4541/1
Kimia
Kertas 1
Sept
2009
1 ¼ jam

JABATAN PELAJARAN NEGERI JOHOR

PEPERIKSAAN PERCUBAAN SPM

KIMIA

Kertas 1

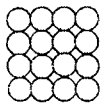
Satu jam lima belas minit

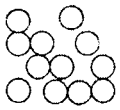
JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

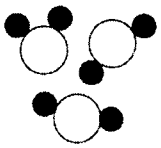
1. *Kertas soalan ini adalah dalam dwibahasa.*
2. *Soalan dalam bahasa Inggeris mendahului soalan yang sepadan dalam bahasa Melayu.*
3. *Calon dikehendaki membaca maklumat di halaman belakang kertas soalan ini.*

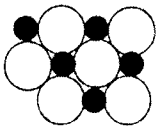
Kertas soalan ini mengandungi 42 halaman bercetak

1 Which of the following represents the arrangement of particles in water?
Antara berikut, yang manakah mewakili susunan zarah bagi air?

A 

B 

C 

D 

2 Which of the following statement is **not** true for one mole of a substance?
*Antara yang berikut , yang manakah **tidak** benar bagi satu mol bahan?*

A 1 mole of oxygen gas contains 6.02×10^{23} molecules
1 mol gas oksigen mengandungi 6.02×10^{23} molekul

B 1 mole of sulphur atom contains 6.02×10^{23} atoms
1 mol atom sulfur mengandungi 6.02×10^{23} atom

C 1 mole of a gas occupies 24 dm^3 at room condition
1 mol gas menempati 24 dm^3 pada keadaan bilik

D 1 mole of a gas occupies 24 dm^3 at standard temperature and pressure
1 mol gas menempati 24 dm^3 pada suhu dan tekanan piawai

3 Diagram 1 shows the symbol of fluorine atom.

Rajah 1 menunjukkan simbol bagi atom fluorin

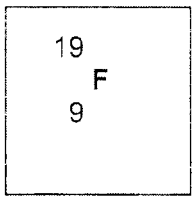


Diagram 1
Rajah 1

Which of the following is true based on the symbol in Diagram 1.

Antara berikut yang manakah benar berdasarkan simbol dalam Rajah 1.

	Proton number *Nombor proton*	Nucleon number *Nombor nukleon*	Number of electron *Bilangan elektron*
A	9	19	9
B	9	19	19
C	10	19	10
D	19	9	19

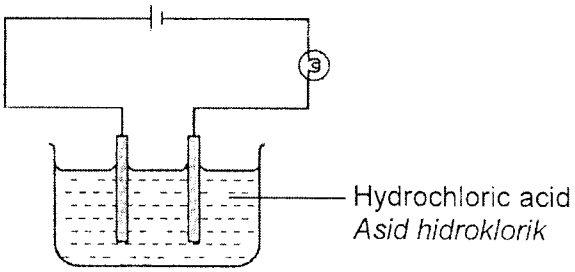
4 Which of the following comparison is correct about ionic compounds and covalent compounds?

Antara perbandingan berikut, yang manakah betul mengenai sebatian ionik dan sebatian kovalen?

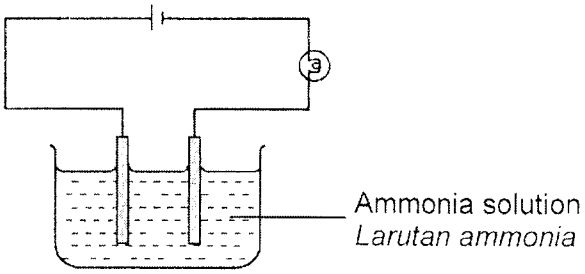
	Ionic compounds ***Sebatian ionik***	Covalent compounds ***Sebatian kovalen***
A	Have low melting and boiling points *Mempunyai takat lebur dan didih yang rendah.*	Have high melting and boiling points. *Mempunyai takat lebur dan didih yang tinggi.*
B	Exist as solid at room temperature. *Wujud sebagai pepejal pada suhu bilik.*	May exist as solid, liquid or gas at room temperature. *Boleh wujud sebagai pepejal, cecair atau gas pada suhu bilik.*
C	Do not conduct electricity. *Tidak mengkonduksikan elektrik.*	Conduct electricity in aqueous solution or molten state. *Mengkonduksikan elektrik dalam larutan akueus atau leburan.*
D	Usually dissolve in organic solvents. *Biasanya larut dalam pelarut organik.*	Usually dissolve in water. *Biasanya larut dalam air.*

5 Which of the following circuit will cause the bulb to light up?
Antara litar berikut, yang manakah akan menyalakan mentol?

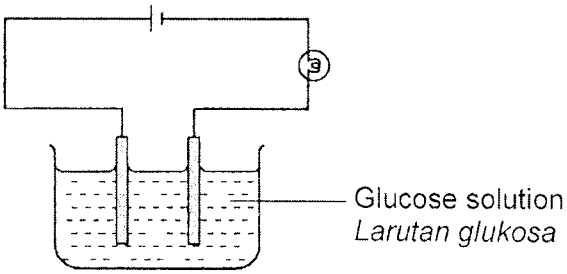
I



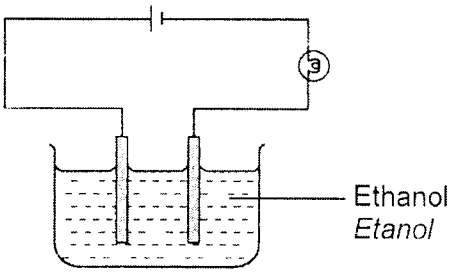
II



III



IV



A I and II only
I dan II sahaja

B I and III only
I dan III sahaja

C III and IV only
III dan IV sahaja

D II and III only
II dan III sahaja

6 Which of the following is **not** a chemical property of an alkali?

*Antara pernyataan berikut yang manakah **bukan** sifat kimia suatu alkali?*

A Alkali + acid → salt + water

Alkali + asid → garam + air

B Alkali + metal → salt + water

Alkali + logam → garam + air

C Alkali + metal ion → insoluble metal hydroxide

Alkali + ion logam → Hidroksida logam yang tidak larut

D Alkali + ammonium salt → salt + water + ammonia gas

Alkali + garam ammonium → garam + air + gas ammonia

7 Which of the following salt is insoluble in water?

Manakah di antara yang berikut merupakan garam tak terlarutkan di dalam air?

A Silver nitrate

Argentum nitrat

B Calcium chloride

Kalsium klorida

C Ammonium sulphate

Ammonium sulfat

D Lead(II) carbonate

Plumbum(II) karbonat

8 Diagram 2 shows the flow chart of Contact Process to manufacture sulphuric acid.

Rajah 2 menunjukkan carta alir proses Sentuh untuk pembuatan asid sulfurik

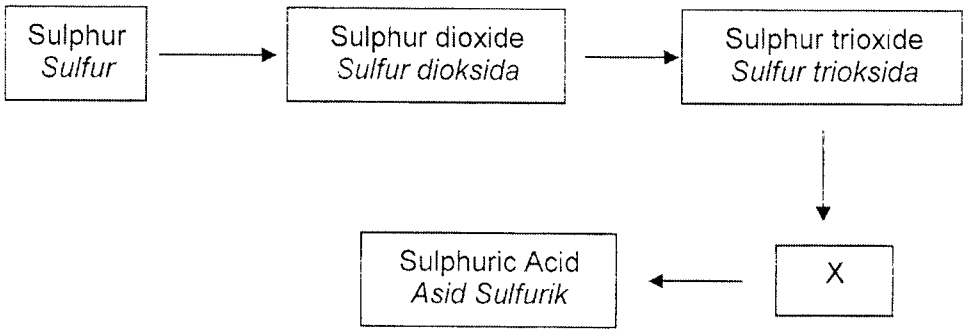


Diagram 2

Rajah 2

What is X ?

Apakah X?

A Oleum
Oleum

B Ammonia
Ammonia

C Nitric Acid
Asid Nitrik

D Sulphur monoxide
Sulfur monoksida

9 Which of the following statement best explains the decrease in rate of decomposition of hydrogen peroxide with time?

Antara berikut,yang manakah penerangan terbaik untuk menerangkan pengurangan kadar penguraian hidrogen peroksida dengan masa ?

A Decrease in quantity of products
Pengurangan kunatiti hasil

B Decrease in volume of hydrogen peroxide
Pengurangan isipadu hidrogen peroksida

C Decrease in temperature of hydrogen peroxide
Pengurangan suhu hidrogen peroksida

D Decrease in concentration of hydrogen peroxide
Pengurangan kepekatan hidrogen peroksida

10

Margarine is made by hydrogenation of the unsaturated vegetable oil such as sunflower oil or palm oil.

Margerin dihasilkan melalui penghidrogenan minyak sayuran tak tepu seperti minyak bunga matahari atau minyak sawit.

Based on the information above, what is the catalyst, temperature and pressure needed for the reaction to take place?

Berdasarkan maklumat yang diberi, apakah mangkin, suhu dan tekanan yang diperlukan untuk tindak balas tersebut berlaku?

	Catalyst *Mangkin*	Temperature(°C) *Suhu(°C)*	Pressure(atmosphere) *Tekanan(atmosfera)*
A	Iron	300	1
B	Iron	200	4
C	Nickel	300	1
D	Nickel	200	4

11 Diagram 3 shows a set-up of apparatus of a redox reaction.
Rajah 3 menunjukkan set radas untuk tindakbalas redok.

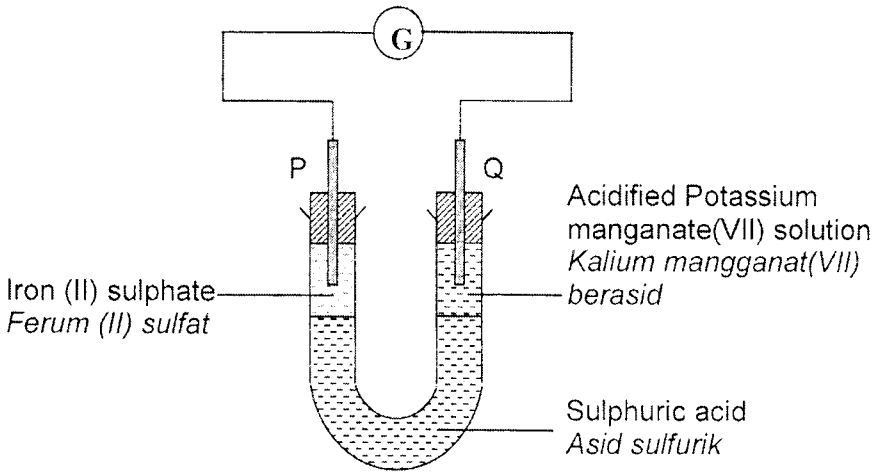


Diagram 3
Rajah 3

Which of the following is correct?
Manakah antara pernyataan berikut adalah benar?

A Iron(II) ion, Fe^{2+} is reduced
Ion Ferum(II), Fe^{2+} mengalami penurunan

B Electrons flow from electrode P to Q
Elektron mengalir dari elektrod P ke Q

C The purple colour of solution becomes green
Warna ungu larutan menjadi hijau

D Manganate(VII) ion, MnO_4^- acts as the reducing agent
Ion manganat(VII), MnO_4^- bertindak sebagai agen penurunan

12 Which of the following is an endothermic reaction?
Manakah antara berikut adalah tindak balas endotermik?

A Dissolving sodium hydroxide pellets in distilled water
Melarutkan butiran natrium hidroksida dalam air

B Adding zinc powder to copper (II) sulphate solution
Tambahkan serbuk zink kepada larutan kuprum (II) sulfat

C Dissolving ammonium chloride solid in distilled water
Melarutkan pepejal ammonium klorida dalam air suling

D The combustion of ethanol in excess oxygen
Pembakaran etanol dalam oksigen berlebihan

13 Thickeners are used to thicken food. Which of the following is a thickener?

Agen pemekat digunakan untuk memekatkan makanan. Yang manakah antara berikut merupakan satu agen pemekat?

A Vinegar
Cuka

B Lecithin
Lesitin

C Gelatine
Gelatin

D Aspartame
Aspartam

14 Diagram 4 below shows an atomic model.

Rajah 4 menunjukkan suatu model atom.

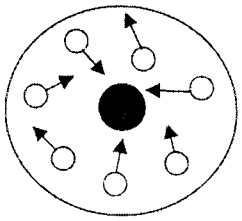


Diagram 4

Rajah 4

Which of the following is **not true**?

*Antara penyataan berikut yang manakah **tidak benar**?*

A Proposed by J.J.Thomson.

Dicadangkan oleh J.J. Thomson

B The nucleus contains positively-charged particles called protons.

Nukleus mengandungi zarah bercas positif yang dipanggil proton.

C The electrons move in a space that is larger than the space occupied by the nucleus.

Electron bergerak dalam ruang yang lebih besar daripada ruang yang ditempati oleh nukleus.

D The positive charge and most of the mass of the atom are concentrated in the nucleus.

Cas positif dan kebanyakan jisim atom tertumpu pada nukleus.

15 The following equation shows the reaction between hydrogen gas and iodine gas to form hydrogen iodide.

Persamaan berikut menunjukkan tindak balas antara gas hidrogen dan gas iodin untuk membentuk hidrogen iodida.

$$H_2(g) + I_2(g) \rightarrow 2HI(g)$$

Which of the following statement is **not** true?

*Antara pernyataan berikut yang manakah **tidak** benar?*

[Relative atomic mass, H = 1, I = 127]

[Jisim Atom Relatif, H = 1, I = 127]

[Molar volume of gas = 24 dm^3 mol^{-1} at room temperature and pressure]

[Isipadu molar gas = 24 dm^3 mol^{-1} pada suhu dan tekanan bilik]

A 2 molecules of hydrogen react with 2 molecules of iodine produced 2 molecule of hydrogen iodide

2 molekul hidrogen bertindak balas bertindak balas dengan 2 molekul iodin menghasilkan 2 molekul hidrogen iodida

B 2 mol of hydrogen iodide is produced by the reaction between 1 mol of hydrogen gas and 1 mol of iodine gas

2 mol hidrogen iodida dihasilkan oleh tindak balas antara 1 mol gas hidrogen dan 1 mol gas iodin

C 48 dm^3 of hydrogen iodide is produced by the reaction between 1 mol of hydrogen gas and I mol of iodine gas

48 dm^3 hidrogen iodida dihasilkan oleh tindak balas diantara 1 mol gas hydrogen dan 1 mol gas iodin

D 1 mol iodine gas and 1 mol hydrogen gas are required to produce 2 mol of hydrogen iodide gas

1 mol iodin dan 1 mol gas hidrogen diperlukan untuk menghasilkan 2 mol gas hirogen iodida

16 Diagram 5 shows the position of element X in the Periodic Table of Element. Which of the following is **not true** about the element?

*Rajah 5 menunjukkan kedudukan unsur X dalam Jadual Berkala Unsur. Antara berikut, yang manakah **tidak benar** tentang unsur itu?*

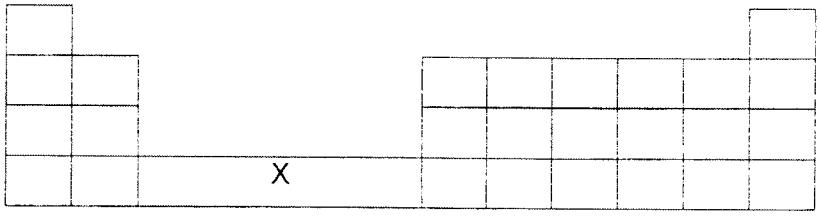


Diagram 5

Rajah 5

A It does not conduct heat

Ia tidak mengkonduksi haba

B It has high melting point

Ia mempunyai takat lebur yang tinggi

C It can form coloured compounds

Ia boleh membentuk sebatian yang berwarna

D It shows different oxidation numbers in its compounds

Ia menunjukkan nombor pengoksidaan yang berlainan dalam sebatiannya

17 Magnesium reacts with chlorine gas to produce magnesium chloride. Which of the following is **true** about magnesium chloride?

Magnesium bertindak balas dengan gas klorin untuk menghasilkan magnesium klorida.
*Yang manakah adalah **benar** tentang magnesium klorida?*

	Molecular Formula ***Formula molekul***	**Bond** ***Ikatan***	**Type Of Particles** ***Jenis Zarah***
A	$MgCl_2$	Ionic *Ionik*	Ion *ion*
B	$MgCl_2$	Covalent *Kovalen*	Molecule *Molekul*
C	MgCl	Ionic *ionik*	Ion *Ion*
D	MgCl	Covalent *Kovalen*	Molecule *Molekul*

18 Diagram 6 shows the set–up of apparatus of a chemical cell.
Which of the following are **true** of a chemical cell?

Rajah 6 menunjukkan susunan radas suatu sel kimia.
*Antara berikut yang manakah **benar** mengenai sel kimia?*

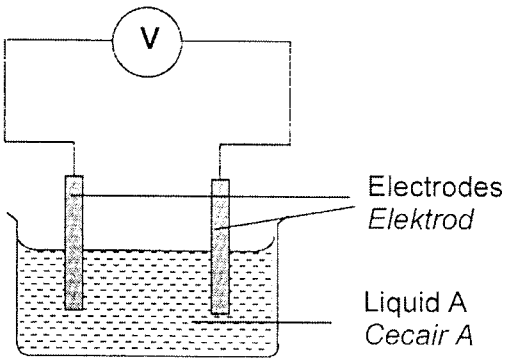


Diagram 6
Rajah 6

I. The electrodes are of the same metal.
Elektrod-elektrod adalah logam yang sama.

II. The electrodes are of different metals
Elektrod-elektrod adalah logam yang berlainan.

III. Liquid A is an electrolyte.
Cecair A ialah sejenis elektrolit.

IV. Liquid A is an organic solvent.
Cecair A ialah pelarut organik.

A I and IV only
I dan IV sahaja

B II and III only
II dan III sahaja

C II and IV only
II dan IV sahaja

D I, III and IV only
I, III dan IV sahaja

19 25.0 cm^3 of sodium hydroxide solution, NaOH is needed to neutralize 22.0 cm^3 of 0.10 mol dm^{-3} hydrochloric acid, HCl. What is the molarity of the sodium hydroxide, NaOH solution?

25.0 cm^3 larutan natrium hidroksida, NaOH diperlukan untuk meneutralkan 22.0 cm^3 0.10 mol dm^{-3} Asid hidroklorik, HCl.
Berapakah kemolaran larutan Natrium hidroksida, NaOH?

A 0.088 mol dm^{-3}

B 0.078 mol dm^{-3}

C 0.077 mol dm^{-3}

D 0.08 mol dm^{-3}

20 Which of the following chemical equation represents a neutralisation reaction?

Antara persamaan kimia berikut , yang manakah mewakili satu tindak balas peneutralan ?

I. $PbO + 2HCl \rightarrow PbCl_2 + H_2O$

II. $CH_3COOH + KOH \rightarrow CH_3COOK + H_2O$

III. $Mg + 2HNO_3 \rightarrow Mg(NO_3)_2 + H_2$

IV $BaCl_2 + H_2SO_4 \rightarrow BaSO_4 + 2HCl$

A I and II only
I dan II sahaja

B II and III only
II dan III sahaja

C II and IV only
II dan IV sahaja

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

21 Which of the following composite materials are correctly matched with their uses?

Antara bahan komposit berikut yang manakah dipadankan dengan betul?

	Composite material *Bahan Komposit*	Uses *Kegunaan*
I	Fibre Optic *Fiber Optik*	Used in mobile phones *Digunakan dalam telefon mudah alih*
II	Fibre glass *Fiber kaca*	To make water storage tanks *Untuk membuat tangki simpanan air*
iII	Superconductors *Superkonduktor*	To make optical lenses *Untuk membuat kanta optik*
IV	Reinforced Concrete *Konkrit yang diteguhkan*	To build oil platforms *Untuk membina pelantar minyak*

A I and II only
I dan II sahaja

B II and III only
II dan III sahaja

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

D I, II,III and IV only
I, II, III and IV sahaja

22 Diagram 7 shows a graph of the volume of carbon dioxide gas produced against time for the reaction between calcium carbonate and sulphuric acid.

Rajah 7 menunjukkan graf isipadu gas karbon dioksida terhasil melawan masa untuk tindak balas antara kalsium karbonat dan asid sulfurik.

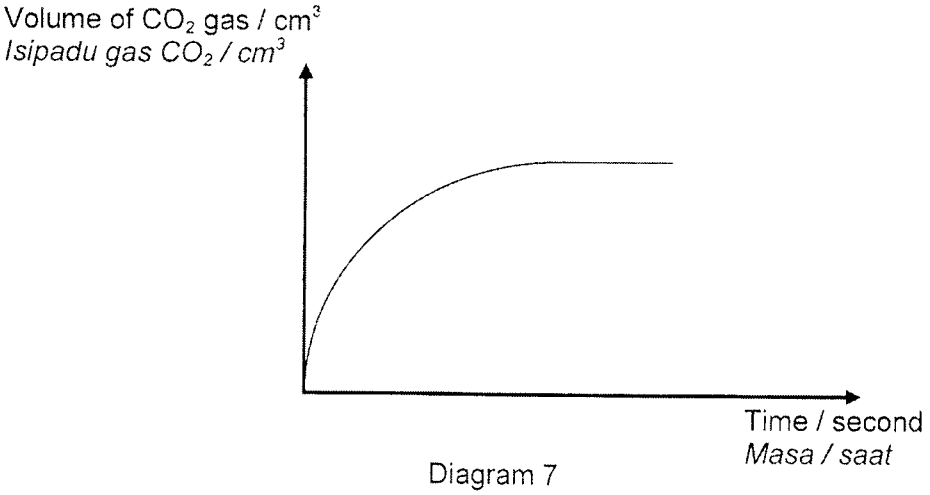


Diagram 7
Rajah 7

The gradient of the graph decreases with time because

Kecerunan graf berkurangan dengan masa kerana

A Catalyst is not used
Mangkin tidak digunakan

B Volume of mixture decreases
Isipadu campuran berkurangan

C Temperature of reaction decreases
Isipadu tindak balas berkurangan

D Concentration of sulphuric acid decreases
Kepekatan asid sulfurik berkurangan

23 A carbon compound, C_4H_8 undergoes the following chemical reactions **except**

*Sebatian karbon, C_4H_8 menjalani tindak balas kimia berikut **kecuali***

A Combustion reaction

Tindak balas Pembakaran

B Substitution reaction

Tindak balas Penukargantian

C Halogenation reaction

Tindak balas Penghalogenan

D Hydrogenation reaction

Tindak balas Penghidrogenan

24 Which of the following shows the correct oxidation numbers for each particle?

Manakah antara berikut menunjukkan nombor pengoksidaan yang betul bagi setiap zarah?

	Mg	Na^+	N^{3-}	H_2O
A	0	+1	+3	-1
B	0	+1	-3	0
C	0	0	+3	-2
D	0	-1	-3	0

25 The following shows a thermochemical equation.
Berikut adalah suatu persamaan termokimia.

$$N_2(g) + 2O_2(g) \rightarrow 2NO_2(g) \qquad \Delta H = +180.6 \text{ kJ}$$

Based on the equation above, it can be concluded that
Berdasarkan persamaan di atas, boleh disimpulkan bahawa

A Energy content of nitrogen and oxygen is higher than energy content of nitrogen dioxide.
Kandungan tenaga nitrogen dan oksigen adalah lebih tinggi daripada kandungan tenaga nitrogen dioksida.

B Heat is released to overcome the bonding of nitrogen and oxygen.
Tenaga dibebaskan untuk mengatasi ikatan nitrogen dan oksigen.

C 180.6 kJ energy is absorbed during the formation of nitrogen dioxide.
180.6 kJ tenaga diserap semasa pembentukan nitrogen dioksida.

D Temperature of the surroundings increases during the reaction.
Suhu persekitaran bertambah semasa tindak balas berlaku.

26 Azo and triphenyl compounds are commonly used in food industries. State why azo and triphenyl compounds are added foods.

Sebatian azo dan trifenil kerap digunakan dalam industri makanan.
Nyatakan mengapa sebatian azo dan trifenik di tambah ke dalam makanan

A To restore the colour in food.
Untuk mengembalikan warna dalam makanan

B To stabilise the dispersion of oil in water.
Untuk menstabilkan penyebaran minyak dalam air.

C To enhance the taste and flavour of food.
Untuk meningkatkan rasa dan kelazatan makanan

D To prevent the food from being oxidised by air.
Untuk menghalang makanan dioksidakan oleh udara.

27 Diagram 8 shows the electron arrangement of sodium atom.

Rajah 8 menunjukkan susunan elektron atom natrium.

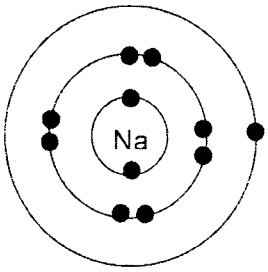


Diagram 8

Rajah 8

Which is the correct standard representation for the atom? [Nucleon number: 23]

Yang manakah menunjukkan perwakilan piawai yang betul bagi atom tersebut? [Nombor Nukleon : 23]

A $^{11}_{23}Na$

B $^{23}_{11}Na$

C $^{23}_{12}Na$

D $^{12}_{23}Na$

28 The number of atoms in one mole of carbon dioxide is equal to the number of atoms in

Bilangan atom di dalam satu mol karbon dioksida adalah bersamaan dengan bilangan atom di dalam

A 1 mole chlorine gas
1 mol gas klorin

B 3/4 mole ammonia
3/4 mol ammonia

C 1/2 mole aluminium
1/2 mol aluminium

D 2/3 mole sulphur dioxide
2/3 mol sulfur dioksida

29 Table 1 shows the proton number for elements W, X, Y and Z.
Jadual 1 menunjukkan nombor proton bagi W, X, Y dan Z.

Element *Unsur*	Proton number *Nombor proton*
W	11
X	13
Y	14
Z	18

Table 1
Jadual 1

Which of the following statement is **true** about the elements W,X,Y and Z
*Antara pernyataan berikut, yang manakah **benar** tentang unsur-unsur W, X, Y dan Z?*

I Element W and Y are metals
Unsur W dan Y adalah logam

II Element X will form an amphoteric oxide
Unsur X akan membentuk oksida amfoterik

III Element Z is also known as noble gas
Unsur Z juga dikenali sebagai gas adi

IV All the elements W,X,Y and Z are in period three
Semua unsur W, X, Y dan Z berada dalam kala tiga

A I and II only
I dan II sahaja

B II and III only
II dan III sahaja

C II , III and IV only
II, III dan IV sahaja

D I, II , III and IV
I, II, III dan IV sahaja

30 Diagram 9 shows the electron arrangement of a compound formed between atoms X and Y.

Rajah 9 menunjukkan susunan elekktron bagi sebatian yang terbentuk antara atom X dan Y.

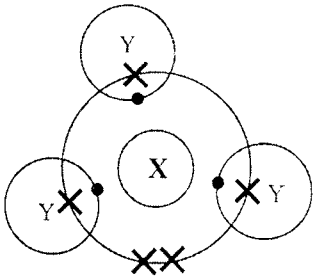


Diagram 9

Rajah 9

Which of the following statement is true about the compound?

Antara pernyataan berikut yang manakah benar tentang sebatian ini?

A The compound has a high boiling point.
Sebatian ini mempunyai takat didih yang tinggi.

B The compound does not conduct electricity.
Sebatian ini tidak mengkonduksikan elektrik.

C The compound is formed by electron transfer.
Sebatian ini terbentuk melalui pemindahan elektron.

D The compound exists as solid at room temperature.
Sebatian ini wujud sebagai pepejal pada suhu bilik.

31 Diagram 10 shows the set-up of apparatus for the electrolysis of copper(II) sulphate solution in beaker X and sodium nitrate solution in beaker Y using carbon electrodes.

Rajah 10 menunjukkan susunan radas untuk menjalankan proses elektrolisis larutan Kuprum(II) sulfat di dalam bikar X dan larutan Natrium nitrat di dalam bikar Y dengan menggunakan elektrod karbon.

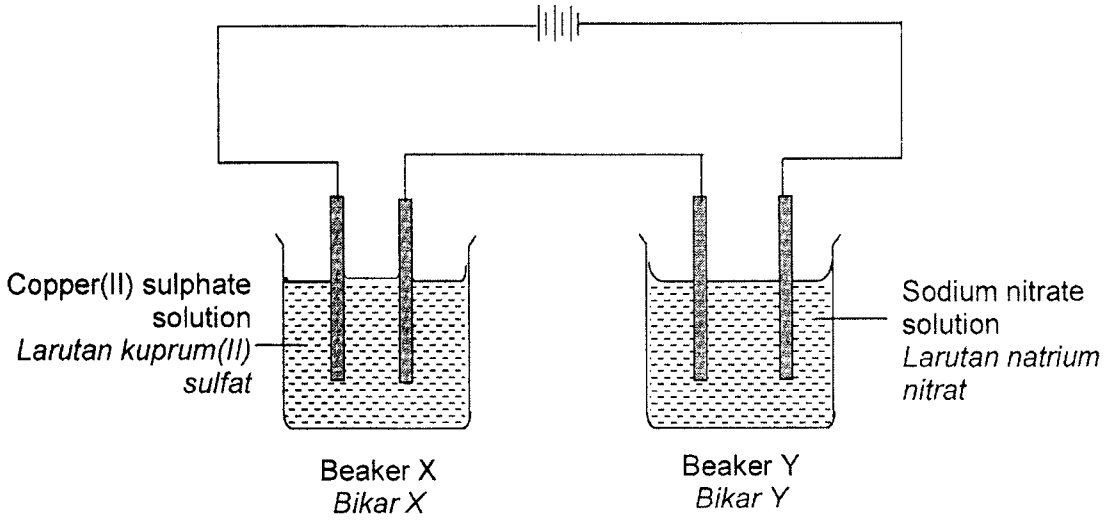


Diagram 10

Rajah 10

Which of the following are produced at the anodes of beaker X and beaker Y?

Manakah antara berikut hasil yang akan diperolehi di anod pada bikar X dan bikar Y?

	Beaker X ***Bikar X***	Beaker Y ***Bikar Y***
A	Oxygen *Oksigen*	Oxygen *Oksigen*
B	Oxygen *Oksigen*	Nitrogen *Oksigen*
C	Sulphur *Sulfur*	Oxygen *Oksigen*
D	Copper *Kuprum*	Sodium *Natrium*

32 A farmer discovered that his vegetables were not growing well because the soil was acidic. Which of the following substances can be used to overcome the problem?

Seorang petani mendapati tanaman sayurannya tidak tumbuh dengan subur kerana tanahnya berasid. Antara bahan berikut, yang manakah boleh digunakan untuk mengatasi masalah tersebut?

A Zinc oxide
Zink oksida

B Calcium oxide
Kalsium oksida

C Sodium hydroxide
Natrium hidroksida

D Magnesium hydroxide
Magnesium hidroksida

33 A series of tests were carried out on a solution of salt X. Table 2 shows the results of the tests.

Satu siri ujian telah dijalankan ke atas larutan garam X. Jadual 2 menunjukkan keputusan ujian tersebut.

Test *Ujian*	Observation *Pemerhatian*
Add lead(II) nitrate solution. *Tambahkan larutan plumbum(II) nitrat*	White precipitate dissolves in water when heated. *Mendakan putih, larut dalam air apabila dipanaskan.*
Add dilute sulphuric acid. *Tambahkan asid sulfurik cair.*	No change. *Tiada perubahan.*
Add sodium hydroxide solution until in excess. *Tambahkan larutan natrium hidroksida sehingga berlebihan.*	White precipitate is formed. It is insoluble in excess sodium hydroxide solution. *Mendakan putih terbentuk.* *Ia tidak larut dalam larutan natrium hidroksida berlebihan.*
Add ammonia solution until in excess. *Tambahkan larutan akueus ammonia sehingga berlebihan.*	White precipitate is formed. It is insoluble in excess ammonia solution. *Mendakan putih terbentuk.* *Ia tidak larut dalam larutan akueus ammonia berlebihan.*

Table 2
Jadual 2

Based on the results of the experiment, salt X is

Berdasarkan keputusan eksperimen, garam X ialah

A Zinc chloride
Zinc klorida

B Calcium carbonate
Kalsium karbonat

C Aluminium sulphate
Aluminium sulfat

D Magnesium chloride
Magnesium klorida

34 The following information shows the properties of glass X.
Maklumat berikut menunjukkan ciri-ciri bagi kaca X.

- Low melting point
  Takat lebur rendah
- Easily shaped
  Mudah dibentuk
- High chemical durability
  Daya tahan yang tinggi terhadap bahan kimia
- High thermal expansion coefficient
  Pemalar pengembangan terma tinggi

What is glass X?
Apakah kaca X?

A Fused glass
Kaca silica terlakur

B Soda-lime glass
Kaca soda kapur

C Borosilicate glass
Kaca borosilikat

D Lead crystal glass
Kaca Plumbum

35 Table 3 shows the result obtained in Experiments I and II to study the rate of reaction

Jadual 3 menunjukkan keputusan yang diperolehi dalam eksperimen I dan II untuk mengkaji kadar tindak balas .

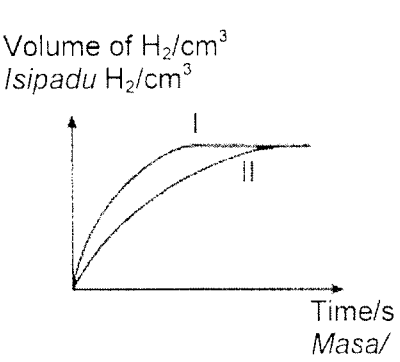
Experiment *Eksperimen*	Zinc metal(5g) *Logam zink(5g)*	Hydrochloric acid *Asid hidroklorik*	
		Volume *Isipadu* (cm^3)	Concentration *Kepekatan* ($mol\ dm^{-3}$)
I	Granule *Butiran*	50	0.1
II	Powder *Serbuk*	25	0.2

Table 3
Jadual 3

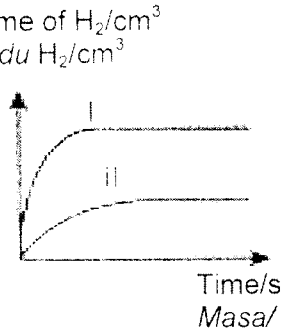
Which of the following graphs represent the two experiments?

Antara graf berikut, yang manakah mewakili kedua-dua eksperimen itu?

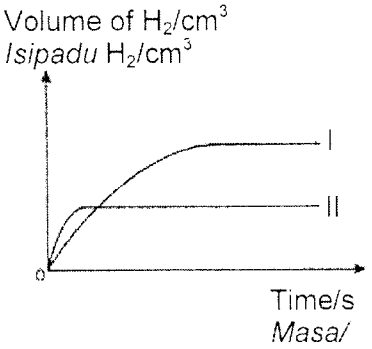
A



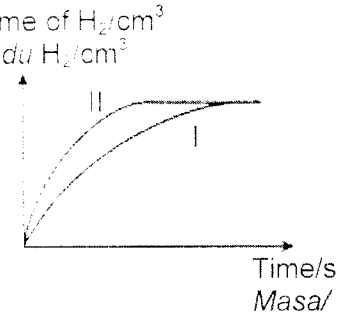
B



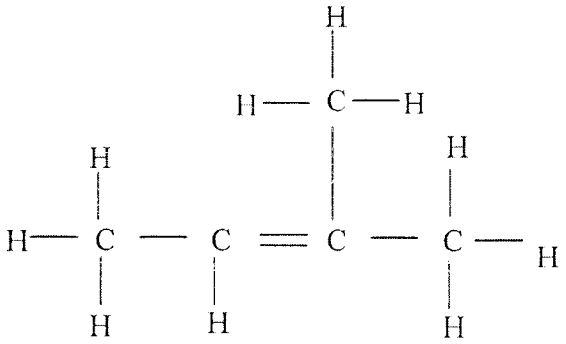
C



D



36



What is the name for the structural formula shown above?

Apakah nama untuk formula struktur yang ditunjukkan di atas ?

A Pent-2-ene
Pent-2-ena

B 3-methylbut-2-ene
3-metilbut-2-ena

C 2-methylbut-2-ene
2-metilbut-2-ene

D 2-methylpent-2-ene
2-metilpent-2-ena

37 In Diagram 11 below, which of the following is **not** true?
*Dalam Rajah 11 di bawah, yang manakah **tidak** benar?*

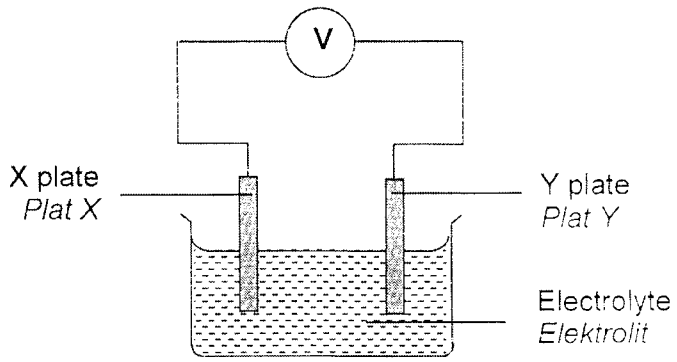


Diagram 11
Rajah 11

	Metal X/Y ***Logam X/Y***	**Metal that will be reduced** ***Logam yang mengalami penurunan***
A	Iron / Zinc *Besi / Zinc*	Iron *Besi*
B	Iron / Copper *Besi/Kuprum*	Copper *Kuprum*
C	Aluminium /Stanum *Aluminium/Timah*	Stanum *Timah*
D	Magnesium / Copper *Magnesium/ Kuprum*	Magnesium *Magnesium*

38 Table 4 shows the fuel values of some common fuels.

Jadual 4 menunjukkan nilai bahan api untuk beberapa bahan api yang biasa.

Fuel ***Bahan bakar***	Fuel value (kJg^{-1}) ***Nilai bahan baker (kJg^{-1})***
Coal *Arang batu*	30
Charcoal *Arang*	35
Kerosene *Minyak Tanah*	37
Natural gas *Gas asli*	50

Table 4

Jadual 4

Which fuel has a high fuel value but is not economical, not easily available and non-renewable.

Bahan api yang manakah mempunyai nilai bahan api yang tinggi, tetapi tidak ekonomi, sukar diperolehi dan tidak boleh diperbaharui.

A Coal
Arang batu

B Charcoal
Arang

C Kerosene
Minyak Tanah

D Natural Gas
Gas asli

39 Which of the following substance will produce scum when it reacts with soap?

Manakah antara bahan berikut akan menghasilkan kekat apabila bertindak dengan sabun?

A Sodium chloride
Natrium klorida

B Calcium sulphate
Kalsium sulfat

C Magnesium chloride
Magnesium klorida

D Potassium nitrate
Kalium nitrat

40 Table 5 shows the mass of elements A and O in a metal oxide, and their relative atomic masses.

Jadual 5 menunjukkan jisim unsur-unsur A dan O dalam suatu oksida logam serta jisim atom relatif masing-masing.

Element ***Unsur***	A	O
Mass / g *Jisim /g*	11.428	2.857
Relative atomic mass *Jisim atom relatif*	64	16

Table 5
Jadual 5

What is the empirical formula of the compound?

Apakah formula empirik sebatian itu?

A AO
B A_2O
C A_2O_3
D A_2O_5

41 In the Periodic Table of Elements, element X is in Group 2 and element Y is in Group 17.The letters X and Y are not the actual symbol of the elements.
Which of the following chemical equation is **true** for the reaction between element X and element Y?

Dalam Jadual Berkala Unsur, unsur X berada dalam Kumpulan 2 dan unsur Y berada dalam Kumpulan 17.
Huruf – huruf X dan Y yang digunakan bukan simbol sebenar unsur itu.
Antara persamaan kimia berikut, yang manakah benar bagi tindak balas antara unsur X dan unsur Y?

A $X + Y \rightarrow XY$

B $2X + Y \rightarrow X_2Y$

C $X + Y_2 \rightarrow XY_2$

D $2X + Y_2 \rightarrow 2XY$

42 Diagram 12 shows the electron arrangement in ions W^-, X^+, Y^{2-} and Z^{2+}.

Rajah 12 menunjukkan susunan elektron dalam ion W^-, X^+, Y^{2-} dan Z^{2+}.

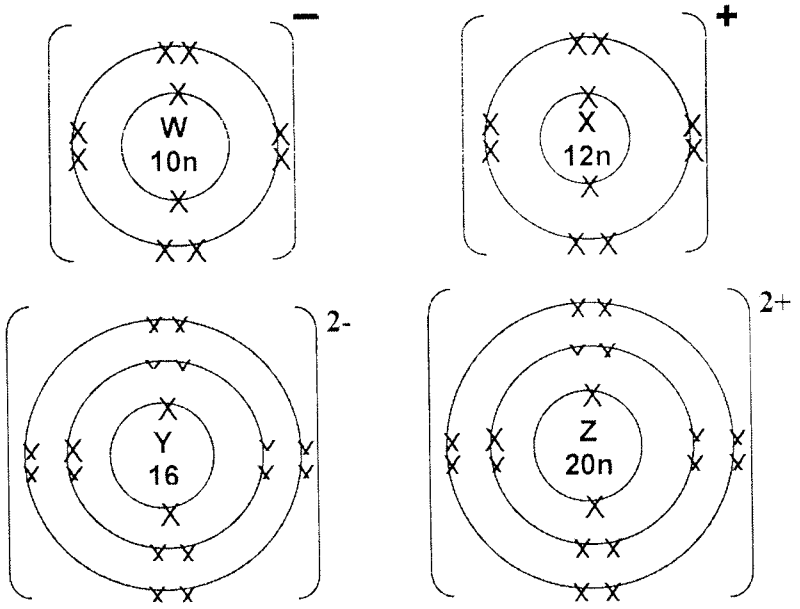


Diagram 12

Rajah 12

Which of the following shows the correct nucleon number of the ion?

Antara berikut, yang manakah menunjukkan nombor nukleon ion yang betul?

	Ion *Ion*	Nucleon number *Nombor nukleon*
A	W^-	20
B	X^+	22
C	Y^{2-}	34

43 A student wants to electroplate an iron key with silver. Which of the following pairs of electrodes and electrolyte are suitable to be used in this experiment?

Seorang pelajar ingin menyadur kunci besi dengan argentum. Pasangan elektrod dan elektrolit yang manakah sesuai digunakan dalam eksperimen ini ?

	Cathode ***Katod***	Anode ***Anod***	Electrolyte ***Elektrolit***
A	Iron *Besi*	Silver *Argentum*	Silver sulphate *Argentum sulfat*
B	Silver *Argentum*	Iron *Besi*	Silver chloride *Argentum klorida*
C	Iron *Besi*	Carbon *Karbon*	Silver nitrate *Argentum nitrat*
D	Carbon *Karbon*	Iron *Besi*	Silver hydroxide *Argentum hidroksida*

44 Hydrochloric acid reacts with substance Y and produces a gas as one of the products. Which of the following is **not** substance Y?

*Asid hidroklorik bertindak balas dengan bahan Y dan menghasilkan suatu gas sebagai salah satu hasil tindak balas. Manakah antara berikut **bukan** bahan Y?*

A Zinc granule
Kepingan zink

B Zinc oxide
Zink oksida

C Sodium thiosulphate
Natrium tiosulfat

D Magnesium carbonate
Magnesium karbonat

45 Chemical equation below shows the reaction between hydrochloric acid and sodium carbonate powder.

Persamaan kimia berikut menunjukkan tindak balas di antara asid hidroklorik dan serbuk natrium karbonat.

$$2HCl + Na_2CO_3 \rightarrow 2NaCl + H_2O + CO_2$$

Calculate the volume of carbon dioxide gas released when 25 cm^3 of hydrochloric acid of 0.2 mol dm^{-3} reacts completely with excess sodium carbonate powder.
[1 mol of gas occupies 24 dm^3 at room temperature]

Hitung isipadu gas karbon dioksida yang dibebaskan apabila 25 cm^3 asid hidroklorik 0.2 mol dm^{-3} bertindak balas lengkap dengan serbuk natrium karbonat yang berlebihan.
[1 mol gas menepati 24dm^3 pada suhu bilik]

A 60 cm^3

B 0.6 dm^3

C 50 cm^3

D 0.12 dm^3

46 The following information shows the effect of a particular factor on the rate of reaction.

Maklumat berikut menunjukkan kesan suatu faktor yang mempengaruhi kadar tindak balas.

- Particles have higher kinetic energy
  Zarah mempunyai tenaga kinetik yang tinggi
- Frequency of collision between particles increases
  Frekuensi pelanggaran antara zarah bertambah
- Frequency of effective collision increases
  Frekuensi pelanggaran berkesan bertambah

Which of the following can cause the above effect?

Manakah antara berikut akan memberikan kesan di atas?

A Adding a catalyst.
Menambah mangkin

B Increasing temperature of reactants
Menaikkan suhu bahan tindak balas

C Increasing the concentration of reactants.
Menambah kepekatan bahan tindak balas

D Increasing total surface area of reactants.
Menambah jumlah luas permukaan bahan tindak balas

47 Diagram 13 is a flow chart showing the conversion of alkene to carboxylic acid and alkane.

Rajah 13 menunjukkan carta alir perubahan alkena kepada asid karboksilik dan alkana.

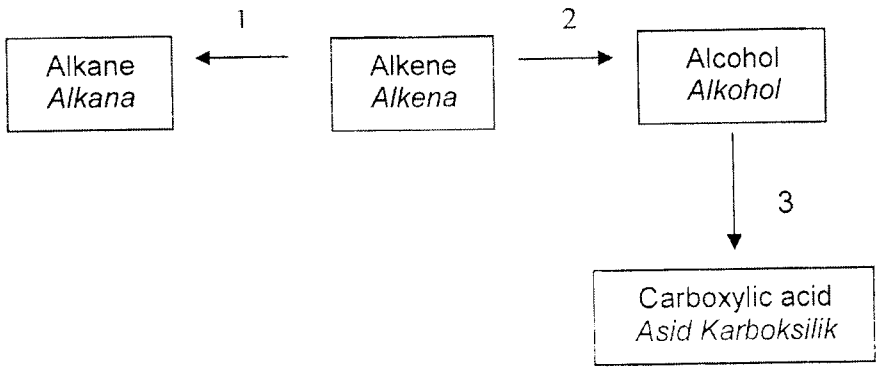


Diagram 13

Rajah 13

What are reactions 1, 2 and 3?

Apakah tindak balas 1, 2 dan 3?

	1	2	3
A	Hydrogenation *Penghidrogenan*	Hydration *Penghidratan*	Oxidation *Pengoksidaan*
B	Hydrogenation *Penghidrogenan*	Oxidation *Pengoksidaan*	Dehydration *Pendehidratan*
C	Oxidation *Pengoksidaan*	Hydration *Penghidratan*	Dehydration *Pendehidratan*
D	Hydration *Penghidratan*	Hydrogenation *Penghidrogenan*	Oxidation *Pengoksidaan*

48 P, Q and R are metals. Based on the ionic equations below, which of the following statement is true?

P, Q dan R merupakan logam. Berdasarkan persamaan ion di bawah, penyataan yang manakah benar ?

Reaction 1 : $P + Q^{2+} \rightarrow Q + P^{2+}$ *Tindak balas 1*

Reaction 2 : $R + P^{2+} \rightarrow R^{2+} + P$ *Tindak balas 2*

A P and Q are oxidised

P dan Q teroksida

B P is more electropositive than R.

P adalah lebih elektropositif daripada R

C Q can displace P from its salt solution.

Q boleh menyesarkan P daripada larutan garamnya

D Q is lower than R in the electrochemical series.

Q adalah di bawah R dalam siri elektrokimia.

49 Table 6 shows the heat of combustion of three common fuels.

Jadual 6 menunjukkan haba pembakaran untuk tiga bahanapi.

Fuel ***Bahanapi***	Heat of combustion / $kJmol^{-1}$ ***Haba Pembakaran / $kJmol^{-1}$***
Methane *Metana*	-890
Ethanol *Etanol*	-1376
Propane *Propana*	-2230

Table 6

Jadual 6

Which of the following statement is **true**?

*Antara pernyataan berikut, yang manakah **benar**?*

A 0.1 mol of methane produces more heat energy than 0.1 mol of propane.

0.1 mol metana menghasilkan lebih banyak haba berbanding 0.1 mol propana.

B Propane has the lowest number of carbon atoms per molecule.

Popana mempunyai bilangan atom karbon per molekul yang paling rendah

C The heat of combustion depends on the number of oxygen atoms in the molecule.

Haba pembakaran sesuatu bahanapi bergantung kepada bilangan atom oksigen dalam molekul.

D 68.8 kJ of energy is released when 0.05 mol of ethanol is burnt in excess oxygen.

68.8 kJ tenaga dibebaskan apabila 0.05 mol etanol terbakar lengkap dalam oksigen berlebihan.

50 The production of soap can be represented by the equation below.
Pembentukan sabun boleh diwakili dengan persamaan berikut.

Fats / Oils + Sodium hydroxide → Soap + Glycerol
Lemak/minyak + Natrium hidroksida → Sabun + Gliserol

Which of the following is **true**?
*Yang manakah penyataan yang **benar**?*

I Glycerol is a type of alcohol
Gliserol merupakan sejenis alkohol

II The reaction is known as Saponification
Tindak balas dikenali sebagai saponifikasi

III Sodium hydroxide is used as catalyst
Natrium hidroksida bertindak sebagai mangkin

IV Animal fats or vegetable oils are commonly used
Lemak haiwan dan minyak sayuran biasanya digunakan

A I and II only
I dan II sahaja

B II and IV only
II dan IV sahaja

C I and IV only
I dan IV sahaja

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

END OF QUESTION PAPER

KERTAS SOALAN TAMAT

INFORMATION FOR CANDIDATES
MATLUMAT UNTUK CALON

1. This question paper consists of **50** questions.

   *Kertas soalan ini mengandungi **50** soalan.*

2. Answer **all** questions.

   *Jawab **semua** soalan.*

3. Each question is followed by four alternative answers, **A**, **B**, **C** and **D**. For each question, choose **one** answer only. Blacken your answer on the objective answer sheet provided.

   *Tiap-tiap soalan diikuti oleh empat pilihan jawapan, iaitu **A**, **B**, **C** dan **D**. Bagi setiap soalan, pilih **satu** jawapan sahaja. Hitamkan jawapan anda pada kertas jawapan objektif yang disediakan.*

4. If you wish to change your answer, erase the blackened mark that you have made. Then blacken the space for the new answer.

   Jika anda hendak menukar jawapan, padamkan tanda yang telah dibuat. Kemudian hitamkan jawapan yang baru.

5. The diagrams in the questions provided are not drawn to scale unless stated.

   Rajah yang mengiringi soalan tidak dilukis mengikut skala kecuali dinyatakan.

6. You may use a non-programmable scientific calculator.

   Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogram.

JULANG JOHOR 2009
CHEMISTRY
PAPER 1
ANSWER

QUESTION	ANSWER
1	C
2	D
3	A
4	B
5	A
6	B
7	D
8	A
9	D
10	D
11	B
12	C
13	C
14	A
15	A
16	A
17	A
18	B
19	A
20	A
21	C
22	D
23	B
24	B
25	C

QUESTION	ANSWER
26	A
27	B
28	B
29	C
30	B
31	A
32	B
33	D
34	B
35	D
36	C
37	D
38	D
39	C
40	A
41	C
42	D
43	A
44	B
45	A
46	B
47	A
48	D
49	D
50	D

SULIT

Nama : ..... Kelas : .....

JABATAN PELAJARAN NEGERI JOHOR

PEPERIKSAAN PERCUBAAN SPM 2009 **4541/2**
CHEMISTRY
Kertas 2
September

2½ jam
Dua jam tiga puluh minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Tuliskan nama dan tingkatan 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 belakang kertas soalan ini.*

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

Kertas soalan ini mengandungi 36 halaman bercetak

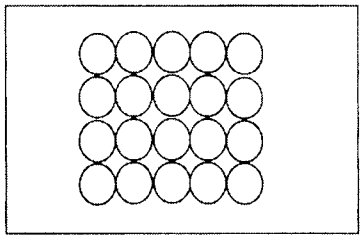
[Lihat sebelah

Section A
Bahagian A

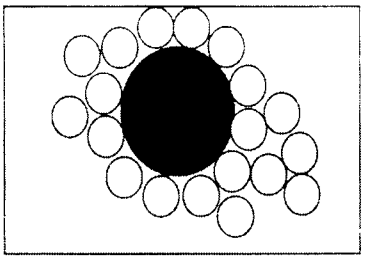
[60 *marks*]
[60 *markah*]

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

1 Diagram 1.1 shows the arrangement of atoms in substance X and Y.
Rajah 1.1 di bawah menunjukkan susunan atom-atom untuk bahan X dan Y



Substance X
Bahan X



Substance Y
Bahan Y

Diagram 1.1
Rajah 1.1

(a) Based on Diagram 1.1, answer the following questions:
Berdasarkan Rajah 1.1, jawab soalan-soalan berikut :

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

Pure metal : .....
Logam Tulen [1 mark]
[1 markah]

Alloy : .....
Aloi [1 mark]
[1 markah]

(ii) Explain your answers in (a) (i)
Terangkan jawapan anda dalam (a) (i).

.....

.....

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

[Lihat sebelah

(iii) Which substance is harder, X or Y?
Give a reason for your answer.

Di antara bahan X dan Y, yang manakah lebih keras?
Berikan satu sebab bagi jawapan anda.

.....

.....

.....

[2 marks]
[2 markah]

(b) Diagram 1.2 below shows the structural formula of a polymer.
Rajah 1.2 di bawah menunjukkan formula struktur bagi suatu polimer.

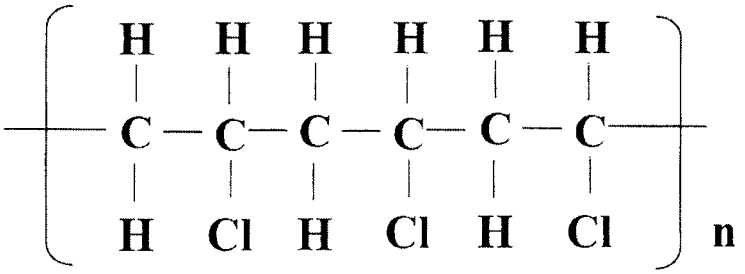


Diagram 1.2
Rajah 1.2

Based on Diagram 1.2, answer the following questions:
Berdasarkan Rajah 1.2, jawab soalan-soalan berikut:

(i) State the meaning of polymer.
Nyatakan maksud polimer.

.....

.....

[1 mark]
[1 markah]

[Lihat sebelah

(ii) Draw and name the structural formula of its monomer.

Lukiskan dan namakan formula struktur bagi monomernya.

[2 marks]
[2 markah]

(iii) State **one** use of the polymer in Diagram 1.2 in our daily life.

*Nyatakan **satu** kegunaan polimer pada Rajah 1.2 dalam kehidupan seharian* kita.

.....

[1 mark]
[1 markah]

[Lihat sebelah

2 Diagram 2.1 shows the heating curve of solid naphthalene, $C_{10}H_8$.

Rajah 2.1 menunjukkan lengkung pemanasan pepejal naftalena, $C_{10}H_8$.

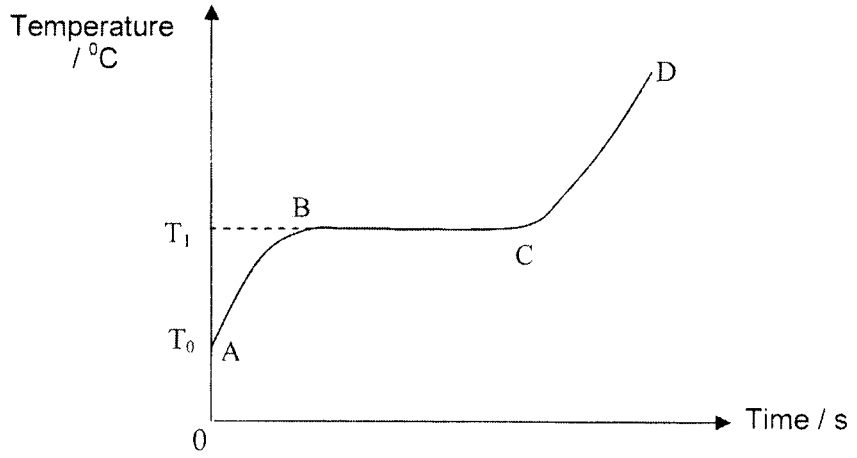


Diagram 2.1

Rajah 2.1

(a) (i) Name the process involved in this experiment.

Namakan proses yang terlibat dalam eksperimen ini.

.....

[*1 mark*]
[*1 markah*]

(ii) State the type of particle present in naphthalene, $C_{10}H_8$.

Nyatakan jenis zarah yang terdapat dalam naftalena, $C_{10}H_8$.

.....

[1 *mark*]
[1 *markah*]

(b) Explain why there is no change in temperature from B to C

Terangkan mengapa tiada perubahan suhu dari B ke C

.....

.....

.....

[2 *marks*]
[*2 markah*]

[Lihat sebelah

(c) State how the movement of naphthalene particles changes from C to D during heating.

Nyatakan bagaimana pergerakan zarah-zarah naftalena berubah semasa pemanasan dari C ke D.

.....

[1 *mark*]
[*1 markah*]

(d) Diagram 2.2 shows the atomic model proposed by Neils Bohr.

Rajah 2.2 menunjukkan model atom yang dicadangkan oleh Neils Bohr.

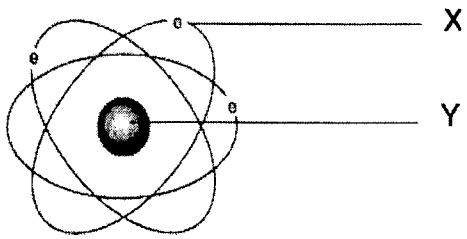


Diagram 2.2

Rajah 2.2

i) Name X and Y.

Namakan X dan Y.

X : ..... Y : .....

[1 mark]
[*1 markah*]

ii) Which subatomic particles are involved in a chemical reaction?

Zarah-zarah sub-atom yang manakah terlibat dalam tindak balas kimia?

.....

[1 mark]
[1 markah]

[Lihat sebelah

(e) Table 2 shows the number of protons and neutrons of four different atoms.
Jadual 2 menunjukkan bilangan proton dan neutron bagi empat atom yang berlainan.

Atom	Number of protons *Bilangan proton*	Number of neutrons *Bilangan neutron*
W	16	17
X	16	16
Y	3	4
Z	19	20

Table 2
Jadual 2

i) Which atoms are isotopes?
Atom-atom yang manakah adalah isotop?

.....

[1 mark]
[1 markah]

ii) Give a reason for your answer in (e) (i).
Berikan satu sebab bagi jawapan anda di (e) (i).

.....

.....

[2 marks]
[2 markah]

[Lihat sebelah

3 Table 3 shows pH values of different concentration of hydrochloric acid, HCl solutions.

Jadual 3 menunjukkan nilai-nilai pH bagi larutan asid hidroklorik, HCl yang berbeza kepekatan.

Type of solution *Jenis larutan*	*Solution I* *Larutan I*	*Solution II* *Larutan II*	*Solution III* *Larutan III*
Concentration *Kepekatan*	0.1 mol dm^{-3}	0.01 mol dm^{-3}	0.001 mol dm^{-3}
pH value *Nilai pH*	1	2	3

Table 3
Jadual 3

(a) (i) Which of the solutions in Table 3 has the highest concentration of hydrogen ions?

Larutan yang manakah dalam Jadual 3 mempunyai kepekatan ion hidrogen yang paling tinggi?

.....

[1 mark]
[1 markah]

(ii) Calculate the number of hydrogen ions in 25 cm^3 of Solution II.
[Avogadro Constant = 6×10^{23} mol^{-1}]

Hitungkan bilangan ion hidrogen dalam 25 cm^3 Larutan II.
[Nombor Avogadro = 6×10^{23} mol^{-1}]

[2 marks]
[2 markah]

[Lihat sebelah

(iii) Name an indicator that can be used to measure the pH values of the solutions I, II and III.

Namakan satu penunjuk yang boleh digunakan untuk mengukur nilai pH larutan-larutan I, II dan III.

.....

[1 mark]
[1 markah]

(b) Solution I is used to neutralise 25 cm^3 of 0.1 mol dm^{-3} of sodium hydroxide, NaOH solution.

Larutan I digunakan untuk meneutralkan 25 cm^3 larutan natrium hidroksida, NaOH 0.1 mol dm^{-3}.

(i) Calculate the number of moles of sodium hydroxide, NaOH in the solution.

Hitungkan bilangan mol natrium hidroksida, NaOH dalam larutan.

[1 mark]
[1 markah]

(ii) Calculate the volume of Solution I used to neutralise sodium hydroxide, NaOH solution in cm^3.

Hitungkan isipadu Larutan I yang digunakan untuk meneutralkan larutan natrium hidroksida, NaOH dalam cm^3.

[3 marks]
[3 markah]

[Lihat sebelah

(iii) Draw an apparatus set-up for the titration of sodium hydroxide solution with solution I.

Lukis susunan radas untuk pentitratan larutan natrium hidroksida dengan Larutan I

[2 marks]
[2 markah]

4 Diagram 4 shows the set-up of apparatus to investigate the electrolysis of sodium chloride solution with carbon electrodes.

Rajah 4 menunjukkan susunan radas untuk mengkaji elektrolisis larutan natrium klorida dengan menggunakan elektrod-elektrod karbon.

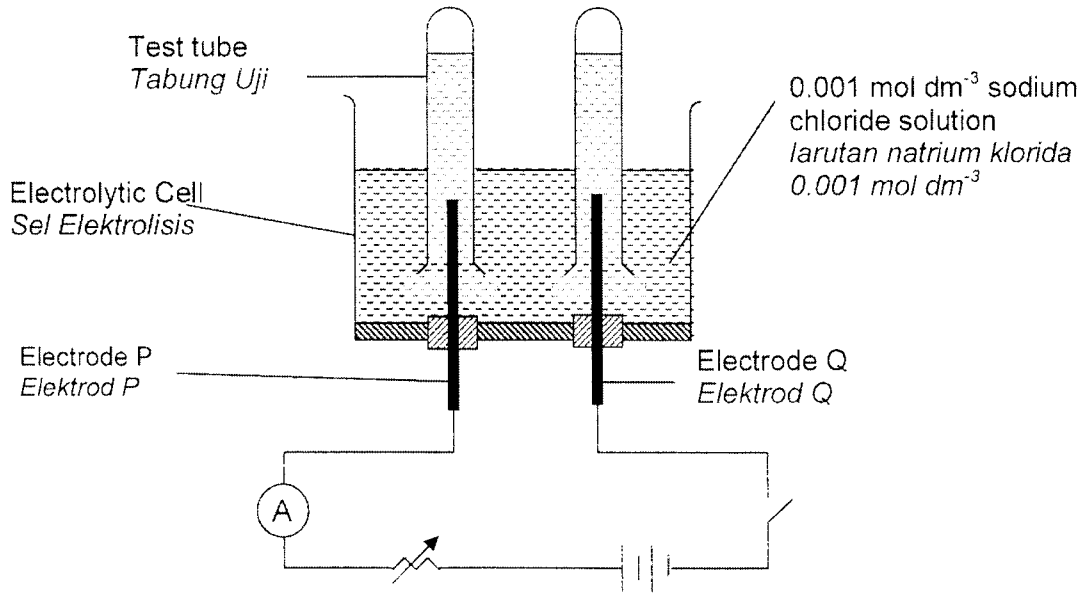


Diagram 4
Rajah 4

(a) What is the energy change in the electrolytic cell above?

Apakah perubahan tenaga dalam sel elektrolisis di atas?

.....

[1 *mark*]
[1 markah]

(b) Write the formulae of all ions present in sodium chloride solution.

Tuliskan formula bagi semua ion yang hadir dalam larutan natrium klorida.

.....

[1 *mark*]
[1 markah]

[Lihat sebelah

(c) (i) Name the gas collected at electrode P.

Namakan gas yang terkumpul pada elektrod P

.....

[1 *mark*]
[1 markah]

(ii) How do you identify the gas collected in *(c)*(i)?

Bagaimanakah anda mengesahkan gas yang terkumpul di (c)(i)?

.....

.....

[2 *marks*]
[2 markah]

(d) (i) What is the product formed at electrode P if the experiment is repeated using 2.0 mol dm^{-3} sodium chloride solution?

Apakah hasil yang akan terbentuk di elektrod P jika eksperimen ini di ulangi dengan menggunakan larutan natrium klorida 2.0 mol dm^{-3}?

.....

[1 *mark*]
[1 markah]

(ii) Explain your answer in *(d)*(i).

Terangkan jawapan anda di (d)(i).

.....

.....

.....

[2 *marks*]
[2 markah]

(iii) Write the half equation for the reaction at electrode P.

Tuliskan persamaan setengah bagi tindak balas di elektrod P.

.....

[1 *mark*]
[1 markah]

[Lihat sebelah

(e) Suggest one metal that can replace the carbon electrodes in this experiment to obtain the same result as above.

Cadangkan satu logam yang boleh menggantikan elektrod karbon dalam eksperimen tersebut untuk mendapatkan keputusan yang sama seperti di atas.

.....

[1 *mark*]
[1 markah]

[Lihat sebelah

5 Table 5 shows the melting points and boiling points of some alkanes.
Jadual 5 menunjukkan takat lebur dan takat didih bagi beberapa alkana.

Alkanes *Alkana*	Number of carbon atoms per molecule *Bilangan atom karbon per molekul*	Melting point *Takat lebur* (°C)	Boiling point Takat didih (°C)
Methane *Metana*	1	-182	-162
Ethane *Etana*	2	-183	- 89
Propane *Propana*	3	-188	- 42
J	4	-138	-1
Pentane *Pentana*	5	-130	36
Hexane *Heksana*	6	-95	69

Table 5
Jadual 5

(a) Based on the data in Table 5, answer the following questions
Berdasarkan data dalam Jadual 5, jawab soalan-soalan berikut.

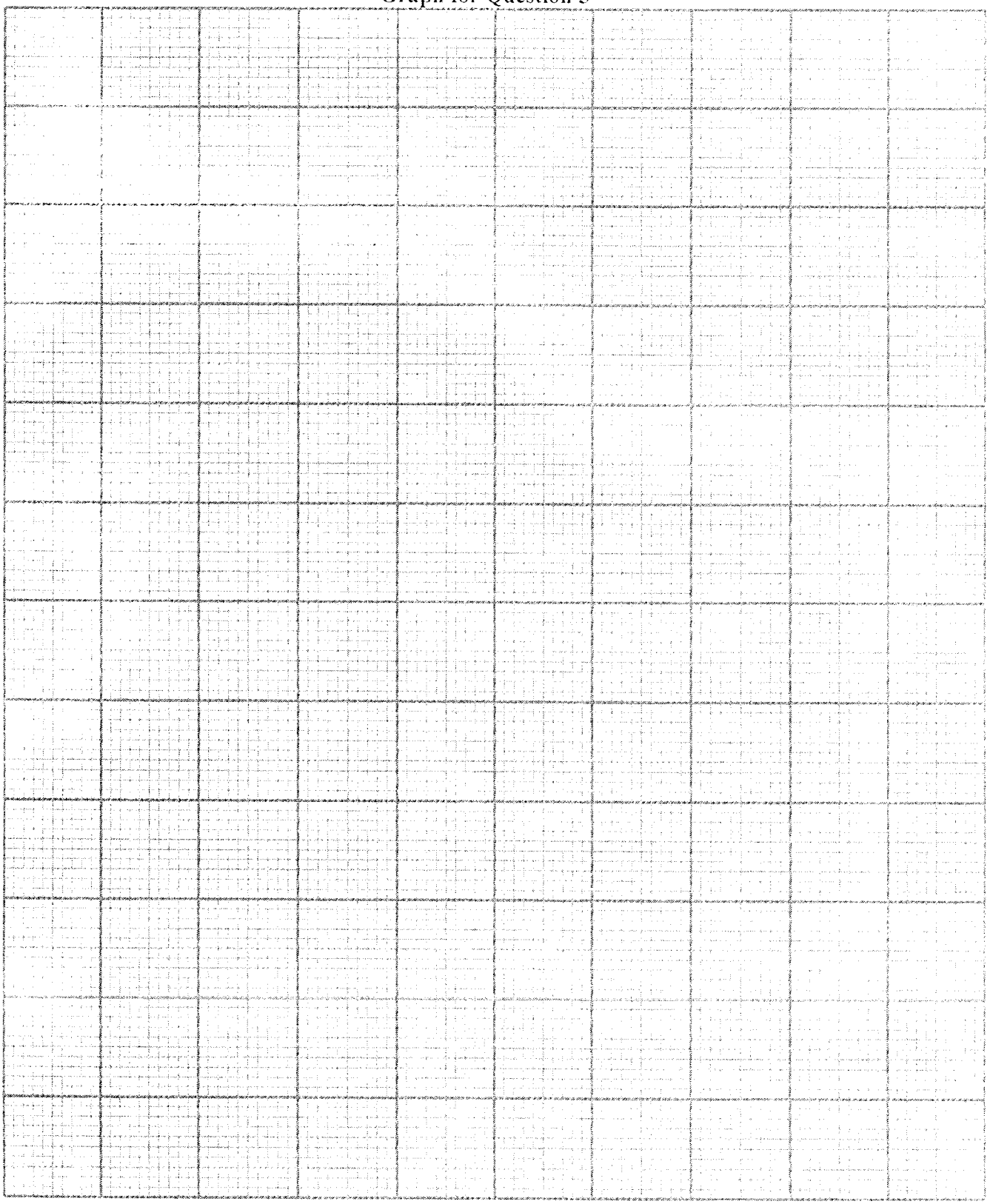
(i) Plot a graph of boiling point against number of carbon atoms per molecule.

Plotkan graf takat didih melawan bilangan atom karbon per molekul.

[3 marks]
[3 markah]

[Lihat sebelah

Graph for Question 5



[Lihat sebelah

(ii) Explain why the boiling point of alkanes increases as the number of carbon atoms in alkanes molecules increases.

Terangkan mengapa takat didih alkana bertambah apabila bilangan atom karbon per molekul alkana bertambah.

.....

.....

[1 mark]
[1 markah]

(iii) Give the physical state of hexane at room temperature.

Beri keadaan fizik heksana pada suhu bilik.

.....

[1 mark]
[1 markah]

(b) Draw **all** of the structural formulae of isomers for alkanes J and name the isomers using IUPAC nomenclature system.

*Lukiskan **semua** formula struktur isomer J dan namakan isomernya mengikut sistem IUPAC.*

[4 marks]
[4 markah]

[Lihat sebelah

6 A pupil carried out an experiment to investigate a redox reaction. Diagram 6.1 shows the set-up of apparatus used in the experiment.

Seorang pelajar menjalankan satu eksperimen untuk mengkaji tindak balas redoks. Rajah 6.1 menunjukkan susunan radas yang digunakan didalam eksperimen ini.

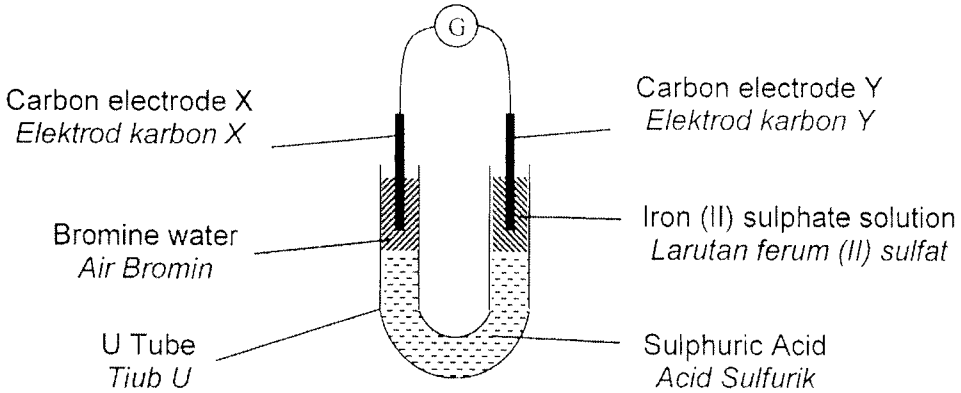


Diagram 6.1
Rajah 6.1

(a) Name one substance that can replace bromine water in this experiment.

Namakan satu bahan yang boleh menggantikan air bromin dalam eksperimen ini.

.....

[1 mark]
[1 markah]

(b) If the experiment is repeated using cooking oil to replace sulphuric acid, the galvanometer does not show any reading. Explain why.

Jika eksperimen ini diulangi dengan menggunakan minyak masak menggantikan asid sulfurik, galvanometer tidak menunjukkan bacaan. Terangkan mengapa.

.....

[1 mark]
[1 markah]

[Lihat sebelah

(c) The half equation of the reaction at electrode Y is as below.

Persamaan setengah tindak balas yang berlaku pada elektrod Y adalah seperti di bawah.

$$Fe^{2+} \rightarrow Fe^{3+} + e$$

(i) State the colour change of iron (II) sulphate solution in this reaction.

Nyatakan perubahan warna larutan ferum (II) sulfat di dalam tindak balas ini.

.....

[1 mark]
[1 markah]

(ii) This reaction is an oxidation reaction. What is meant by oxidation reaction in terms of electron transfer?

Tindak balas ini adalah tindak balas pengoksidaan. Apakah yang dimaksudkan dengan tindak balas pengoksidaan dari segi pemindahan elektron?

.....

.....

.....

[1 mark]
[1 markah]

(iii) Name a reagent to identify Fe^{3+} ion produced at electrode Y.

Namakan satu reagen untuk mengenal pasti ion Fe^{3+} yang terhasil pada elektrod Y.

.....

.....

.....

[1 mark]
[1 markah]

[Lihat sebelah

(d)

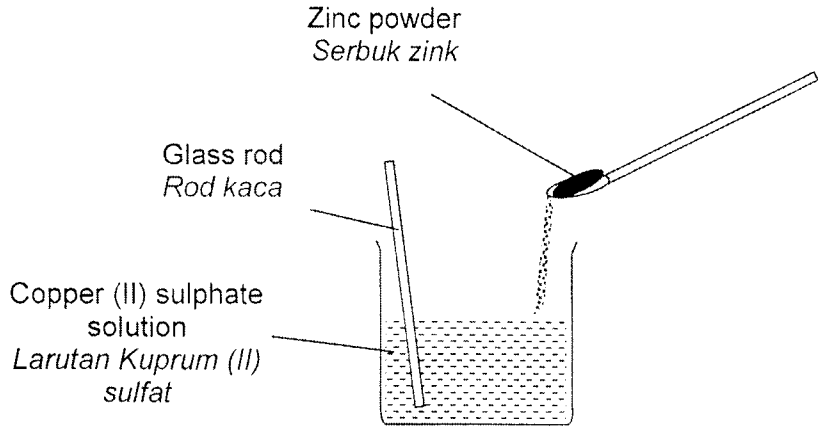


Diagram 6.2
Rajah 6.2

In another experiment, excess zinc powder is added to 25 cm^3 of 0.2 mol dm^{-3} of copper (II) sulphate solution as shown in Diagram 6.2. The solution is stirred until there is no colour change in the solution. The solution is filtered and the filtrate, M is poured into another beaker.

Dalam eksperimen yang lain, serbuk zink berlebihan di tambah ke dalam 25 cm^3 larutan kupurm (II) sulfat 0.2 mol dm^{-3} seperti ditunjukkan dalam Rajah 6.2. Larutan itu dikacau sehingga tidak ada perubahan warna pada larutan itu. Larutan itu dituras dan hasil turasan, M dituangkan ke dalam sebuah bikar yang lain.

(i) Name the filtrate M.

Namakan hasil turasan M.

.....

[1 mark]
[1 markah]

(ii) Write a balanced chemical equation for this reaction.

Tuliskan satu persamaan kimia yang seimbang bagi tindak balas ini.

.....

[1 mark]
[1 markah]

[Lihat sebelah

(iii) State the change in the oxidation number of copper in this reaction.
Nyatakan perubahan nombor pengoksidaan kuprum dalam tindak balas ini.

.....

[1 mark]
[1 markah]

(iv) Calculate the number of moles of copper (II) sulphate in the solution.

Hitungkan bilangan mol larutan kuprum (II) sulfat dalam larutan.

[1 mark]
[1 markah]

(v) Calculate the mass of zinc sulphate produced.
[Relative atomic mass : Zn = 65, S = 32, O = 16]

Hitungkan jisim zink sulfat yang dihasilkan.
[Jisim atom relatif : Zn = 65, S = 32, O = 16]

[1 mark]
[1 markah]

[Lihat sebelah

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) Diagram 7.1 shows an apparatus set-up to determine the empirical formula of magnesium oxide.

Rajah 7.1 menunjukkan susunan radas untuk menentukan formula empirik magnesium oksida.

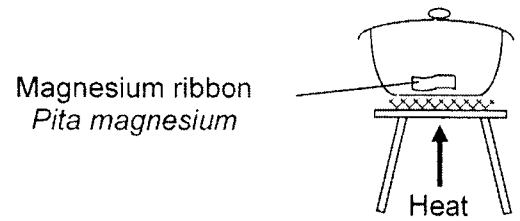


Diagram 7.1
Rajah 7.1

(i) During the experiment, we need to raise the lid a little at intervals. Why?

Ketika eksperimen dijalankan, kita perlu membuka penutup sekali sekala. Mengapa?

[2 marks]
[2 markah]

[Lihat sebelah

(ii) Table 7 shows the results for the experiment to determine the empirical formula of magnesium oxide.

Jadual 7 menunjukkan keputusan bagi satu eksperimen untuk menentukan formula empirik bagi magnesium oksida.

Mass of crucible + lid *Jisim mangkuk pijar + penutup*	28.24 g
Mass of crucible + lid + magnesium ribbon *Jisim mangkuk pijar + penutup + pita magnesium*	30.64 g
Mass of crucible + lid + magnesium oxide *Jisim mangkuk pijar + penutup + magnesium oxide*	32.24 g

Table 7
Jadual 7

Based on the results in Table 7, determine the empirical formula of magnesium oxide.
[Relative atomic mass : Mg = 24 , O = 16]

Berdasarkan keputusan dalam Jadual 7, tentukan formula empirik bagi magnesium oksida.
[Jisim atom relatif : Mg = 24 , O = 16]

[5 marks]
[*5 markah*]

[Lihat sebelah

(b) Diagram 7.2 shows an apparatus set-up to determine the empirical formula of copper oxide.

Rajah 7.2 menunjukkan susunan radas untuk menentukan formula empirik kuprum oksida.

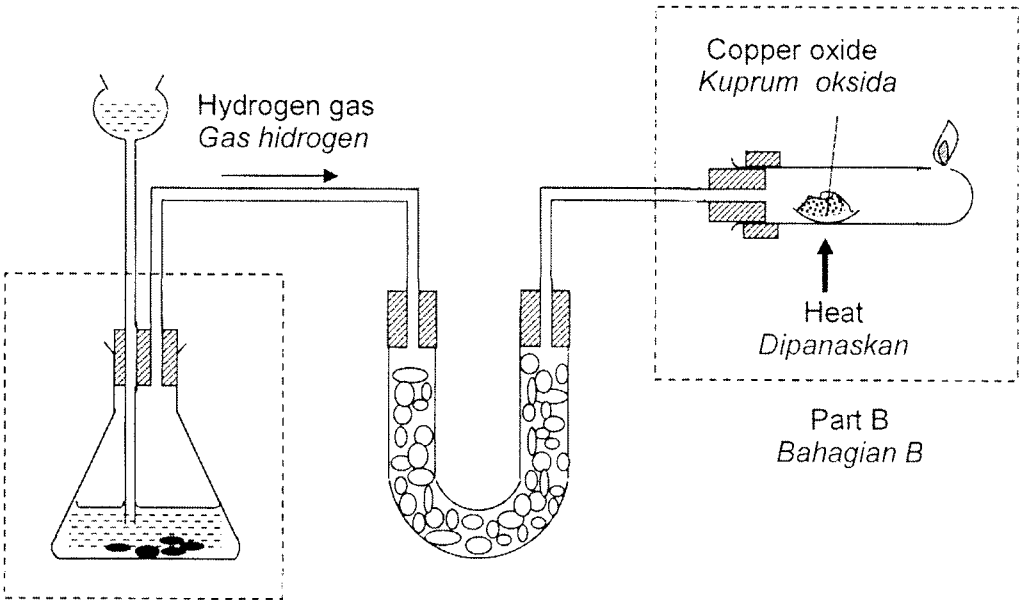


Diagram 7.2
Rajah 7.2

(i) Compare the method used in experiment in Diagram 7.2 with Diagram 7.1.

Bandingkan kaedah melakukan eksperimen dalam Rajah 7.2 dengan kaedah dalam Rajah 7.1.

[4 marks]
[4 markah]

(ii) State the reactants to produce hydrogen gas in Part A.

Nyatakan bahan-bahan untuk menghasilkan gas hidrogen di Bahagian A.

[2 marks]
[2 markah]

(iii) Write the chemical equation for the reaction in Part A.

Tuliskan persamaan kimia untuk tindak balas di Bahagian A.

[1mark]
[1 markah]

[Lihat sebelah

(iv) State three precautions that must be taken in Part B.
Explain your answer.

Nyatakan tiga langkah berjaga-jaga yang mesti diambil dalam Bahagian B.
Terangkan jawapan anda.

[6 marks]
[6 markah]

[Lihat sebelah

8 (a) Salts can be classified into soluble and insoluble salt.

Garam boleh dikelaskan kepada garam terlarutkan dan garam tak terlarutkan.

(i) Name one example of an insoluble chloride salt.

Namakan satu contoh garam klorida tak terlarutkan.

[1 mark]
[1 markah]

(ii) Name the chemicals needed to prepare salt in (a) (i) and name the reaction.

Namakan bahan kimia yang diperlukan untuk menyediakan garam di (a) (i) dan namakan tindak balas itu.

[3 marks]
[3 markah]

(b) Diagram 8 shows a flow chart of the qualitative analysis of substance X.

Rajah 8 menunjukkan carta alir analisis kualitatif bagi sebatian X.

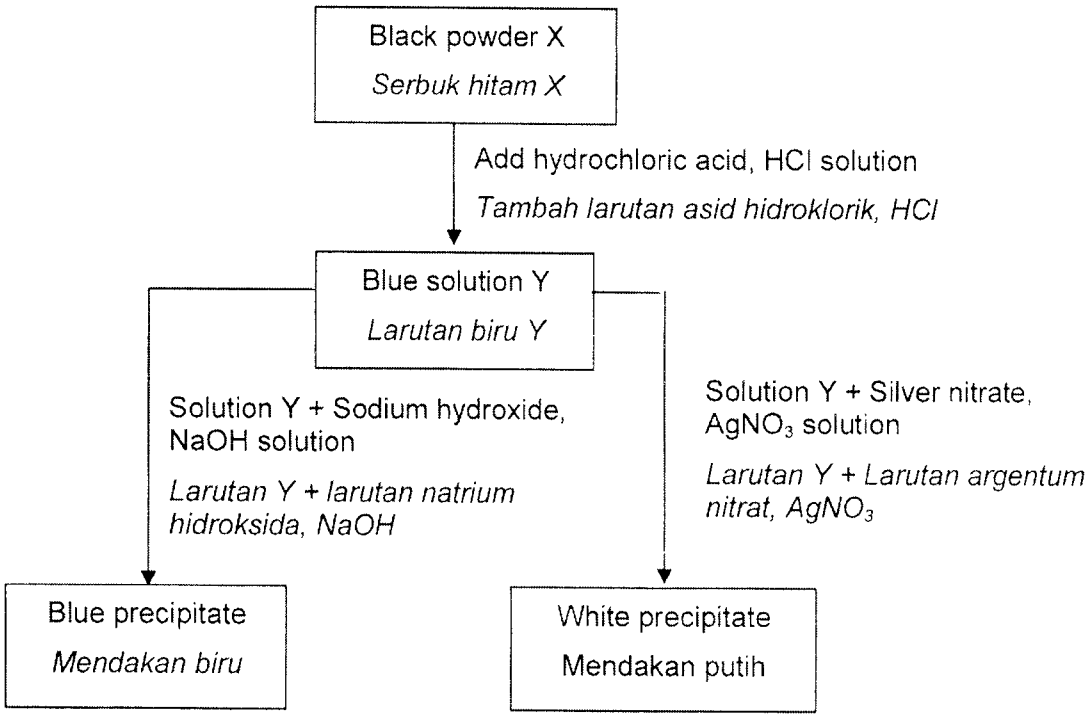


Diagram 8
Rajah 8

[Lihat sebelah

(i) Based on diagram 8, identify the
Berdasarkan rajah 8, kenal pasti

- Black powder X
  Serbuk hitam X
- Blue solution Y
  Larutan biru Y
- **Cation** and **anion** of Y solution.
  Kation dan anion larutan Y

[4 marks]
[*4 markah*]

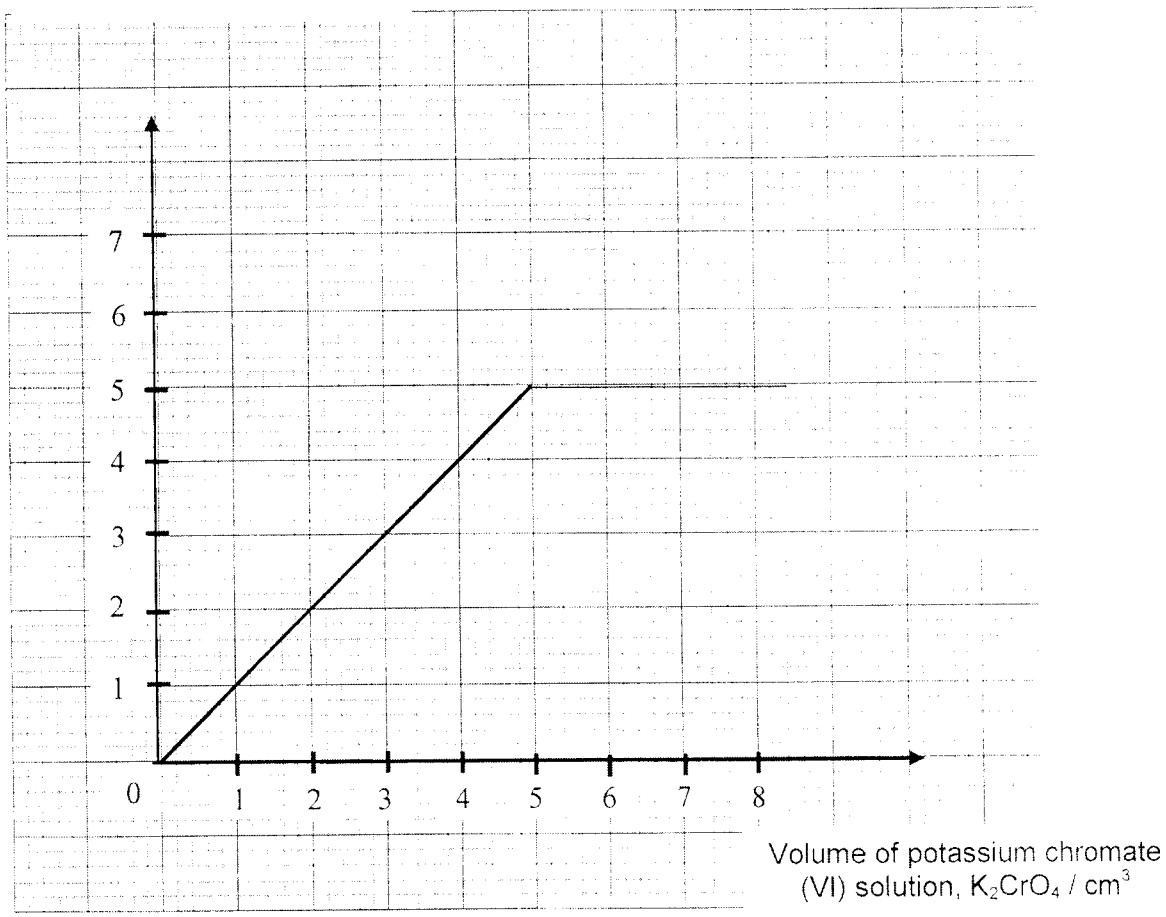
(c) An experiment is carried out to construct an ionic equation for an insoluble salt, lead (II) chromate (VI).

- A fixed volume of 5.00 cm^3 of 1.0 mol dm^{-3} lead (II) nitrate, $Pb(NO_3)_2$ solution is placed into each of the 8 test tubes of the same size.
- Different volume of 1.0 mol dm^{-3} potassium chromate (VI), K_2CrO_4 solution is added to each test tube.
- The height of the yellow precipitate, lead (II) chromate (VI) formed into each test tube is measured, recorded and plotted in Graph 8.

Satu eksperimen dijalankan untuk membina persamaan ion untuk garam tak terlarukan, plumbum (II) kromat(VI).

- *Isipadu tetap 5.00 cm^3 1.0 mol dm^{-3} larutan plumbum(II) nitrat $Pb(NO_3)_2$ diisikan ke dalam setiap 8 tabung uji yang sama saiz.*
- *Isipadu yang berbeza larutan kalium kromat (VI), K_2CrO_4 1.0 mol dm^{-3} ditambahkan ke dalam setiap tabung uji.*
- *Tinggi mendakan kuning plumbum (II) kromat (VI) yang terbentuk dalam setiap tabung uji diukur, direkod dan diplot dalam Graf 8.*

[Lihat sebelah



Graph 8
Graf 8

[Lihat sebelah

Based on Graph 8
Berdasarkan Graf 8

(i) Calculate
Hitungkan

- The number of moles of lead (II) ions used.
  Bilangan mol ion plumbum (II) yang digunakan.

- The number of moles of potassium chromate (VI) that has reacted completely with 5.00 cm^3 of lead (II) nitrate.
  Bilangan mol kalium kromat (VI) yang bertindak balas selengkapnya dengan 5.00 cm^3 plumbum (II) nitrat.

[4 marks]
[4 markah]

(ii) Based on the answer in (c) (i), construct an ionic equation for the formation of lead (II) chromate (VI).
Berdasarkan jawapan anda di (c) (i), bina persamaan ion untuk pembentukan plumbum (II) kromat (VI).

[2 marks]
[2 markah]

(iii) Explain why
Terangkan mengapa

- The height of precipitate formed increases and then remain constant
  Tinggi mendakan bertambah dan kemudian menjadi malar.

- The colour change in the solution above the precipitate.
  Perubahan warna larutan di bahagian atas mendakan.

- The eight test tubes used are of the same size.
  Kelapan-lapan tabung uji yang digunakan adalah bersaiz sama.

[6 marks]
[6 markah]

[Lihat sebelah

Section C
Bahagian C

[20 *marks*]
[20 markah]

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

9 Diagram 9 shows the atomic structure of three elements X, Y and Z.

Rajah 9 menunjukkan struktur atom bagi tiga unsur X, Y dan Z.

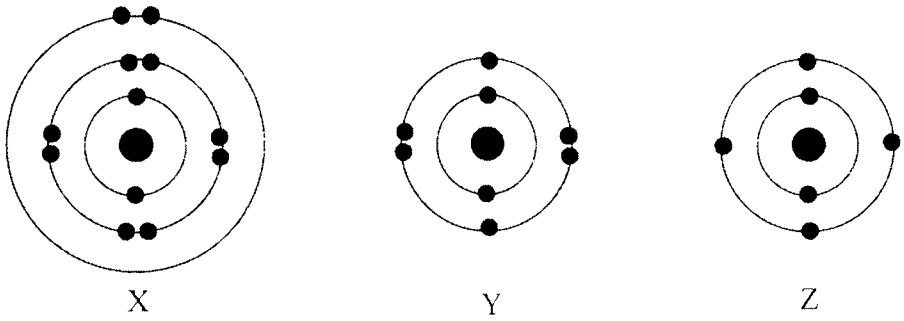


Diagram 9
Rajah 9

(a) Based on Diagram 9, two types of compounds can be formed.
Explain the differences between the two compounds formed in terms of
- Types of chemical bonds, and
- Boiling and melting points.

Berdasarkan Rajah 9, dua jenis sebatian boleh terbentuk.
Terangkan perbezaan di antara dua sebatian tersebut dari segi
- *jenis ikatan kimia yang terbentuk, dan*
- *takat lebur dan takat didihnya.*

[4 *marks*]
[4 markah]

(b) Draw the electron arrangement of the compound formed between X and Y, and explain the formation of the compound.

Lukiskan susunan elektron untuk pembentukan sebatian di antara X dan Y, dan terangkan pembentukan sebatian tersebut.

[6 *marks*]
[6 markah]

[Lihat sebelah

(c) You are given two samples of chemical substances, P and Q.
Both of them are white solids. P is a covalent compound and Q is an ionic compound.
Describe a laboratory experiment to investigate the electrical conductivity of P and Q. Include the observations in your answer.
Suggest a suitable example for each substance P and substance Q.

Anda diberi dua sampel bahan kimia, P dan Q.
Kedua-duanya berwarna putih.P adalah sebatian kovalen dan Q adalah sebatian ion.
Huraikan satu eksperimen makmal untuk mengkaji kekonduksian arus elektrik sebatian P dan Q. Sertakan pemerhatian yang diperolehi dalam jawapan anda.
Cadangkan satu contoh yang sesuai bagi setiap bahan P dan bahan Q .

[10 *marks*]
[10 markah]

[Lihat sebelah

10 (a) Methane, CH_4 is commonly used as a fuel and is the main component in liquified natural gas.
The heat of combustion of methane is -898 kJ mol^{-1}
Write the chemical equation for the complete combustion of methane.
Calculate the amount of heat released when 1 g of methane is completely burnt in air.
[Relative atomic mass of C=12, H=1,O=16]

Metana, CH_4 adalah bahan api yang biasa digunakan dan ianya adalah komponen utama yang terdapat dalam gas asli cecair.
Haba pembakaran metana adalah -898 kJ mol^{-1}.
Tuliskan persamaan kimia bagi pembakaran lengkap metana. Hitungkan jumlah haba yang dibebaskan apabila 1 gram metana terbakar dengan lengkap dalam udara berlebihan.
[Jisim atom relatif : C=12, H=1,O=16]

[4marks]
[4 markah]

(b) Diagram 10.1 and diagram 10.2 show two energy level diagrams of reactions.

Rajah 10.1 dan 10.2 menunjukkan dua gambar rajah aras tenaga tindak bals kimia.

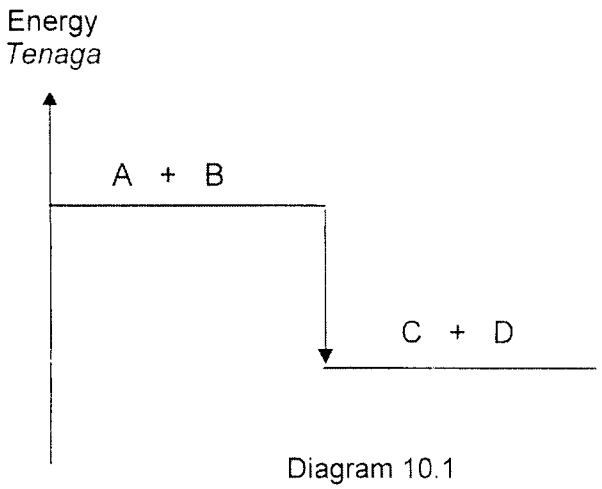


Diagram 10.1
Rajah 10.1

[Lihat sebelah

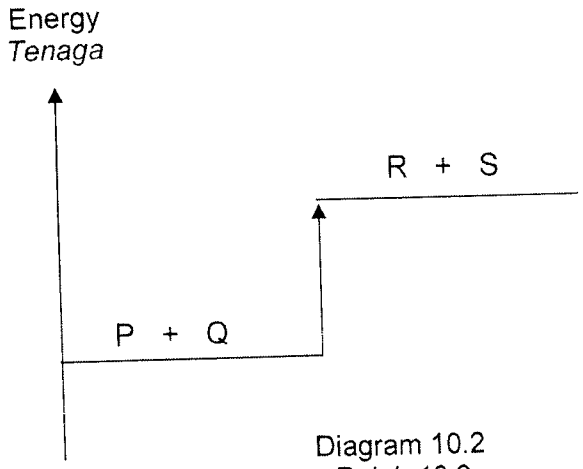


Diagram 10.2
Rajah 10.2

Compare and contrast Diagram 10.1 and 10.2 in terms of changes of energy content, heat change and the temperature change for the reactions.

Bandingkan dan bezakan Rajah 10.1 dan 10.2 dari segi perubahan kandungan tenaga, perubahan haba dan perubahan suhu tindak balas dalam tindak balas ini.

[6 marks]
[6 markah]

[Lihat sebelah

(c) Table 10 shows the heat of combustion of four types of alcohol.
Jadual 10 di atas menunjukkan haba pembakaran bagi empat jenis alcohol.

Name of alcohol *Nama Alkohol*	**Molecular formula** *Formula Molekul*	**Relative molecular mass** *Jisim atom realtif*	**Heat of combustion** *Haba Pembakaran* / kJ mol^{-1}
Methanol *Metanol*	CH_3OH	32	- 725
Ethanol *Etanol*	C_2H_5OH	46	- 1 376
Propanol *Propanol*	C_3H_7OH	60	- 2 015
Butan-1-ol *Butan-1-ol*	C_4H_9OH	74	- 2 676

Table 10
Jadual 10

Use data from Table 10, draw the graph of **magnitude** of heat of combustion against number of carbon atoms.

Based on the data from Table 10 and the graph plotted,
(i) state the change in the heat of combustion for the given alcohols.
(ii) explain your answer in (c)(i).

Dengan menggunakan data dari Jadual 10, lukis graf magnitud haba pembakaran melawan bilangan atom karbon.

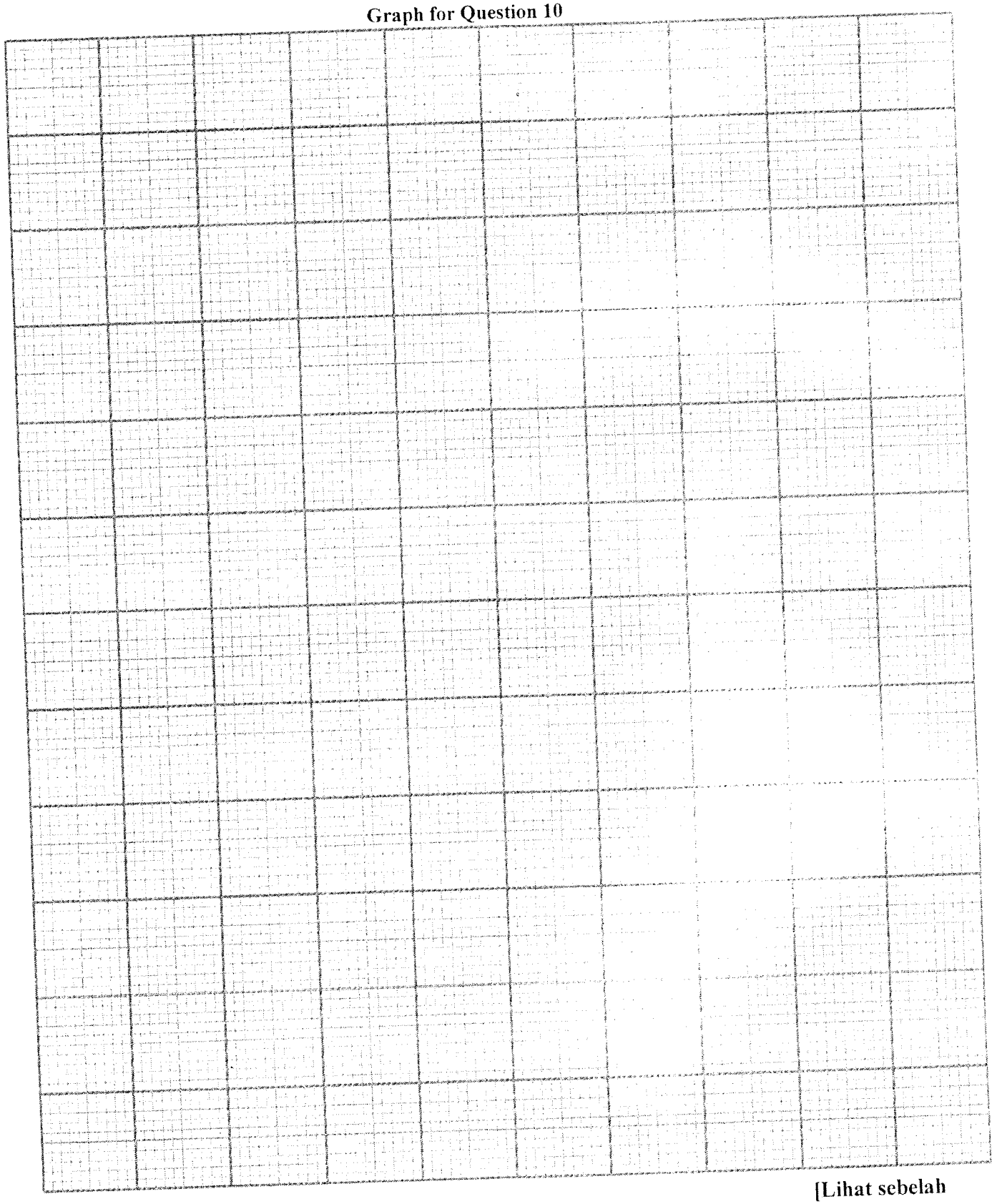
Berdasarkan data dari Jadual 10 dan graf yang di plotkan,
(i) nyatakan perubahan haba pembakaran bagi alcohol yang diberikan.
(ii) *terangkan jawapan anda dalam (c)(i)*

[10marks]
[10 markah]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

[Lihat sebelah

Graph for Question 10



[Lihat sebelah

PERIODIC TABLE of Elements

Period	Group 1	Alkali earth metals ⇓ Group 2										Group 13	Group 14	Group 15	Group 16	Group 17	Inert Gas ⇓ Group 18
	Alkali metals ⇓																
1	1 H Hydrogen 1																2 He Helium 4
2	3 Li Lithium 7	4 Be Beryllium 9										5 B Boron 11	6 C Carbon 12	7 N Nitrogen 14	8 O Oxygen 16	9 F Fluorine 19	10 Ne Neon 20
3	11 Na Sodium 23	12 Mg Magnesium 24	3	4	5	6	7	8	9	10	11	12	13 Al Aluminum 27	14 Si Silicon 28	15 P Phosphorus 31	16 S Sulfur 32	17 Cl Chlorine 35.5	18 Ar Argon 40
4	19 K Potassium 39	20 Ca Calcium 40	21 Sc Scandium 45	22 Ti Titanium 48	23 V Vanadium 51	24 Cr Chromium 52	25 Mn Manganese 55	26 Fe Iron 56	27 Co Kobalt 59	28 Ni Nickel 59	29 Cu Copper 64	30 Zn Zinc 65	31 Ga Gallium 70	32 Ge Germanium 73	33 As Arsenic 75	34 Se Selenium 79	35 Br Bromine 80	36 Kr Krypton 84
5	37 Rb Rubidium 85.5	38 Sr Strontium 88	39 Y Yttrium 89	40 Zr Zirconium 91	41 Nb Niobium 93	42 Mo Molybdenum 96	43* Tc Technetium 98	44 Ru Ruthenium 101	45 Rh Rhodium 103	46 Pd Palladium 106	47 Ag Silver 108	48 Cd Cadmium 112	49 In Indium 115	50 Sn Tin 119	51 Sb Antimony 122	52 Te Tellurium 128	53 I Iodine 127	54 Xe Xenon 131
6	55 Cs Cesium 144	56 Ba Barium 137	57 La Lanthanum 139	72 Hf Hafnium 178.5	73 Ta Tantalum 181	74 W Tungsten 184	75 Re Rhenium 186	76 Os Osmium 190	77 Ir Iridium 192	78 Pt Platinum 195	79 Au Gold 197	80 Hg Mercury 201	81 Tl Thallium 204	82 Pb Lead 207	83 Bi Bismuth 209	84 Po Polonium 210	85 At Astatine 210	86 Rn Radon 222
7	87 Fr Francium 223	88 Ra Radium 226	89 Ac Actinium 227	*Unq	*Unp	*Unh	*Uns	*Uno	*Une									

Transition Elements

11 Na Sodium 23 ← Proton Number ←Symbol of Elements ←Name of the element ←Relative atomic mass

← Metal

← Metalloid

← Non=metal

' - Not exist naturally

* - elements not yet discovered

Lanthanide Series	58 Ce Cerium 140	59 Pr Praseodymium 141	60 Nd Neodymium 144	61* Pm Promethium 147	62 Sm Samarium 150	63 Eu Europium 152	64 Gd Gadolinium 157	65 Tb Terbium 159	66 Dy Dysprosium 162.5	67 Ho Holmium 165	68 Er Erbium 167	69 Tm Tulium 169	70 Yb Ytterbium 173	71 Lu Lutetium 175
Actinide Series	90 Th Thorium 232	91 Pa Protactinium 231	92 U Uranium 238	93* Np Neptunium 237	94* Pu Plutonium 242	95* Am Americium 243	96* Cm Kurium 247	97* Bk Berkelium 247	98* Cf Californium 251	99* Es Einsteinium 254	100* Fm Fermium 253	101* Md Mendelevium 256	102* No Nobelium 254	103* Lr Lawrencium 260

[Lihat sebelah

SULIT

Nama : ..... Kelas : .....

JABATAN PELAJARAN NEGERI JOHOR

PEPERIKSAAN PERCUBAAN SPM 2009
CHEMISTRY
Kertas 3
September

4541/3

1½ jam
Satu jam tiga puluh minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Tuliskan nama dan tingkatan 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 dikehendaki membaca maklumat di halaman belakang kertas soalan ini.*

Untuk Kegunaan Pemeriksa		
Soalan	**Markah Penuh**	**Markah Diperoleh**
1	33	
2	17	
JUMLAH	50	

Kertas soalan ini mengandungi 11 halaman bercetak

Jawab **semua** *soalan.*

1 The alkali metals in Group 1 of the Periodic Table of Elements can react with oxygen gas with different reactivity.
Table 1 shows the experiment and observation when Lithium, Li, Sodium, Na and Potassium, K react with Oxygen, O_2 gas.

Logam alkali dalam Kumpulan 1 Jadual Berkala Unsur boleh bertindak balas dengan gas oksigen dengan kereaktifan berbeza.
Jadual 1 menunjukkan eksperimen dan pemerhatian apabila Litium, Li, Natrium, Na dan Kalium, K bertindak balas dengan gas oksigen.

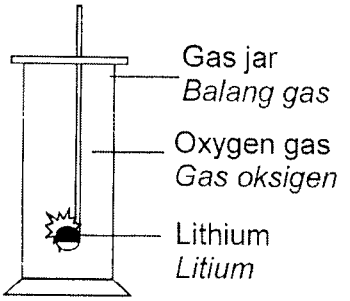
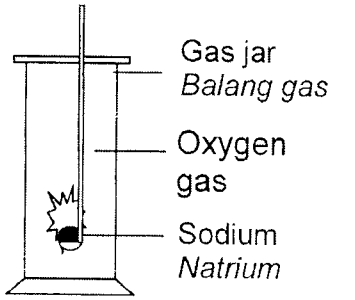
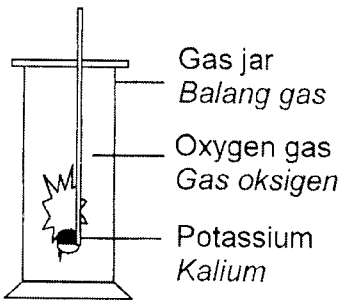
Experiment ***Eksperimen***	**Observation** ***Pemerhatian***
	Lithium burns slowly with a red flame. White fume is released. White solid is produced. *Litium terbakar perlahan-lahan dengan nyalaan merah.* *Wasap putih di bebaskan.* *Pepejal putih terhasil.*
	Sodium burns vigorously with a yellow flame. White fume is released. White solid is produced. *Natrium terbakar cergas dengan nyalaan kuning.* *Wasap putih terbebas.* *Pepejal putih terhasil.*
	Potassium burns very vigorously with a reddish-purple flame. White fume is released. White solid is produced. *Kalium terbakar sangat cergas dengan nyalaan ungu-kemerahan.* *Wasap putih terbebas.* *Pepejal putih terhasil.*

Table 1
Jadual 1

(a) State the inference for the observations in Table 1.

Nyatakan inferens bagi pemerhatian-pemerhatian dalam Jadual 1.

.....

.....

[3 marks]
[3 *markah*]

1(a)

3

(b) Based on the experiment above:

Berdasarkan eksperimen di atas:

(i) State the method to manipulate the variable.

Nyatakan kaedah untuk memanipulasi pembolehubah.

.....

(ii) State the responding variable.

Nyatakan pembolehubah bertindak balas.

.....

(iii) State the controlled variable.

Nyatakan pembolehubah dimalarkan.

.....

[3 marks]
[3 *markah*]

1(b)

3

(c) State the hypothesis for the experiment.

Nyatakan hipotesis bagi eksperimen tersebut.

.....

[3 marks]
[3 *markah*]

1(c)

3

(d) By refering to the reaction between alkali metals with oxygen, give the operational definition for the reactivity of alkali metals.

Merujuk kepada tindak balas antara logam alkali dengan oksigen, berikan definisi secara operasi bagi kereaktifan logam-logam alkali.

.....

[3 marks]
[3 *markah*]

1(d)

3

[Lihat sebelah
SULIT

Alkali metal X ignites spontaneously in air with a reddish-violet flame. White fumes and a white solid are also produced.

Logam X juga adalah merupakan ahli Kumpulan 1.
Logam alkali X terbakar secara spontan di udara dengan nyalaan ungu-kemerahan. Wasap putih dan pepejal putih juga terbentuk.

(i) Predict in which period, the metal X is located in the Periodic Table of Element.

Ramalkan Kala, logam X diletakkan dalam Jadual Berkala Unsur.

1(e)(i) 3

.....

[3 marks]
[3 *markah*]

(ii) Based on the observations in Table 1 and (e) (i) , arrange lithium, sodium, potassium and metal X in ascending order of reactivity of metals towards oxygen.

Berdasarkan pemerhatian dalam Jadual 1 dan (e) (i) , susun litium, natrium, kalium dan logam alkali X mengikut tertib menaik kereaktifan logam terhadap oksigen.

1(e)(ii) 3

.....

[3 marks]
[3 *markah*]

(f) 0.2 g of sodium will take 18 seconds to burn completely in oxygen gas.
0.5 g of sodium will take 45 seconds to burn completely in oxygen gas.
State the relationship between the mass of sodium and the time taken for the metal to burn completely in oxygen gas.

0.2 g natrium mengambil masa 18 saat untuk terbakar lengkap dalam oksigen gas.
0.5 g natrium mengambil masa 45 saat untuk terbakar lengkap dalam oksigen gas.
Nyatakan hubungan antara jisim natrium dan masa yang diambil untuk logam itu terbakar bertindak balas lengkap dalam oksigen gas.

1(f) 3

.....

.....

[3 marks]
[3 *markah*]

For Examiner's Use

When the reaction in Table 1 is completed , 10 cm^3 of water is poured into the gas jar. A pH meter is dipped into the solution formed.
Table 2 shows the pH meter reading.

Apabila tindak balas dalam Jadual 1 selesai, 10 cm^3 air dituang ke dalam balang gas. Meter pH dicelup ke dalam larutan yang terbentuk.
Jadual 2 menunjukkan bacaan meter pH..

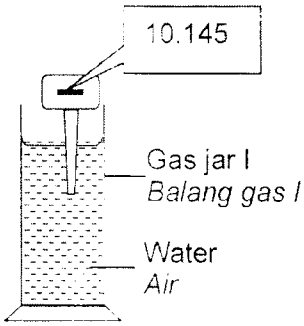
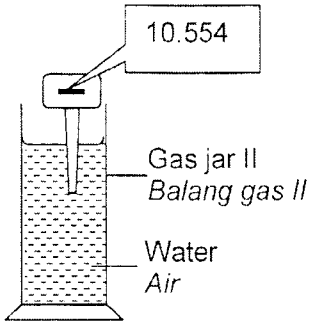
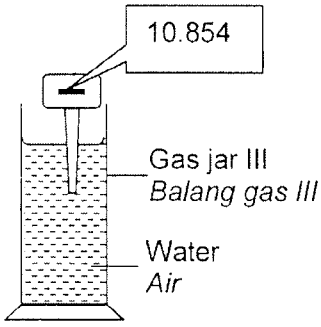
		
Reading:..... *Bacaan*	Reading:..... *Bacaan*	Reading:..... *Bacaan*

Table 2

Jadual 2

(g) Record the pH meter reading to one decimal place in Table 2.

Rekod bacaan meter pH dengan satu tempat perpuluhan dalam Jadual 2.

[3 marks]
[3 *markah*]

1(g)

3

For Examiner's Use

(h) Write the observations when blue litmus paper and red litmus paper are dipped into the solution formed in Gas Jar I, Gas Jar II and Gas Jar III.

Tuliskan pemerhatian apabila kertas litmus biru dan merah dicelup ke dalam larutan yang terbentuk dalam Balang Gas 1, Balang Gas II dan Balang Gas III.

Solutions *Larutan-larutan*	Red litmus paper *Kertas litmus merah*	Blue litmus paper *Kertas litmus biru*
Gas Jar I *Balang Gas I*		
Gas Jar II *Balang Gas II*		
Gas Jar III *Balang Gas III*		

1(h) 3

[3 marks]
[3 *markah*]

(i) Write the balanced chemical equations for the reaction:

Tulis persamaan kimia yang seimbang untuk tindak balas:

(i) Between alkali metal and oxygen gas (choose only one from Table 1):

Di antara logam alkali dan gas oksigen (pilih satu daripada Jadual 1):

.....

(ii) Between the product formed from (i) (i) and water :

Di antara hasil yang terbentuk daripada (i) (i) dan air:

1(i) 3

.....

[3 marks]
[3 *markah*]

For Examiner's Use

(j) Classify the following alkaline solutions into strong alkali and weak alkali.

Kelaskan larutan-larutan alkali berikut kepada alkali kuat dan alkali lemah.

Sodium hydroxide, NaOH	Ammonia solution, NH_3
Natrium hidroksida, NaOH	*Larutan ammonia, NH_3*
Potassium hydroxide, KOH	Calcium hydroxide, $Ca(OH)_2$
Kalium hidroksida, KOH	*Kalsium hidroksida, $Ca(OH)_2$*

1(j)

[3 marks]
[3 *markah*]

3

Total
1

33

For Examiner's Use

2 Reaction I / *Tindak balas I*

Reaction between sodium thiosulphate, $Na_2S_2O_3$ solution and dilute sulphuric acid, H_2SO_4 will produce sodium sulphate, Na_2SO_4, sulphur, S, sulphur dioxide, SO_2 and water, H_2O. The chemical equation is:

Tindak balas antara larutan natrium tiosulfat, $Na_2S_2O_3$ dan asid sulfurik cair, H_2SO_4 akan menghasilkan natrium sulfat, Na_2SO_4, sulfur, S, sulfur dioksida, SO_2 dan air, H_2O. Persamaan kimia adalah.

$$Na_2S_2O_3 + H_2SO_4 \rightarrow Na_2SO_4 + S + SO_2 + H_2O$$

Reaction II / *Tindak balas II*

Reaction between hydrochloric acid, HCl and zinc, Zn will produce zinc chloride, $ZnCl_2$ and hydrogen gas, H_2. The chemical equation is:

Tindak balas antara asid hidroklorik, HCl dan zink, Zn akan menghasilkan zink klorida, $ZnCl_2$ dan gas hydrogen, H_2. Persamaan kimia adalah:

$$2HCl + Zn \rightarrow ZnCl_2 + H_2$$

By using the information of Reaction I **or** Reaction II, plan an experiment to investigate the effect of temperature on the rate of reaction. Your planning should include:

*Dengan menggunakan maklumat Tindak balas I **atau** Tindak balas II, rancang satu eksperimen untuk mengkaji kesan suhu ke atas kadar tindak balas. Perancangan anda hendaklah mengandungi:*

(i) Problem statement
Pernyataan masalah

(ii) All the variables
Semua pembolehubah

(iii) Hypothesis
Hipotesis

(iv) List of material and apparatus
Senarai bahan dan alat radas

(v) Procedure
Prosedur

(vi) Tabulation of data
Penjadualan data

[17 *marks*]
[17 *markah*]

Total
2

17

END OF QUESTION PAPER

MARKING SCHEME PAPER 3

Question No.	Rubric	Score
1 (a)	*Able to state the inference correctly.* Sample answer: The reactivity (of alkali metals with oxygen) increase from lithium to potassium. // Lithium, sodium and potassium / alkali metals show similar chemical in their reactions with oxygen.	3
	Able to state the inference less correctly. Sample answer: The reactivity increase // All metals burns produced white fume and white solid // Going down group I the reactivity increase.	2
	Able to state any idea of inference. Sample answer: Lithium, sodium and potassium show different reactivity // Potassium, Sodium, lithium → Increase	1
	No response or wrong response	0

Question No.	Rubric	Score
1(a)	*Able to state the three variables correctly:* 1. *Method to manipulate variable.* 2. *The responding variable.* 3. *The controlled variable.* Sample answer: (i) Use different types of (alkali)/(group 1) metals (ii) Reactivity of metals with oxygen // Vigorousness of the reaction between metals and oxygen. (iii) Oxygen gas // size / mass of metal	3
	Able to state any two variables correctly:	2
	Able to state any one variable correctly.	1
	No response or wrong response	0

Question No.	Rubric	Score
1 (c)	*Able to state the relationship correctly between the manipulated variable and the responding variable.* Sample answer: (The lower/higher the position of metal in)/(Going down/up) Group 1, the more/less reactive is the metal in reaction with oxygen. // The lower/higher the position of metals in group 1, the lower/higher is the reactivity. The metal which is lower / upper in Group 1 is more/less reactive in reaction ~~with~~ oxygen. // The lower/higher the metal in Group 1 the more/less reactive the reaction with oxygen.	3
	Able to state the relationship between the manipulated variable and the responding variable. Sample answer: Reactivity increases for the reaction between alkali metals and oxygen when going down Group 1/ from lithium to potassium. // (The lower/higher the position of metal in)/(Going down/up) Group 1, the more/less reactive. // The metal which is lower/upper in Group 1 is more/less reactive // The lower/higher the metal in Group 1 the more/less reactive the reaction. // The more reactive the reaction, the lower the position of the metal in Group 1.	2
	Able to state the idea of hypothesis. Sample Answer: Metals in Group 1 can react with oxygen. // Alkali metals have different reactivity.	1
	No response or wrong response	0

Question No.	Rubric	Score
1 (d)	*Able to give the operational definition accurately by stating the following three information.* - *alkali metals* - *vigorously / more vigorous / reactive with oxygen* - *more / highly reactive* Sample answer: An alkali metal that reacts more vigorously with oxygen is a more reactive metal.	3
	Able to give the operational definition correctly by stating any two of the information above. Sample answer: The metal that reacts more vigorously with oxygen is a more reactive metal. // The alkali metal that reacts more vigorously is a more reactive metal. // The higher/lower the alkali metals, the more/less reactive metal.	2
	Able to give the operational definition correctly by stating any one of the information above. Sample answer: Alkali metals can react with oxygen. // Metals can react vigorously with oxygen.	1
	No response or wrong response	0

Question No.	Rubric	Score
1 e)(i)	*Able to state the position of metal X in Group 1 accurately.* Sample answer: Period 5/6/7	3
	Able to make a prediction of the position of metal X in Group 1 less accurately. Sample answer: Below /under potassium // Lower than potassium	2
	Able to make any prediction of the position of metal X in Group 1. Sample answer: In group 1 // Upper than Li/Na/K // Lower than Li/ Na	1
	No response or wrong response	0

Question No.	Rubric	Score
1 (e)(ii)	*Able to arrange the metals **in ascending order** based on their reactivity.* Sample answer: Lithium, Sodium, Potassium, X // Li, Na, K, X	3
	*Able to arrange any three of the metals **in ascending order** based on their reactivity.* Sample answer: X, Li, Na, K // Li, K, Na, X // K, Li, Na, X // Na, Li, K, X // Na, K, Li, X // Li, X, Na, K	2
	*Able to arrange any two of the metals **in ascending order** based on their reactivity or arrange in **descending order**.* Sample answer: X, K, Li, Na // X, Li, Na , K // K, X, Na, Li K, X, Na, Li // X, Na, K, Li // Na, K, Li ,X X, K, Na, Li //	1
	No response or wrong response	0

Question No.	Rubric	Score
1 (f)	*Able to state the relationship between the mass of sodium and the time taken for the metal to burn completely in oxygen gas.* - *the higher the mass / the bigger the size* - *the longer the time taken* - *burn completely* Sample answer: The higher the mass of metals, the longer the time taken to burn completely. // The bigger the size of metals, the longer the time taken to burn completely.	3
	Able to state the relationship between the mass of sodium and the time taken for the metal to burn completely in oxygen gas. Sample answer: The higher the mass of metals the longer the time taken. // More mass more time to burn completely //	2
	Able to state the relationship between the mass of sodium and the time taken for the metal to burn completely in oxygen gas. Sample answer: Bigger mass burns longer. // The metals needs longer time // More mass more time to burn.	1
	No response or wrong response	0

Question No.	Rubric	Score
1 (g)	*Able to record all the readings with one decimal place accurately.* Sample answer: 10.1 , 10.6, 10.9	3
	Able to record any two readings with one decimal place accurately. Sample answer: 10.1, 10.6, 10.8 // 10.1 , 10.5, 10.9 // 10.0, 10.6, 10.9	2
	Able to record at least one reading with one decimal place accurately. Sample answer: 10.1 // 10.6 // 10.9	1
	No response or wrong response	0

<table>
<tr><th>Question No.</th><th>Rubric</th><th>Score</th></tr>
<tr><td>1 (h)</td><td>Able to state observations for blue and red litmus paper correctly.

Sample answer:

<table>
<tr><th>Solutions</th><th>Red litmus paper</th><th>Blue litmus paper</th></tr>
<tr><td>Gas Jar I</td><td>Turns blue</td><td>No change</td></tr>
<tr><td>Gas Jar II</td><td>Turns blue</td><td>No change</td></tr>
<tr><td>Gas Jar III</td><td>Turns blue</td><td>No change</td></tr>
</table></td><td>3</td></tr>
<tr><td></td><td>Able to state any one of the litmus paper observations correctly.

Sample answer:

<table>
<tr><th>Solutions</th><th>Red litmus paper</th><th>Blue litmus paper</th></tr>
<tr><td>Gas Jar I</td><td>Turns blue</td><td>Turns red</td></tr>
<tr><td>Gas Jar II</td><td>Turns blue</td><td>Turns red</td></tr>
<tr><td>Gas Jar III</td><td>Turns blue</td><td>Turns red</td></tr>
</table>
//
<table>
<tr><th>Solutions</th><th>Red litmus paper</th><th>Blue litmus paper</th></tr>
<tr><td>Gas Jar I</td><td>Turns red</td><td>No change</td></tr>
<tr><td>Gas Jar II</td><td>Turns red</td><td>No change</td></tr>
<tr><td>Gas Jar III</td><td>Turns red</td><td>No change</td></tr>
</table></td><td>2</td></tr>
<tr><td></td><td>Able to give an idea on litmus paper observations.

Sample answer:

<table>
<tr><th>Solutions</th><th>Red litmus paper</th><th>Blue litmus paper</th></tr>
<tr><td>Gas Jar I</td><td>No change</td><td>Turns blue</td></tr>
<tr><td>Gas Jar II</td><td>No change</td><td>Turns blue</td></tr>
<tr><td>Gas Jar III</td><td>No change</td><td>Turns blue</td></tr>
</table></td><td>1</td></tr>
<tr><td></td><td>No response or wrong response</td><td>0</td></tr>
</table>

Question No.	Rubric	Score
1 (i)	*Able to write the two balanced chemical equations for the reaction accurately.* Sample answer : i. $4Na + O_2 \rightarrow 2Na_2O$ and ii. $Na_2O + H_2O \rightarrow 2NaOH$ Notes: Sodium can be replaced with any alkali metals from Table 1.	3
	Able to write two chemical equations with correct chemical formulae but not balanced // Any one of the two balanced chemical equations for the reaction accurately. Sample answer: i. $Na + O_2 \rightarrow Na_2O$ and ii. $Na_2O + H_2O \rightarrow NaOH$ // i. $4Na + O_2 \rightarrow 2Na_2O$ // ii. $Na_2O + H_2O \rightarrow 2NaOH$	2
	Able to give at least one chemical formulae of the substances correct // Able to write any one of the two chemical equations with correct chemical formulae but not balanced . Sample answer: i. Na // O_2 // Na_2O and ii. Na_2O // H_2O // NaOH i. $Na + O_2 \rightarrow Na_2O$ // ii. $Na_2O + H_2O \rightarrow NaOH$	1
	No response or wrong response	0

Question No.	Rubric	Score
1 (j)	*Able to classify all alkaline solutions into strong alkali and one weak alkali correctly.* Sample answer: Strong alkali : Sodium hydroxide / NaOH, Potassium hydroxide / KOH Calcium hydroxide / $Ca(OH)_2$ Weak alkali : Ammonia solution, NH_3	3
	Able to classify any two of strong alkali and one weak alkali correctly. Sample answer: Strong alkali : Sodium hydroxide / NaOH, Potassium hydroxide / KOH Weak alkali : Ammonia solution / NH_3	2
	Able to classify any one of strong alkali and weak alkali correctly. Sample answer: Strong alkali : Sodium hydroxide / NaOH // Potassium hydroxide / KOH // Calcium hydroxide / $Ca(OH)_2$ // Weak alkali : Ammonia solution / NH_3	1
	No response or wrong response	0

Experiment 1: $Na_2S_2O_3 + H_2SO_4 \rightarrow Na_2SO_4 + S + SO_2 + H_2O$

Question No.	Rubric	Score
2 (i)	*Able to give the statement of the problem accurately. Response is in question form.* Sample answer: Does the temperature of sodium thiosulphate solution affect the rate of reaction? // How does the temperature of sodium thiosulphate solution affect the rate of reaction? // How does the high / low temperature of sodium thiosulphate solution affect the rate of reaction?	3
	Able to give the statement of the problem less accurately. Response in question form. Sample answer: Does the increase / decrease in temperature increase/decrease the rate of reaction? // How does the increase/decrease in temperature affect the rate of reaction?	2
	Able to give an idea of statement of the problem. Sample answer: Does temperature affect the rate of reaction? The increase/decrease in temperature will increase /decrease the rate of reaction. // The higher / lower in temperature will increase /decrease the rate of reaction. // To investigate the effect of temperature to the rate of reaction.	1
	No response or wrong response	0

Question No.	Rubric	Score
2 (ii)	*Able to state the three variables correctly* Sample answer: Manipulated variable: Temperature of sodium thiosulphate solution Rate of reaction // Time taken for mark 'X' to become invisible /disappear Constant variable: Volume and concentration of sodium thiosulphate/ sulphuric acid / size of conical flask	3
	Able to state any two variables correctly	2
	Able to state any one variables correctly	1
	No response or wrong response	0

Question No.	Rubric	Score
2.(iii)	*Able to state the relationship correctly between the manipulated variable and the responding variable with direction.* Sample answer: The higher/lower the temperature of sodium thiosulphate solution, the higher/lower the rate of reaction. // The higher/lower the temperature of sodium thiosulphate solution, the shorter/longer the time taken for mark 'X' to disappear from sight/view // The increase/decrease in temperature of sodium thiosulphate solution will increase/decrease the rate of reaction. // When the temperature of sodium thiosulphate solution increase /decrease, the rate of reaction will increase/decrease.	3
	Able to state the relationship between the manipulated variable and the responding variable with direction. Sample answer: The higher/lower the temperature, the higher/lower the rate of reaction. // The higher/lower the temperature, the shorter/longer the time taken for mark 'X' to disappear // The increases/decreases in temperature will increase /decrease the rate of reaction. //	2
	Able to state the idea of hypothesis. Sample answer; Different temperature, different reactivity. // Temperature changes, the time taken is different.	1
	No response or wrong response	0

Question No.	Rubric	Score
2 (iv)	*Able to give complete list of materials and apparatus* Sample answer: Materials: Sodium thiosulphate solution, sulphuric acid. Apparatus: Conical flask, ,bunsen burner, measuring cylinder (10 ml), measuring cylinder (50 ml), stop-watch, filter /white /cardboard paper.	3
	Able to give complete list of materials and four apparatus as following. Answer: Materials: Sodium thiosulphate solution, sulphuric acid. Apparatus : Conical flask, thermometer, bunsen burner, filter / white /cardboard paper.	2
	Able to give at least one substances and at least one apparatus.	1
	No response or wrong response	0

Question No.	Rubric	Score
2 (v)	*Able to list all the steps correctly* Sample Answer: 1. 'X 'mark is drawn on a piece of white/filter/ cardboard paper. 2. 50 cm^3 of sodium thiosuphate solution [(0.01-1.0) mol dm^{-3}] is measured with a (50 cm^3) measuring cylinder and is poured into a conical flask. 3. The solution is slowly heated until 30 °C. 4. 5 cm^3 of hydrochloric acid [(0.1- 2.0) mol dm^{-3}] is measured with a (10 cm^3) measuring cylinder and is added to the conical flask. A stop-watch is started immediately. 5. The conical flask is swirled and is placed on a white/filter/cardboard paper with a mark 'X'. 6. The 'X' mark is observed vertically from the top through the solution. 7. The stop-watch is stopped immediately when the 'X' mark cannot be seen. Time is recorded. 8. The experiment is repeated by using the sodium thiosuphate solution at 40 °C, 50 °C, 60 °C and 70 °C respectively.	3
	Able to list down steps 2, 4, 5, 7, 8	2
	Able to give an idea to step 4.	1
	No response or wrong response	0

<table>
<tr><th>Question No.</th><th>Rubric</th><th>Score</th></tr>
<tr><td>2 (vi)</td><td>Able to tabulate the data with following aspects

1. Correct titles with units
2. Complete list of temperatures

Sample answer:

<table><tr><th>Temperature (°C)</th><th>Time (s)</th></tr><tr><td>30</td><td></td></tr><tr><td>40</td><td></td></tr><tr><td>50</td><td></td></tr><tr><td>60</td><td></td></tr><tr><td>70</td><td></td></tr></table></td><td>2</td></tr>
<tr><td></td><td>Able to contruct a table.

1. At least 1 titles correct without units
2. Incomplete list of tempereatures

Sample answer:

<table><tr><td>Temperature</td><td></td></tr><tr><td>30</td><td></td></tr></table></td><td>1</td></tr>
<tr><td></td><td>No response or wrong response</td><td>0</td></tr>
</table>

Experiment 2: $2HCl + Zn \rightarrow ZnCl_2 + H_2$

Question No	Rubric	Score
2 (i)	*Able to give the statement of the problem accurately. Response is in question form.* Sample answer: Does the temperature of hydrochloric acid solution affect the rate of reaction? // How does the temperature of hydrochloric acid solution affect the rate of reaction? // How does the high / low temperature of solution affect the rate hydrochloric acid of reaction?	3
	Able to give the statement of the problem less accurately. Response in question form. Sample answer: Does the increase / decrease in temperature increase/decrease the rate of reaction? // How does the increase/decrease in temperature affect the rate of reaction?	2
	Able to give an idea of statement of the problem. Sample answer: Does temperature affect the rate of reaction? The increase/decrease in temperature will increase /decrease the rate of reaction. // The higher / lower in temperature will increase /decrease the rate of reaction. // To investigate the effect of temperature to the rate of reaction.	1
	No response or wrong response	0

Question No.	Rubric	Score
2 (ii)	*Able to state the three variables correctly* Sample answer: Manipulated variable: Temperature of hydrochloric acid Responding variable: Rate of reaction // Volume of gas per unit time Constant variable: Mass/size of zinc // Volume and concentration of hydrochloric acid	3
	Able to state any two variables correctly	2
	Able to state any one variables correctly	1
	No response or wrong response	0

Question No.	Rubric	Score
2 (iii)	*Able to state the relationship correctly between the manipulated variable and the responding variable with direction.* Sample answer: The higher/lower the temperature of hydrochloric acid, the higher/lower the rate of reaction. // The higher/lower the temperature of hydrochloric acid, the higher/lower the volume of the hydrogen gas release per unit time // The increase/decrease in temperature of hydrochloric acid will increase/decrease the rate of reaction. // When the temperature of hydrochloric acid increases/decreases, the rate of reaction will increase/decrease.	3
	Able to state the relationship between the manipulated variable and the responding variable with direction. Sample answer: The higher/lower the temperature, the higher/lower the rate of reaction. // The higher/lower the temperature, the higher/lower the volume of the hydrogen gas released per unit time. // The increase/decrease in temperature will increase/decrease the rate of reactions. //	2
	Able to state the idea of hypothesis. Sample answer; Different temperature, different reactivity. // Temperature changes, the time taken is different.	1
	No response or wrong response	0

Question No.	Rubric	Score
2 (iv)	*Able to give complete list of materials and apparatus.* Sample answer: Materials: Zinc, hydrochloric acid Apparatus: Conical flask, thermometer , bunsen burner, stop-watch measuring cylinder (50 ml), delivery tube and stopper, burette, basin,	3
	Able to give all materials and five apparatus as following. Answer: Materials: Zinc, hydrochloric acid Apparatus : Conical flask, thermometer, bunsen burner, delivery tube, burette	2
	Able to give at least one substance and at least one apparatus.	1
	No response or wrong response	0

Question No.	Rubric	Score
2 (v)	*Able to list all the steps correctly* Sample Answer: 1. Burette is filled with water and inverted into a basin containing water. 2. The burette is clamped vertically using retort stand. 3. Initial reading of burette is recorded. 4. [20-50] cm^3 of hydrochloric acid [(0.01-1.0) mol dm^{-3}] is measured with a (50 ml) measuring cylinder and is poured into a conical flask. 5. The solution is slowly heated until 30 °C. 6. 2 g of zinc is weighed, and is put into the conical flask. 7. The conical flask is closed immediately with a stopper which is joined to the delivery tube and the stopwatch is started. 8. The burette reading is recorded at interval of 30 seconds until the reaction is completed. 9. The experiment is repeated by using the hydrochloric acid at 40 °C, 50 °C, 60 °C and 70 °C respectively.	3
	Able to list down steps 1, 4, 6, 8, 9	2
	Able to give an idea to step 6.	1
	No response or wrong response	0

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Sample answer:

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</table>

END OF MARKING SCHEME