BAHAN KECEMERLANGAN
SPM 2015

BK 1

KIMIA
KERTAS 1

NAMA : .....

KELAS : .....

DIBIAYAI OLEH
KERAJAAN NEGERI TERENGGANU

CHEMISTRY
Kertas 1
Februari
1 ¼ jam

4541/1

BAHAN KECEMERLANGAN (BK1)
SIJIL PELAJARAN MALAYSIA 2015

CHEMISTRY
Kertas 1
Satu iam lima belas minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Kertas ini mengandungi* **50** *soalan.*
2. *Jawab* **semua** *soalan.*
3. *Tiap-tiap soalan diikuti oleh empat jawapan, iaitu* **A, B, C** *dan* **D.** *Bagi setiap soalan, pilih* **satu** *jawapan sahaja. Hitamkan jawapan anda pada kertas jawapan objektif yang disediakan.*
4. *Jika anda hendak menukar jawapan, padamkan tanda yang telah dibuat. Kemudian hitamkan jawapan yang baru.*
5. *Rajah yang mengiringi soalan tidak dilukis mengikut skala kecuali dinyatakan.*
6. *Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogram.*

Kertas soalan ini mengandungi 33 halaman bercetak

1 When a glass filled with some ice is left opened, dew is formed on the outer surface of the glass.
Apabila satu gelas yang diisikan dengan ais dibiarkan terdedah, kabus terbentuk di luar permukaan gelas tersebut.

Name the process that happens.
Namakan proses yang berlaku.

A Condensation
Kondensasi

B Evaporation
Peruapan

C Melting
Peleburan

D Sublimation
Pemejalwapan

2 The mass of one atom of element Q is equal to the mass of four carbon atoms.
Q is not the actual symbol of the element.
What is the relative atomic mass of element Q?
[Relative atomic mass : C = 12]
Jisim satu atom bagi unsur Q *adalah sama dengan jisim empat atom karbon.*
Q *bukan simbol bagi atom itu.*
Apakah jisim atom relatif bagi unsur Q?
[*Jisim atom relatif* : C = 12]

A 12

B 16

C 36

D 48

3 Which of the following elements are in Group 1 in The Periodic Table of Elements?
Antara berikut unsur yang manakah dalam Kumpulan 1 dalam Jadual Berkala Unsur?

A Sodium and potassium
Natrium dan kalium

B Hydrogen and oxygen
Hidrogen dan oksigen

C Chlorine dan bromine
Klorin dan bromin

D Helium dan kripton
Helium dan kripton

4 Which substance is an ionic compound?
Antara bahan berikut, yang manakah sebatian ionik ?

A Phosphorous (V) oxide
Fosforus (V) oksida

B Copper (II) oxide
Kuprum (II) oksida

C Sulphur dioxide
Sulfur dioksida

D Carbon dioxide
Carbon dioksida

5 Which of the following is true about electrolytes?
Antara pernyataan berikut, yang manakah benar elektrolit?

A Element that conduct electricity in molten state.
Unsur yang mengalirkan arus elektrik dalam keadaan leburan.

B Compound that conduct electricity in solid state.
Sebatian yang mengalirkan arus elektrik dalam keadaan pepejal.

C Element that conduct electricity in solid and molten state.
Unsur yang mengalirkan arus elektrik dalam keadaan pepejal dan leburan.

D Compound that conduct electricity in molten state or aqueous solution.
Sebatian yang mengalirkan arus elektrik dalam keadaan leburan atau larutan akueus.

6 Which of the following is acid?
Antara berikut, yang manakah asid?

A Soap
Sabun

B Fertilizer
Baja

C Toothpaste
Ubat gigi

D Orange juice
Jus oren

7 The salt that is commonly used to give salty taste during preparation of food in the kitchen is
Garam yang biasa digunakan untuk memberikan rasa masin dalam makanan di dapur ialah

A Monosodium glutamate
Monosodium glutamat

B Sodium chloride
Natrium klorida

C Sodium hydrogen carbonate
Natrium hidrogen karbonat

D Sodium benzoate
Natrium benzoat

8 Which properties belong to ceramic?
Sifat-sifat manakah dipunyai oleh seramik?

I Brittle
Rapuh

II Ductile
Mulur

III Do not corrode
Tidak terkakis

IV Low melting point
Takat lebur rendah

A I and II
I *dan* II

B I and III
I *dan* III

C II and IV
II *dan* IV

D III and IV
III *dan* IV

9 Definition of the rate reaction is
Takrif bagi kadar tindak balas ialah

A $\frac{\text{Volume of gas produced}}{\text{Changes in the mass of reactant}}$

$\frac{\textit{Isipadu gas yang terhasil}}{\textit{Perubahan jisim bahan tindak balas}}$

B $\frac{\text{Changes in the mass of reactant}}{\text{Volume of gas produced}}$

$\frac{\textit{Perubahan jisim bahan tindak balas}}{\textit{Isipadu gas yang terhasil}}$

C $\frac{\text{Increase in the mass of product}}{\text{Decrease in the mass of the reactant}}$

$\frac{\textit{Pertambahan jisim hasil tindak balas}}{\textit{Pengurangan jisim bahan tindak balas}}$

D $\frac{\text{Decrease in the mass of reactant}}{\text{Time taken}}$

$\frac{\textit{Pengurangan jisim bahan tindak balas}}{\textit{Masa yang diambil}}$

10 Which of the following is a molecule?
Yang manakah antara berikut adalah molekul?

A Neon
Neon

B Ammonia
Ammonia

C Sodium chloride
Natrium klorida

D Potassium hexacyanoferate(III)
Kalium heksasianoferat(III)

11 0.58 g flavouring substance is used to improve the taste of pineapple cake.
What is the number of molecules of the flavouring substance?
[Relative molecular mass of flavouring substance = 116 g mol^{-1} ;
Avogadro constant = 6.02 X 10^{23} mol^{-1}]
0.58 g *bahan perisa digunakan untuk menambahkan rasa sebiji kek nanas. Berapakah bilangan molekul bahan perisa itu?*
[*Jisim molekul relatif* = 116 g mol^{-1} ;
Pemalar Avogadro = 6.02 X 10^{23} mol^{-1}]

A 1.20 X 10^{26}

B 3.01 X 10^{21}

C 3.32 X 10^{-22}

D 8.31 X 10^{-27}

12 The following statements refer to the contribution of a scientist in the development of the Periodic Table.
Pernyataan berikut merujuk kepada sumbangan seorang saintis dalam membangunkan Jadual Berkala.

> ➢ The first scientist to classify substances.
> *Ahli sains yang pertama mengklasifikasi bahan.*
>
> ➢ His classification is unsuccessful because light, heat and compound is considered as elements.
> *Klasifikasinya tidak berjaya kerana cahaya, haba dan sebatian dianggap sebagai unsur.*

A Lothar Meyer

B Henry Moseley

C Antoine Lavoisier

D Dmitri Mendeleev

13 Which of the following is a property of tetrachloromethane, CCl_4?
Antara yang berikut, yang manakah sifat bagi tetraklorometana,CCl_4 ?

A Conducts electricity in the molten state
Mengalirkan arus elektrik dalam keadaan leburan

B Has high melting point
Mempunyai takat lebur tinggi

C Soluble in water
Larut dalam air

D Exist as liquid at room temperature
Wujud sebagai cecair pada suhu bilik

14 Which of the following does not affect the products of the electrolysis of aqueous solution?
Antara yang berikut tidak mempengaruhi hasil elektrolisis bagi larutan akueus?

A Type of electrod
Jenis elektod

B Volume of electrolyte
Isipadu elektrolit

C Concentration of electrolyte
Kepekatan elektrolit

D Position of ions in the Electrochemical Series
Kedudukan ion dalam Siri Elektrokimia

15 Which of the following substances ionise completely in water?
Antara bahan-bahan berikut, yang manakah mengion dengan lengkap dalam air?

A Ethanoic acid
Asid etanoik

B Ammonia
Ammonia

C Hydrochloric acid
Asid hidroklorik

D Ascorbic acid
Asid askorbik

16 Diagram 1 shows excess copper (II) oxide powder in a beaker that contains dilute nitric acid.

Rajah 1 menunjukkan serbuk kuprum(II) oksida yang berlebihan di dalam satu bikar yang mengandungi asid nitrik cair.

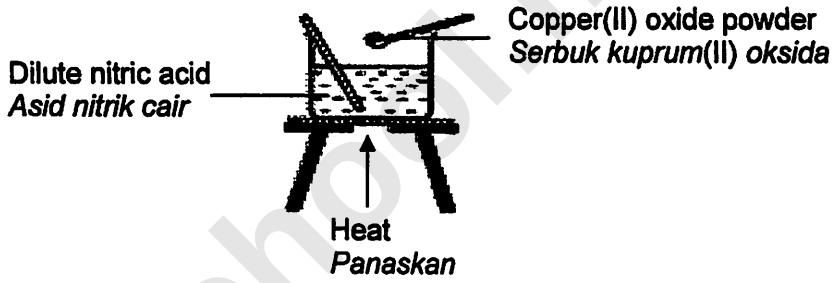


Diagram 1
Rajah 1

Which of the following steps is correct to obtain copper(II) sulphate crystals?
Antara langkah-langkah berikut, yang manakah betul untuk membentuk hablur kuprum(II) sulfat?

A Filtration → cooling → evaporation
Penurasan → penyejukan → penyejatan

B Cooling → filtration → evaporation
Penyejukan → penurasan → penyejatan

C Filtration → evaporation → cooling
Penurasan → penyejatan → penyejukan

D Evaporation → cooling → filtration
Penyejatan → penyejukan → penurasan

17 During the manufacturing of sulphuric acid, sulphur dioxide gas is oxidised to sulphur trioxide gas.
Di dalam pembuatan asid sulfurik, gas sulfur dioksida dioksidakan kepada gas sulfur trioksida.

$$2SO_2 + O_2 \rightarrow 2SO_3$$

Which substance is used as catalyst in the reaction?
Bahan manakah digunakan sebagai mangkin dalam tindak balas tersebut?

A Manganese (IV) oxide
Mangan (IV) oksida

B Vanadium (V) oxide
Vanadium (V) oksida

C Nickel
Nikel

D Iron
Besi

18 Diagram 2 shows the electron arrangement of atom X.
Rajah 2 menunjukkan susunan elektron bagi atom X.

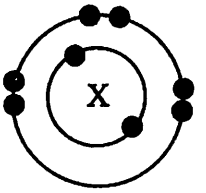


Diagram 2
Rajah 2

How many protons are there in the nucleus of atom X?
Berapakah bilangan proton yang terdapat dalam nukleus atom X?

A 2

B 4

C 6

D 8

19 Diagram 3 shows the energy profile of a reaction. E_a is the activation energy for this reaction.
Rajah 3 menunjukkan profil tenaga bagi suatu tindak balas. E_a adalah tenaga pengaktifan bagi tindak balas ini.

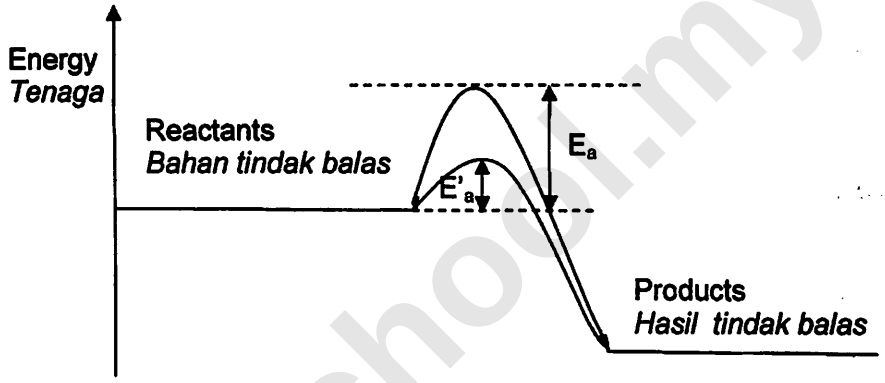


Diagram 3
Rajah 3

What will change the activation energy from E_a kepada E'_a?
Apakah yang akan mengubah tenaga pengaktifan daripada E_a kepada E'_a ?

A Temperature
Suhu

B Catalyst
Mangkin

C Concentration
Kepekatan

D Total surface area
Jumlah luas permukaan

20 Which of the following contains 6.02×10^{23} atoms?
Antara berikut, yang manakah mengandungi 6.02×10^{23} *atom*?

A 1 mol of neon
1 mol *neon*

B 1 mol ammonia
1 mol *ammonia*

C 1 mol chlorine gas
1 mol *gas klorin*

D 1 mol nitrogen gas
1 mol *gas nitrogen*

21 What is the number of moles in 100 cm^3 of 1.5 mol dm^{-3} of sulphuric acid?
Berapakah bilangan mol dalam 100 cm^3 *asid sulfurik* 1.5 mol dm^{-3}?

A 0.10 mol

B 0.15 mol

C 1.00 mol

D 1.50 mol

22 Which particles are produced when an electrolyte dissolves in water?
Zarah manakah yang terhasil apabila elektrolit melarut dalam air?

A Ions
Ion

B Atoms
Atom

C Electrons
Elektron

D Molecules
Molekul

23 Diagram 4 shows the electron arrangement of atom Q.
Rajah 4 menunjukkan susunan elektron bagi atom Q.

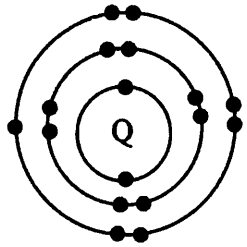
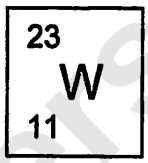
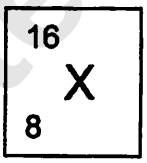
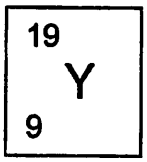


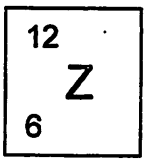
Diagram 4
Rajah 4

Which atom reacts with atom Q by transferring of electron?
Atom manakah bertindak balas dengan atom Q melalui pemindahan elektron?

A


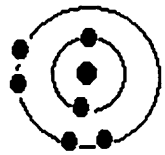
B


C


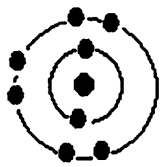
D


24 Which of the following diagrams represents the arrangement of an element of Group 18?
Antara gambar rajah berikut, yang manakah mewakili susunan elektron bagi suatu unsur Kumpulan 18?

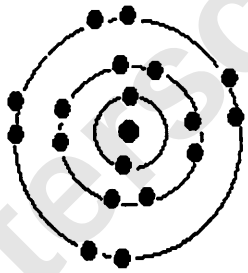
A



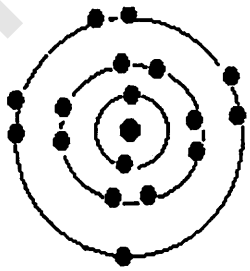
B



C



D



25 Which pair of the following reagents will produce an insoluble salt when react together?
Antara pasangan reagen berikut yang manakah menghasilkan satu garam tidak larut apabila ditindakbalaskan bersama?

A Nitric acid and sodium carbonate
Asid nitrik dan natrium karbonat

B Sulphuric acid and sodium hydroxide
Asid sulfurik dan natrium hidroksida

C Barium chloride and sodium nitrate
Barium klorida dan natrium nitrat

D Lead nitrate and sodium chloride
Plumbum nitrat dan natrium klorida

26 The following statements are related to the collision theory of a reaction.
Pernyataan berikut adalah berkaitan dengan teori perlanggaran bagi suatu tindak balas.

I The total surface area of the reactant particles increases
Jumlah luas permukaan zarah bahan tindak balas bertambah

II The kinetic energy of the reactant particle increases
Tenaga kinetik zarah bahan tindak balas bertambah

III The frequency of the collision between the reactant particles increases
Frekuensi perlanggaran antara zarah bahan tindak balas bertambah

IV The number of reactant particle per unit volume increases
Bilangan zarah bahan tindak balas dalam satu unit isipadu bertambah

Which of the following combinations is true about the effect of the increase of concentration of the reactant particles?
Antara kombinasi berikut, yang manakah benar tentang kesan pertambahan kepekatan bahan tindak balas?

A I and II
I *dan* II

B III and IV
III *dan* IV

C II and III
II *dan* III

D I and IV
I *dan* IV

27 Diagram 5 shows the effect of a weight that is dropped onto steel ball bearing placed on brass and copper blocks.
Rajah 5 menunjukkan kesan satu pemberat dijatuhkan ke atas bebola keluli yang terletak di atas bongkah loyang dan kuprum.

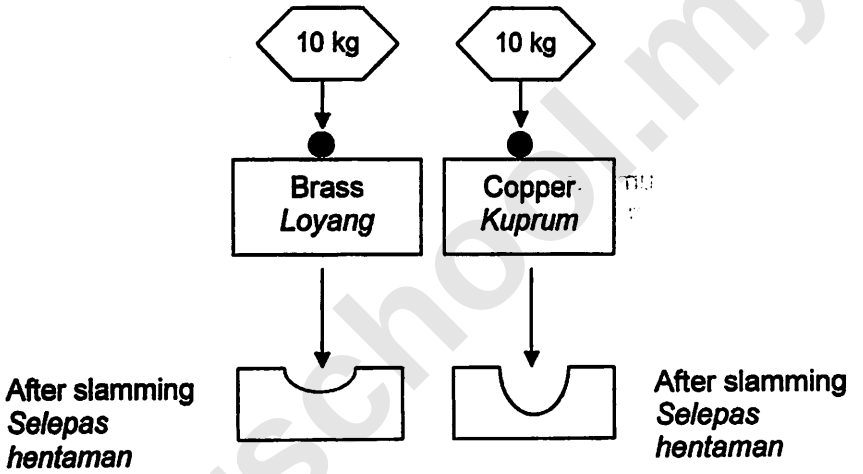


Diagram 5
Rajah 5

What is the characteristic shown by the brass block?
Apakah sifat yang ditunjukkan oleh bongkah loyang?

A Ductile and malleable
Mulur dan boleh ditempa

B Hard and ductile
Keras dan mulur

C Strong and hard
Kuat dan keras

D Strong and malleable
Kuat dan boleh ditempa

28 Table 1 shows the proton number and nucleon number for elements P, Q, R, S, T and U. The letters used are not the actual symbol of the elements.
Jadual 1 menunjukkan nombor proton dan nombor nukleon bagi unsur-unsur P,Q,R,S,T *dan* U. *Huruf yang digunakan bukan simbol sebenar unsur itu.*

Element *Unsur*	Proton number *Nombor Proton*	Nucleon number *Nombor Nukleon*
P	10	20
Q	17	35
R	53	127
S	20	40
T	12	24
U	53	131

Table 1
Jadual 1

Which of the following pair is an isotope?
Antara pasangan berikut, yang manakah isotop?

A P and S
P dan S

B R and U
R dan U

C Q and T
Q and T

D Q and R
Q and R

29 The following equation represents the reaction between aluminium and oxygen.
Persamaan berikut mewakili tindak balas antara aluminium dan oksigen.

$$4Al + 3O_2 \rightarrow 2Al_2O_3$$

Which of the following statements is correct?
Antara pernyataan berikut, yang manakah betul?

A 4 mol of aluminium atoms react with 3 mol of oxygen atoms
4 mol *atom aluminium bertindakbalas dengan* 3 mol *atom oksigen*

B 4 mol of aluminium atoms react with 3 mol of oxygen molecules
4 mol *atom aluminium bertindakbalas dengan* 3 mol *molekul oksigen*

C 4 mol of aluminium atoms react with 3 mol of oxygen atoms producing 2 mol of aluminium oxide
4 mol *atom aluminium bertindakbalas dengan* 3 mol *atom oksigen menghasilkan 2 mol aluminium oksida*

D 4 mol of aluminium atoms react with 6 mol of oxygen molecules producing 2 mol of aluminium oxide
4 mol *atom aluminium bertindakbalas dengan* 6 mol *molekul oksigen menghasilkan 2 mol aluminium oksida*

30 Element Z is located in the same group as chlorine in the Periodic Table. Z is not the actual symbol of element.
Which of the following statements are the chemical properties of element Z?
Unsur Z berada dalam kumpulan yang sama dengan klorin dalam Jadual Berkala. Z bukan unsur sebenar unsur itu.
Antara pernyataan berikut, yang manakah sifat kimia bagi unsur Z?

A Reacts with water to produce alkaline solution
Bertindak balas dengan air menghasilkan larutan beralkali

B Reacts with sodium to produce a black solid
Bertindak balas dengan natrium untuk menghasilkan pepejal hitam

C Reacts with sodium hydroxide to produce an acidic solution
Bertindak balas dengan natrium hidroksida menghasilkan larutan berasid

D Reacts with hot iron to form brown solid
Bertindak balas dengan ferum panas menghasilkan pepejal perang

31 Compound X has the following properties.
Sebatian X mempunyai sifat-sifat berikut.

- Soluble in water
  Larut dalam air
- Boiling point 1420 °C
  Takat didih 1420 °C
- Conducts electricity in aqueous solution
  Mengkonduksi arus elektrik dalam larutan

What is X?
Apakah X?

A Potassium chloride
Kalium klorida

B Silver chloride
Argentum klorida

C Naphthalene
Naftalena

D Glucose
Glukosa

32 A student has an iron ring. He wants to make the ring more beautiful and durable to give his friends as a present.
What is the best way to do it?
Seorang pelajar mempunyai sebentuk cincin besi. Dia ingin menjadikan cincin itu lebih cantik dan tahan lama untuk dihadiahkan kepada rakannya.
Apakah langkah yang paling baik dilakukan?

A Dip the ring in acid
Mencelup cincin dalam asid

B Wash the ring with detergent
Mencuci cincin dengan detergen

C Plate the ring with silver
Menyadur cincin dengan argentum

D Brush the ring with glossy material
Memberus cincin dengan bahan pengilat

33 Table 2 shows the degree of dissociation of four solutions of alkalis which have the same concentration.
Jadual 2 menunjukkan darjah penceraian empat larutan alkali yang mempunyai kepekatan yang sama.

Solution *Larutan*	Degree of dissociation *Darjah penceraian*
W	Very high *Sangat tinggi*
X	High *tinggi*
Y	Medium *sederhana*
Z	Low *rendah*

Table 2
Jadual 2

Which of the following solutions has the highest pH?
Antara larutan berikut, yang manakah mempunyai pH *yang paling tinggi?*

A W
B X
C Y
D Z

34 Diagram 6 shows the set-up of apparatus of heating a substance X.
Rajah 6 menunjukkan susunan radas pemanasan bahan X

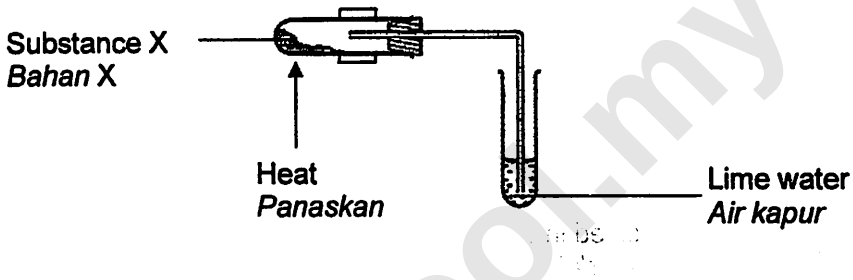


Diagram 6
Rajah 6

The lime water turns cloudy and a black residue remains in the boiling tube.
Air kapur bertukar menjadi keruh dan baki berwarna hitam tertinggal di dalam tabung didih.

Which of the following explains the observations?
Antara berikut, yang manakah menerangkan pemerhatian itu?

A The gas given off is oxygen
Gas yang terbebas ialah oksigen

B The black residue is carbon
Baki berwarna hitam ialah karbon

C The substance X is copper (II) carbonate
Bahan X ialah kuprum(II) *karbonat*

D The lime water turned cloudy indicates that the reaction is complete
Air kapur keruh menandakan tindak balas telah lengkap

35 Sulphuric acid, H_2SO_4 is manufactured in industry through Contact Process involving three stages.
Which stage is correct?
Asid sulfurik, H_2SO_4 dihasilkan dalam industri melalui Proses Sentuh yang melibatkan tiga peringkat.
Peringkat manakah yang betul?

A Sulphur dioxide gas is dissolved in water
Gas sulfur dioksida dilarutkan dalam air

B Sulphur trioxide gas is dissolved in water
Gas sulfur trioksida dilarutkan dalam air

C Sulphur dioxide gas is dissolved in concentrated sulphuric acid
Gas sulfur dioksida dilarutkan dalam asid sulfurik pekat

D Sulphur trioxide gas is dissolved in concentrated sulphuric acid
Gas sulfur trioksida dilarutkan dalam asid sulfurik pekat

36 Table 3 shows the total volume of oxygen collected in the decomposition of hydrogen peroxide catalysed by manganese(IV) oxide.
Jadual 3 menunjukkan jumlah isipadu oksigen yang dikumpul dalam penguraian hidrogen peroksida yang dimangkinkan oleh mangan(IV) oksida.

Time(minute) ***Masa (minit)***	0	1	2	3	4	5
Volume of gas (cm^3) ***Isipadu gas (cm^3)***	0.00	10.50	18.40	24.60	29.20	29.20

Table 3
Jadual 3

What is the average rate of reaction?
Berapakah kadar tindak balas purata bagi tindak balas itu?

A 5.84 cm^3min^{-1}

B 7.30 $cm^3 min^{-1}$

C 7.46 $cm^3 min^{-1}$

D 9.20 $cm^3 min^{-1}$

37 Diagram 7 shows a cooling curve of a liquid of substance S.
Rajah 7 menunjukkan graf penyejukan bahan S.

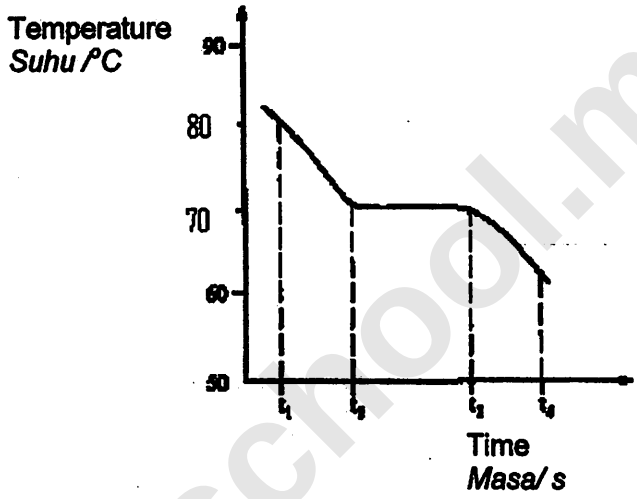


Diagram 7
Rajah 7

Which statement can be deduced from Diagram 7?
Pernyataan manakah yang boleh dideduksikan daripada Rajah 7?

A Heat energy is absorbed at t_2 to t_3
Tenaga haba diserap pada t_2 *ke* t_3

B The melting point of S is 70 °C
Takat lebur S ialah 70 °C

C All the S turn to liquid at t_2
Semua S bertukar ke cecair pada t_2

D The volume of S increases from t_2 to t_3
Isipadu S bertambah daripada t_2 *ke* t_3

38 The following equation shows the decomposition of hydrogen peroxide, H_2O_2.

$$2\,H_2O_{2\,(l)} \rightarrow 2\,H_2O_{(l)} + O_{2(g)}$$

What is the volume of oxygen gas, O_2 produced from the decomposition of 500 cm^3 of 2 mol dm^{-3} hydrogen peroxide at standard temperature and pressure (STP)?
[Molar volume of gas at STP = 22.4 $dm^3\,mol^{-1}$]
Persamaan berikut menunjukkan penguraian bagi hydrogen peroksida, H_2O_2.

$$2\,H_2O_{2\,(l)} \rightarrow 2\,H_2O_{(l)} + O_{2(g)}$$

Berapakah isipadu gas oksigen, O_2 *terhasil daripada penguraian* 500 cm^3 *hidrogen peroksida* 2 mol dm^{-3} *pada suhu dan tekanan piawai* (STP)?
[*Isipadu molar gas pada* STP = 22.4 $dm^3\,mol^{-1}$]

A 11.2 dm^3

B 22.4 dm^3

C 33.6 dm^3

D 44.8 dm^3

39 Which of the following ions form a white precipitate that insoluble in excess sodium hydroxide solution ?
Antara ion berikut yang manakah membentuk satu mendakan putih yang tidak larut dalam larutan natrium hidroksida berlebihan?

A Al^{3+}

B Mg^{2+}

C Pb^{2+}

D Zn^{2+}

40 Table 4 shows three atoms of the elements and their electron arrangement respectively. The letters used are not the actual symbol of the element.
Jadual 4 menunjukkan tiga atom bagi unsur dan susunan elektron masing-masing. Huruf yang digunakan bukan simbol sebenar bagi unsur itu.

Atom of element *Atom unsur*	Electron arrangement *Susunan elektron*
G	2.8.1
H	2.8.4
I	2.8.7

Table 4
Jadual 4

Which of the following is correct about three elements according to the sequence G, H and I?
Antara yang berikut, yang manakah betul tentang ketiga-tiga unsur itu mengikut urutan G, H *dan* I?

A Atomic radius decreases
Jejari atom berkurang

B Melting point increases
Takat lebur bertambah

C Metallic properties increases
Sifat kelogaman bertambah

D Electronegativity decreases
Keelektronegatifan berkurang

41 Diagram 8 shows a substance that is commonly used in daily lives.
Rajah 8 menunjukkan satu bahan yang biasanya digunakan dalam kehidupan seharian.

Diagram 8
Rajah 8

Which pair of the type of compound and its property that useful in manufacturing of the substances in Diagram 8?
Pasangan manakah menunjukkan jenis sebatian dan sifatnya yang berguna dalam pembuatan bahan-bahan dalam Rajah 8?

	Type of compound *Jenis sebatian*	Property *Sifat*
A	Covalent *Kovalen*	Low melting and boiling point *Takat lebur dan didih rendah*
B	Ionic *Ion*	High melting and boiling point *Takat lebur dan didih tinggi*
C	Covalent *Kovalen*	Volatile *Mudah meruap*
D	Ionic *Ion*	Non-volatile *Tidak mudah meruap*

42 Table 5 shows information about three voltaic cells. Metal X, Y and Z are used as electrodes in the cells.
Jadual 5 menunjukkan maklumat tentang tiga sel voltan. Logam-logam X, Y dan Z digunakan sebagai elektrod dalam sel itu.

Voltaic cell *Sel voltan*	Negative terminal *Terminal negatif*	Positive terminal *Terminal positif*	Voltage (V) *Voltan* (V)
I	X	Y	3.0
II	Z	Y	1.2
III	X	Z	1.8

Table 5
Jadual 5

What is the order of the metals from the most electropositive to the least electropositive ?
Apakah susunan logam daripada yang paling elektropositif kepada yang paling kurang elektropositif ?

A X, Y, Z

B X, Z, Y

C Y, Z, X

D Z, X, Y

43 If you want to cook 50 potatoes within a short time, which is the most suitable method?
Sekiranya anda ingim memasak 50 biji kentang dalam masa yang singkat, apakah langkah yang paling sesuai dilakukan?

A Boil the potatoes in a pan
Merebus kentang dalam kuali leper

B Boil the potatoes in a pressure cooker
Merebus kentang dalam periuk tekanan

C Steam the potatoes in a steamer
Mengukus kentang dalam pengukus

D Fry the potatoes in a wok
Menggoreng kentang dalam kuali

44 Which pair is correctly matched?
Pasangan manakah dipadankan dengan betul?

	Copper (II) chloride *Kuprum(II) klorida*	Hydrogen chloride *Hidrogen klorida*
A	Low melting and boiling point *Takat lebur dan didih rendah*	High melting and boiling point *Takat lebur dan didih tinggi*
B	Exist as liquid at room temperature *Wujud sebagai cecair pada suhu bilik*	Exist as gas at room temperature *Wujud sebagai gas pada suhu bilik*
C	Conducts electricity in a molten state *Mengkonduksikan elektrik dalam keadaan leburan*	Does not conduct electricity *Tidak mengkonduksikan elektrik*
D	Insoluble in water *Tidak larut dalam air*	Soluble in water *Larut dalam air*

45 Which of the following is a use of neutralisation in daily lives?
Antara berikut, yang manakah kegunaan peneutralan dalam kehidupan seharian?

I Vinegar cures the jellyfish sting
Cuka merawat sengatan obor-obor

II Anti-acid neutralise the excess acid in our stomach
Antasid meneutralkan asid berlebihan dalam perut

III Limestone treats acidic soil
Batu kapur memulihkan tanah yang berasid

IV Toothpaste neutralise acid in our mouth
Ubat gigi meneutralkan asid dalam mulut

A I and II
I *dan* II

B II and IV
II *dan* IV

C I, II dan III
I, II *dan* III

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

46 Diagram 9 shows a motorcyclist wear an object Y to protect his head from injury during a motorcycle race.
Rajah 9 menunjukkan seorang penunggang motosikal memakai objek Y untuk melindungi kepalanya daripada kecederaan semasa suatu perlumbaan motosikal.

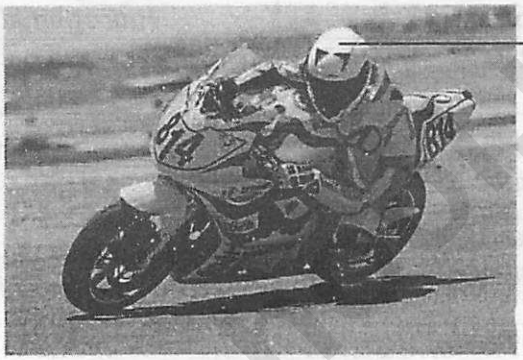


Diagram 9
Rajah 9

Object Y is made from a material with the following properties:
Objek Y diperbuat daripada suatu bahan dengan sifat-sifat berikut:

- Strong
  Kuat
- Light
  Ringan
- High tensile strength
  Kekuatan regangan tinggi
- Can withstand corrosion
  Tahan kakisan

Which of the following is the material of object Y?
Antara berikut, yang manakah bahan bagi objek Y?

A Photochromic glass
Kaca fotokromik

B Fibre glass
Kaca gentian

C Superconductor
Superkonduktor

D Reinforced concrete
Konkrit diperkukuhkan

47 Diagram 10 shows a symbol of an atom.
Rajah 10 *menunjukkan simbol bagi suatu atom*

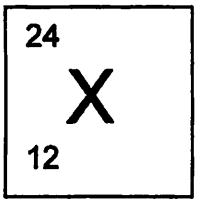


Diagram 10
Rajah 10

Which of the following is true about an ion formed from the atom?
Antara berikut yang manakah benar tentang ion yang terbentuk daripada atom tersebut?

	Proton number *Nombor proton*	Nucleon number *Nombor nukleon*	Number of electrons *Bilangan elektron*
A	10	24	12
B	12	24	10
C	12	20	10
D	12	24	12

48 The following equation represents the combustion of propane in excess oxygen.
Persamaan berikut mewakili pembakaran propane dalam oksigen berlebihan.

$$2\ C_4H_{10} + 13\ O_2 \rightarrow 8\ CO_2 + 10\ H_2O$$

What are the volume of carbon dioxide gas produced when 48 cm^3 of butane is completely burnt?
[Molar volume of gas = 24 $dm^3\ mol^{-1}$ at room temperature]
Apakah isipadu gas karbon dioksida yang terhasil apabila 48 cm^3 *butana terbakar dengan lengkap?*
[*Isipadu molar gas* = 24 $dm^3\ mol^{-1}$ *pada suhu bilik*]

A 192 cm^3

B 288 cm^3

C 384 cm^3

D 480 cm^3

49 Table 6 shows the observation when the oxides of elements in Period 3 of the Periodic Table is added to sodium hydroxide solution and nitric acid. X, Y and Z are not the actual symbols of the elements.
Jadual 6 menunjukkan pemerhatian apabila oksida bagi unsur-unsur dalam Kala 3 bagi Jadual Berkala ditambahkan kepada larutan natrium hidroksida dan asid nitrik. X, Y dan Z bukan simbol sebenar bagi unsur-unsur itu.

Oxides of elements in Period 3 *Oksida bagi unsur dalam Kala 3*	Observation *Pemerhatian*	
	Sodium hydroxide solutiom *Larutan natrium hidroksida*	Nitric acid *Asid nitrik*
XO_3	Dissolves to form a colouless solution *Larut membentuk larutan tak berwarna*	No changes *Tiada perubahan*
YO	No changes *Tiada perubahan*	Dissolves to form a colourless solution *Larut membentuk larutan tak berwarna*
Z_2O_3	Dissolves to form a colourless solution *Larut membentuk larutan tak berwarna*	Dissolves to form a colourless solution *Larut membentuk larutan tak berwarna*

Table 6
Jadual 6

What is the correct arrangement in increasing proton number of the elements?
Apakah susunan yang betul mengikut pertambahan nombor proton unsur-unsur itu?

A X, Y, Z

B X, Z, Y

C Z, Y, X

D Y, Z, X

50 Table 7 shows the positive terminal and voltmeter readings of three pairs of metals used as electrodes in voltaic cells.
Jadual 7 menunjukkan terminal positif dan bacaan voltmeter bagi tiga pasangan logam yang digunakan sebagai elektrod dalam sel voltan.

Pair of metal *Pasangan logam*	Positive terminal *Terminal positif*	Voltmeter reading (V) *Bacaan voltmeter* (V)
R, S	S	1.8
S, Q	S	0.3
P,R	R	0.2

Table 7
Jadual 7

What is the voltmeter reading when P and Q are the pair of metals used as electrode?
Apakah bacaan voltmeter apabila P *dan* Q *adalah pasangan logam yang digunakan sebagai elektrod?*

A 0.1 V
B 0.5 V
C 1.7 V
D 2.3 V

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

BAHAN KECEMERLANGAN

SPM 2015

Skema
BK 1

KIMIA

DIBIAYAI OLEH
KERAJAAN NEGERI TERENGGANU

JABATAN PENDIDIKAN TERENGGANU

Mark Sheet Paper 1 BK1 (TOV)

CHEMISTRY BK1(TOV) 2015

1	A
2	B
3	A
4	B
5	D
6	D
7	B
8	B
9	D
10	B
11	B
12	C
13	D
14	B
15	C
16	C
17	B
18	D
19	B
20	A

21	B
22	A
23	A
24	C
25	D
26	B
27	C
28	B
29	B
30	D
31	A
32	C
33	A
34	C
35	D
36	B
37	B
38	A
39	B
40	A

41	C
42	B
43	B
44	C
45	D
46	B
47	B
48	A
49	D
50	C

BAHAN KECEMERLANGAN SPM 2015

BK 1

KIMIA

KERTAS 2

NAMA : .....

KELAS : .....

DIBIAYAI OLEH
KERAJAAN NEGERI TERENGGANU

NAMA : .....

TINGKATAN : .....

ANGKA GILIRAN : .....

4541/2

KIMIA
Kertas 2
Feb
2 ½ jam

BAHAN KECEMERLANGAN (BK 1)

SIJIL PELAJARAN MALAYSIA 2014

Dua jam tiga puluh minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Tulis **nama** dan **tingkatan** anda pada ruangan yang disediakan di atas.*

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 diperoleh
A	1	
	2	
	3	
	4	
	5	
	6	
B	7	
	8	
C	9	
	10	
JUMLAH		

Kertas soalan ini mengandungi 23 halaman bercetak.

[Lihat halaman sebelah

SULIT

Section A
Bahagian A
[60 marks]
[60 *markah*]

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

1 Ali found a white granule in his cupboard. The substance is used as mothballs. In his school laboratory, substance J has same colour and smell like white granule that Ali's found and it is heated until melted as Diagram 1.

Ali menjumpai satu ketulan putih di dalam almari rumahnya. Bahan tersebut digunakan sebagai ubat gegat. Ketika berada di makmal kimia sekolahnya, satu bahan J yang mempunyai warna dan bau yang sama seperti ketulan putih yang dijumpainya itu telah dipanaskan sehingga melebur seperti Rajah 1.

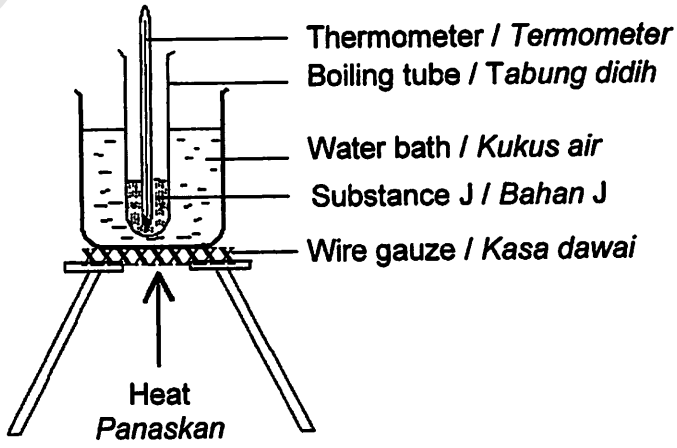


Diagram / *Rajah* 1

(a) What is the meaning of melting point?
Apakah maksudkan dengan takat lebur?

.....
[1 *mark*]

(b) Suggest substance J.
Cadangkan bahan J.

.....
[1 *mark*]

(c) State the type of particles that form substance J.
Nyatakan jenis zarah yang membentuk bahan J.

.....
[1 *mark*]

(d) What is the purpose of using water bath in the experiment?
Apakah tujuan menggunakan kukus air dalam eksperimen itu?

.....

[1 *mark*]

(e) Why do we need to stir the naphthalene in the experiment?
Mengapakah kita perlu mengacau naftalena dalam eksperimen itu?

.....

[1 *mark*]

(f) Sketch the graph to show the heating curve of naphthalene.
Lakarkan graf untuk menunjukkan lengkung pemanasan naftalena.

[2 *marks*]

(g) State the change of the particles that occurred when substance J is heated according to the
Nyatakan perubahan yang dialami oleh zarah-zarah dalam bahan J apabila dipanaskan dari segi

(i) Energy
Tenaga : .....

(ii) Attraction force
Daya tarikan : .....

[2 *marks*]

2 Diagram 2 shows an airplane, a chair and an oven.
Rajah 2 menunjukkan kapal terbang, kerusi dan ketuhar.

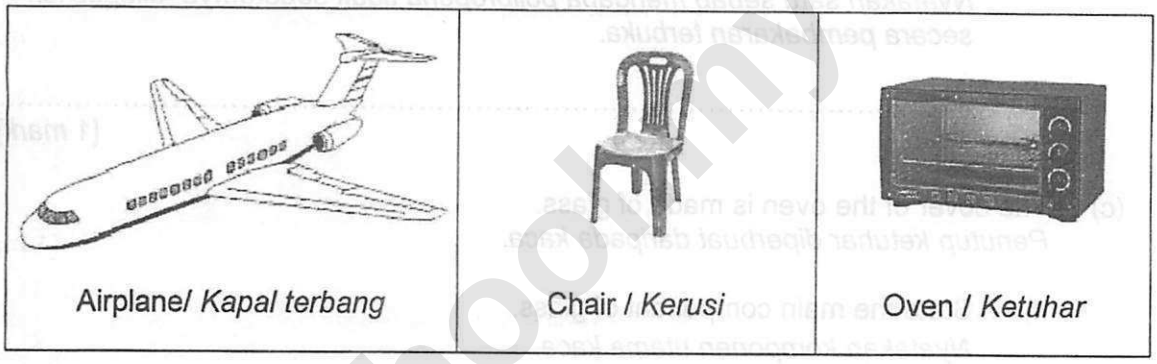


Diagram 2
Rajah 2

(a) (i) The body of airplane made from duralumin. State two elements in duralumin.
Badan kapal terbang diperbuat daripada duralumin. Nyatakan dua unsur dalam duralumin.

.....

[2 *marks*]

(ii) State the difference in hardness between duralumin and its pure metal.
Nyatakan perbezaan dari segi kekerasan antara duralumin dan logam tulennya.

.....

[1 *mark*]

(b) The chair is made from a synthetic polymer, polypropene.
Kerusi itu diperbuat daripada polimer sintetik, polipropena.

(i) State the name of the monomer for polypropene.
Nyatakan nama monomer bagi polipropena.

.....

[1 *mark*]

(ii) Draw the structural formula for the monomer.
Lukis formula struktur bagi monomer itu.

[1 *mark*]

(iii) State one reason why polypropene should not be disposed by open burning?
Nyatakan satu sebab mengapa polipropena tidak sepatutnya dilupuskan secara pembakaran terbuka.

.....
[1 *mark*]

(c) The cover of the oven is made of glass.
Penutup ketuhar diperbuat daripada kaca.

(i) State the main component of glass.
Nyatakan komponen utama kaca.

.....
[1 *mark*]

(ii) Suggest the type of glass that is most suitable to make the cover.
Cadangkan jenis kaca yang paling sesuai untuk membuat penutup itu.

.....
[1 *mark*]

(iii) Give one reason for your answer in 2(c) (ii).
Berikan satu sebab bagi jawapan anda di 2(c) (ii).

.....
[1 *mark*]

3 In the 19th century, chemist has discovered a large amount of elements. A systematic way to arrange the elements is needed for the chemist to predict the properties of the element which has yet to be discovered. This led to the development of the Periodic Table of Elements that we use today.

Menjelang abad ke-19, ahli-ahli kimia telah menemui sebilangan besar unsur. Suatu cara yang bersistematik untuk menyusun unsur-unsur amat diperlukan supaya ahli-ahli kimia dapat meramal sifat unsur yang masih belum ditemui. Usaha ini telah membawa kepada perkembangan Jadual Berkala Unsur yang digunakan pada hari ini.

(a) Describe how scientists arranged and determined the position of element in the Modern Periodic Table that we used nowadays?
Huraikan bagaimana saintis menyusun dan menentukan kedudukan unsur-unsur dalam Jadual Berkala Unsur Moden yang digunakan hingga ke hari ini?

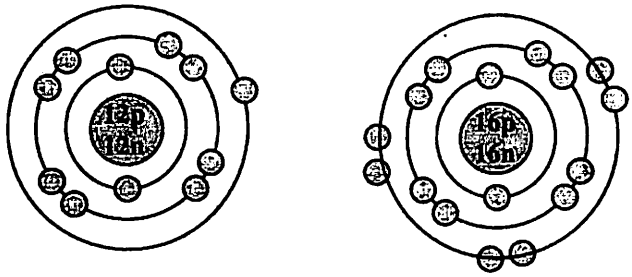
.....

.....

.....

[3 *marks*]

(b) Element X and Y are two elements in the periodic table.
Diagram 3.1 shows the atomic structure of element X and Y.
Unsur X *dan* Y *merupakan dua unsur yang berada dalam jadual berkala.*
Rajah 3.1 *di bawah menunjukkan struktur atom bagi unsur* X *dan* Y.



Element X
Unsur X

Element Y
Unsur Y

Diagram / *Rajah* 3.1

(i) What is the similarity of these elements in terms of position in the periodic table? Give a reason.
Apakah persamaan bagi kedua dua unsur ini dari segi kedudukan dalam jadual berkala unsur? Berikan satu sebab.

.....

.....

[2 *marks*]

(ii) Compare the atomic size of Element X and Y. Explain your answer.
Bandingkan saiz atom bagi unsur X dan Y. Terangkan jawapan anda.

.....

.....

.....

[3 *marks*]

(c) A group of students carried out an experiment to investigate the properties of the oxides of X and Y when dissolved in water. Table 3.2 shows the results of the experiment.
Sekumpulan pelajar telah menjalankan eksperimen untuk mengkaji sifat oksida bagi X dan Y apabila dilarutkan dalam air. Jadual 3.2 menunjukkan keputusan daripada eksperimen tersebut.

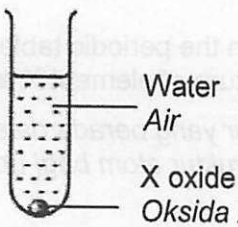
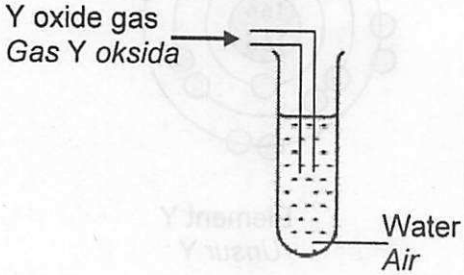
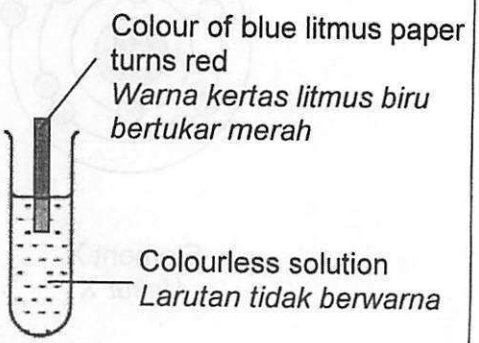
Experiment *Eksperimen*	**Reaction** *Tindak Balas*	**Observation** *Pemerhatian*
I		
II		

Table / *Jadual* 3.2

Based on the results of the experiments, what is the conclusion that can be made on the properties of X oxide and Y oxide?

Berdasarkan keputusan eksperimen tersebut, apakah kesimpulan yang boleh dibuat terhadap sifat oksida X dan oksida Y?

.....

.....

[2 *marks*]

4 An experiment is conducted to determine the rate of reaction between 25 cm^3 of 0.1 mol dm^{-3} hydrochloric acid and 10.0 g of marble chips (calcium carbonate). The gas evolved is collected into a burette by water displacement technique. Diagram 4.1 shows the incomplete apparatus set-up for this experiment.

Satu eksperimen telah dijalankan untuk menentukan kadar tindak balas antara 25 cm^3 *asid hidroklorik* 0.1 mol dm^{-3} *dan* 10.0 g *ketulan marmar (kalsium karbonat). Gas yang terbebas dikumpulkan ke dalam sebuah buret menggunakan kaedah sesaran air. Rajah* 4.1 *menunjukkan susunan radas yang tidak lengkap yang digunakan dalam eksperimen itu.*

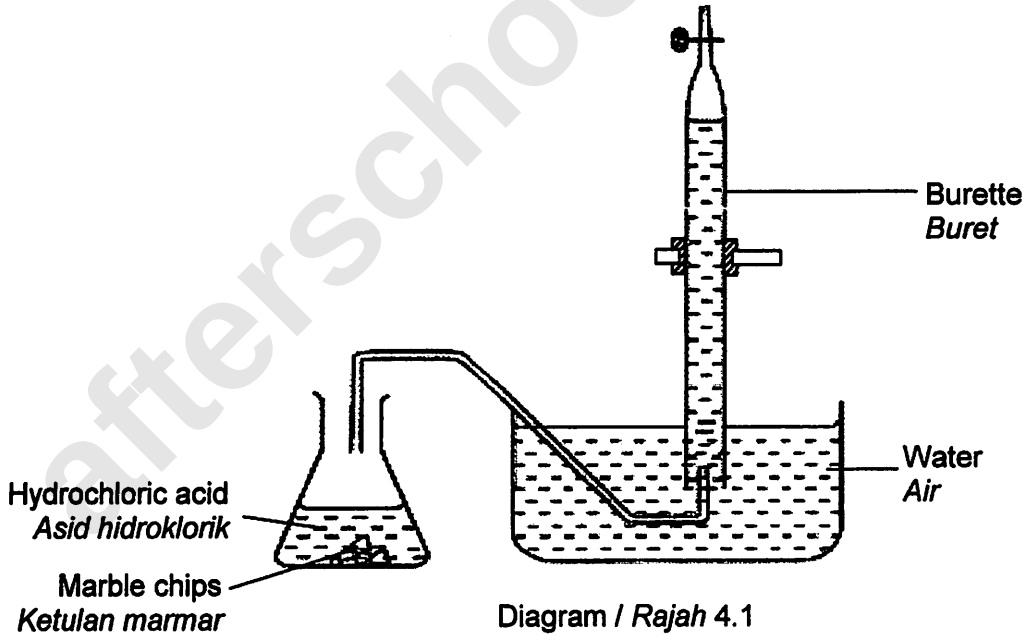


Diagram / *Rajah* 4.1

(a) Complete the diagram above with a suitable apparatus.
Lengkapkan gambar rajah di atas dengan radas yang sesuai.

[1 *mark*]

(b) Write the chemical equation for the reaction between hydrochloric acid and calcium carbonate.
Tuliskan persamaan kimia bagi tindak balas antara asid hidroklorik dengan kalsium karbonat.

.....

[2 *marks*]

Table 4.2 shows the result of the experiment.
Jadual 4.2 *menunjukkan keputusan eksperimen itu.*

Time /s *Masa /s*	0	25	50	75	100	125	150	175
Volume of gas /cm^3 *Isipadu gas /*cm^3	0	16	32	48	58	60	60	60

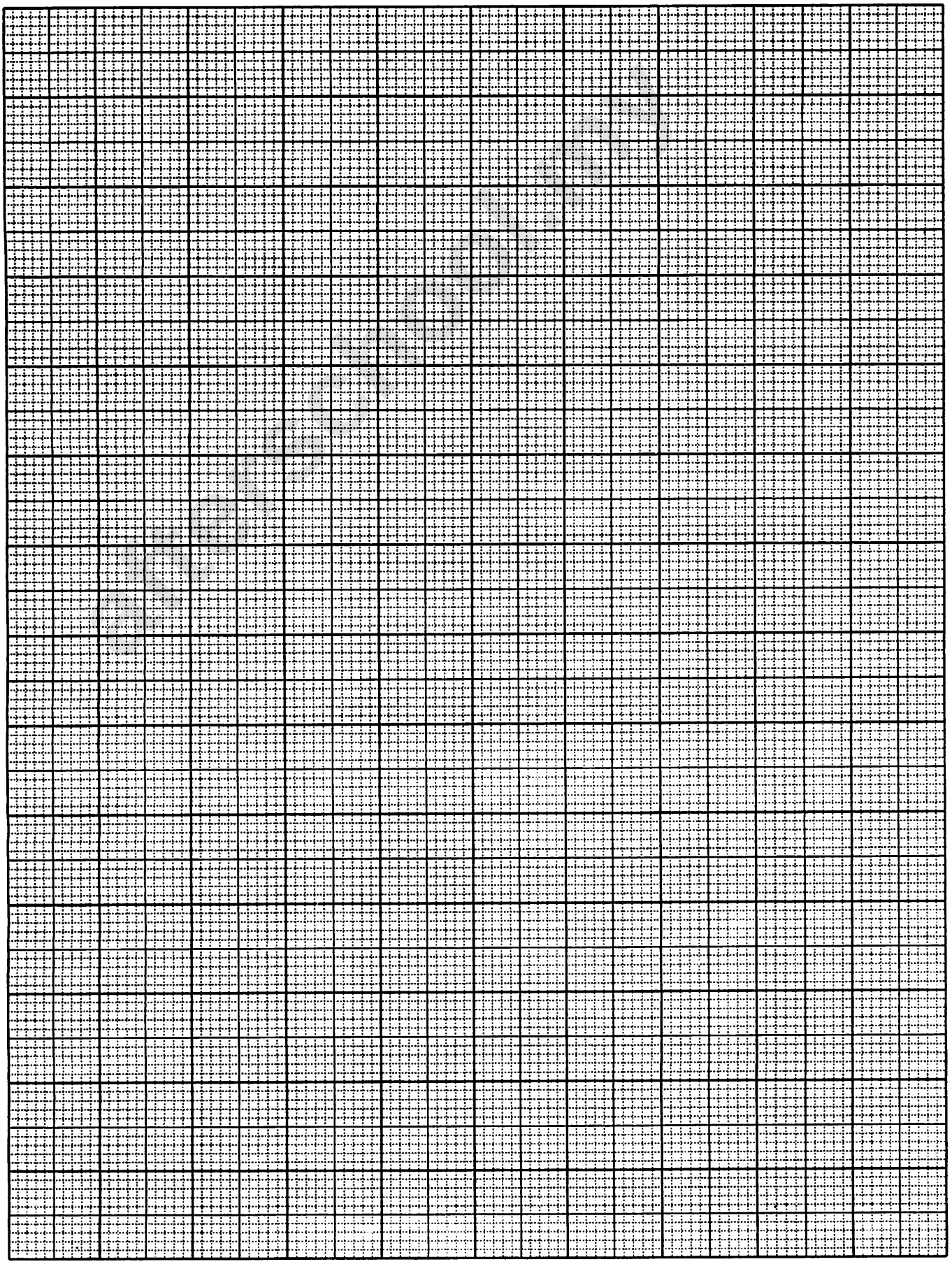
Table / *Jadual* 4.2

(c) Plot a graph of volume of gas against time on the graph paper provided on page 10.
Lukiskan graf isipadu gas melawan masa menggunakan kertas graf yang dibekalkan di muka surat 10.

[4 *marks*]

(d) Calculate the rate of reaction at 100 seconds.
Hitungkan kadar tindak balas pada saat ke-100.

[3 *marks*]



5 Diagram 5 shows the set-up of apparatus to investigate the electrolysis of 1.0 mol dm^{-3} of sodium sulphate solution using carbon electrodes.
Rajah 5 menunjukkan susunan radas bagi mengkaji elektrolisis larutan natrium sulfat 1.0 *mol* dm^{-3} *menggunakan elektrod karbon.*

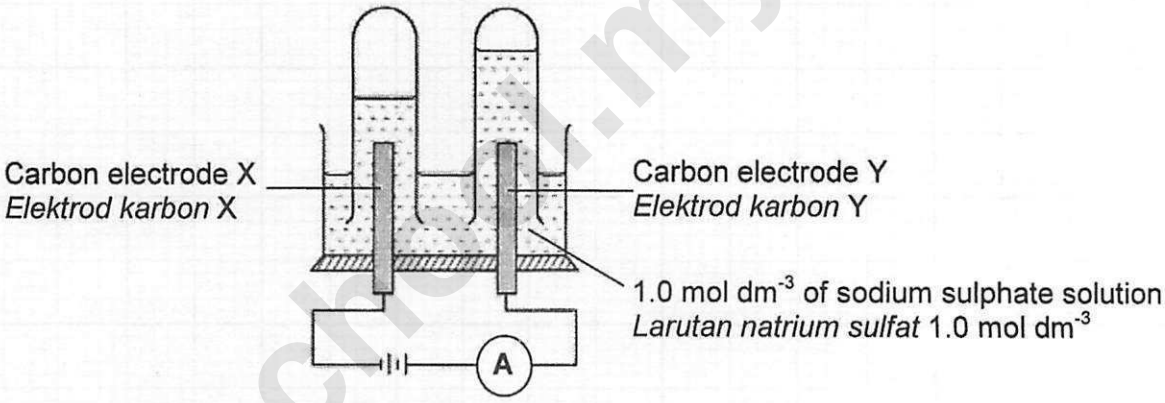


Diagram / *Rajah* 5

(a) What is meant by electrolysis?
Apakah yang dimaksudkan dengan elektrolisis?

.....

.....
[1 *mark*]

(b) (i) State **all** the cations present in the electrolyte.
Nyatakan ***semua*** kation *yang hadir dalam elektrolit itu.*

.....
[1 *mark*]

(ii) Based on your answer in (b) (i) , which cation is selected to be discharged at cathode.
Berdasarkan jawapan anda di (b) (i) , *kation yang manakah dipilih untuk dinyahcas di katod.*

.....
[1 *mark*]

(c) Write the half equation for the reaction at the electrode X
Tuliskan setengah persamaan bagi tindak balas di elektrod X.

.....
[1 *mark*]

(d) (i) State the name of the gas collected in the test tube at the electrode Y.
Nyatakan nama bagi gas yang terkumpul dalam tabung uji di elektrod Y.

.....
[1 *mark*]

(ii) Describe the chemical test to confirm the gas in (d) (i).
Huraikan ujian kimia untuk mengesahkan gas di (d) (i).

.....

.....

[2 *marks*]

(e) Ali intends to carry out electrolysis project using the substance in his house. The substances are table salt, water, two pieces of pencil, dry cell, wire and a mug.
Ali ingin menjalankan satu projek elektrolisis menggunakan bahan-bahan yang terdapat dalam rumahnya. Bahan-bahan tersebut ialah garam, air, dua batang pensil, sel kering, wayar dan cawan.

(i) In your opinion, what products are produced?
Give a reason for your answer.
Pada pandangan anda apakah hasil-hasil yang diperolehi?
Berikan alasan bagi jawapan anda.

.....

.....

.....

[2 *marks*]

(ii) Draw the set up of apparatus to carry out the electrolysis.
Lukiskan gambar rajah susunan radas bagi menjalankan elektrolisis itu.

[2 *marks*]

6 Different substances have different levels of acidity or alkalinity. The pH scale which ranged from 0 to 14 is used to indicate the degree of acidity and alkalinity of substances. The pH values for daily common substances are shown in Diagram 6.1.

Bahan yang berbeza mempunyai tahap keasidan dan kealkalian yang berbeza. Skala pH *digunakan untuk menunjukkan darjah keasidan dan kealkalian bahan. Skala* pH *mempunyai nilai dari* 0 *ke* 14. *Nilai* pH *bagi keperluan harian ditunjukkan di bawah.*

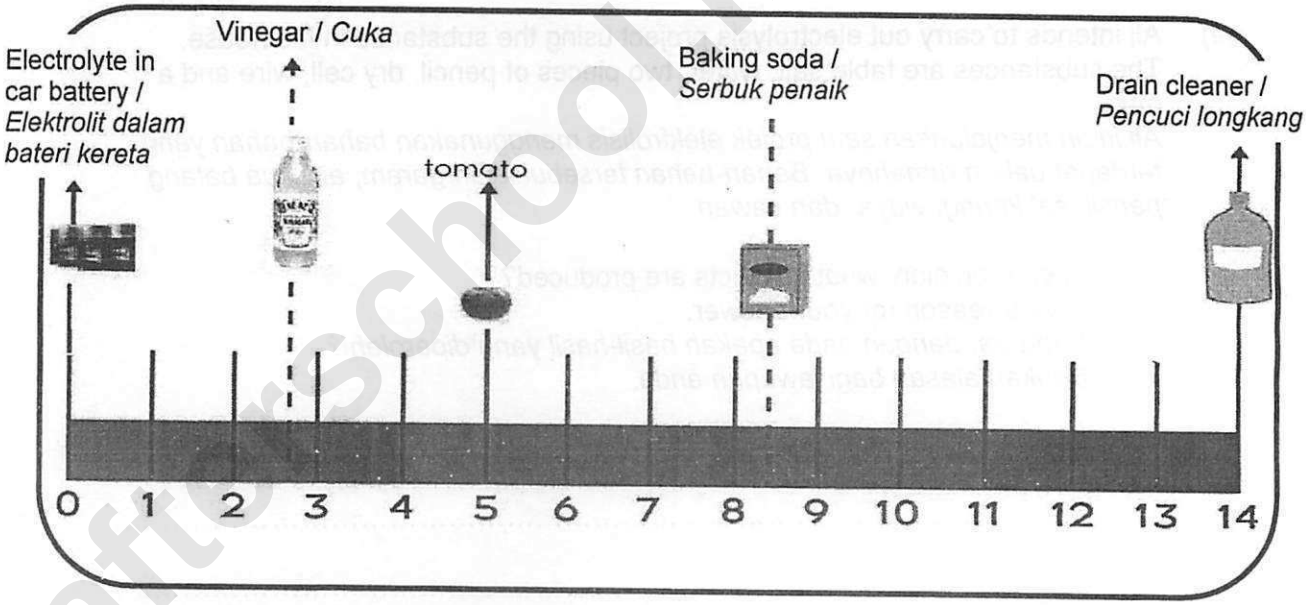


Diagram / *Rajah* 6.1

Based on the Diagram 6.1,
Berdasarkan Rajah 6.1,

(a) State the formula of ions that enable the substances to show its acidic **and** alkaline property.
Nyatakan formula bagi ion yang membolehkan bahan-bahan tersebut menunjukkan sifat keasidan dan kealkalian.

Acidic
Keasidan : .....

Alkaline
Kealkalian : .....

[2 *marks*]

(b) How does the ions that you have stated in (a) affect pH value of the substances?
Bagaimanakah ion-ion yang anda nyatakan di (a) *mempengaruhi nilai* pH *bahan-bahan tersebut*?

.....

.....

[2 *marks*]

(c) A label on the bottle of vinegar states that it contains 8 g of ethanoic acid, CH_3COOH in 100 cm^3 of vinegar.

Label pada botol cuka menyatakan ia mengandungi 8 g *asid etanoik,* CH_3COOH *dalam* 100 cm^3 *cuka.*

(i) Calculate the molarity of ethanoic acid in the vinegar?
[Relative atomic mass : H =1, C =12 , O = 16]

Hitung kemolaran asid etanoik dalam cuka tesebut?
[*Jisim atom relatif* : H =1, C =12 , O = 16]

[2 *marks*]

(ii) If 50 cm^3 of distilled water is added to 200 cm^3 of the vinegar, what is the resulting molarity of the solution?
Jika 50 cm^3 *air suling ditambahkan kepada* 200 cm^3 *cuka tersebut, apakah kemolaran larutan yang terhasil?*

[1 *mark*]

(d)

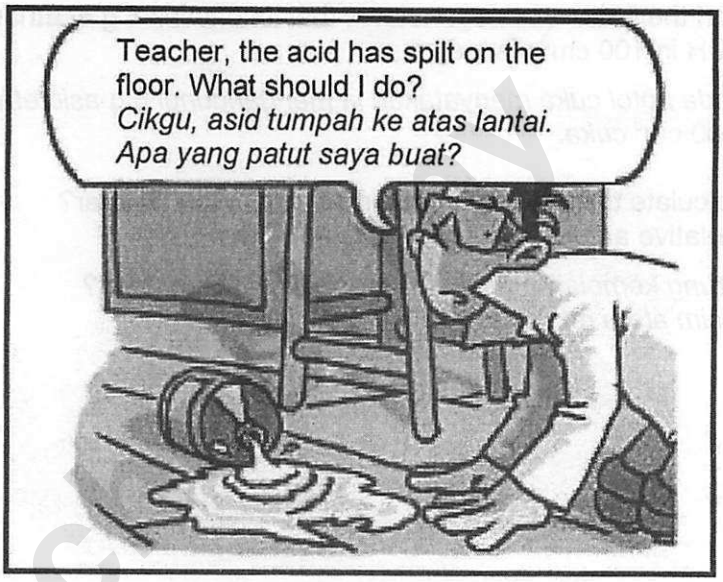


Diagram / *Rajah* 6.2

(i) Based on the situation in Diagram 6.2, which substance in Diagram 6.1 you would suggest the student to solve the problem?
Give reason for your answer.

Berdasarkan situasi dalam Rajah 6.2, *bahan manakah dalam Rajah* 6.1 *yang akan anda cadangkan kepada pelajar tersebut untuk menyelesaikan masalahnya?*
Beri alasan kepada jawapan anda.

.....

.....

[2 *marks*]

(iii) The student then found there was a piece of magnesium ribbon on the floor that started dissolving and fizzing as the acid ran over it.
Explain the observation.

Pelajar itu kemudiannya mendapati sekeping pita magnesium di atas lantai sedang melarut dan mendesis apabila terkena asid yang mengalir.
Terangkan pemerhatian tersebut.

.....

.....

[2 *marks*]

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 shows the set up of the apparatus to determine the empirical formula of oxide of metal M. M is less reactive than hydrogen.

Rajah 7 menunjukkan susunan radas untuk menentukan formula empirik bagi oksida logam M. M *kurang reaktif berbanding hidrogen.*

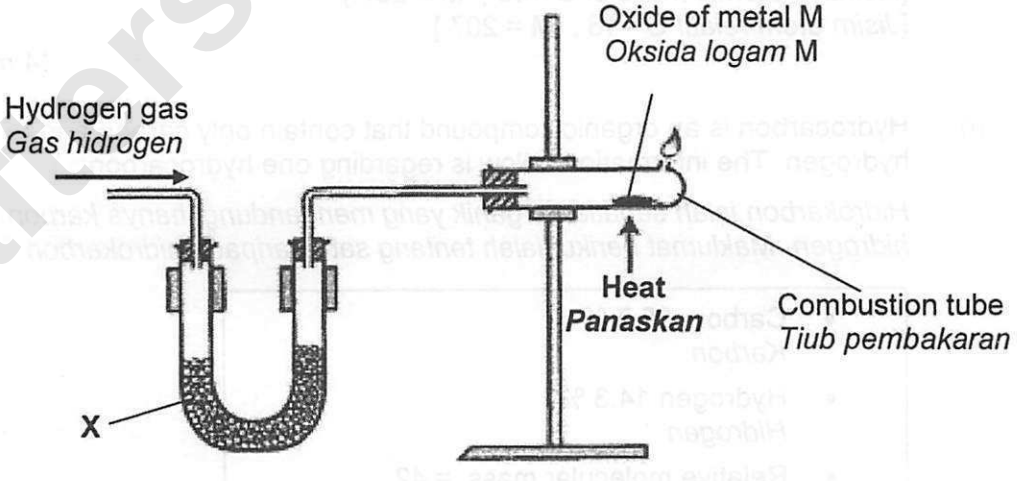


Diagram / *Rajah 7*

(i) State two precautions that must be taken while carrying out the experiment.
Nyatakan dua langkah berjaga-jaga yang perlu diambil semasa menjalankan eksperimen ini.

[2 *marks*]

(ii) Suggest a suitable chemical substance for X and state the function of X.
Cadangkan satu bahan kimia yang sesuai bagi X *dan nyatakan fungsi* X.

[2 *marks*]

(iii) List two material that can be use in the laboratory to prepare hydrogen gas.
Senaraikan dua bahan yang boleh digunakan dalam makmal untuk menyediakan gas hidrogen.

[2 *marks*]

(iv) Information below shows the results of the experiment.
Maklumat di bawah menunjukkan keputusan bagi eksperimen tersebut.

Mass of combustion tube + porcelain dish *Jisim tabung pembakaran + piring porselin*	= 52.34 g
Mass of combustion tube + porcelain dish + oxide of M *Jisim tabung pembakaran + piring porselin + oksida* M	= 105.86 g
Mass of combustion tube + porcelain dish + M *Jisim tabung pembakaran + piring porselin* + M	= 102.02 g

Determine the empirical formula of the oxide of M :
Tentukan formula empirik oksida M *:*

[Relative atomic mass of O =16 , M = 207]
[*Jisim atom relatif* O =16 , M = 207]

[4 *marks*]

(b) (i) Hydrocarbon is an organic compound that contain only carbon and hydrogen. The information below is regarding one hydrocarbon.
Hidrokarbon ialah sebatian organik yang mengandungi hanya karbon dan hidrogen. Maklumat berikut ialah tentang satu daripada hidrokarbon.

- Carbon 85.7 %
  Karbon
- Hydrogen 14.3 %
  Hidrogen
- Relative molecular mass = 42
  Jisim molekul relatif = 42

[Relative atomic mass : H = 1 , C = 2]
[*Jisim atom relatif* : H = 1 , C = 2]

Based on the information above, calculate the molecular formula of the hydrocarbon.
Berdasarkan maklumat di atas, hitungkan formula molekul bagi hidrokarbon tersebut.

[5 *marks*]

(ii) 4.6 g of sodium metal is burnt in excess oxygen gas to produce sodium oxide. Write the chemical equation of this reaction.
Calculate the mass of sodium oxide produced.
[Relative atomic mass : O = 16 , Na = 23]

4.6 g *logam natrium dibakar dalam gas oksigen berlebihan menghasilkan natrium oksida. Tulis persamaan kimia bagi tindak balas ini.*
Hitungkan jisim natrium oksida yang dihasilkan.
[*Jisim atom relatif* : O = 16 , Na = 23]

[5 *marks*]

8 Diagram 8 shows a diver in the sea.
Rajah 8 menunjukkan seorang penyelam di dalam laut.

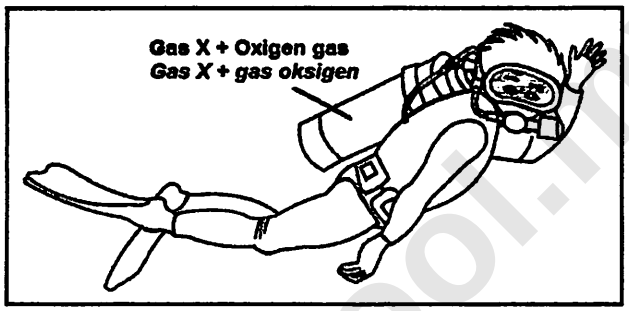


Diagram / *Rajah* 8

(a) State the name of gas X.
In your opinion, what is the rational of using gas X in the diver's tank?

Nyatakan nama bagi gas X.
Pada pendapat anda, apakah rasional penggunaan gas X *dalam tangki penyelam?*

[3 *marks*]

(b) With reference to the number of protons in the Periodic Table, explain why the gas X exists as a monoatomic gases while oxygen gas exists as a diatomic gases.
Dengan merujuk kepada bilangan proton dalam Jadual Berkala, terangkan mengapa gas X *wujud sebagai gas monoatom sedangkan gas oksigen wujud sebagai gas dwiatom.*

[7 *marks*]

(c) Sea water containing sodium chloride.
Explain the formation of bond between sodium atom and chlorine atom.
In your description, state the type of bond and draw the electron arrangement of the compound formed.
[Proton number : Na = 11, Cl = 17]

Air laut mengandungi garam natrium klorida.
Terangkan pembentukan ikatan antara atom natrium dan atom klorin.
Dalam penerangan anda, nyatakan jenis ikatan dan lukiskan susunan elektron bagi sebatian yang terbentuk.

Apart from soluble in water, state one another physical properties of sodium chloride.
Selain daripada larut dalam air, nyatakan satu sifat fizik lain bagi natrium klorida.

[10 *marks*]

Section C
Bahagian C
[20 *marks*]
[20 *markah*]

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

9 (a) Diagram 9.1 shows a reaction between lead(II) nitrate solution, $Pb(NO_3)_2$ and sodium chloride solution, NaCl.

Diagram 9.1

Rajah 9.1 *menunjukkan tindak balas antara larutan plumbum*(II) *nitrat,* $Pb(NO_3)_2$ *dengan larutan natrium klorida*, NaCl.

Rajah 9.1

(i) State the name and write the formula of salt Z.
Write an ionic equation for the formation of salt Z.
Describe a chemical test to verify the anion present in lead(II) nitrate solution.

Nyatakan nama dan tuliskan formula bagi garam Z.
Tuliskan persamaan ion bagi pembentukan garam tersebut.
Huraikan satu ujian kimia untuk mengesahkan anion yang hadir dalam larutan plumbum(II) *nitrat.*

[7 *marks*]

(ii) 50 cm^3 of 1.0 mol dm^{-3} lead(II) nitrate solution is added to 50 cm^3 of 2.0 mol dm^{-3} sodium chloride to form salt Z.
Calculate the mass of salt Z formed.
[Relative formula mass of salt Z formed is 278]

50 cm^3 *larutan plumbum*(II) *nitrat* 1.0 mol dm^{-3} *ditambah ke dalam* 50 cm^3 *larutan natrium klorida* 2.0 mol dm^{-3}.
Hitungkan jisim garam yang terbentuk.
[*Jisim formula relatif garam Z terbentuk ialah* 278]

[3 *marks*]

(b) Diagram 9.2 shows the method of preparing insoluble salt P by mixing salt solution M and salt solution N.

Rajah 9.2 *menunjukkan kaedah yang digunakan bagi penyedian garam tak terlarutkan melalui campuran larutan garam* M *dan larutan garam* N.

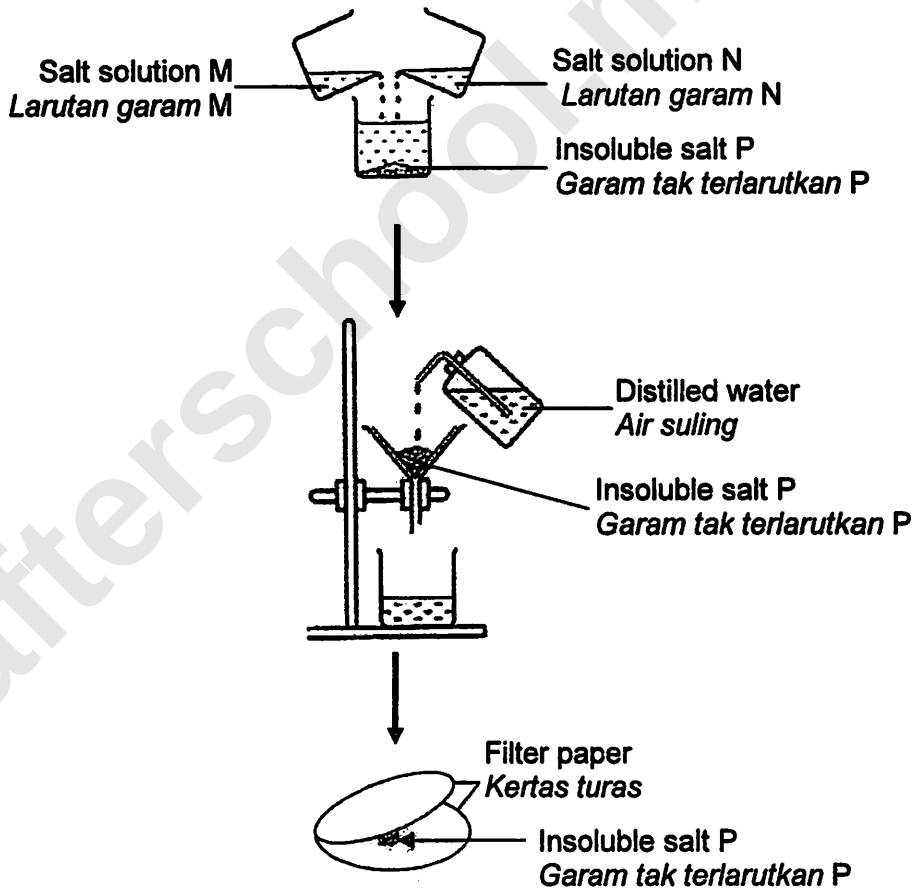


Diagram *1 Rajah* 9.2

(i) Based on Diagram 9.2, describe the preparation of lead(II) carbonate, $PbCO_3$ by using a suitable salt solution M and salt solution N.
Berdasarkan Rajah 9.2, *huraikan bagaimana garam plumbum*(II) *karbonat,* $PbCO_3$ *boleh disediakan dengan menggunakan larutan garam* M *dan larutan garam* N *yang sesuai.*

[7 *marks*]

(ii) Lead(II) carbonate salt, $PbCO_3$ is heated to produce lead(II) oxide, PbO and gas X.
State the name of gas X and describe a chemical test how you verify the gas.
Garam plumbum(II) *karbonat,* $PbCO_3$ *dipanaskan untuk menghasilkan plumbum*(II) *oksida,* PbO *dan gas* X.
Nyatakan nama bagi gas X *dan huraikan satu ujian kimia untuk mengesahkan kehadiran gas tersebut.*

[3 *marks*]

10 (a)

A catalyst is a substance which causes a change in the rate of reaction without itself undergoing a chemical change at the end of reaction.

Mangkin adalah bahan yang boleh meningkatkan kadar sesuatu tindak balas tanpa mengalami perubahan kimia pada akhir tindak balas.

(i) State another two characteristic of catalyst.
Nyatakan dua ciri mangkin yang lain.

[2 *marks*]

(ii) State an example of industrial process and the catalyst used.
Nyatakan satu contoh proses industri dan mangkin yang digunakan.

[2 *marks*]

(iii) Referring the collision theory, explain how the catalyst increases the rate of reaction.
Merujuk kepada teori perlanggaran, terangkan bagaimana mangkin dapat meningkatkan kadar tindak balas.

[4 *marks*]

(b) You are provided with :
Anda dibekalkan dengan :

Hydrogen peroxide solution, manganese(IV) oxide powder, test tube and wooden splinter

Larutan hidrogen peroksida, serbuk mangan(IV) oksida, tabung uji dan kayu uji

By using the apparatus and materials provided, describe an experiment to determine the effect of catalyst on the rate of reaction.
Your description should include:

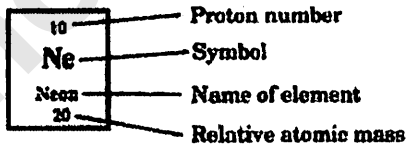
Dengan menggunakan radas dan bahan yang dibekalkan, huraikan suatu eksperimen bagi menentukan kesan mangkin terhadap kadar suatu tindak balas. Huraian anda perlu disertakan dengan:

- procedure
  prosedur
- diagram
  gambar rajah,
- observation
  pemerhatian
- chemical equation
  persamaan kimia
- conclusion
  kesimpulan

[12 *marks*]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

THE PERIODIC TABLE OF ELEMENTS



1 H Hydrogen 1																	2 He Helium 4
3 Li Lithium 7	4 Be Beryllium 9											5 B Boron 11	6 C Carbon 12	7 N Nitrogen 14	8 O Oxigen 16	9 F Fluorine 19	10 Ne Neon 20
11 Na Sodium 23	12 Mg Magnesium 24											13 Al Aluminium 27	14 Si Silicon 28	15 P Phosphorus 31	16 S Sulphur 32	17 Cl Chlorine 35	18 Ar Argon 40
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 Cobalt 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
37 Rb Rubidium 86	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
55 Cs Cesium 133	56 Ba Barium 137	57 La Lanthanum 139	72 Hf Hafnium 179	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
87 Fr Francium 223	88 Ra Radium 226	89 Ac Actinium 227	104 Unq Unnil-quadium 257	105 Unp Unnil-pentium 260	106 Unh Unnil-hexium 263	107 Uns Unnilseptium 262	108 Uno Unniloctium 265	109 Une Unnilenium 266									

58 Ce Cerium 140	59 Pr Praseo-dymium 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 163	67 Ho Holmium 165	68 Er Erbium 167	69 Tm Thulium 169	70 Yb Ytterbium 173	71 Lu Lutetium 175
90 Th Thorium 232	91 Pa Protactinium 231	92 U Uranium 238	93 Np Neptunium 237	94 Pu Plutonium 244	95 Am Americium 243	96 Cm Curium 247	97 Bk Berkelium 247	98 Cf Californium 249	99 Es Einsteinium 254	100 Fm Fermium 253	101 Md Mendele-vium 256	102 No Nobelium 254	103 Lr Lawrencium 257

INFORMATION FOR CANDIDATES
MAKLUMAT UNTUK CALON

1. This question paper consists of three sections: **Section A, Section B** and **Section C.**
   Kertas soalan ini mengandungi tiga bahagian: ***Bahagian A, Bahagian B*** *dan* ***Bahagian C.***

2. Answer **all** questions in Section A. Write your answers for **Section A** in the spaces provided in the question paper.
   Jawab **semua** *soalan dalam* ***Bahagian A.*** *Tuliskan jawapan bagi* ***Bahagian A*** *dalam ruang yang disediakan dalam kertas soalan*

3. Answer **one** question from **Section B** and **one** question from **Section C.**
   Write your answers for **Section B** and **Section C** on the 'answer sheet' provided by the invigilators.
   Answer questions in **Section B** and **Section C** in detail.
   You may use equations, diagrams, tables, graphs and other suitable methods to explain your answer.
   Jawab **satu** *soalan daripada* ***Bahagian B*** *dan* ***satu*** *soalan daripada* ***Bahagian C.*** *Tuliskan jawapan bagi* ***Bahagian B*** *dan* ***Bahagian C*** *pada kertas tulis yang dibekalkan oleh pengawas peperiksaan.*
   Jawab ***Bahagian B*** *dan* ***Bahagian C*** *dengan terperinci. Anda boleh menggunakan persamaan, gambar rajah, jadual, graf dan cara lain yang sesuai untuk menjelaskan jawapan anda.*

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

5. Marks allocated for each question or sub-part of the question is shown in brackets.
   Markah yang diperuntukkan bagi setiap soalan atau ceraian soalan ditunjukkan dalam kurungan.

6. Show your working. It may help you to get marks.
   Tunjukkan kerja mengira.Ini membantu anda mendapatkan markah.

7. If you wish to change your answer, neatly cross out the answer that you have done. Then write down the new answer.
   Sekiranya anda hendak membatalkan sesuatu jawapan, buat garisan di atas jawapan itu.

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

9. You are advised to spend 90 minutes to answer questions in **Section A**, 30 minutes for **Section B** and 30 minutes for **Section C.**
   Anda dicadangkan mengambil masa 90 *minit untuk menjawab soalan dalam* ***Bahagian A,*** 30 *minit untuk* ***Bahagian B*** *dan* 30 *minit untuk* ***Bahagian C.***

10. Tie together your answer sheets at the end of the examination.
    Ikat semua kertas jawapan anda di akhir peperiksaan.

BAHAN KECEMERLANGAN

SPM 2015

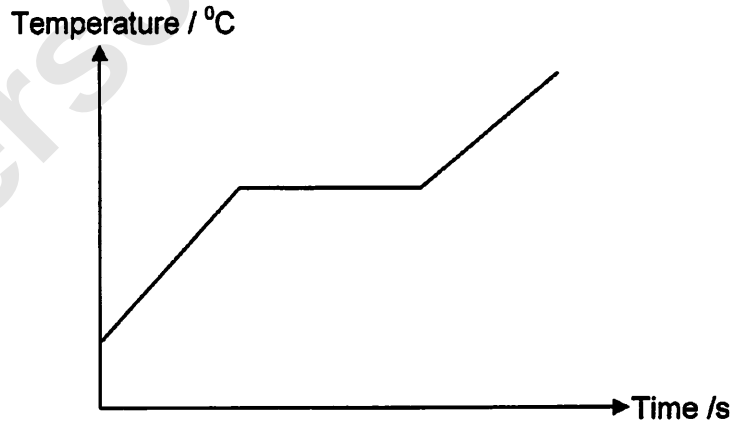
Skema
BK 1

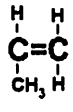
KIMIA

DIBIAYAI OLEH
KERAJAAN NEGERI TERENGGANU

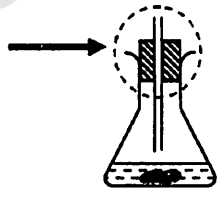
TOV 2015
SIJIL PELAJARAN MALAYSIA
4541/2 CHEMISTRY
Paper 2

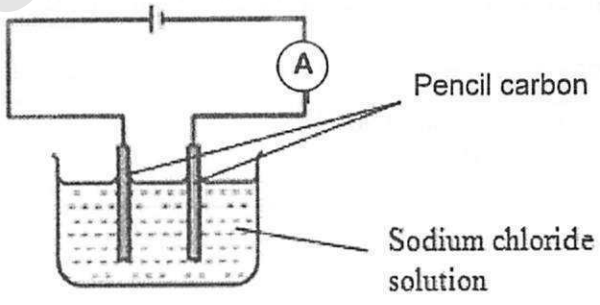
Section A

1	(a)		Temperature which solid turn to liquid at particular pressure		1
	(b)		naphthalene		1
	(c)		Molecule		1
	(d)		Substance J is highly flammable// To get uniformly heating		1
	(e)		To get uniformly heating		1
	(f)				2
	(g)	(i) (ii)	Increase Decrease/becomes weaker	1 1	...2
			TOTAL		**9**

2	(a)	(i)	Aluminium/Al // copper/Cu Magnesium/Mg // Manganese/Mn [*Any two*]	1 1	2
		(ii)	Duralumin is harder		1
	(b)	(i)	Propene		1
		(ii)			1
		(iii)	Produce toxic/poisonous gas		1
	(c)	(i)	Silica/silicon dioxide		1
		(ii)	Borosilicate		1
		(iii)	Resistance to high heat		1
			TOTAL		**9**

3	(a)		Increasing order of proton number Number of valence electrons determine the group and the number of shells occupied with electron determine the period	1 1 1	 ...3
	(b)	(i)	Same period / Period 3 They have the same number of shells occupied with electrons/ They have three shells occupied with electron	1 1	 ...2
		(ii)	Atom Y is smaller than X The number of protons in the nucleus of Y is more than X Force of attraction between nucleus and electrons become stronger in atom Y than X.	1 1 1	 ...3
	(c)		X oxide is basic oxide Y oxide is acidic oxide	1 1	 ...2
			TOTAL		**10**

4	(a)	 [*The stopper is drawn in the correct position (half in, half out)*]		1
	(b)	**2**HCl + $CaCO_3$ → $CaCl_2$ + H_2O + CO_2 [*Correct formulae of reactants and products*] [*Balanced equation*]	 1 1	 2
	(c)	[*Both axes are labelled with the correct units*] [*Scales are suitable (cover ½ of the graph paper)*] [*All points are transferred correctly*] [*Smooth curve*]	1 1 1 1	 4
	(d)	[*A tangent line // triangle is drawn on the graph*] [*Calculation*] [*Correct value with unit*] *Sample answer* : **0.245** $cm^3 s^{-1}$ ± 0.045 // **range* [0.200 - 0.290]	1 1 1	 3
		TOTAL		**10**

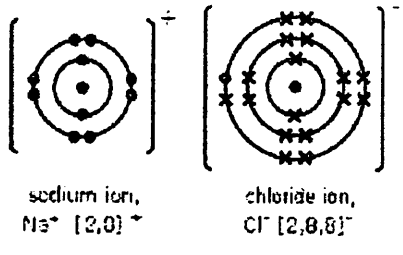
5	(a)		Electrolysis is a process whereby compounds in molten or aqueous state are broken down into their constituent elements by passing electric current through them.		1
	(b)	(i)	Na^+ , H^+		1
		(ii)	H^+		1
	(c)		$2H^+ + 2e \rightarrow H_2$		1
	(d)	(i)	Oxygen		1
		(ii)	Put glowing wooden splinter into test tube Glowing wooden splinter light up	1 1	...2
	(e)	(i)	Hydrogen and chlorine H^+ below Na^+ in the electrochemical series // Cl^- more concentrated than OH^- Or Hydrogen and oxygen H^+ below Na^+ in the electrochemical series // OH^- below Cl^- in the electrochemical series	1 1	...2
		(iii)	[*Functional diagram*] [*Labelled diagram*]  	1 1	...2
				TOTAL	**11**

6	(a)		H^+ OH^-	1 1	...2
	(b)		The higher the concentration of H^+, the lower the pH value The higher the concentration of OH^-, the higher the pH value	1 1	...2
	(c)	(i)	RMM for ethanoic acid = 12 + 3+ 12 + (16x2) + 1 = 60 Molarity of acid = (8/ 60) mol ---------- // 1.33 mol dm^{-3} (100/ 1000) dm^3	1 1	...2
		(ii)	1.33 x 200 = M_2 x 250 =1.064mol dm^{-3}		1
	(d)	(i)	Baking soda Baking soda is an alkali that can neutralise the acid [*reject* : drain cleaner because it is a very strong alkali]	1 1	...2
		(ii)	Magnesium reacts with acid / H^+ To produce hydrogen gas	1 1	...2
			TOTAL		**11**

Section B

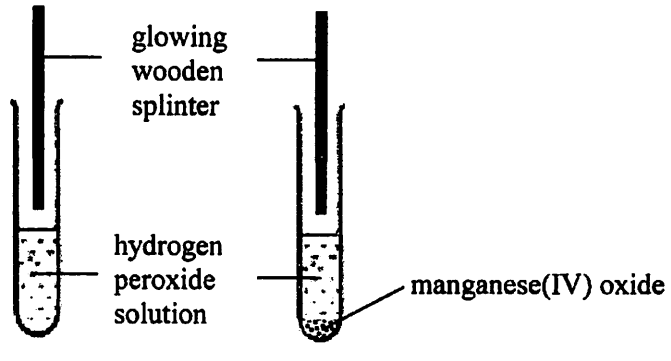
7	(a) (i)	1. All the **air** in the combustion tube must be eliminated/removed before oxide of metal M is heated // H_2 gas must be allowed to pass through the combustion tube **before** the M oxide is heated. 2. The hot copper metal is allowed to cool in a stream of H_2 gas. 3. Heating, cooling and weighing process are repeated until a constant weight is obtained. [*Any* ***two***]		2
	(a) (ii)	Anhydrous calcium chloride To dry the hydrogen gas // absorb the water	1 1	2
	(a) (iii)	Hydrochloric acid zinc	1 1	2
	(a) (iv)	**Element** / **M** / **O** mass/g: 102.02 – 52.34 = 49.68 / 105.86 – 102.02 = 3.84 Number of mole/mol: 49.68/207 = 0.24 / 3.84/16 = 0.24 Ratio of mole: **1** / **1** Empirical formula is **MO**	1 1 1 1	4
	(b) (i)	**Element** / **C** / **H** Number of mole/mol: 85.7/12 = 7.14 / 14.3/1 = 14.3 Ratio of mole: 7.14/7.14 =1 / 14.3/7.14 = 2 Empirical formula is CH_2 $(CH_2)n = 42$ $14n=42$ $n = 3$ Molecular Formula = C_3H_6	1 1 1 1 1	5
	(b) (ii)	$4\,Na + O_2 \longrightarrow 2Na_2O$ *Correct reactant and product* *Balanced equation* No. of mol = 4.6/23 = 0.2 mol 4 mol of Na produced 2 mol of Na_2O 0.2 mol of Na produced 0.1 mol of Na_2O	1 1 1 1	

		Mass of Na_2O, = 0.1 X 62 = 6.2 g	1	5
		TOTAL		20

8	(a)		Helium Light Inert /chemically unreactive	1 1 1	3
	(b)		Electron arrangement of helium atom 2 Archive duplet electron arrangement The atom no need to accept, donate and share electrons Electron arrangement of oxygen atom 2.6 oxygen atom needs two electrons to achieve octet electron arrangement 2 oxygen atoms share two pairs of electrons	1 1 1 1 1 1 1	7
	(c)		Ionic bond Electron arrangement of sodium atom 2.8.1 to achieve octet electron arrangement atom sodium release 1 e // $Na \rightarrow Na^+ + e$ Electron arrangement of chlorine atom 2.8.7 to achieve octet electron arrangement atom chlorine gain 1 e // $Cl + e \rightarrow Cl^-$ sodium ion and chloride ion attract to each other by strong electrostatic force Diagram  sodium ion, Na^+ [2,8] $^+$ chloride ion, Cl^- [2,8,8] $^-$ high melting / boiling point // conduct electricity in molten/aqueous state.	1 1 1 1 1 1 1 1+1 1	10
			TOTAL		20

Section C

9	(a)	(i)	Lead(II)chloride $PbCl_2$ $Pb^{2+} + 2Cl^- \rightarrow PbCl_2$ Add dilute sulphuric acid followed by iron(II) sulphate solution Add[slowly] concentrated sulphuric acid Brown ring	1 1 1+1 1 1 1	7
		(ii)	Mol $Pb(NO_3)_2 = \frac{50 \times 1}{1000}$ // 0.05 mol 0.05 mol $Pb(NO_3)_2 \rightarrow$ 0.05 mol Z Mass Z = 0.05 x 278 // 13.9 g	1 1 1	3
	(b)	(i)	*Sample answer* M : Lead(II)nitrate and N : Sodium carbonate Measure and pour 50 cm^3 of 1.0 mol dm^{-3} lead(II) nitrate solution into a beaker. Add 50 cm^3 of 1.0 mol dm^{-3} sodium carbonate solution into the beaker. Stir the mixture. Filter the mixture Rinse the residue/salt with distilled water. Dry the salt by pressing it between two filter papers	1 1 1 1 1 1 1	7
		(ii)	Carbon dioxide Flow the gas into lime water Lime water turn cloudy/milky/chalky	1 1 1	3
			TOTAL		**20**

10	(a)	(i)	1. Only a small amount is needed 2. Specific in action 3. It does not change **the <u>quantity</u>** (amount) of the products formed. [*any **two** suitable characteristics*]	1+1	...2
		(ii)	[*Suitable chemical reaction/process*] [*Suitable catalyst*] <u>*Sample answer*</u> : Contact process, vanadium(V) oxide Haber process, iron/ferum	1 1	2
		(iii)	1. Reduce/Lower the activation energy 2. Provide an alternative path with a lower activation energy 3. More colliding particles are able to overcome the lower activation 4. Frequency of effective collision increase	1 1 1 1	...4
	(b)		<u>*Procedure*</u> : 1. 5 cm^3 of [1 – 2] mol dm^{-3} / [5 – 20 Volume] hydrogen peroxide is poured into a test tube. 2. A glowing wooden splinter is insert into test tube. 3. The observation is recorded. 4. Experiment is repeated by adding 1g of manganese(IV) oxide. 5. In the second experiment, another condition are similar. <u>*Diagram*</u> : [*Functional diagram*] [*Label*] <u>*Sample answer*</u> :  	1 1 1 1 1 1 1	
			<u>*Observation*</u> : Experiment: H_2O_2 — The wooden splinter glows dimly / slowly Experiment: H_2O_2 and MnO_2 — The wooden splinter rekindle	1 1	

		Chemical equation : $2H_2O_2 \rightarrow 2H_2O + O_2$ **Conclusion** : The presence of catalyst / MnO_2 increase the rate of reaction	2 1	12
		TOTAL		**20**

END OF MARKING SCHEME