baru.

8. You may use a non-programmable scientific calculator.
Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh deprogram.

9. You are advised to spend 1 hour to answer **Question 1 and Question 2** and 30 minutes for **Question 3**.
*Anda dinasihati supaya mengambil masa 60 minit untuk menjawab **Soalan 1** dan 30 minit untuk menjawab **Soalan 2**.*

10. Detach **Question 3** from this question paper. Tie the 'helaian tambahan' together with this question paper and hand in to the invigilator at the end of the examination.
*Ceraikan **Soalan 2** daripada kertas soalan ini. Ikat helaian tambahan bersama – sama kertas soalan ini dan serahkan kepada pengawas peperiksaan pada akhir peperiksaan.*

Answer **all** questions.

*Jawab **semua** soalan.*

1 A group of students carried out an experiment to compare the heat of combustion of alcohol. Three types of alcohol that is ethanol, propanol and butanol are burnt in separate spirit lamps. The heat released from each type of alcohol is then used to raise the temperature of 100cm^3 of water by 30^{0}C. By this method Heat of combustion for the three types of alcohol can be determined.

Tiga jenis alkohol iaitu etanol, propanol dan butanol dibakar dalam lampu spirit yang berlainan. Haba yang dibebaskan oleh setiap alkohol kemudian digunakan untuk menaikkan suhu 100 cm^3 air sebanyak 30^{0}C. Dengan kaedah ini, haba pembakaran bagi tiga jenis alkohol boleh ditentukan.

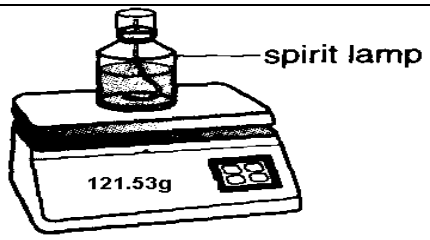
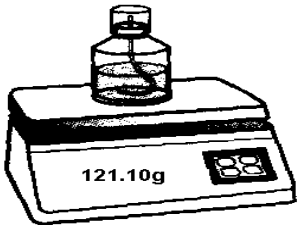
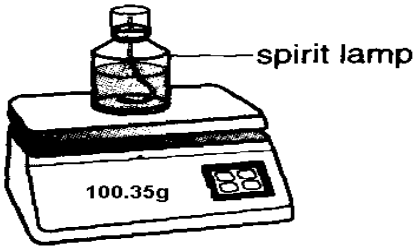
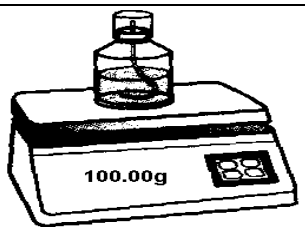
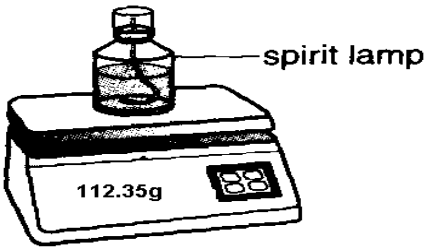
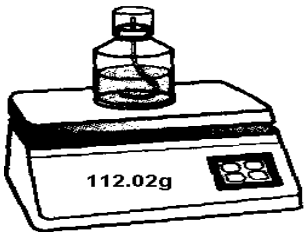
Alcohol	**Before experiment**	**After experiment**	**Mass of alcohol burnt(g)**
Ethanol	 Initial mass/Jisim awal	 Final mass/Jisim akhir	.....
Propanol	 Initial mass/Jisim awal	 Final mass/Jisim akhir	.....
Butanol	 Initial mass/Jisim awal	 Final mass/Jisim akhir	.....

Diagram 1.1 *Gambarajah 1.1*

(a) Record the mass of alcohol burnt in the spaces provided in Diagram 1.1.
Rekod jisim alcohol yang terbakar dalam ruangan yang disediakan dalam Rajah 1.1.

[3 marks]

(b) Draw a labelled diagram showing the set-up of apparatus used to determine Heat of combustion of alcohols in this experiment.
Lukiskan gambarajah berlabel menunjukkan alat radas yang digunakan untuk menentukan Haba pembakaran alkohol dalam eksperimen ini.

[3 marks]

(c) Diagram 1.2 shows the calculation to determine the heat of combustion alcohol.
Rajah 1.2 menunjukkan pengiraan untuk menentukan Haba Pembakaran alkohol.

Heat released
= $mc\theta$
= _____ g x 4.2 J g^{-1} $^oC^{-1}$ x 30^oC
= x J

Number of mole of alcohol burnt
$= \frac{\text{mass of alcohol burnt}}{\text{molar mass of alcohol}}$
= y mol

Heat of combustion
$= \frac{\text{x kJ}}{\text{y mol}}$

Diagram 1.2 / Rajah 1.2

Based on Diagram 1.2 / *Berdasarkan Rajah 1.2 :*

(i) Give the operational definition for the heat of combustion.
Beri definisi secara operasi bagi haba pemabakaran.

.....

.....

[3 marks]

(ii) calculate Heat of combustion of ethanol, propanol and butanol. Show your calculation in the space provided in Table 1.

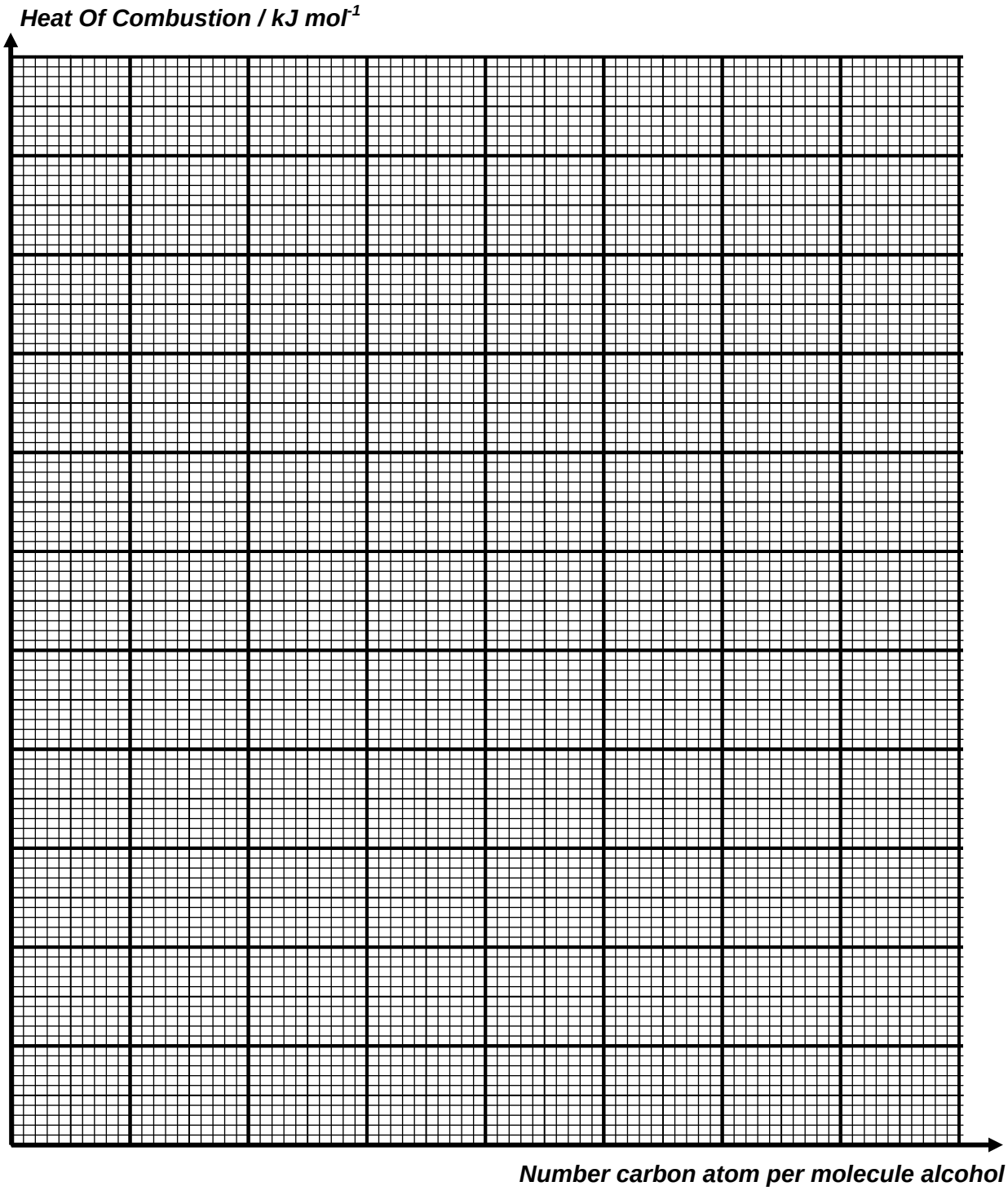
[Specific heat capacity of water, 4.2 $Jg^{-1}{}^{\circ}C^{-1}$ **;**
Molar mass of ethanol = 46 g mol^{-1}, propanol = 74 g mol^{-1} and
butanol = 90 $gmol^{-1}$]

Alcohols	**Heat Of Combustion / kJ mol^{-1}**
Ethanol	
Propanol	
Butanol	

Table 1 / Jadual 1

[6 marks]

(d) Based on Table 1 plot the graph of heat of combustion against the number of carbon atoms per molecule alcohol.
Berdasarkan Jadual 1, plotkan graf bagi haba pembakaran melawan bilangan karbon atom per molekul alkohol.



[3 marks]

2 Diagram 2 shows the set-up of the apparatus to study the reactivity of halogen with iron wool.

Rajah 2 menunjukkan susunan radas bagi mengkaji kereaktifan halogen terhadap wul besi.

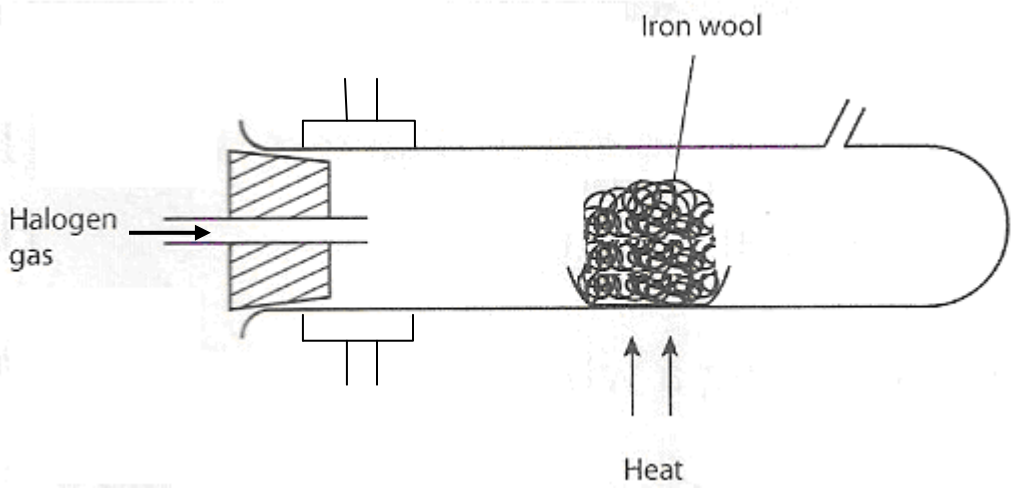


Diagram 2 / Rajah 2

The experiment is carried out by using chlorine gas, bromine vapour and iodine vapour to react with iron wool.

Eksperimen ini dijalankan dengan menggunakan gas klorin, wap bromin dan wap iodin bagi bertindak balas dengan wul besi.

(a) State the hypothesis of this experiment.
Nyatakan hipotesis bagi eksperimen ini.

.....

.....
[3 marks]

(b) Complete the following table.
Lengkapkan jadual berikut.

Variable ***Pemboleh ubah***	**Action to be taken** ***Tindakan yang perlu diambil***
(i) Manipulated variable: *Pemboleh ubah dimanipulasi* …… …… ……	(i) Method to manipulate the variable: *Cara memanipulasikan pemboleh ubah* …… …… ……
(ii) Responding variable: *Pemboleh ubah bergerak balas* …… …… ……	(ii) How the variable is responding: *Bagaimana pemboleh ubah ini bergerak balas* …… …… ……
(iii) Controlled variable: *Pemboleh ubah dimalarkan* …… …… ……	(iii) The way to maintain the controlled variable: *Cara menetapkan pemboleh ubah dimalarkan* …… …… ……

[6 marks]

(c) The following table shows the observation after the experiment has been conducted. Predict the result when iodine reacts with iron wool.

Jadual berikut menunjukkan pemerhatian selepas eksperimen dijalankan. Ramalkan keputusan yang bakal diperolehi apabila iodin bertindak balas dengan wul besi.

Halogen	**Observation/ *Pemerhatian***
Chlorine/ *Klorin*	Iron wool glows brightly. *Wul besi menyala dengan terang.*
Bromine/ *Bromin*	Iron wool glows moderately. *Wul besi menyala dengan sederhana.*
Iodine/ *Iodin*	

[3 marks]

(d) Based on the observation, arrange the halogens in ascending order of reactivity.
Berdasarkan pemerhatian di atas, susun halogen dalam tertib susunan menaik dari segi kereaktifan.

.....

[1 marks]

(e) From the above experiments, write the chemical equation for the reaction between iron and chlorine.
Berdasarkan eksperimen di atas, tulis persamaan kimia bagi tindak balas antara besi dengan klorin.

.....

[2 marks]

3. Diagram 3 shows a rusting ship.
Diagram 3 menunjukkan sebuah kapal yang mengalami pengaratan.

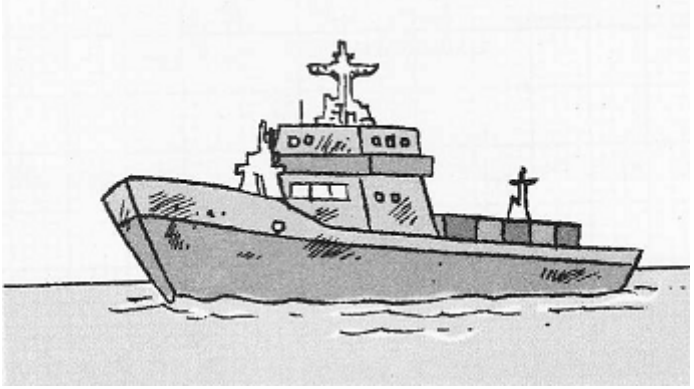


Diagram 3

Rusting damages metal parts. A method to prevent rust is by connecting iron objects to a more reactive metal. Plan an experiment to investigate the effect of reactive metals on the rusting of iron.
Pengaratan merosakkan bahan logam. Satu kaedah untuk mencegah pengaratan adalah dengan mencampurkan objek besi dengan logam yang lebih reaktif. Rancang satu eksperimen untuk mengkaji kesan logam yang lebih reaktif ke atas pengaratan besi.

Your planning should include the following aspects:
Perancangan anda hendaklah meliputi aspek berikut:

(a) Aim of the experiment
Tujuan eksperimen

(b) All the variables
Semua pembolehubah

(c) Statement of the hypothesis
Pernyataan hipotesis

(d) List of substances and apparatus
Senarai bahan dan radas

(e) Procedure of the experiment
Prosedur eksperimen

(f) Tabulation of data
Penjadualan data

[17 marks]

END OF QUESTION PAPER.

MARKING SCHEME PAPER 1 EXCEL2 CHEMISTRY SPM 2010

Question number	Answer	Question Number	Answer	Question Number	Answer
1	A	21	C	41	B
2	C	22	D	42	C
3	A	23	C	43	D
4	D	24	D	44	A
5	D	25	C	45	A
6	A	26	D	46	C
7	B	27	A	47	B
8	B	28	B	48	B
9	A	29	B	49	A
10	C	30	D	50	D
11	D	31	B		
12	B	32	D		
13	D	33	D		
14	C	34	A		
15	C	35	B		
16	A	36	A		
17	D	37	B		
18	B	38	C		
19	C	39	C		
20	C	40	C		

MARKING SCHEME EXCELL2 CHEMISTRY PAPER 2 SPM 2010

SECTION A :

QUESTION 1 / SOALAN 1

(a) Sublimation

Pemejalwapan 1

(b) (i) Kinetic energy increase
Tenaga kinetik meningkat
(ii) Particles become futher away each other
Zarah-zarah semakin jauh antara satu sama lain 2

(c) (i) No/Cannot
Tidak boleh 1

Because the boling point of water is 100^{o}C //
The boiling point of water cannot
achieved 181^{o}C
Kerana takat didih air adalah 100^{o}C//
Takat didih air tidak mencapai sehingga181^{o}C 1

(ii) cooking oil/oil palm
Minyak masak/Minyak kelapa 1

(d) (i) Atom with same proton number/number of
proton but different nucleon numbers/
number of neutrons/Atom of the same element
but different in nucleon numbers
Atom dengan nombor proton tetapi
berbeza nombor nucleon/nombor neutron/
Atom dari unsur yang sama tetapi berbeza
Nombor nucleon 1

(ii) Boiling and freezing point are different
Takat didih dan takat beku berbeza 1

(iii) Y Number of proton=17
Number of neutron=18

Z Number of proton=17
Number of neutron=20 2

max 10

2. (a) Na, Mg or Al 1

(b) The atomic radius become smaller 1

- The charge of the nucleus increases by one unit from one element to the next element across the period but the number of filled electron shells is the same. 1

- Thus, the force of attraction between the nucleus and the valence electrons becomes stronger. 1

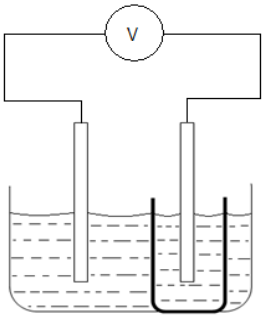
(c) (i) Na_2O 1

(ii) Na_2O (s) + H_2O (l) → 2NaOH (aq) 2

(d) transition elements form coloured ions or compounds/*unsur peralihan membentuk ion-ion berwarna atau sebatian berwarna* 1

Max 8

3. (a)



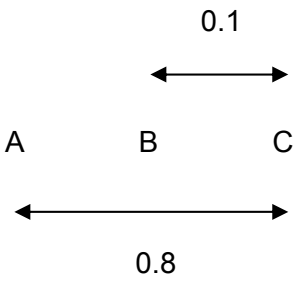
1

Draw the connecting wire and voltmeter

(b) Labelling zinc plate → (-) and copper plate → (+) 1

(c)		From zinc plate to copper plate through the external circuit	1	
(d)		To allow the flow of ion from both electrolyte through it to complete the circuit	1	
(e)		The zinc plate becomes thinner	1	
(f)		Decrease	1	
		Concentration of Cu^{2+} decrease / Cu^{2+} ion discharge to form copper atom	1	
(g)		$Cu^{2+} + 2e \rightarrow Cu$	1	12
(h)	(i)	The voltage will be higher	1	
	(ii)	Silver metal is below copper metal in the electrochemical series	1	

(i)



For pair of metal A / B, the voltage produced

= A/C – B/C

= 0.8 – 0.1 1

= 0.7 V 1

4. (a) Filtration 1

(b) Ammonia gas, Ammonium ion 2

(c) Barium sulphate, Sulphate ion 2

(d) Zinc ion 1

(e) (i) Metal Q is Zinc, Gas T is hydrogen gas 2

(ii) $Zn (s) + 2H^+(aq) \rightarrow Zn^{2+}(s) + H_2(g)$ 1

Max 9

5 (a) Sulphuric acid / potassium sulphate / potassium nitrate 1

(b) From electrod P to electorod Q 1

(c) (i) Colourless change to brown 1

(ii) Add starch solution. 1

Dark blue precipitate is formed. 1

(d) Iodide ion // potassium iodide 1

Loss electron//increase in oxidation number 1

(e) $Cl_2 + 2e \longrightarrow 2Cl^-$ 1

(f) Bromine water // acidified $KMnO_4$ solution // acidified $K_2Cr_2O_7$ solution 1

max 10

6. a)

(i) $CH_2=CHCl$ 1

(ii) addition 1

(iii) PVC does not rust 1

b) i) substance which contains **two or more** different materials 1

with properties **more superior** than both of the original materials. 1

ii) glass and silver bromide/silver chloride 1

iii) it darkens in sunlight and lightens in the absence of sunlight. 1

c) i) P : detergent 1

Q : soap 1

ii) P works in hard water, salt/sea water/acidic condition

without forming scum. 1

iii) $2C_{15}H_{31}COO^- + Ca^{2+} \rightarrow Ca(C_{15}H_{31}COO)_2$ (s) 1

max 11

SECTION B :

Questions *Soalan*	Marking scheme / *Skema jawapan*	Marks *Markah*	∑ Mark ∑ *markah*
7 (a) (i)	Helium has a duplet electron arrangement and argon has an octet electron arrangement // *Helium mempunyai susunan electron duplet* *dan argon mempunyai susunan electron octet.*	1	
	These two elements do not donate, accept or share electrons with other elements // They exist as monoatoms *Kedua-dua unsur ini tidak menderma, menerima atau kongsi elektron dengan unsur yang lain // Gas adi wujud sebagai monoatom.*	1	2
7 (a) (ii)	The conditions for the formation of chemical bonds: *Syarat pembentukan ikatan kimia:* 1). Atoms of elements from Group 1 -17 have less than 8 electrons in the outermost shell. Each element will tend to donate, accept or share electron to achieve the stable octet or duplet electron arrangement of a noble gas // *Atom unsur kumpulan 1 hingga 17 mempunyai kurang daripada 8 electron di petala terluar. Setiap unsure cenderung menderma, menerima atau kongsi electron untuk mencapai kestabilan susunan elektron duplet atau octet gas adi.*	1	
	2). In the process to attain the stable duplet or octet electron arrangement, chemical bonds are formed between atoms of these elements // *Dalam proses memperolehi kestabilan susunan electron duplet atau octet, ikatan kimia terbentuk antara unsur ini.*	1	2

7 (b)

1. R is an ionic compound because it conducts electricity when it melts //
R adalah sebatian ion kerana ia menkonduksikan elektrik ketika ia lebur. 1

2. P and Q are covalent compounds because they do not conduct electricity //
P dan Q adalah sebatian kovalen kerana kedua-duanya tidak menkonduksikan elektrik. 1

3. Q is a non-polar covalent compound because it is insoluble in water //
Q adalah sebatian kovalen tak berkutub kerana ia tak larut dalam air 1

   whereas P is a polar covalent compound because it is soluble in water // 1

   manakala P adalah sebatian kovalen berkutub kerana ia larut dalam air.

4. R consist of ions held by strong ionic bonds // 1
R mengandungi ion yang diikat dengan ikatan ion yang kuat.

8

5. P and Q consist of simple covalents held by weak intermolecular force of attraction //
P dan Q mengandungi ikatan kovalent dengan daya tarikan intermolekul yang lemah. 1

6. Q is giant molecules covalent compound because it is insoluble in water // 1
Q adalah sebatian kovalen bermolekul giant kerana ia tak larut dalam air

   whereas P is simple molecules covalent compound because it is soluble in water // 1

   manakala P adalah sebatian kovalen bermolekul ringkas kerana ia larut dalam air.

7 (c)

Tetrachloromethane is simple molecules covalent compound. Melting and boiling point of tetrachlorometane are low because the intermolecular force of attraction between molescules (van de waals' force of attration) is very weak //

Tetraklorometane adalah sebatian kovalen bermolekul ringkas. Takat lebur dan takat didih rendah disebabkan daya tarikan intermolekul antara molekul (daya tarikan Van de Waals) adalah lemah.

1

Little heat energy is required to overcome the weak intermolecular force //

Hanya sedikit tenaga haba diperlukan untuk mengatasi daya intermolekul.

1

4

Carbohydrate is a giant molescules covalent compound. Melting and boiling point of carbohydrate are high because it consist of a covalent network of molecules. Strong covalent bonds hold the atoms together in these giant molecules //

Karbohidrat adalah sebatian kovalen bermolekul giant. Takat lebur dan didihnya adalah tinggi kerana ia mempunyai rangkaian ikatan kovalen antara molekul. Ikatan kovalen mengikatkan banyak molekul membentukkan molekul giant.

1

A lot of heat energy is required to overcome the strong covalent bonds in these giant molecules //

Tenaga haba yang banyak diperlukan untuk memutuskan ikatan kovalen yang kuat antara molekul.

1

7 (d) acetone – solvents for vanish.

aseton – Pelarut untuk varnish. 1

ether – solvent for the manufacture of some drugs or perfume.

eter – Pelarut untuk menghasilkan barangan ubat-ubatan dan minyak wangi. 1

ethanol – solvents for medicine, perfume or ink. 1

etanol – Pelarut untuk ubat-ubatan, minyak wangi atau ink.

turpentine – to remove grease and paint stains. 1

turpentine – Untuk menghilangkan gris dan kotoran cat

4

8 a - Ethanoic acid ionises in water to form

Freely / mobile ions that can conduct electricity 1

-Without water, ethanoic acid exists as neutral covalent molecules which cannot conduct electricity. 1

b -Hydrochloric acid is a strong acid that ionises completely in water to produce a solution of high concentration of hydrogen ions.

$HCl \longrightarrow H^+ + Cl^-$ 1

-If the concentration of H^+ ion is high, the pH value is low 1

-Ethanoic acid is a weak acid that ionises partially in water to produce a solution of low concentration of hydrogen ions.

$CH_3COOH \rightleftharpoons CH_3COO^- + H^+$ 1

-If the concentration of H^+ ion is low, the pH value is high 1

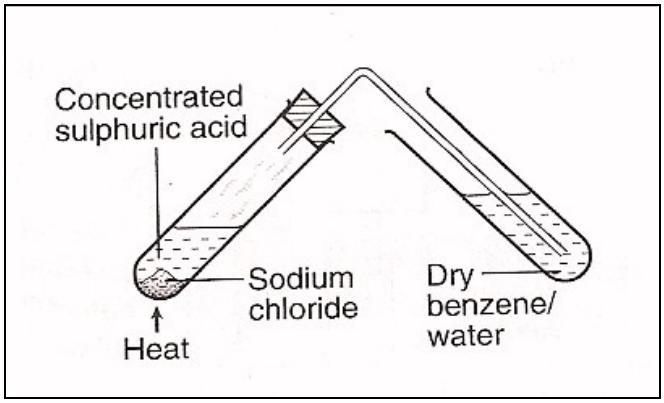
Procedure:

1. Hydrogen chloride gas is prepared by reacting sodium chloride with concentrated sulphuric acid.

c $2NaCl + H_2SO_4 \longrightarrow 2HCl + Na_2SO_4$ 1

2. The hydrogen chloride gas is dissolved in dry benzene (or in any organic solvent) and in water in two separate test tubes. 1

3. Both solutions are tested with marble chips and zinc granules. 1



Correct diagram – 1m

Labeled correct - 1m

Observations

Test	HCl in water	HCl in dry benzene	
With marble chips	Effervescence occurs. Gas turns lime water chalky.	No reaction	1 m
With zinc granules	Effervescence occurs. Gas gives a 'pop' sound when tested with a burning wooden splinter	No reaction	1 m

d i -Solution *M* is a strong alkali 1

-Solution *N* is a weak alkali 1

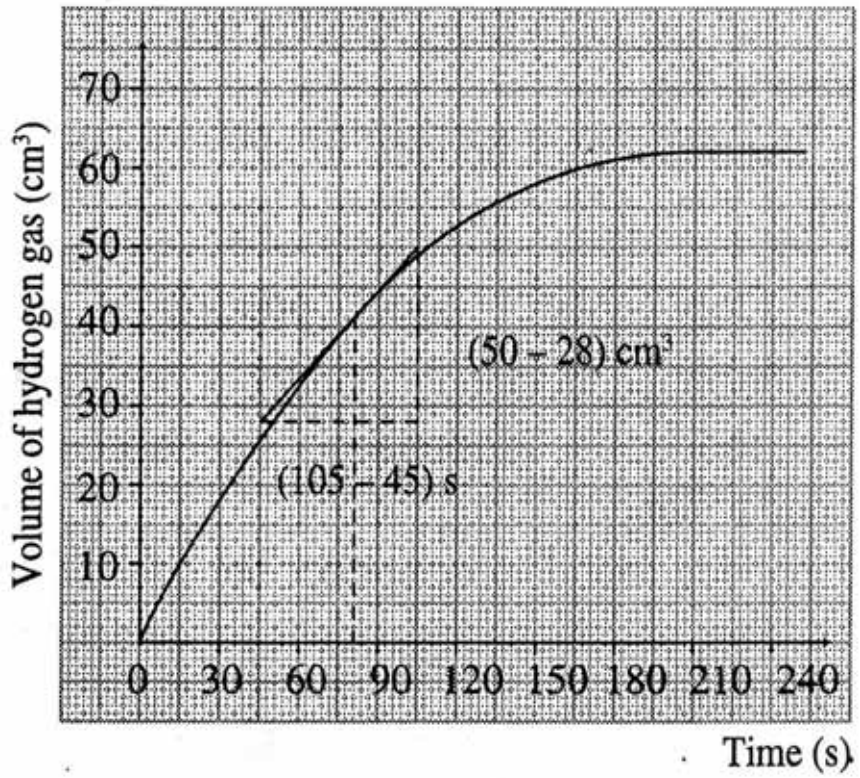
ii -Put solutions *L* and *N* into two separate test tubes 1

-Add some zinc pieces into each solution 1

-Colourless gas bubbles are released in solution *L* 1

-No change occurs in solution *N* 1

QUESTION NO. 9

QUESTION NO.		SUGGESTED ANSWER		Mark
		Refrigerator	Kitchen cabinet	
(a)		Low temperature Low bacteria activity Less toxin produced by bacteria Rate of food spoilage is low	High temperature High bacteria activity More toxin produced by bacteria Rate of food spoilage is high	**4**
	(i)			**3**
	(ii) (a)	• Volume of hydrogen gas evolved in the first 90 seconds = 44 cm^3 • Average rate of a reaction in the first 90 seconds = $\frac{44}{90}$ cm3/s = 0.49 cm^3s^{-1}		**1** **1**
	(b)	Rate of a reactioan at 81st second $\frac{50-20}{105-45}$ cm^3/s = 0.37 cm^3s^{-1}		**1**
	(ii)	• The gradient of the graph drawn in b(i) becomes smaller with time and eventually reaches zero when the reaction is completed		1 1

- Thus, the rate of reaction at a given time is inversely proportional with the time taken, 1/time (t).

2

- The bigger the value of t, the lower the rate of reaction

(c) (i)

Effect of concentration

- When the concentration of the reactants increases, the number of particles per unit area or volume increases.

1

- This causes the number of collisions to increase followed by an increase in the frequency of effective collisions of the reactants particles

1

- More particles of the reactants can overcome the activation energy

1

.

1

Max 4

(c)(ii)

Temperature	1
Size of particles / size of magnesium ribbon	1
Pressure	1

[any two]

Max 2

Question *Soalan*	Marking scheme *Skema pemarkahan*	Marks *Markah*
10. (a)		
(i)	Propanoic acid *Asid Propanoik*	1
(ii)		
	1. gives sourish test *memberi rasa masam*	1
	2. turns Blue litmus paper to red. *mengubah warna litmus biru ke merah.*	1
(iii)	3. able to conduct electricity / act as electrolyte *berupaya mengkonduksi elektrik/bertindak sebagai elektrolit.*	1
	4. does not combustible *tidak terbakar*	1
		Max 3

1. Correct drawing 1
   Lukisan betul

2. Correct label 1
   Melabel dengan betul

(iv) Balanced chemical equation :
Persamaan kimia berimbang

$$C_3H_7OH \xrightarrow{KmnO_4,\ H^+/\ K_2Cr_2O_7,\ H^+} C_2H_5COOH + H_20$$

1

1

1. Correct chemical formulae
   Formula kimia betul
2. Balanced equation
   Persamaan berimbang

(b)

Observation
Pemerhatian

(i) Colour of solution turns purple to colourless/ 1
Colour of solution turns Orange to green //
Warna unggu larutan bertukar menjadi tanpa warna /
Warna jingga larutan bertukar menjadi hijau.

1

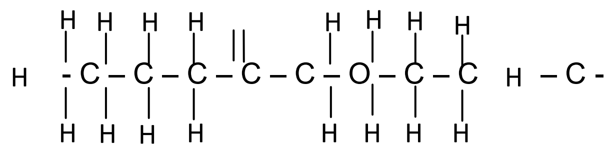
1. When compound Y mixed with carbonated salt, gas liberated which turns lime water to cloudy when mixed with carbonated salt //
   Apabila sebatian Y dicampurkan dengan garam karbonat gas yang terbebas mengeruhkan air kapur dibebaskan.

1

2. When compound Y mixed with metal (eq. Ca/Mg/ Al/Zn), gas
   liberated produced a “Pop” sound when test with burning wooden splinter //
   Apabila sebatian Y dicampurkan dengan logam (cth. Ca/Mg/Al/Zn) gas terbebas menghasilkan bunyi “Pop” apabila diuji dengan kayu uji menyala.

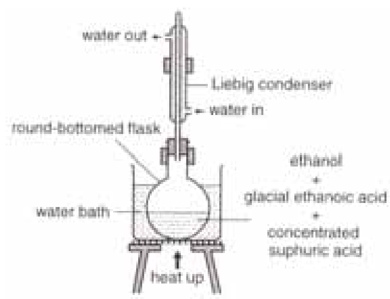
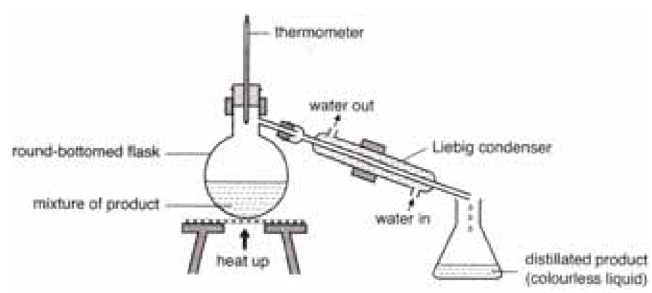
1

Buthyl pentanoate
Butil pentanoat



1

10

10	Marks scheme/skema markah	Mark/s Markah
(ii)	 	
	Reflux set-up diagram for esterification Correct label / *Label betul* Correct drawing / *Lukisan betul*	1
	Steps *Langkah-langkah*	
	• 50 cm^3 of butan-1-ol is measured and poured into a round bottom flask // *Sukat 50 cm^3 butan-1-ol telah disukat dan dimasukkan ke dalam kelalang bulat.*	1
	• 50 cm^3 of pentanoic acid is measured and poured into the round bottom flask which has filled with 50 cm^3 of butan-1-ol //	

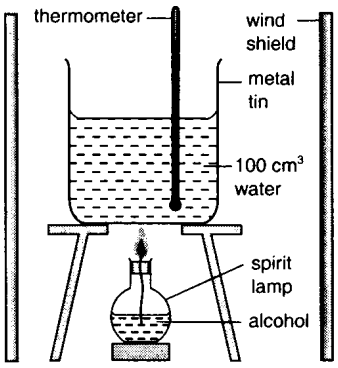
	• *Sukat 50 cm^3 asid pentanoik telah disukat dan dimasukkan ke dalam kelalang bulat.*	1
	• Few drops of concentrated sulphuric acid was then mixed in the mixture // *Beberapa titik asid sulfurik pekat ditambahkan ke dalam campuran*	1
	• The round bottom flask was dipped into a beaker filled with water which was placed on the tripod stand // *Kelalang bulat dimasukkan ke dalam bikar berisi air yang diletakkan di atas kaki tungku tiga.*	1
	• A Liebig's Condenser was then fixed to the mouth of the round bottom flask // *Kondenser Liebig dipasangkan ke mulut kelalang bulat.*	1
	• Water is then flown through the Liebig's Condenser with the dirrection as shown on diagram // *Air dialirkan menerusi kondenser Liebig mengikut laluan yang ditunjukkan pada gambarajah.*	1
	• The mixture is then heated under reflux for 30 minutes // *Campuran di dalam kelalang bulat telah dipanaskan secara refluks selama 30 minit.*	1
	$C_4H_9OH + C_4H_9COOH \xrightarrow[\text{Heat under Reflux}]{H_2SO_4 \text{ cons.}} C_4H_9COOC_4H_9 + H_2O$ H_2SO_4 *pekat* *Panas dibawah refluks*	3
	State requirement : Concentrated sulphuric acid *Nyatakan keadaan* *Asid sulfurik pekat* Heat under reflux *Pemanasan dibawah refluks*	**Max 3** 1 1 1
		Max 10

ANSWER SCHEME PAPER 3 CHEMISTRY SPM 2010

1 (a)

Score	Rubric
3	[Able to state all mass of alcohol burnt correctly] • 2 decimal places • Unit in g Suggested answer Ethanol = 0.43 g Propanol = 0.35 g Butanol = 0.33 g
2	[Able to state any two mass of alcohol burnt correctly]
1	[Able to state any one mass of alcohol burnt correctly]
0	No response or wrong response

1 (b)

Score	Rubric
3	[Able to draw the apparatus set-up and labelled, used to conduct experiment] 
2	[Able to draw diagram without labelled]
1	[Able to draw diagram without labelled and incomplete.]
0	No response or wrong response

1 (c)

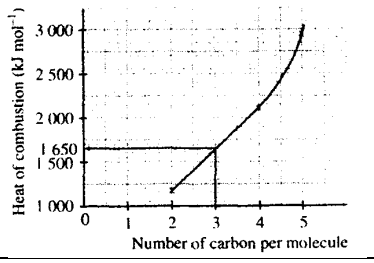
Score	Rubric
(i)	Heat of combustion is the amount of heat released when one mole of alcohol is completely burnt.
(ii) Score 3	[Able to state all variables correctly] **Sample answer:**

Manipulated variables	Type of alcohol
Responding variables	Heat of combustion
Controlled (fixed) variables	Volume of water, temperature change, metal tin/copper container, type of spirit lamp.

Score 2	[Able to state any two of the variables above correctly]
Score 1	[Able to state any one of the variables above correctly]

0	No response or wrong response
1(d) Score 6	Able to show all calculation on correct number of mole and correct heat of combustion **Ethanol** Heat change = 100 x 4.2 x 30 = 12,600 J Number of mole of ethanol = $\frac{0.43}{46}$ = 0.00935 mol Heat of combustion = 1347.59 kJ mol^{-1} **Propanol** Heat change = 100 x 4.2 x 30 = 12,600 J Number of mole of ethanol = $\frac{0.35}{60}$ = 0.00583 mol Heat of combustion = 2,172.41 kJ mol^{-1} **Butanol** Heat change = 100 x 4.2 x 30 = 12,600 J Number of mole of ethanol = $\frac{0.33}{74}$ = 0.00446 mol Heat of combustion = 2,825.11 kJ mol^{-1}
Score 5	Able to state any five calculation on correct number of mole and correct heat of combustion
Score 4	Able to state any four calculation on correct number of mole and correct heat of combustion
Score 3	Able to state any three calculation on correct number of mole and correct heat of combustion
Score 2	Able to state any two calculation on correct number of mole and correct heat of combustion
Score 1	Able to state any one calculation on correct number of mole and correct heat of combustion
0	No response or wrong response

1 (e)

Score	Rubric
3	[Able to draw a graphs of heat of combustion against the number of carbon atoms per molecule with all the 4 items below correctly] (i) suitable scale used (ii) axes labelled correctly (iii) all points plotted correctly (iv) smooth curve of graphs 
2	[Able to draw a graphs of heat of combustion against the number of carbon atoms per molecule with at least 3 items correctly]
1	[Able to manipulate two items correctly]
0	No response or wrong response

1 (f)

Score	Rubric
3	[Able to determine the combustion heat for propanol from graph]. Suggested answer: - 1 650kJ mol^{-1}
2	[Able to determine the combustion heat for propanol from graph less accurately, without unit] Suggested answer: - 1650
1	[Able to give an idea] - 1650 +-5
0	No response or wrong response

2. (a) The halogens show similar chemical properties in their reaction with iron wool but the reactivity increases from iodine, bromine to chlorine.

[3 *marks*]

(b)

(i) Manipulated variable: Type of halogens.	(i) Method to Manipulated the variable: Different halogen gases are used in the experiment.
(ii) Responding variable: The glowing of iron wool.	(ii) How the variable is responding: Observe the brightness of the flames when iron wool burns in halogen glasses.
(iii) Controlled variable: The quantity of iron wool.	(iii) Method to maintain the controlled variable: Use the same mass of iron wool for each experiment.

[6 *marks*]

(c)

Halogen	**Observation**
Chlorine	Iron wool glows brightly.
Bromine	Iron wool glows moderately.
Iodine	Iron wool glows dimly and slowly.

[3 *marks*]

(d) Iodine < Bromine < Chlorine

[1 *mark*]

(e) $2Fe + 3Cl_2 \rightarrow 2FeCl_3$
Correct reactant -1m
Correct product – 1m

[2 *marks*]

Question	Rubric	Score
3(a)	Able to **state the aim of the experiment** correctly. Sample answer **To investigate the effect of reactive metals on the rusting of iron.**	3
	Able to state the aim of the experiment less accurately.	2
	Able to give an idea of the aim of the experiment.	1
	Wrong response / no response.	0
3(b)	Able to state **all the variables** correctly. Sample answer Manipulated variable: **Type of metals in contact with iron** Responding variable: **The rusting of iron** Controlled variable: **Iron nail // volume of jelly solution with potassium hexacyanoferrate(III) solution // temperature.**	3
	Able to state **any two** variables correctly.	2
	Able to state **any one** variable correctly	1
	Wrong response / no response.	0
3(c)	Able to **state the hypothesis** correctly. Sample answer **Iron nails which in contact with more reactive metal will not rust.**	3
	Able to state the hypothesis less accurately.	2
	Able to state an idea of hypothesis.	1
	Wrong response / no response.	0
3(d)	Able to give a complete **list of substances and apparatus**. Sample answer **Substances:** Iron nails, magnesium ribbon, zinc strip, copper strip, hot jelly solution with a few drops of potassium hexacyanoferrate(III) solution, $K_3Fe(CN)_6$, phenoftalein solution	3

	Apparatus: Test tube, sandpaper	
	Able to give at least **two** substances and at least **one** apparatus.	2
	Able to give at least **one** substance and at least **one** apparatus.	1
	Wrong response / no response.	0
3(e)	Able to list all **the procedure of the experiment** correctly. <u>Sample answers</u> 1. Four iron nails are cleaned with sandpaper. 2. The first iron nail is placed into a test tube. 3. The rest of the iron nails are coiled with magnesium ribbon, zinc strip and copper strip respectively and placed into three separate test tubes. 4. The four test tubes are then filled with the same volume of hot jelly containing potassium hexacyanoferrate(III) solution, $K_3Fe(CN)_6$ and phenolptalein solution. 5. The test tubes are left aside for two days. 6. After two days, the intensity of the dark blue colour in each test tube is recorded in a table.	3
	Able to list down steps 1, 3, 5, 6.	2
	Able to give an idea of step 3 and 4.	1
	Wrong response / no response.	0
3(f)	Able to **tabulate the data** with the following aspects. <u>Sample answer</u>	2

	<table><tr><td rowspan="2">Test Tube</td><td colspan="2">Observation</td></tr><tr><td>Intensity of dark blue colour</td><td>Intensity of rust</td></tr><tr><td>Iron nail</td><td></td><td></td></tr><tr><td>Iron nail coiled with magnesium ribbon</td><td></td><td></td></tr><tr><td>Iron nail coiled with zinc strip</td><td></td><td></td></tr><tr><td>Iron nail coiled with copper strip</td><td></td><td></td></tr></table>	
	Able to construct a table with I at least one suitable title II incomplete list of type of metal used	1
	Wrong response / no response.	0