CONFIDENTIAL
4541/1
Chemistry
Paper 1
September
2009
1 1/4 hour

SPM TRIAL EXAMINATION 2009
MARA JUNIOR SCIENCE COLLEGE

CHEMISTRY

Paper 1

One hour and fifteen minutes

DO NOT OPEN THE QUESTION BOOK UNTIL BEING TOLD TO DO SO.

1 *This question booklet is bilingual*
Kertas soalan ini adalah dalam dwibahasa

2 *Candidates are advised to read INFORMATION FOR CANDIDATES on page 28*
Calon dikehendaki membaca MAKLUMAT UNTUK PELAJAR di halaman 28

This question booklet has 28 printed pages

1 Diagram 1 shows the atomic representation of an atom.
Rajah 1 menunjukkan perwakilan bagi suatu atom.

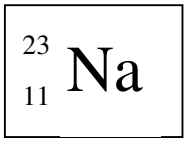


Diagram 1
Rajah 1

Number 23 refers to
Nombor 23 mewakili

A nucleon number
nombor nukleon

B number of proton
bilangan proton

C atomic number
nombor atom

D number of neutron
bilangan neutron

2 $C_6H_{12}O_6$ is the molecular formula of glucose.
What is its empirical formula?
Formula molekul bagi glukosa adalah $C_6H_{12}O_6$.
Apakah formula empiriknya?

A $C_2H_2O_2$

B CH_2O_2

C $C_2H_4O_2$

D CH_2O

3 1 mol of oxygen gas, O_2 and 1 mol of carbon dioxide gas, CO_2 have
1 mol gas oksigen, O_2 dan 1 mol gas karbon dioksida, CO_2 mempunyai

A same mass
jisim yang sama

B same number of electrons
bilangan elektron yang sama

C same number of atoms
bilangan atom yang sama

D same number of molecules
bilangan molekul yang sama

4 Which of the following is true about elements in the Periodic Table?
Antara yang berikut manakah benar tentang unsur -unsur dalam Jadual Berkala?

A The metallic properties increases from left to right across a period
Sifat kelogaman bertambah apabila merentasi Jadual Berkala dari kiri ke kanan

B Elements of the same group have the same physical properties
Unsur dalam kumpulan yang sama mempunyai sifat fizik yang sama

C Group 18 elements have low melting and boiling points
Unsur kumpulan 18 mempunyai takat lebur dan takat didih yang rendah

D Group 17 elements exist naturally as monoatoms
Unsur kumpulan 17 wujud semulajadi sebagai monoatom

5 Which of the following is true about the products formed when sodium reacts with water?
Antara yang berikut manakah benar mengenai hasil yang terbentuk apabila natrium bertindak balas dengan air?

I Oxygen
Oksigen

II Hydrogen
Hidrogen

III Sodium oxide
Natrium oksida

IV Sodium hydroxide
Natrium hidroksida

A I and IV
I dan IV

B II and IV
II dan IV

C I and III
I dan III

D I, III, and IV
I, III dan IV

6 Which substance is a covalent compound?
Bahan manakah adalah sebatian kovalen?

A Hydrogen chloride
Hidrogen klorida

B Sodium chloride
Natrium klorida

C Magnesium oxide
Magnesium oksida

D Copper(II) oxide
Kuprum(II) oksida

7 Diagram 2 shows a chemical cell using copper and metal X.
Rajah 2 menunjukkan satu sel kimia menggunakan kuprum dan logam X

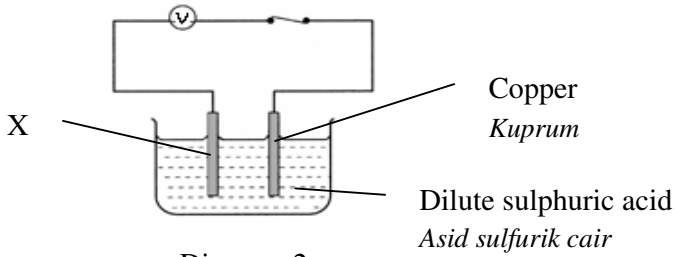


Diagram 2
Rajah 2

Which of the following represents X in order to give the highest reading?
Antara berikut manakah mewakili X untuk menghasilkan bacaan tertinggi?

A Zinc
Zink

B Lead
Plumbum

C Magnesium
Magnesium

D Iron
Ferum

8 Diagram 3 shows a circuit where the bulb lights up
Rajah 3 menunjukkan litar dimana mentol menyala

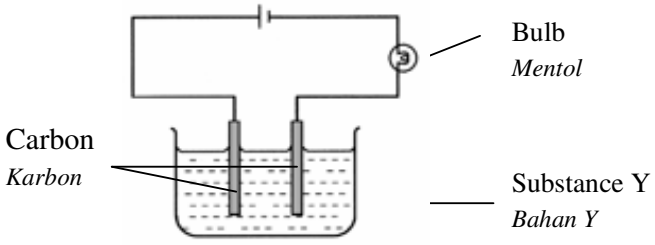


Diagram 3
Rajah 3

What is substance Y?
Apakah bahan Y?

A Tetrachloromethane
Tetraklorometana

B Aqueous sodium chloride
Natrium klorida akueus

C Ethyl ethanoate
Etil etanoat

D Ethanol
Etanol

9 Which element reacts with dilute sulphuric acid to produce hydrogen gas?
Unsur manakah bertindak balas dengan asid sulfurik cair untuk menghasilkan gas hidrogen?

A Zinc
Zink

B Iodine
Iodin

C Carbon
Karbon

D Copper
Kuprum

10 The following items are made of glass.
Bahan berikut diperbuat daripada kaca.

Mirror *Cermin*
Electrical bulbs *Mentol elektrik*
Glass windows *Kaca tingkap*

Which type of glass is used to manufacture the items?
Jenis kaca manakah yang digunakan bagi menghasilkan bahan tersebut?

A Lead crystal glass
Kaca kristal plumbum

B Borosilicate glass
Kaca borosilikat

C Soda lime glass
Kaca soda kapur

D Fused silica glass
Kaca silika terlakur

11 Diagram 4 shows the stages in the Contact Process.
Rajah 4 menunjukkan peringkat-peringkat dalam Proses Sentuh.

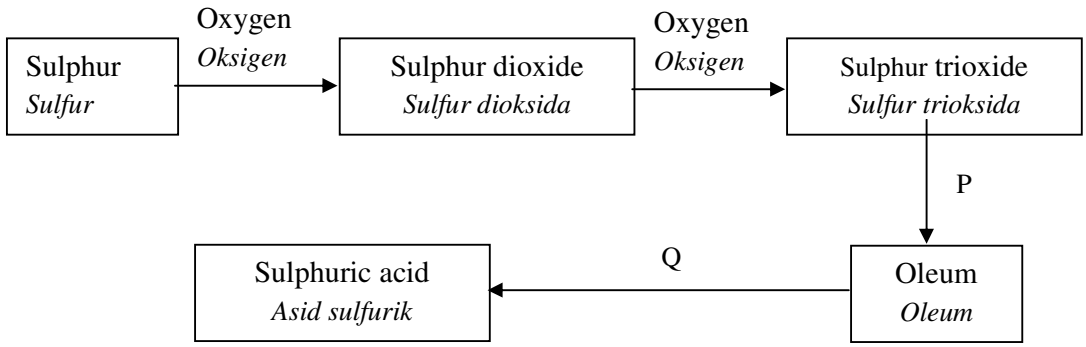


Diagram 4
Rajah 4

Name the substances P and Q.
Namakan bahan P dan Q.

	P	Q
A	Water *Air*	Concentrated sulphuric acid *Asid sulfurik pekat*
B	Concentrated sulphuric acid *Asid sulfurik pekat*	Water *Air*
C	Concentrated sulphuric acid *Asid sulfurik pekat*	Vanadium (V) oxide *Vanadium(V) oksida*
D	Vanadium (V) oxide *Vanadium (V) oksida*	Vanadium (V) oxide *Vanadium (V) oksida*

12 Diagram 5 shows a displacement reaction between metal and silver nitrate solution.
Rajah 5 menunjukkan tindak balas penyesaran antara logam dan larutan argentum nitrat.

Diagram 5
Rajah 5

Which of the following metal will produce the highest rate of reaction?
Antara logam berikut manakah akan menghasilkan kadar tindak balas yang paling tinggi?

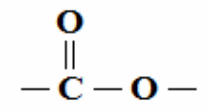
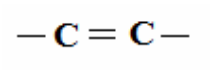
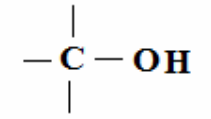
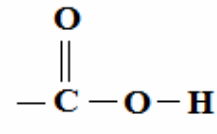
A Aluminium
Aluminium

B Magnesium
Magnesium

C Lead
Plumbum

D Zinc
Zink

13 Which of the following homologous series and its functional group are correctly paired?
Antara pasangan siri homologus dan kumpulan berfungsinya yang berikut manakah dipadankan dengan betul?

	Homologous Series *Siri homologus*	**Functional Group** *Kumpulan berfungsi*
I	Ester *Ester*	
II	Alkane *Alkana*	
III	Alcohol *Alkohol*	
IV	Carboxylic Acid *Asid karboksilik*	

A I and II
I dan II

B II and IV
II dan IV

C II, III and IV
II, III dan IV

D I, III and IV
I, III dan IV

14 When liquid R is refluxed with propanoic acid and a few drops of concentrated sulphuric acid, a sweet smelling liquid is formed. Liquid R may be
Apabila cecair R direfluks dengan asid propanoik dan beberapa titis asid sulfurik pekat, cecair berbau wangi terhasil. Cecair R mungkin

A propanol
propanol

B ethanoic acid
asid etanoik

C hexane
heksana

D ethyl propanoate
etil propanoat

15 The following equation represents the oxidation of magnesium atom.
Persamaan berikut mewakili pengoksidaan atom magnesium.

$$Mg \rightarrow Mg^{2+} + 2e^{-}$$

What is meant by oxidation based on the equation?
Apa yang dimaksudkan dengan pengoksidaan berdasarkan persamaan tersebut?

A Electrons are received by magnesium ion
Elektron diterima oleh ion magnesium

B Electrons are donated by magnesium ion
Elektron didermakan oleh ion magnesium

C Electrons are received by magnesium atom
Elektron diterima oleh atom magnesium

D Electrons are donated by magnesium atom
Elektron didermakan oleh atom magnesium

16 Diagram 6 shows the changes of iron (II) sulphate to iron (III) sulphate using bromine water.
Rajah 6 menunjukkan perubahan ferum (II) sulfat kepada ferum (III) sulfat menggunakan air bromin.

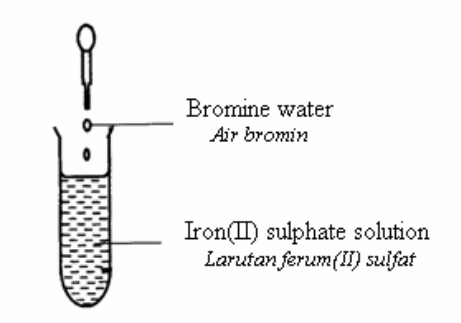


Diagram 6
Rajah 6

Which of the following is true regarding the reaction?
Antara berikut manakah benar tentang tindak balas tersebut?

A Iron(II) ions are reduced
Ion ferum(II) diturunkan

B Bromine water is oxidized
Air bromin dioksidakan

C Green solution turns brown
Larutan hijau bertukar perang

D Iron(II) ions gain electron
Ion ferum(II) menerima elektron

17 Which of the following is true about endothermic reaction?
Antara berikut manakah benar tentang tindak balas endotermik?

A The heat of reaction has negative value
Haba tindak balas bernilai negatif

B Heat is absorbed from the surrounding
Haba diserap dari sekeliling

C The reaction shows an increase in temperature
Tindak balas menunjukkan peningkatan suhu

D The energy of the reactants is higher than the products
Tenaga bahan tindak balas tinggi daripada hasil tindak balas

18 Diagram 7 represents an energy profile diagram representing an endothermic reaction.
Rajah 7 menunjukkan gambar rajah profil tenaga yang mewakili tindak balas endotermik.

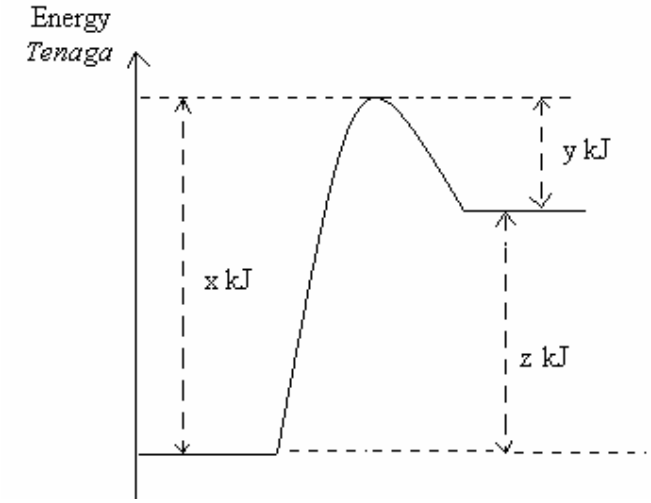


Diagram 7
Rajah 7

What is the value of activation energy?
Apakah nilai tenaga pengaktifan?

A x kJ

B y kJ

C z kJ

D (x - y) kJ

19 Sodium chloride is added to fish to produce salted fish.
Which of the following is the main function of sodium chloride?
Natrium klorida ditambah kepada ikan untuk menghasilkan ikan masin.
Antara berikut manakah fungsi utama natrium klorida?

A It improves the texture
Memperbaiki tekstur

B It gives a better taste
Menjadikan lebih sedap

C Prevents oxidation so that it does not turn rancid
Menghalang pengoksidaan supaya ia tidak menjadi tengik

D It absorbs water in order to inhibit the growth of bacteria
Menyerap air dan menghalang pembiakan bakteria

20 Which of the following differences between soap and detergent is **not** true?
Antara perbezaan berikut manakah **tidak** *benar bagi sabun dan detergen?*

	Soap ***Sabun***	**Detergent** ***Detergen***
A	Effective in soft water *Berkesan dalam air lembut*	Effective in soft and hard water *Berkesan dalam air lembut dan air liat*
B	Forms scum in hard water *Membentuk skum dalam air liat*	Does not form scum in hard water *Tidak membentuk skum dalam air liat*
C	Harmful to aquatic life *Berbahaya kepada hidupan akuatik*	Harmless to aquatic life *Tidak berbahaya kepada hidupan akuatik*
D	Raw material is fat or oil *Bahan mentah ialah lemak atau minyak*	Raw material is petroleum *Bahan mentah ialah petroleum*

21 A solid substance is heated until it turns to vapour.
Diagram 8 shows the graph of temperature against time taken in the experiment.
Satu bahan pepejal dipanaskan sehingga berubah kepada wap.
Rajah 8 menunjukkan graf suhu melawan masa untuk eksperimen tersebut.

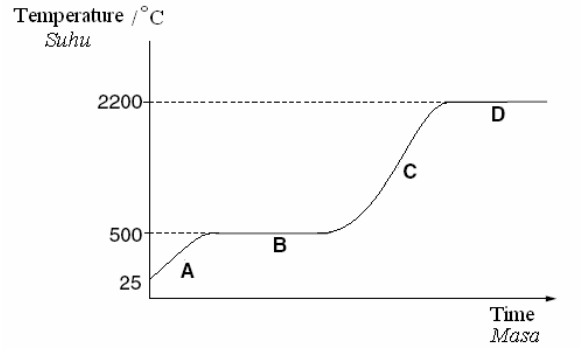


Diagram 8
Rajah 8

Which part of the graph does melting process occurs?
Bahagian graf yang manakah berlakunya proses peleburan?

22 Table 1 shows the number of neutrons, number of protons and number of electrons of four different particles.
Jadual 1 menunjukkan bilangan neutron, bilangan proton dan bilangan elektron bagi empat zarah berbeza.

Particle ***Zarah***	**Number of Neutrons** ***Bilangan neutron***	**Number of Protons** ***Bilangan proton***	**Number of electrons** ***Bilangan elektron***
E	18	17	18
F	18	17	17
G	18	18	18
H	20	19	18

Table 1
Jadual 1

Which of the following particles is an anion?
Antara zarah berikut yang manakah adalah anion?

A E

B F

C G

D H

23 Element S has 11 protons. It can be deduced that element S has the same chemical properties with the element which have
Unsur S mempunyai 11 proton. Oleh itu dapat disimpulkan bahawa unsur S mempunyai sifat kimia yang sama dengan unsur yang mempunyai bilangan

A 9 protons
9 proton

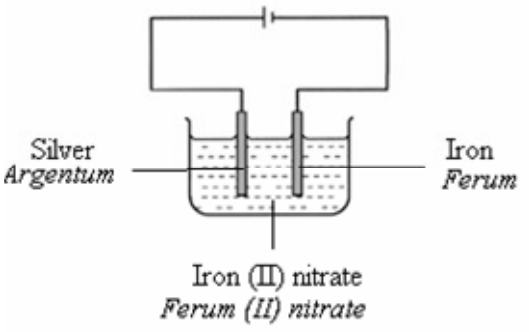
B 10 protons
10 proton

C 18 protons
18 proton

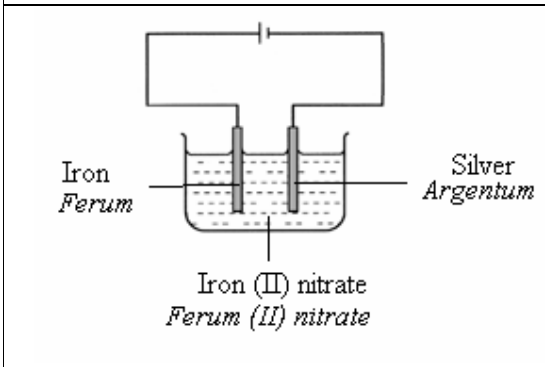
D 19 protons
19 proton

24 Which of the following diagram shows the correct apparatus set up to electroplate an iron with silver?
Antara rajah berikut yang manakah menunjukkan susunan radas yang betul untuk menyadur ferum dengan argentum?

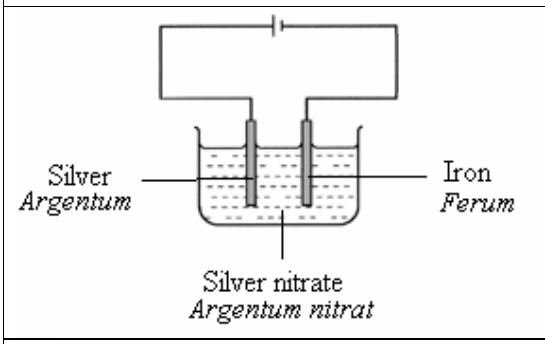
A



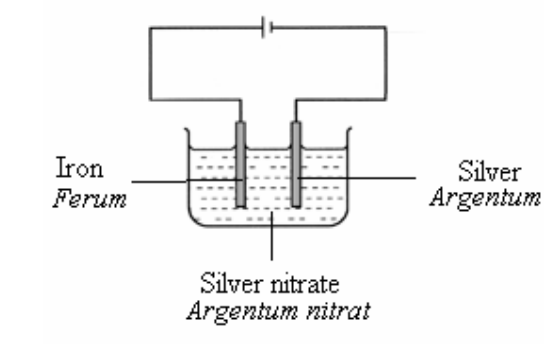
B



C



D



25 Elements M and N combined to form a compound which has the following characteristics.
Unsur M dan N bergabung untuk membentuk sebatian yang mempunyai ciri-ciri berikut:

- Low melting point
  Takat lebur yang rendah
- Does not dissolves in water
  Tidak larut dalam air

Which of the following is true about elements M and N?
Antara berikut yang manakah benar tentang unsur M dan N?

A M and N have equal number of electrons
M dan N mempunyai bilangan elektron yang sama

B Both M and N are transition metals
Kedua-dua M dan N adalah lagam peralihan

C M is a metal and N is a non metal
M adalah logam manakala N adalah bukan logam

D Both M and N are non metals
Kedua-dua M dan N adalah unsur bukan logam

26 Calcium carbonate is added to solutions V and W in two different test tubes.
Table 2 shows the experimental result for solutions V and W.
Kalsium karbonat ditambahkan ke dalam larutan V dan W ke dalam dua tabung uji yang berlainan.
Jadual 2 menunjukkan keputusan eksperimen untuk larutan V dan W.

Solution ***Larutan***	V	W
Observation ***Pemerhatian***	No changes *Tiada perubahan*	Bubbles given off *Gelembung gas dibebaskan*

Table 2
Jadual 2

From the result, solutions V and W are
Berdasarkan keputusan V dan W adalah

	V	**W**
A	glacial ethanoic acid *asid etanoik glasial*	aqueous hydrochloric acid *asid hidroklorik akueus*
B	glacial ethanoic acid *asid etanoik glasial*	aqueous sodium hydroxide *natrium hidroksida akueus*
C	aqueous sodium hydroxide *natrium hidroksida akueus*	glacial ethanoic acid *asid etanoik glasial*
D	aqueous hydrochloric acid *asid hidroklorik akueus*	aqueous ethanoic acid *asid etanoik akueus*

27 Diagram 9 shows the formation of a white precipitate when solution J and solution K are mixed.
Rajah 9 menunjukkan pembentukan mendakan putih apabila larutan J dan larutan K dicampurkan.

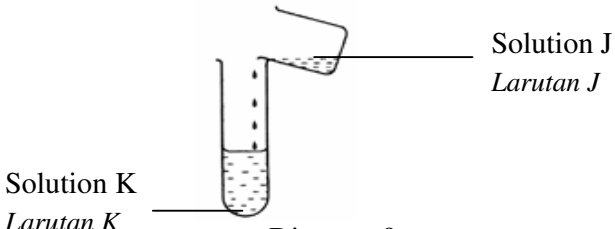


Diagram 9
Rajah 9

Which of the following is the most suitable to be solution J and solution K?
Antara berikut yang manakah paling sesuai sebagai larutan J dan larutan K?

I Sodium sulphate and lead (II) nitrate
Natrium sulfat dan plumbum (II) nitrat

II Sodium chloride and aluminium nitrate
Natrium klorida dan aluminium nitrat

III Sodium chloride and silver nitrate
Natrium klorida dan argentum nitrat

IV Sodium nitrate and calcium chloride
Natrium nitrat dan kalsium klorida

A I and II
I dan II

B I and III
I dan III

C II and III
II dan IV

D II and IV
II dan IV

28 Diagram 10 shows the structure for a part of a polymer.
Rajah 10 menunjukkan struktur sebahagian polimer

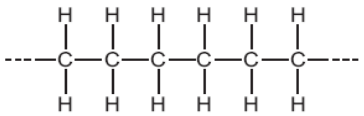


Diagram 10
Rajah 10

Which of the following compound is the monomer for the polymer?
Antara bahan berikut yang manakah adalah monomer bagi polimer tersebut?

A C_6H_{12}

B C_6H_{14}

C C_2H_4

D C_2H_6

29 Diagram 11 shows the graph of the volume of hydrogen gas against time for the reaction between granulated zinc and 50 cm^3 1.0 mol dm^{-3} sulphuric acid.
Rajah 11 menunjukkan graf isipadu gas hidrogen melawan masa untuk tindak balas antara ketulan zink dan 50 cm^3 asid sulfurik 1.0 mol dm^{-3}

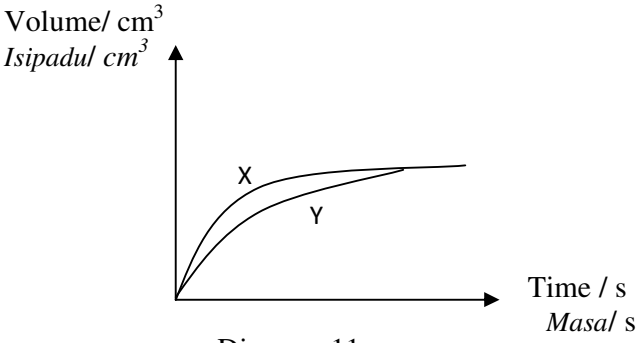


Diagram 11
Rajah 11

Curve X is obtained when excess granulated zinc is reacted with 50 cm^3 1.0 mol dm^{-3} sulphuric acid.
Which of the following must be done to produce curve Y?
Lengkung X diperoleh apabila ketulan zink yang berlebihan bertindak balas dengan 50 cm^3 asid sulfurik 1.0 mol dm^{-3}.
Antara berikut yang manakah perlu dilakukan untuk menghasilkan lengkung Y?

A Add distilled water to sulphuric acid
Tambahkan air suling ke dalam asid sulfurik

B Replace granulated zinc with zinc powder
Gantikan ketulan zink dengan serbuk zink

C Add a few drops of copper (II) sulphate solution
Tambahkan beberapa titis larutan kuprum (II) sulfat

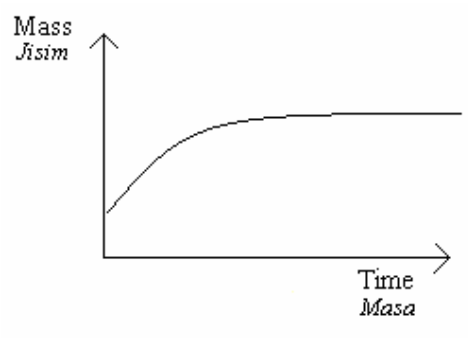
D Add sulphuric acid to the mixture
Tambahkan asid sulfurik ke dalam campuran

30 The equation represents the reaction between sodium carbonate and hydrochloric acid.
Persamaan mewakili tindak balas antara natrium karbonat dengan asid hidroklorik.

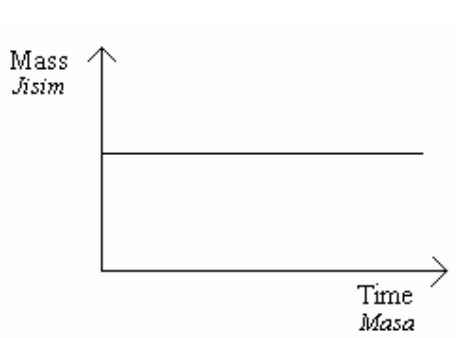
$$Na_2CO_3 + 2\ HCl \rightarrow 2\ NaCl + H_2O + CO_2$$

The mass of the beaker and its contents is plotted against time.
Which graph represents what happens when sodium carbonate reacts with an excess of dilute hydrochloric acid?
Jisim bikar dan kandungannya diplotkan melawan masa.
Graf manakah yang diwakili oleh tindak balas natrium karbonat dengan asid hidroklorik cair berlebihan?

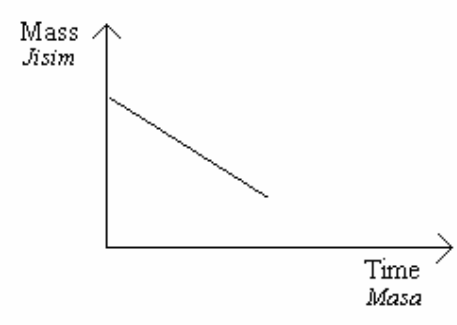
A



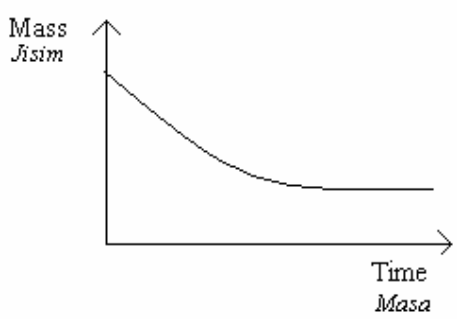
B



C



D



31 Diagram 12 shows the apparatus set up used to prepare gas T.
Rajah 12 menunjukkan susunan radas yang digunakan untuk menghasilkan gas T.

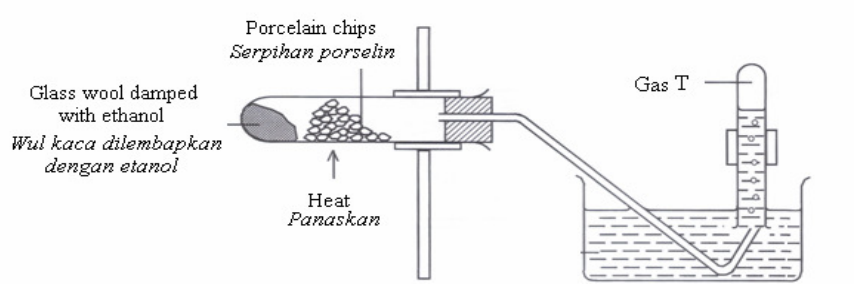


Diagram 12
Rajah 12

Which of the following is the characteristic of gas T?
Antara berikut yang manakah merupakan sifat gas T?

A Green in colour
Berwarna hijau

B Decolourised bromine water
Menyahwarnakan air bromin

C Changes the blue litmus to red
Menukarkan kertas litmus biru ke merah

D Reacts with alcohol to form ester
Bertindak balas dengan alkohol untuk menghasilkan ester

32 Diagram 13 shows the structural formula of a compound.
Rajah 13 menunjukkan formula struktur bagi suatu sebatian.

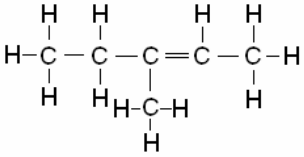


Diagram 13
Rajah 13

What is the name of the compound?
Apakah nama bagi sebatian tersebut?

A 1,2- dimethylbutene
1,2-dimetilbutena

B 3-methylpent-3-ene
3-metilpent-3-ena

C 3-methylpent-2-ene
3-metilpent-2-ena

D 3,4-dimethylbut-2-ene
3,4-dimetilbut-2-ena

33 Diagram 14 shows an apparatus set up to study a redox reaction.
Rajah 14 menunjukkan susunan radas untuk mengkaji tindak balas redoks.

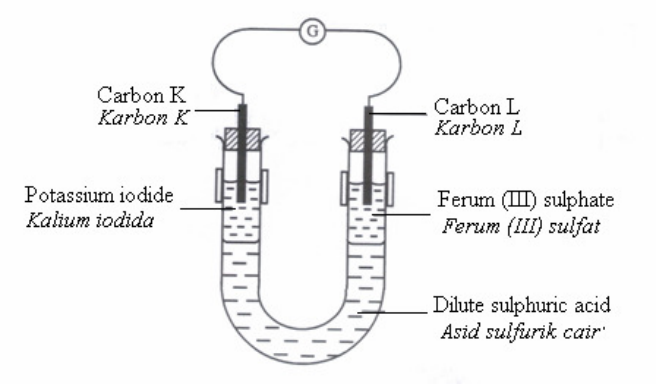


Diagram 14
Rajah 14

What is observed at the carbon K and carbon L?
Apakah yang diperhatikan pada karbon K dan karbon L?

	Carbon K ***Karbon K***	**Carbon L** ***Karbon L***
A	Brown to colourless *Perang ke tanpa warna*	Green to brown *Hijau ke perang*
B	Brown to colourless *Perang ke tanpa warna*	Colourless to yellow *Tanpa warna ke kuning*
C	Colourless to brown *Tanpa warna ke perang*	Green to brown *Hijau ke perang*
D	Colourless to brown *Tanpa warna ke perang*	Brown to green *Perang ke hijau*

34 Which of the following acid releases the highest amount of heat when reacted with excess potassium hydroxide?
Antara asid berikut yang manakah membebaskan tenaga haba yang paling banyak apabila bertindak balas dengan kalium hidroksida yang berlebihan?

A 20 cm^3 of 1.0 mol dm^{-3} of sulphuric acid
20 cm^3 asid sulfurik 1.0 mol dm^{-3}

B 20 cm^3 of 1.0 mol dm^{-3} of nitric acid
20 cm^3 asid nitrik 1.0 mol dm^{-3}

C 20 cm^3 of 1.0 mol dm^{-3} of ethanoic acid
20 cm^3 asid etanoik 1.0 mol dm^{-3}

D 20 cm^3 of 1.0 mol dm^{-3} of hydrochloric acid
20 cm^3 asid hidroklorik 1.0 mol dm^{-3}

35 The following thermochemical equation shows the formation of lead (II) sulphate.
Persamaan termokimia berikut menunjukkan pembentukan plumbum (II) sulfat.

$$Pb^{2+} + SO_4^{2-} \rightarrow PbSO_4 \qquad \Delta H = -50 \text{ kJ mol}^{-1}$$

Which of the following statements is true regarding the reaction?
Antara penyataan berikut manakah benar mengenai tindak balas tersebut?

I White precipitate is formed
Mendakan putih terbentuk

II Reaction is exothermic
Tindak balas adalah eksotermik

III Temperature decreases during the reaction
Suhu berkurangan semasa tindak balas

IV The heat released when 0.2 mole of lead(II) ions react is 10.0 kJ
Haba yang terbebas apabila 0.2 mol ion plumbum(II) bertindak balas ialah 10.0 kJ

A I and III
I dan III

B II and IV
II dan IV

C I, II and IV
I, II dan IV

D II, III and IV
II, III dan IV

36 Table 3 shows the melting point and boiling point of substances P, Q, R and S.
Jadual 3 menunjukkan takat lebur dan takat didih bagi bahan P, Q, R dan S.

Substance ***Bahan***	**Melting point (°C)** ***Takat lebur***	**Boiling point (°C)** ***Takat didih***
P	-187	-126
Q	-78	70
R	75	130
S	114	444

Table 3
Jadual 3

Which of the following substance is in liquid state at room temperature?
Antara bahan berikut yang manakah merupakan cecair pada suhu bilik?

A P

B Q

C R

D S

37 The following chemical equation represents a reaction between magnesium oxide and sulphuric acid.
Persamaan kimia berikut mewakili tindak balas antara magnesium oksida dan asid sulfurik.

$$MgO + H_2SO_4 \rightarrow MgSO_4 + H_2O$$

What is the mass of magnesium sulphate formed when 2.0 g of magnesium oxide powder is reacted with excess sulphuric acid?
Apakah jisim magnesium sulfat yang terbentuk apabila 2.0 g serbuk magnesium oksida bertindak balas dengan asid sulfurik berlebihan?

(Molar mass : MgO = 40; $MgSO_4$= 120)
(*Jisim molar : MgO = 40; $MgSO_4$ = 120*)

A 3.6 g

B 6.0 g

C 9.6 g

D 12.0 g

38 Diagram 15 shows the electron arrangement of atom T.
Rajah 15 menunjukkan susunan elektron bagi atom T.

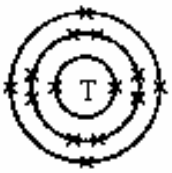


Diagram 15
Rajah 15

Atoms T and U are placed in the same period in the Periodic Table. The atomic radius of atom U is larger than atom T.
What is the probable electron arrangement of atom U?
Atom T dan U terletak dalam kala yang sama dalam Jadual Berkala Unsur. Jejari atom U lebih besar dari atom T.
Apakah susunan elektron yang mungkin bagi atom U?

A 2.8.2

B 2.8.6

C 2.8.8

D 2.8.8.4

39 Atom W has 14 protons while atom Z has 17 protons.
Which of the following shows the formula and type of compound formed when atom W combines with atom Z?
Atom W mempunyai 14 proton manakala atom Z mempunyai 17 proton.
Antara berikut yang manakah menunjukkan formula dan jenis sebatian yang terbentuk apabila atom W dan atom Z bertindak balas?

	Formula	Type of Compound *Jenis sebatian*
A	WZ_2	Ionic *Ionik*
B	W_4Z	Covalent *Kovalen*
C	WZ	Ionic *Ionik*
D	WZ_4	Covalent *Kovalen*

40 Table 4 shows information about three simple cells.
Jadual 4 menunjukkan maklumat mengenai tiga sel ringkas.

Pairs of metal *Pasangan logam*	Potential difference / V *Beza keupayaan*	Negative terminal *Terminal negatif*
P and copper *P dan kuprum*	0.44	P
Q and copper *Q dan kuprum*	1.70	Q
R and copper *R dan kuprum*	0.53	Cu

Table 4
Jadual 4

What is the potential difference between metal Q and R?
Apakah beza keupayaan bagi pasangan logam Q dan R ?

A 0.97 V

B 2.14 V

C 2.23 V

D 2.67 V

41 The following chemical equation represents the neutralization reaction between sulphuric acid and sodium hydroxide solution.
Persamaan kimia berikut mewakili tindak balas peneutralan antara asid sulfurik dan larutan natrium hidroksida.

$$H_2SO_4 + 2\ NaOH \rightarrow Na_2SO_4 + 2H_2O$$

20.00 cm^3 of 0.1 mol dm^{-3} sodium hydroxide solution was titrated with 0.1 mol dm^{-3} sulphuric acid.
What is the final reading of the burette if the initial reading is 5.00 cm^3?
20.00 cm^3 larutan natrium hidroksida 0.1 mol dm^{-3} dititratkan dengan asid sulfurik 0.1 mol dm^{-3}.
Apakah bacaan akhir buret jika bacaan awal ialah 5.00 cm^3?

A 10.00 cm^3

B 15.00 cm^3

C 20.00 cm^3

D 25.00 cm^3

42 Diagram 16 shows the observations of an experiment conducted on solution Z.
Jadual 16 menunjukkan pemerhatian bagi eksperimen yang dijalankan ke atas larutan Z.

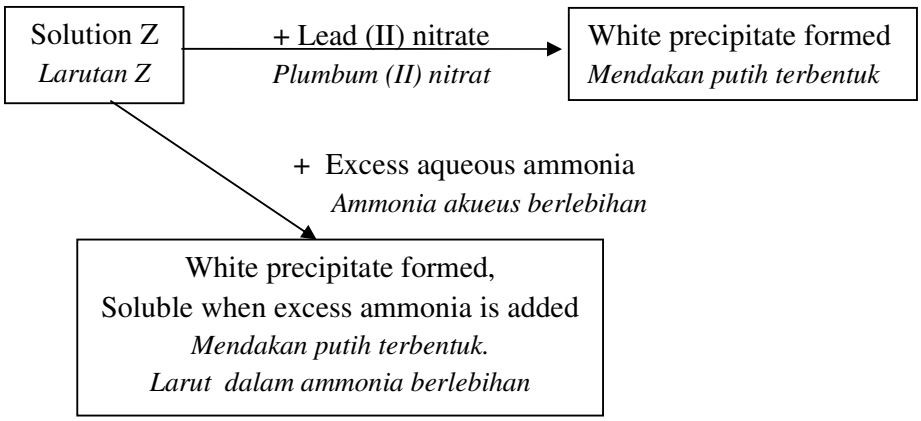


Diagram 16
Rajah 16

From the observations, Z could be
Berdasarkan pemerhatian, Z mungkin

A zinc sulphate
zink sulfat

B calcium chloride
kalsium klorida

C magnesium nitrate
magnesium nitrat

D aluminium sulphate
aluminium sulfat

43 Diagram 17 shows a racing car. The body of the car is made of substance M.
Rajah 17 menunjukkan sebuah kereta lumba. Badan kereta tersebut dibuat daripada bahan M.

Diagram 17
Rajah 17

Substance M has the following properties:
Bahan M mempunyai ciri-ciri berikut:

- strong
  kuat
- light
  ringan
- withstand high temperature
  tahan haba tinggi
- durable
  tahan lasak

Which of the following is substance M?
Antara berikut yang manakah bahan M?

A Ceramic
Seramik

B Concrete
Konkrit

C Polymer
Polimer

D Composite material
Bahan komposit

44 Table 5 shows the volume of hydrogen gas collected in the reaction between zinc granules and dilute hydrochloric acid.
Jadual 5 menunjukkan isipadu gas hidrogen terhasil dalam tindak balas antara ketulan zink dan asid hidroklorik cair.

Time/min ***Masa / min***	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5
Volume of gas (cm^3) ***Isipadu gas / cm^3***	0.0	5.4	9.5	12.8	15.0	15.9	16.3	16.5

Table 5
Rajah 5

What is the average rate of reaction during the second minute?
Apakah kadar tindak balas purata dalam minit kedua?

A 1.50 $cm^3\ min^{-1}$

B 2.20 $cm^3\ min^{-1}$

C 5.50 $cm^3\ min^{-1}$

D 7.50 $cm^3\ min^{-1}$

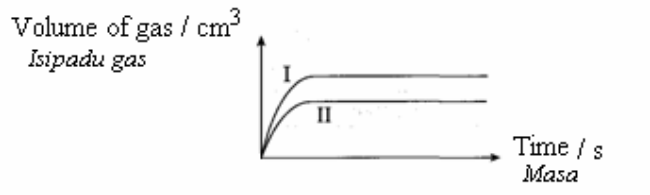
45 Table 6 shows the substances used to study the rate of reaction between marble and nitric acid.
Jadual 6 menunjukkan bahan yang digunakan untuk mengkaji kadar tindak balas antara batu marmar dengan asid nitrik.

Experiment *Eksperimen*	**Substance** *Bahan*
I	Excess marble and 50 cm^3 of 0.2 mol dm^{-3} nitric acid *Batu marmar berlebihan dan 50 cm^3 asid nitrik 0.2 mol dm^{-3}*
II	Excess marble and 100 cm^3 of 0.1 mol dm^{-3} nitric acid *Batu marmar berlebihan dan 100 cm^3 asid nitrik 0.1 mol dm^{-3}*

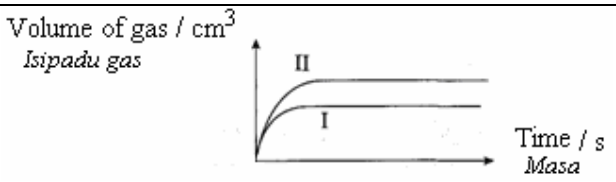
Table 6
Jadual 6

Which of the following graphs represents the two experiments?
Antara graf berikut yang manakah mewakili kedua-dua eksperimen?

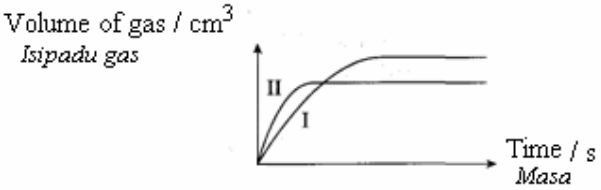
A



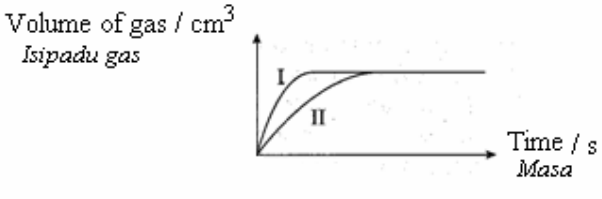
B



C



D



46 Diagram 18 shows the conversion of ethanol into compound G and subsequently to compound L.
Rajah 18 menunjukkan penukaran etanol kepada sebatian G seterusnya kepada sebatian L.

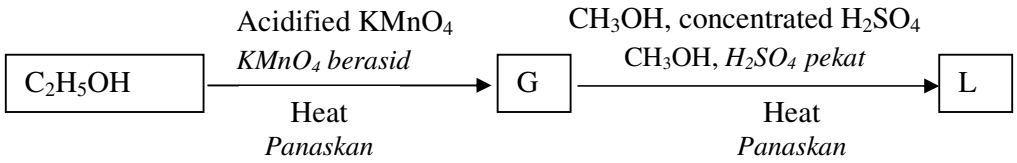


Diagram 18
Rajah 18

Which of the following may be compound L?
Antara berikut yang manakah mungkin sebatian L?

A Ethanoic acid
Asid etanoik

B Ethyl methanoate
Etil metanoat

C Ethyl ethanoate
Etil etanoat

D Methyl ethanoate
Metil etanoat

47 Which of the underlined elements has the highest oxidation number?
Antara unsur-unsur yang digariskan yang manakah mempunyai nombor pengoksidaan yang tinggi?

A $K_2\underline{Cr}_2O_7$

B $\underline{Fe}_2(SO_4)_3$

C $\underline{Pb}Cl_4$

D $\underline{Cu}_2O$

48 Table 7 shows the observation obtained when a mixture of two substances was heated strongly.
Jadual 7 menunjukkan pemerhatian apabila campuran dua sebatian dipanaskan dengan kuat.

Mixture ***Campuran***	**Observation** ***Pemerhatian***
Carbon powder and metal P oxide *Serbuk karbon dan lagam oksida P*	Mixture glows *Campuran membara*
Hydrogen gas and metal Q oxide *Gas hidrogen dan logam oksida Q*	Mixture glows *Campuran membara*
Hydrogen gas and metal P oxide *Gas hidrogen dan logam oksida P*	No change *Tiada perubahan*

Table 7
Jadual 7

Arrange elements P, Q, carbon and hydrogen in ascending order of reactivity towards oxygen.
Susunkan unsur P, Q, karbon dan hidrogen mengikut susunan menaik bagi kereaktifan tehadap oksigen.

A Carbon, P, hydrogen , Q
Karbon, P , hidrogen , Q

B Q, hydrogen, P, carbon
Q, hidrogen, P, karbon

C Hydrogen, P, carbon, Q
Hidrogen , P , karbon, Q

D Hydrogen, Q, carbon, P
Hidrogen , Q, karbon , P

49 A tuberculosis patient is suffering from high fever.
Seorang pesakit tuberkulosis mengalami demam panas.

Which of the following medicines should be prescribed to the patient?
Antara ubat berikut yang manakah sesuai diberikan kepada pesakit tersebut?

A Analgesic and psychotic medicine
Analgesik dan ubat psikotik

B Antibiotic and psychotic medicine
Antibiotik dan ubat psikotik

C Analgesic and antibiotic
Analgesik dan antibiotik

D Psychotherapeutic and antibiotic
Psikoterapiutik dan antibiotik

50 The heat of combustion for propanol, C_3H_7OH is – 2016 kJ mol^{-1}. When 0.3 g of propanol is completely burnt, the heat given out is used to heat 250 cm^3 of water. What is the rise in temperature for the water?
[Specific heat capacity of water = 4.2 J g^{-1} $^oC^{-1}$. Molar mass of propanol = 60 g mol^{-1}]

Haba pembakaran propanol, C_3H_7OH adalah - 2016 kJ mol^{-1}. Apabila 0.3 g propanol terbakar lengkap, haba yang dibebaskan digunakan untuk memanaskan 250 cm^3 air.
Apakah kenaikan suhu air?
[*Muatan haba tentu air = 4.2 J g^{-1} $^oC^{-1}$. Jisim molar propanol = 60 g mol^{-1}*]

A 2.4^oC

B 4.8^oC

C 9.6^oC

D 19.2^oC

INFORMATION FOR CANDIDATES
MAKLUMAT 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 di ikuti 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 new answer.
Sekiranya 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 dilukiskan mengikut skala kecuali dinyatakan.

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

4541/2
Chemistry
Paper 2
Sept 2009
2 ½ hour

Name : …….....……

Class : ….....…….

MAKTAB RENDAH SAINS MARA

SIJIL PELAJARAN MALAYSIA
TRIAL EXAMINATION 2009

CHEMISTRY

Paper 2
Kertas 2

Two hours and thirty minutes
(Dua jam tiga puluh minit)

DO NOT OPEN THE QUESTION BOOKLET UNTIL BEING TOLD TO DO SO

1. Write your name and class in the space provided.
   *Tuliskan **nama** dan **kelas** anda pada ruang yang disediakan.*

2. The question booklet is bilingual
   Kertas soalan ini adalah dalam dwibahasa.

3. Candidate is required to read the information on page 28.
   Calon dikehendaki membaca maklumat di halaman 28 .

Kod Pemeriksa			
Section	Question	Full mark	Marks
A	1	9	
	2	10	
	3	10	
	4	10	
	5	11	
	6	10	
B	1	20	
	2	20	
C	3	20	
	4	20	
TOTAL			

For Examiner's Use

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 a label of ingredients present in a canned food.
Rajah 1.1 menunjukkan label kandungan bahan - bahan yang terdapat dalam satu makanan dalam tin.

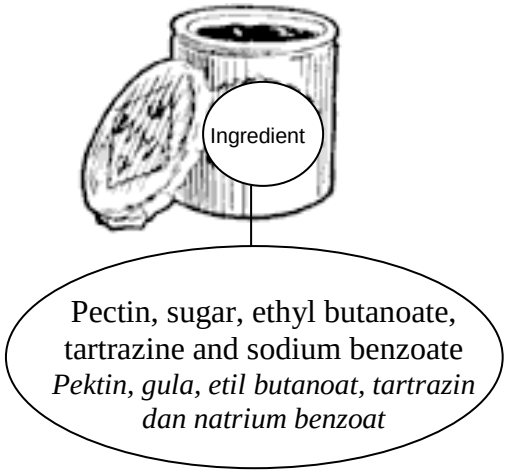


Diagram 1.1
Rajah 1.1

1(*a*)(i)

(*a*) (i) What is the function of sodium benzoate?
Apakah fungsi natrium benzoat?

.....

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

1(*a*)(ii)

(ii) How does sugar make the food last longer?
Bagaimanakah gula membolehkan makanan tahan lebih lama?

.....

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

For Examiner's Use

(iii) Table 1 shows the function of two types of food additives.
Jadual 1 menunjukkan fungsi dua jenis bahan tambah makanan.

Name ***Name***	**Function** ***Fungsi***	**Type of food additives** ***Jenis bahan tambah makanan***
Soy lecithin *Lesitin soya*	Helps to prevent an emulsion from separating out *Menghalang lapisan emulsi dari terpisah*	
Ethyl butanoate *Etil butanoat*	Helps to enhance the smell of foods. *Membantu meningkatkan bau makanan*	

Table 1
Jadual 1

1(*a*)(iii)

Complete Table 1 by identifying the food additives
Lengkapkan Jadual 1 dengan mengenalpasti jenis bahan tambah makanan.
[2 *marks*]
[2 *markah*]

(*b*) Diagram 1.2 shows two examples of modern medicine.
Rajah 1.2 menunjukkan dua contoh ubat – ubatan moden.

Codeine
Kodeina

Aspirin

Diagram 1.2
Rajah 1.2

(i) Name the class of medicines for aspirin and codeine.
Namakan kelas ubatan bagi aspirin dan kodeina.

1(*b*)(i)

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

(ii) What is the function of aspirin?
Apakah fungsi aspirin?

1(*b*)(ii)

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

For Examiner's Use

(*c*) Diagram 1.3 shows two pieces of greasy cloth soaked in two types of water.
Rajah 1.3 menunjukkan dua helai kain bergris yang direndam dalam dua jenis air.

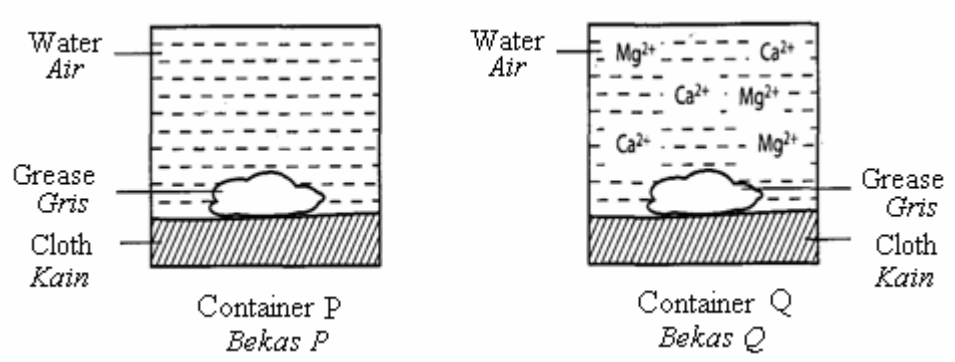


Diagram 1.3
Rajah 1.3

1(*c*)(i)

(i) State the type of water that has high concentration of Ca^{2+} and Mg^{2+} ions.
Nyatakan jenis air yang mempunyai kepekatan ion Ca^{2+} dan Mg^{2+} yang tinggi.

.....

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

1(*c*)(ii)

(ii) In which container can soap removes the grease easily?
Dalam bekas manakah sabun dapat menghilangkan kotoran bergris dengan lebih mudah?

.....

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

1(*c*)(iii)

(iii) Give a reason for your answer in *c*(ii).
Berikan sebab bagi jawapan anda dalam c(ii).

.....

.....

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

For Examiner's Use

2 (*a*) Atoms of all elements consist of three main sub-particles; proton, electron and neutron.
Diagram 2.1 shows an atomic structure of helium.
Atom bagi semua unsur mempunyai tiga zarah sub-atom; proton, elektron dan neutron.
Rajah 2.1 menunjukkan struktur atom helium.

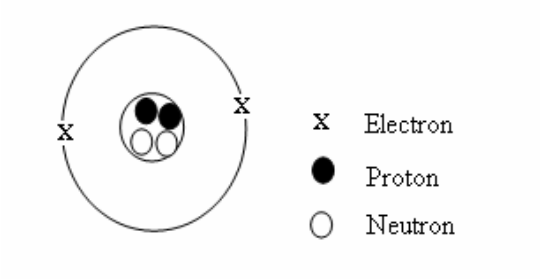


Diagram 2.1
Rajah 2.1

Based on Diagram 2.1, answer the following questions.
Berdasarkan Rajah 2.1, jawab soalan-soalan berikut.

(i) State the nucleon number of helium.
Nyatakan nombor nukleon bagi helium.

……..
[1 *mark*]
[1 *markah*]

2(*a*)(i) ☐

(ii) Write a chemical symbol for helium atom in the form of ${}^{A}_{Z}X$.
Tuliskan simbol kimia untuk atom helium dalam bentuk ${}^{A}_{Z}X$.

……..
[1 *mark*]
[1 markah]

2(*a*)(ii) ☐

(iii) An atom of helium is electrically neutral. Explain.
Atom helium adalah neutral secara elektrik. Terangkan.

……..
[1 *mark*]
[1 *markah*]

2(*a*)(iii) ☐

For Examiner's Use

(*b*) Diagram 2.2 shows an experiment to compare the rate of diffusion between ammonia and hydrogen chloride gas.
Rajah 2.2 menunjukkan satu eksperimen untuk membandingkan kadar resapan antara gas ammonia dan gas hidrogen klorida.

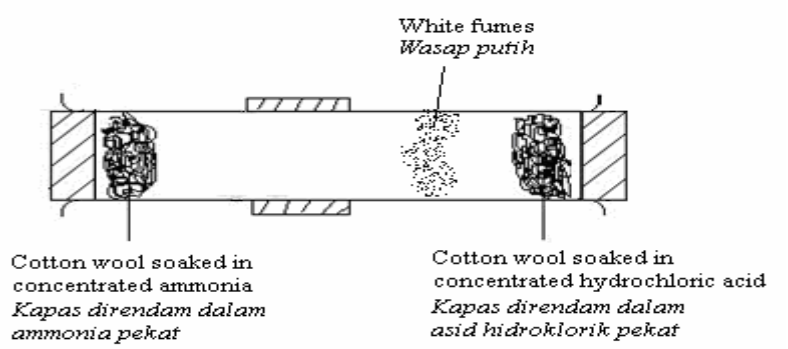


Diagram 2.2
Rajah 2.2

2(*b*)(i)

(i) Name the white fume formed.
Namakan wasap putih yang terbentuk.

.....

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

2(*b*)(ii)

(ii) Write the chemical equation for the reaction.
Tulis persamaan kimia bagi tindak balas tersebut.

.....

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

(*c*) Diagram 2.3 shows the heating curve for solid naphthalene.
Rajah 2.3 menunjukkan lengkung pemanasan bagi pepejal naftalena.

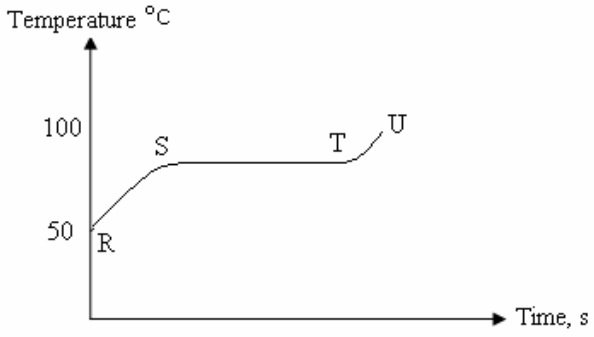


Diagram 2.3
Rajah 2.3

2(*c*)(i)

(i) On the graph, indicate and label the melting point of naphthalene.
Di atas graf, tunjukkan dan label takat lebur naftalena.

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

For Examiner's Use

(ii) What is the physical state of naphthalene from S to T?
Apakah keadaan fizikal naftalena dari S ke T?

2(*c*)(ii)

.....

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

(iii) Explain why there is no change in temperature from S to T
Terangkan mengapa tiada perubahan suhu dari S ke T.

2(*c*)(iii)

.....

.....

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

For Examiner's Use

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

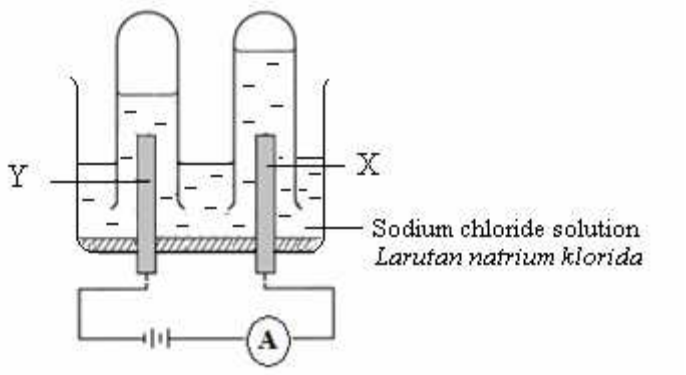


Diagram 3
Rajah 3

3(*a*)

(*a*) State all ions present in sodium chloride solution.
Nyatakan semua ion yang hadir dalam larutan natrium klorida.

.....

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

3(*b*)(i)

(*b*) (i) State the ion that will be discharged at electrode X.
Nyatakan ion yang akan didiscas di elektrod X.

.....

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

3(*b*)(ii)

(ii) Explain your answer in *b*(i).
Terangkan jawapan anda dalam b(i).

.....

[1 mark]
[1 *markah*]

3(*c*)(i)

(*c*) (i) Name the product formed at electrode Y.
Namakan hasil yang terbentuk di elektrod Y.

.....

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

For Examiner's Use

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

.....

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

3(*c*)(ii)

(iii) 0.1 mol of gas is released at electrode Y.
Calculate the volume of gas released.
0.1 mol gas terbebas di elektrod Y.
Hitungkan isipadu gas yang terbebas.

[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*]

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

3(*c*)(iii)

(*d*) The experiment is repeated using 0.0001 mol dm^{-3} sodium chloride solution as the electrolyte.
Eksperimen ini diulang menggunakan larutan natrium klorida 0.0001 mol dm^{-3} sebagai elektrolit.

(i) Name the gas produced at electrode X.
Namakan gas yang terhasil di elektrod X.

.....

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

3(*d*)(i)

(ii) Write the half equation for the reaction in *d*(i).
Tuliskan persamaan setengah bagi tindak balas di d(i).

.....

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

3(*d*)(ii)

(iii) Describe a chemical test to confirm the presence of gas named in *d*(i).
Huraikan satu ujian kimia untuk mengesahkan kehadiran gas yang dinamakan dalam d(i).

.....

.....

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

3(*d*)(iii)

For Examiner's Use

4 Diagram 4 shows a test tube containing 5 cm^3 of glacial ethanoic acid and magnesium ribbon.
Rajah 4 menunjukkan satu tabung uji mengandungi 5 cm^3 asid etanoik glasial dan pita magnesium.

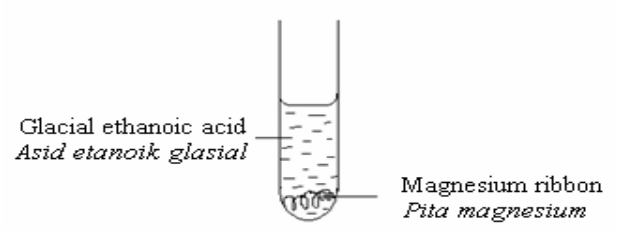


Diagram 4
Rajah 4

(*a*) (i) What type of particle is present in glacial ethanoic acid?
Apakah jenis zarah yang terdapat dalam asid etanoik glasial?

4(*a*)(i)

.....

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

(ii) What can be observed when magnesium ribbon is added to glacial ethanoic acid?
Apakah yang dapat diperhatikan apabila pita magnesium dimasukkan ke dalam asid etanoik glasial?

4(*a*)(ii)

.....

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

(iii) What can be observed if water is added to the glacial ethanoic acid containing magnesium ribbon? Explain your answer.
Apakah yang dapat diperhatikan jika air ditambah ke dalam asid etanoik glasial yang mengandungi pita magnesium? Terangkan jawapan anda.

4(*a*)(iii)

.....

.....

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

(*b*) 50 cm^3 of distilled water is added to 50 cm^3 of ethanoic acid 1.0 mol dm^{-3}
Calculate the molarity of the solution formed.
50 cm^3 air suling ditambahkan kepada 50 cm^3 asid etanoik 1.0 mol dm^{-3}
Hitung kemolaran larutan yang terbentuk.

4(*b*)

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

(*c*) In a separate experiment, 25 cm^3 of 0.5 mol dm^{-3} sodium hydroxide solution is titrated with 1.0 mol dm^{-3} hydrochloric acid.
Dalam eksperimen yang berasingan, 25 cm^3 larutan natrium hidroksida 0.5 mol dm^{-3} dititratkan dengan asid hidroklorik 1.0 mol dm^{-3}.

For Examiner's Use

(i) Draw the apparatus set up for this titration process.
Lukiskan gambar rajah susunan radas bagi proses pentitratan tersebut.

4(*c*)(i)

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

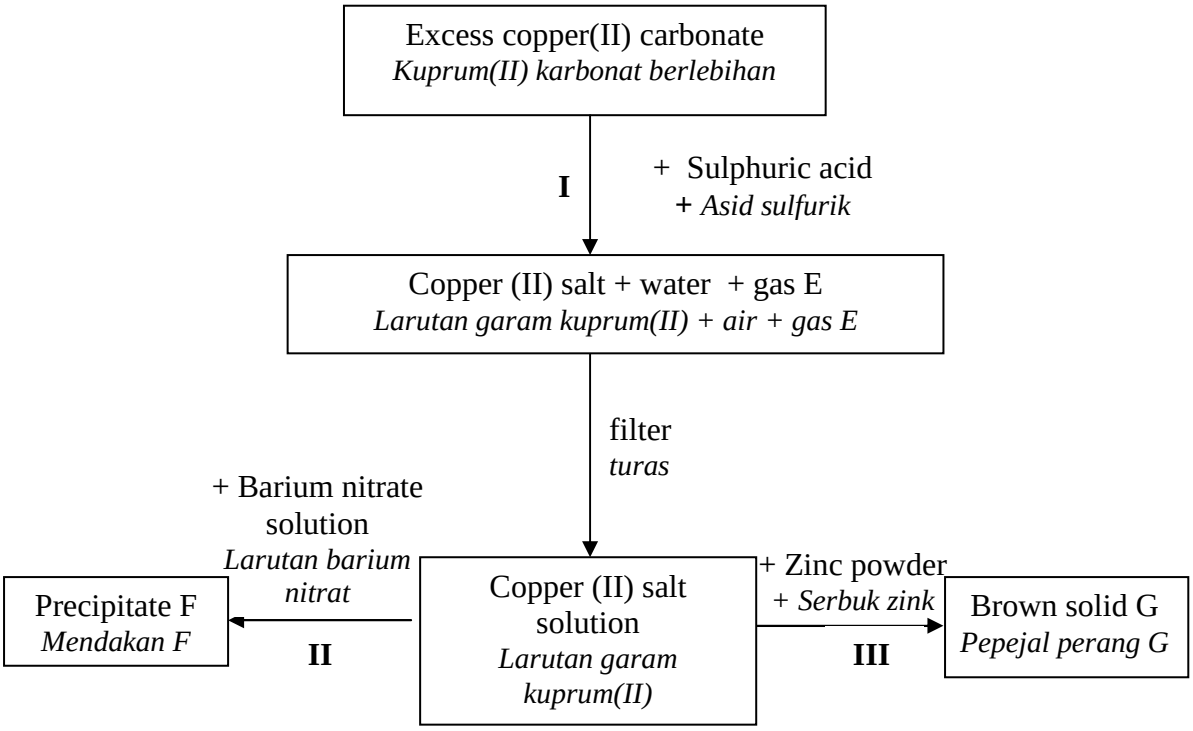
(ii) Calculate the volume of hydrochloric acid needed to neutralize the sodium hydroxide solution.
Hitung isipadu asid hidroklorik yang diperlukan untuk meneutralkan larutan natrium hidroksida tersebut.

4(*c*)(ii)

[3 *marks*]
[3 *markah*]

For Examiner's Use

5 The following flow chart shows the formation of a copper (II) salt solution and a series of its reactions.
Carta alir berikut menunjukkan penghasilan sejenis larutan garam kuprum (II) dan satu siri tindak balas larutan garam itu.



(*a*) (i) State one observation in Reaction I.
Nyatakan satu pemerhatian dalam Tindak balas I.

5(*a*)(i)

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

(ii) Name the copper(II) salt and gas E that are produced in Reaction I.
Namakan garam kuprum(II) dan gas E yang terhasil dalam Tindak balas I.

5(*a*)(ii)

Copper(II) salt: .....
Garam kuprum:

Gas E: .....
[2 *marks*]
[2 *markah*]

(*b*) (i) Name the process occurred in Reaction II to produce precipitate F.
Namakan proses yang berlaku dalam Tindak balas II untuk menghasilkan mendakan F.

5(*b*)(i)

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

For Examiner's Use

(ii) Write an ionic equation for the formation of precipitate F.
Tuliskan persamaan ion bagi pembentukan mendakan F.

.....

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

5(*b*)(ii)

(iii) If 0.02 mol of precipitate F is formed, calculate the volume of 0.5 mol dm^{-3} of barium nitrate solution used.
Jika 0.02 mol mendakan F terbentuk, hitungkan isipadu barium nitrat 0.5 mol dm^{-3} yang digunakan.

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

5(*b*)(iii)

(*c*) Brown solid G is formed when zinc powder is added to copper(II) salt solution in Reaction III.
Explain.
Pepejal perang G terbentuk apabila serbuk zink ditambahkan kepada larutan garam kuprum(II) dalam Tindak balas III.
Terangkan.

.....

.....

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

5(*c*)

(*d*) State the observation when aqueous ammonia is added till excess to the copper(II) salt solution.
Nyatakan pemerhatian apabila ammonia akueus ditambah sehingga berlebihan ke dalam larutan garam kuprum(II).

.....

.....

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

5(*d*)

For Examiner's Use

6 (*a*) Diagram 6.1 shows the apparatus set up to investigate the transfer of electrons at a distance between potassium iodide solution and acidified potassium manganate(VII) solution.
After a few minutes, colourless solution turns brown at electrode R.
Rajah 6.1 menunjukkan susunan radas untuk mengkaji pemindahan elektron pada satu jarak antara larutan kalium iodida dengan larutan kalium manganat(VII) berasid.
Selepas beberapa minit, larutan tanpa warna menjadi perang di elektrod R.

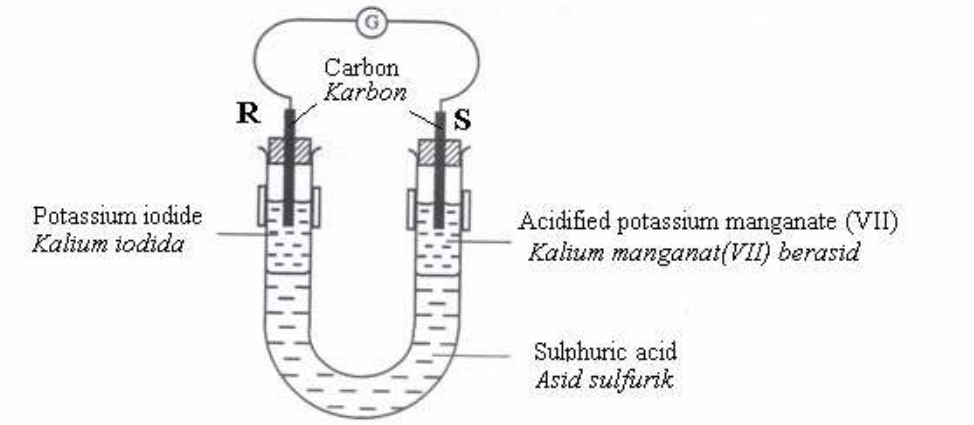


Diagram 6.1
Rajah 6.1

6(*a*)(i)

(i) Name the product formed at electrode R.
Namakan hasil yang terbentuk di elektrod R.

.....

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

6(*a*)(ii)

(ii) Complete the half equation for the reaction at electrode S.
Lengkapkan persamaan setengah bagi tindak balas di elektrod S.

MnO_4^- + ... H^+ + ... e → Mn^{2+} + ... H_2O

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

6(*a*)(iii)

(iii) State the change in oxidation number of manganese and name the process that occurs at S.
Tentukan perubahan nombor pengoksidaan bagi mangan dan namakan proses yang berlaku di S.

Change in oxidation number : …….....…….....……..
Perubahan nombor pengoksidaan:

Name of process : .....
Nama proses:

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

(iv) Suggest a substance that can replace potassium iodide solution in order to obtain the same reaction.
Cadangkan satu bahan yang boleh menggantikan larutan kalium iodida untuk menghasilkan tindak balas yang sama.

.....

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

For Examiner's Use

6(*a*)(iv)

(*b*) Diagram 6.2 shows the set up of the apparatus to investigate the reactivity of metals J, K and L. The different metals are heated consecutively.
Rajah 6.2 menunjukkan gambar rajah susunan radas untuk mengkaji kereaktifan logam-logam J, K dan L. Logam -logam itu dipanaskan secara bergilir -gilir.

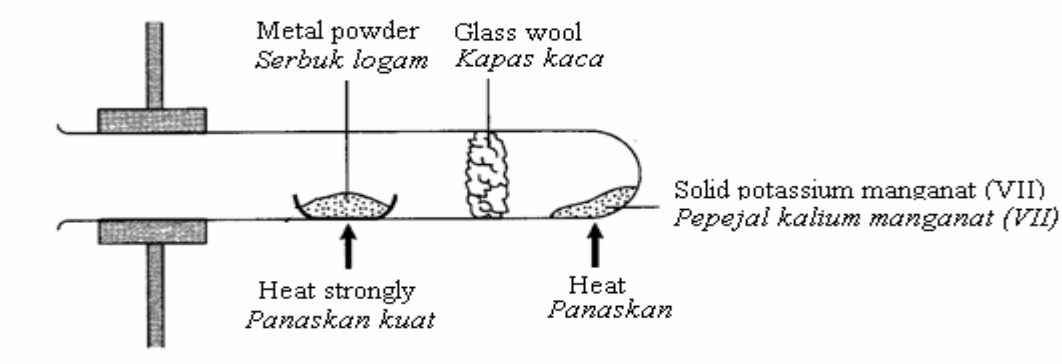


Diagram 6.2
Rajah 6.2

Table 6.1 shows the observation of the experiment.
Jadual 6.1 menunjukkan pemerhatian bagi eksperimen tersebut.

Metal ***Logam***	**Observations** ***Pemerhatian***	**Colour of residue** ***Warna baki***	
		Hot ***Panas***	**Cold** ***Sejuk***
J	Burns brightly *Menyala dengan terang*	Yellow *Kuning*	White *Putih*
K	Glows dimly *Berbara dengan malap*	Black *Hitam*	Black *Hitam*
L	Burns with a very bright flame *Menyala dengan nyalaan yang sangat terang*	White *Putih*	White *Putih*

Table 6.1
Rajah 6.1

(i) Name metal J.
Namakan logam J.

.....

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

6(*b*)(i)

For Examiner's Use

6(*b*)(ii)

(ii) Write a chemical equation for the reaction between metal J and oxygen.
Tuliskan persamaan kimia bagi tindak balas antara logam J dengan oksigen.

.....

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

6(*b*)(iii)

(iii) Based on the observation in Table 6.1, arrange metals J, K and L in ascending order of reactivity towards oxygen.
Berdasarkan pemerhatian dalam Jadual 6.1, susun logam-logam J, K dan L dalam susunan kereaktifan menaik terhadap oksigen.

.....

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

6(*c*)(iv)

(iv) A mixture of metal J and oxide of metal L is heated strongly.
Predict an observation and explain your answer.
Campuran logam J dan oksida L dipanaskan dengan kuat.
Ramalkan satu pemerhatian dan terangkan jawapan anda.

.....

.....

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

Section B
Bahagian B

[20 *marks*]
[20 *markah*]

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

7 Diagram 7 shows the symbol of three elements.
Rajah 7 menunjukkan simbol bagi tiga unsur.

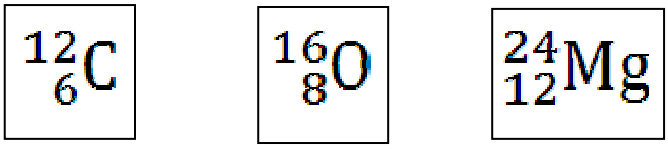


Diagram 7
Rajah 7

(*a*) Write the electron arrangement for atom O. Explain the position of the element in the Periodic Table of Elements.
Tulis susunan elektron bagi atom O. Terangkan kedudukan unsur tersebut dalam Jadual Berkala Unsur.

[5 *marks*]
[5 *markah*]

(*b*) Both elements C and Mg can react with O to form different compounds.
Explain the formation of the compounds between:
Kedua-dua unsur C dan Mg boleh bertindak balas dengan O untuk menghasilkan sebatian yang berbeza. Terangkan pembentukan sebatian bagi tindak balas antara:

- C and O
  C dan O
- Mg and O
  Mg dan O

In your answer, include the type of bonds and the electron arrangement diagram of the compounds formed.
Dalam jawapan anda, sertakan jenis ikatan dan gambar rajah susunan elektron bagi sebatian yang terbentuk.

[10 *marks*]
[10 *markah*]

(*c*) Compare the electrical conductivity and melting points of the compounds formed in (*b*).
Explain their differences.
Bandingkan kekonduksian elektrik dan takat lebur sebatian-sebatian yang terbentuk dalam (b).
Terangkan perbezaan tersebut.

[5 *marks*]
[5 *markah*]

8 (*a*) A student carried out an experiment to investigate the effect of catalyst on the rate of reaction.
Diagram 8 shows the decomposition of hydrogen peroxide in the presence of manganese(IV) oxide.
Seorang pelajar menjalankan satu eksperimen untuk mengkaji kesan mangkin ke atas kadar tindak balas.
Rajah 8 menunjukkan penguraian hidrogen peroksida dengan kehadiran mangan(IV) oksida.

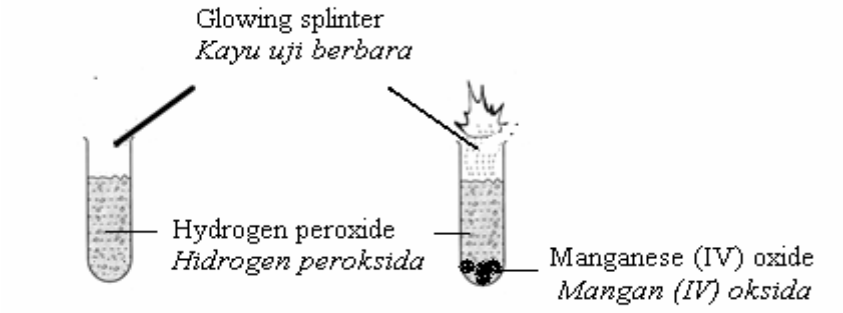


Diagram 8
Rajah 8

Using Collision Theory, explain the effect of manganese(IV) oxide on the decomposition of hydrogen peroxide.
Dengan menggunakan Teori Perlanggaran, terangkan kesan mangan(IV) oksida ke atas penguraian hidrogen peroksida.

[5 *marks*]
[5 *markah*]

(*b*) A student carried out two experiments to determine the time taken to collect a maximum volume of 50 cm^3 of gas.
Table 8 shows the result of the experiments.
Seorang pelajar menjalankan dua eksperimen untuk menentukan masa yang diambil bagi mengumpul isipadu maksima gas sebanyak 50 cm^3.
Jadual 8 menunjukkan keputusan eksperimen tersebut.

Experiment ***Eksperimen***	**Reactant** ***Bahan tindak balas***	**Time, s** ***Masa, s***
I	50 cm^3 of 1-volume hydrogen peroxide solution and 1 g manganese(IV) oxide *50 cm^3 larutan hidrogen peroksida 1-isipadu dan 1g mangan(IV) oksida*	40
II	25 cm^3 of 2-volume hydrogen peroxide solution and 1 g manganese(IV) oxide *25 cm^3 larutan hidrogen peroksida 2-isipadu dan 1g mangan(IV) oksida*	20

Table 8
Jadual 8

(i) Draw a labelled diagram of the apparatus set up for the experiment.
Lukiskan gambar rajah berlabel bagi susunan radas eksperimen tersebut.

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

(ii) Sketch the graph for the gas liberated against time for Experiment I and Experiment II on the same axes.
Lakarkan graf isipadu gas terbebas melawan masa pada paksi yang sama bagi Eksperimen I dan Eksperimen II.

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

(iii) Calculate the average rate of reaction for both experiments.
Tentukan kadar tindak balas purata bagi kedua-dua eksperimen.

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

(iv) Compare the rate of reaction between Experiment I and Experiment II. Explain the differences based on Collision Theory.
Bandingkan kadar tindak balas antara Eksperimen I dan Eksperimen II. Terangkan perbezaan tersebut berdasarkan Teori Perlanggaran.

[5 *marks*]
[5 *markah*]

(v) Calculate the concentration in mol dm^{-3} hydrogen peroxide used in Experiment I in order to produce 50 cm^3 of oxygen.
Hitung kepekatan hidrogen peroksida dalam mol dm^{-3} yang digunakan dalam Eksperimen I untuk menghasilkan 50 cm^3 oksigen.

[Molar volume of gas = 24 dm^3 mol^{-1} at room conditions]
[*Isipadu molar gas = 24 dm^3 mol^{-1} pada keadaan bilik*]

[4 *marks*]
[4 *markah*]

Section C
Bahagian C

[20 *marks*]
[20 *markah*]

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

9 (*a*) Hexane and hexene are hydrocarbon compounds from different homologous series. The combustion of these two compounds produce different amount of soot.
Explain the difference based on the percentage of carbon by mass.
Heksana dan heksena adalah sebatian-sebatian hidrokarbon daripada siri homolog yang berbeza. Pembakaran kedua-dua sebatian ini menghasilkan jumlah jelaga yang berbeza. Terangkan perbezaan ini berdasarkan peratus karbon mengikut jisim.

[Relative atomic mass: C = 12, H = 1]
[*Jisim atom relatif: C = 12, H = 1*]

[4 *marks*]
[4 *markah*]

(*b*) (i) Explain the following statement:
Terangkan pernyataan berikut:

An aqueous solution of ethanol does not conduct electricity while an aqueous solution of ethanoic acid conducts electricity. *Larutan akueus etanol tidak mengkonduksikan elektrik manakala larutan akueus asid etanoik boleh mengkonduksikan elektrik.*

[3 *marks*]
[3 *markah*]

(ii) Describe one chemical test to differentiate ethanol from ethanoic acid
Huraikan satu ujian kimia untuk membezakan etanol dan asid etanoik.

[3 *marks*]
[3 *markah*]

(*c*) Diagram 9 shows the flow chart for preparation of substance P, C_2H_6O from pineapple juice through fermentation process.
Rajah 9 menunjukkan carta alir bagi penghasilan bahan P, C_2H_6O daripada jus nenas melalui proses penapaian.

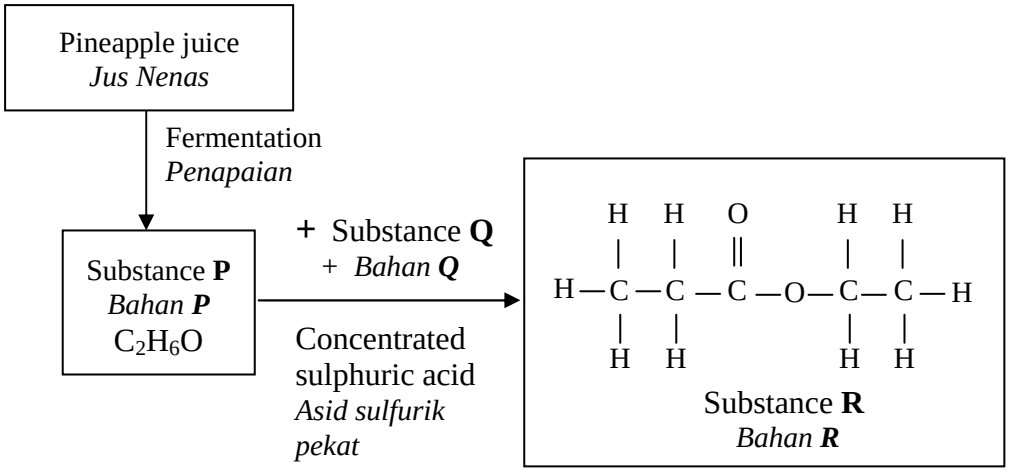


Diagram 9
Rajah 9

Describe an experiment to produce substance R from pineapple juice in the laboratory.
In your description, name P, Q and R and include the chemical equations involved.
Huraikan satu eksperimen untuk menghasilkan bahan R daripada jus nenas di makmal.
Dalam huraian anda, namakan P, Q dan R dan sertakan persamaan-persamaan kimia yang terlibat.

[10 *marks*]
[10 *markah*]

10 Diagram 10 shows energy level diagram for two reactions.
Rajah 10 menunjukkan gambar rajah aras tenaga bagi dua tindak balas.

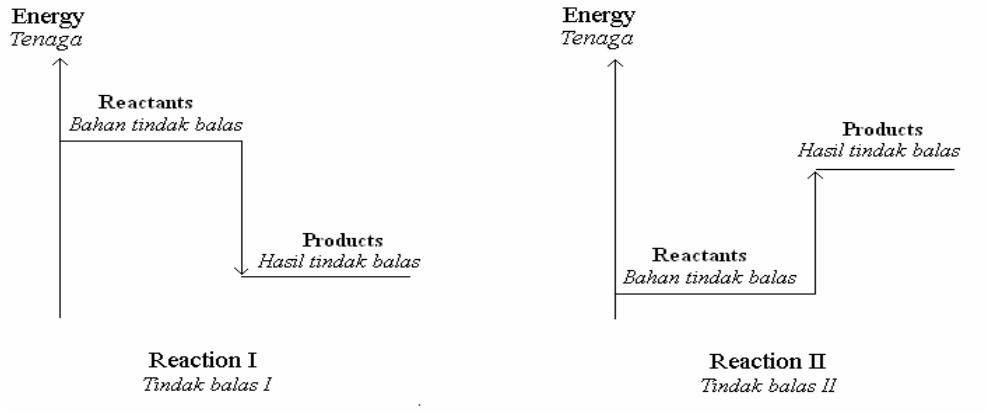


Diagram 10
Rajah 10

(*a*) Explain the differences between the energy level diagrams for Reaction I and Reaction II.
Terangkan perbezaan antara gambar rajah aras tenaga bagi Tindak balas I dan Tindak balas II.

[5 *marks*]
[5 *markah*]

(*b*) The heat of combustion of butanol can be determined in the laboratory.
Describe how to determine the heat of combustion of butanol.
Haba pembakaran butanol boleh ditentukan di makmal.
Huraikan bagaimana untuk menentukan haba pembakaran butanol.

Your answer should include the following:
Jawapan anda perlu mengandungi perkara-perkara berikut:

- Diagram of apparatus set-up
  Gambar rajah susunan radas
- Procedure of the experiment
  Prosedur eksperimen
- Precautionary steps to get better results
  Langkah berjaga-jaga untuk mendapat keputusan lebih baik

[10 *marks*]
[10 *markah*]

(*c*) The heat of combustion of butanol is -2678 kJ mol^{-1}. 3.7 g of butanol is used to heat 500 cm^3 of water.
Calculate the maximum temperature of water if the initial temperature of water is 28.0 ^{0}C.
[Relative atomic mass;H=1, C=12,O=16, Specific heat of water 4.2 $Jg^{-1}\,^0C^{-1}$]
Haba pembakaran bagi butanol ialah -2678 kJ mol^{-1}. 3.7 g butanol digunakan untuk memanaskan 500 cm^3 air.
Tentukan suhu maksima air jika suhu awalnya ialah 28.0 ^{0}C.
[*Jisim atom relatif;H=1, C=12, O=16, Muatan haba tentu air ialah 4.2 J $g^{-1}\,^0C^{-1}$*]

[5 *marks*]
[5 *markah*]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

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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 lined pages at the end of the question paper. 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.
   Jawap ***satu*** *soalan daripada* ***Bahagian B*** *dan* ***satu*** *soalan daripada* ***Bahagian C****. Tuliskan jawapan bagi* ***Bahagian B*** *dan* ***Bahagian C*** *pada halaman bergaris di bahagian akhir kertas soalan ini. 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. Show your working, it may help you to get marks.
   Tunjukkan kerja mengira, ini membantu anda mendapatkan markah.

5. If you wish to cancel any answer, neatly cross out the answer.
   Sekiranya anda hendak membatalkan sesuatu jawapan, buat garisan di atas jawapan itu.

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

7. Marks allocated for each question or part question are shown in brackets.
   Markah yang diperuntukkan bagi setiap soalan atau ceraian soalan ditunjukkan dalam kurungan.

8. The time suggested to complete **Section A** is 90 minutes, **Section B** is 30 minutes and **Section C** is 30 minutes
   Masa yang dicadangkan untuk menjawab ***Bahagian A*** *ialah 90 minit****, Bahagian B*** *ialah 30 minit dan* ***Bahagian C*** *ialah 30 minit.*

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

10. Hand in all your answer sheets at the end of the examination.
    Serahkan semua kertas jawapan anda di akhir peperiksaan.

Name : …….……...……..… Class : …...……..

SULIT
4541/3
Chemistry
Paper 3
September
2009
1½ hours

MAKTAB RENDAH SAINS MARA

SIJIL PELAJARAN MALAYSIA
TRIAL EXAMINATION 2009

CHEMISTRY

Paper 3

One hour and thirty minutes

DO NOT OPEN THIS QUESTION BOOKLET UNTIL BEING TOLD TO DO SO

1. Write down your name and class in the space provided
   Tuliskan nama dan kelas anda pada ruang yang disediakan.

2. The question booklet is bilingual.
   Buku soalan ini adalah dalam dwibahasa.

3. Candidates are required to answer all questions.
   Calon dikehendaki menjawab semua soalan.

For Examiner's Use		
Question	Full Mark	Mark
1	15	
2	18	
3	17	
Total	50	

This question booklet contains 12 printed pages including the front page.

For Examiner's Use

1 Diagram 1.1 shows the apparatus set-up for an experiment to measure the potential difference between copper,Cu and metal M. The experiment is repeated by replacing metal M with metals J and Q. The results are used to determine the position of metals M, J, Q and copper,Cu in the Electrochemical Series.
Rajah 1.1 menunjukkan susunan radas bagi eksperimen untuk mengukur beza keupayaan antara kuprum,Cu dan logam M. Eksperimen ini diulangi secara menggantikan logam M dengan logam J dan Q. Keputusan yang diperolehi digunakan untuk menentukan kedudukan logam M, J, Q dan kuprum,Cu di dalam Siri Elektrokimia.

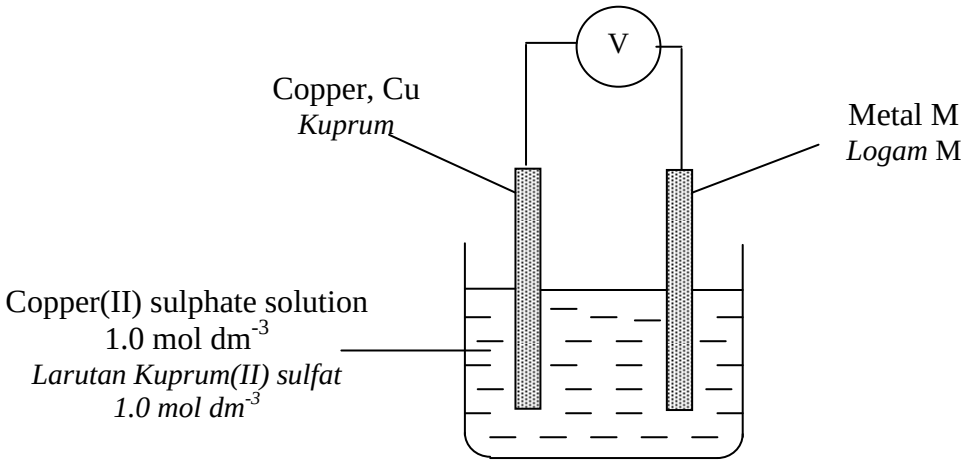
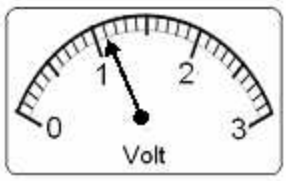
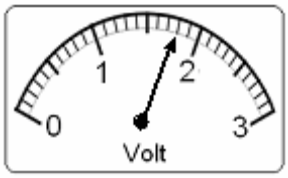


Diagram 1.1
Rajah 1.1

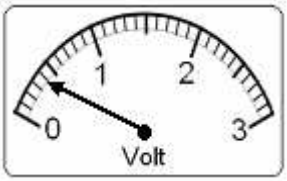
Diagram 1.2 shows the voltmeter readings for three pairs of metals; Cu/M, Cu/J and Cu/Q respectively.
Rajah 1.2 menunjukkan bacaan voltmeter bagi tiga pasangan logam; Cu/M, Cu/J dan Cu/Q.



Cu/M
Cu/M



Cu/J
Cu/J



Cu/Q
Cu/Q

Diagram 1.2
Rajah 1.2

For Examiner's Use

Pairs of metal *Pasangan logam*	**Potential difference** *Beza keupayaan* / **(V)**	**Positive terminal** *Terminal positif*
Cu and M *Cu dan M*		Cu
Cu and J *Cu dan J*		Cu
Cu and Q *Cu dan Q*		Q

Table 1
Jadual 1

1 (*a*)

(*a*) Record the voltmeter reading for the pairs of metal in Table 1.
Rekodkan bacaan voltmeter bagi pasangan-pasangan logam tersebut dalam Jadual 1.

[3 *marks*]
[3 *markah*]

(*b*) Arrange J, Cu, M and Q metals in descending order in the Electrochemical Series.
Susun logam J, Cu, M dan Q dalam Siri Elektrokimia mengikut tertib menurun.

1 (*b*)

.....

[3 *marks*]
[3 *markah*]

(*c*) Iron is located between metal M and copper in the Electrochemical Series. Classify the metals into groups of more electropositive and less electropositive metals than iron.
Logam ferum terletak antara logam M dan logam kuprum dalam Siri Elektrokimia. Kelaskan logam-logam ini ke dalam kumpulan logam yang lebih elektropositif dan kurang elektropositif daripada ferum.

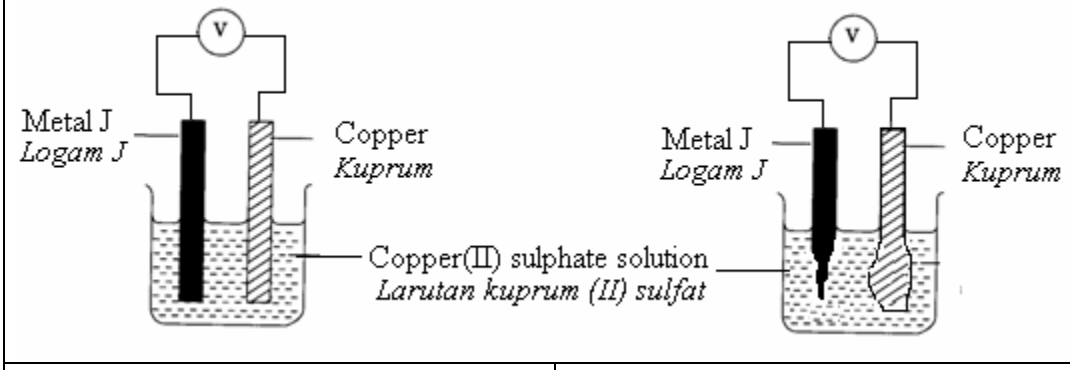
More electropositive metals than iron ***Logam yang lebih elektropositif berbanding ferum***	**Less electropositive metals than iron** ***Logam yang kurang elektropositif berbanding ferum***

1 (*c*)

[3 *marks*]
[3 *markah*]

For Examiner's Use

(*d*) Diagram 1.2 shows a simple cell using copper and metal J.
Rajah 1.2 menunjukkan sel kimia ringkas menggunakan kuprum dan logam J.



Beginning of experiment **Blue solution** ***Permulaan eksperimen*** ***Larutan biru***	**After 3 hours** **Pale blue solution** ***Selepas 3 jam*** ***Larutan biru pudar***

Diagram 1.2
Rajah 1.2

(i) Based on Diagram 1.2, state **three** observations.
*Berdasarkan Rajah 1.2, nyatakan **tiga** pemerhatian.*

1(*d*)(i)

1. ……

2. ……

3. ……

[3 *marks*]
[3 *markah*]

(ii) What would you observe at metal J if the cell is allowed to stand for 6 hours?
Apakah yang anda akan perhatikan pada logam J jika sel ini di biarkan selama 6 jam?

1(*d*)(ii)

……...

……...

[3 *marks*]
[3 *markah*]

For Examiner's Use

2 Two experiments are carried out to determine the relationship between the pH value and the concentration of two alkaline solutions. The pH values of three different concentrations of sodium hydroxide and ammonia solutions are recorded using pH meter.
Dua eksperimen dijalankan untuk menentukan hubungan antara nilai pH dengan kepekatan bagi dua larutan alkali. Nilai pH bagi tiga kepekatan berbeza larutan natrium hidroksida dan ammonia telah direkodkan menggunakan meter pH.

Diagram 2 shows the pH readings of the solutions in the experiments.
Rajah 2 menunjukkan bacaan pH bagi larutan-larutan dalam kedua-dua eksperimen

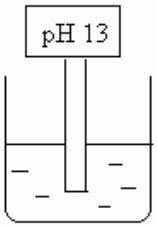
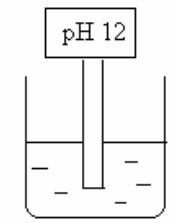
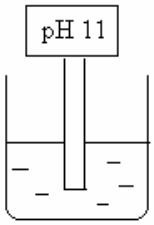
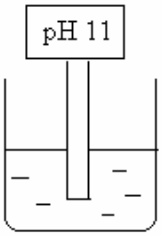
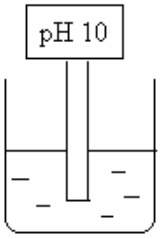
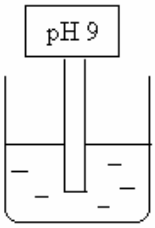
Experiment ***Eksperimen***	**Solution** ***Larutan***	**Concentration (mol dm^{-3})** ***Kepekatan (mol dm^{-3})***		
		0.1	0.01	0.001
I	Sodium hydroxide *Natrium hidroksida*			
II	Ammonia *Ammonia*			

Diagram 2
Rajah 2

For Examiner's Use

(*a*) Based on Experiment I, complete Table 2.1
Berdasarkan Eksperimen I, lengkapkan Jadual 2.1

Name of variable ***Nama pembolehubah***	**Action to be taken** ***Tindakan yang perlu diambil***
(i) Manipulated variable: *Pembolehubah dimanipulasikan:* …… ……	(i) The way to manipulate the variable: *Cara mengubah pembolehubah dimanipulasi:* …… ……
(ii) Responding variable: *Pembolehubah bergerak balas:* …… ……	(ii) What to observe in the responding variable: *Apa yang diperhatikan dalam pembolehubah bergerak balas:* …… ……
(iii) Controlled variable: *Pembolehubah yang dimalarkan:* …… ……	(iii) The way to maintain the controlled variable: *Cara menetapkan pembolehubah dimalarkan:* …… ……

Table 2.1
Jadual 2.1

[3 *marks*]
[3 *markah*]

2(*a*)

(*b*) Construct a table and record the results for Experiment I and II in the space provided below.
Berdasarkan eksperimen ini, bina jadual dan rekodkan keputusan Eksperimen I dan II pada ruangan di bawah.

2(*b*)

[3 *marks*]
[3 *markah*]

For Examiner's Use

(*c*) Based on the answer in Table 2.1, state the relationship between the concentration of OH^- ions and the pH value.
Berdasarkan keputusan eksperimen dalam Jadual 2.1, nyatakan hubungan antara kepekatan ion OH^- dengan nilai pH.

……

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[3 *marks*]
[3 *markah*]

2(*c*)

(*d*) Ammonia solution of 0.1 mol dm^{-3} has different pH value compared to sodium hydroxide solution of the same concentration.
Explain why?
Larutan ammonia 0.1 mol dm^{-3} mempunyai nilai pH yang berbeza dibandingkan dengan larutan natrium hidroksida yang sama kepekatannya.
Terangkan mengapa.

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[3 marks]
[3 *markah*]

2(*d*)

(*e*) Sodium hydroxide solution is a strong alkali while ammonia solution is a weak alkali. State the operational definition for the strong alkali and weak alkali.
Larutan natrium hidroksida adalah alkali kuat manakala larutan ammonia adalah alkali lemah. Nyatakan definisi secara operasi bagi alkali kuat dan alkali lemah.

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[3 *marks*]
[3 *markah*]

2(*e*)

(*f*) A sodium hydroxide solution has pH value of 9. Estimate the concentration of the solution.
Suatu larutan natrium hidroksida mempunyai nilai pH 9. Anggarkan kepekatan larutan tersebut.

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[3 *marks*]
[3 *markah*]

2(*f*)

For Examiner's Use

3 Diagram 3 shows a reaction between dilute acid and metal in Test tube I and Test tube II.
Rajah 3 menunjukkan tindak balas antara asid cair dan logam dalam Tabung uji I dan Tabung uji II.

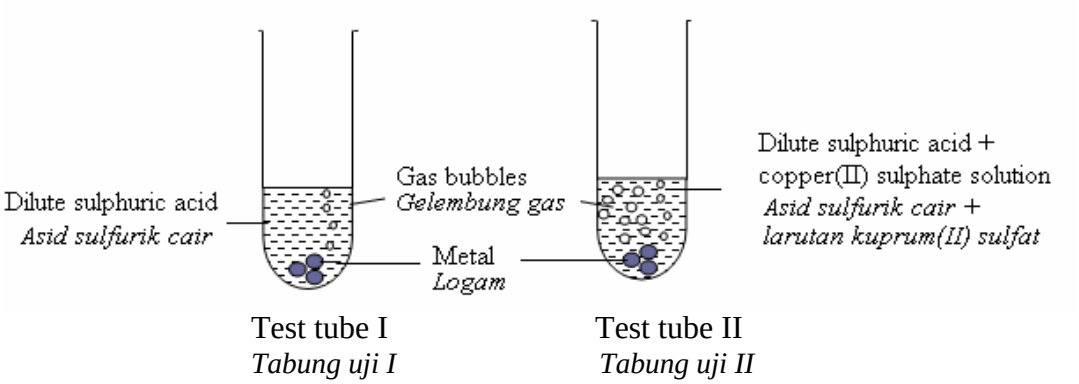

Diagram 3
Rajah 3

The time taken for the reaction in Test tube II to complete is shorter than in Test tube I.
Identify the factor that influences the difference in the observation between Test tube I and Test tube II.
Masa yang diambil untuk tindak balas selesai bagi Tabung uji II adalah lebih pendek berbanding Tabung uji I.
Tentukan faktor yang mempengaruhi perbezaan pemerhatian antara Tabung uji I dan Tabung uji II.

Referring to Diagram 3, plan a laboratory experiment to investigate the factor that influences the difference in the rate of reaction.
Merujuk Rajah 3, rancang satu eksperimen dalam makmal untuk mengkaji faktor yang mempengaruhi perbezaan kadar tindak balas.

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

(*a*) Aim of the experiment
Tujuan eksperimen

(*b*) All the variables
Semua pembolehubah

(*c*) Statement of the hypothesis
Pernyataan hipotesis

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

(*e*) Procedure of the experiment
Prosedur eksperimen

(*f*) Tabulation of data
Penjadualan data

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

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INFORMATION FOR CANDIDATES
MAKLUMAT UNTUK CALON

1. This question paper consists of three questions. Answer **all** questions.
Kertas soalan ini mengandungi tiga soalan. Jawab **semua** *soalan.*

2. Write your answers for **Question 1 and 2** in the spaces provided in the question paper.
Tuliskan jawapan bagi **Soalan 1 dan 2** *dalam ruang yang disediakan dalam kertas soalan.*

3. Write your answers for **Question 3** on the lined pages at the end of the question paper in detail.
Tuliskan jawapan bagi **Soalan 3** *pada halaman bergaris di bahagian akhir kertas soalan ini dengan terperinci.*

4. Show your working, it may help you to get marks.
Tunjukkan cara mengira kerana ia boleh membantu anda mendapatkan markah

5. If you wish to cancel any answer, neatly cross out the answer.
Sekiranya anda hendak membatalkan sesuatu jawapan, buat garisan di atas jawapan itu

6. The diagrams in the questions are not drawn to scale unless stated.
Rajah yang terdapat dalam soalan tidak dilukis mengikut skala kecuali dinyatakan sebaliknya.

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

8. *The time suggested to complete* **Question 1 and 2** *is 60 minutes and* **Question 3** *is 30 minutes.*
Masa yang dicadangkan untuk menjawab **Soalan 1 dan 2** *ialah 60 minit dan* **Soalan 3** *ialah 30 minit*

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

10. Hand in all your answer sheets at the end of the examination.
Serahkan semua kertas jawapan anda di akhir peperiksaan.

