PEPERIKSAAN PERCUBAAN BERSAMA SIJIL PELAJARAN MALAYSIA 2010

ANJURAN
PERSIDANGAN KEBANGSAAN PENGETUA-PENGETUA
SEKOLAH MENENGAH MALAYSIA CAWANGAN PERLIS

CHEMISTRY

KERTAS 1

Satu jam lima belas minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

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

Kertas soalan ini mengandungi **24** halaman bercetak

1 Which of the factor **does not** affect the rate of reaction?
*Faktor manakah **tidak** mempengaruhi kadar tindak balas?*

A Volume of the solution
Isipadu larutan
B The presence of catalyst
Kehadiran mangkin
C Concentration of the solution
Kepekatan larutan
D Size of the solid reactant
Saiz pepejal bahan tindak balas

2 Which of chemical equation is balanced?
Antara persamaan kimia berikut, yang manakah seimbang?

A $Mg + O_2 \longrightarrow MgO$
B $Li + O_2 \longrightarrow Li_2O$
C $Mg + HCl \longrightarrow MgCl_2 + H_2$
D $Zn + H_2SO_4 \longrightarrow ZnSO_4 + H_2$

3 Which of the following chemical formulae is correct?
Antara formula kimia berikut, yang manakah betul?

A Li_2O
B KBr_2
C Al_3Cl
D $MgNO_3$

4 Which of the following is the use of carbon-14 isotope?
Antara berikut, yang manakah kegunaan isotop karbon-14?

A To treat cancer patient
Untuk merawat pesakit kanser
B To estimate the age of fossils
Untuk menganggar usia fosil
C To control the thickness of plastic
Untuk mengawal ketebalan plastik
D To detect the leakage of underground pipes
Untuk mengesan kebocoran paip bawah tanah

5 Diagram 1 shows the change of the state of matter.
Rajah 1 menunjukkan perubahan keadaan jirim.

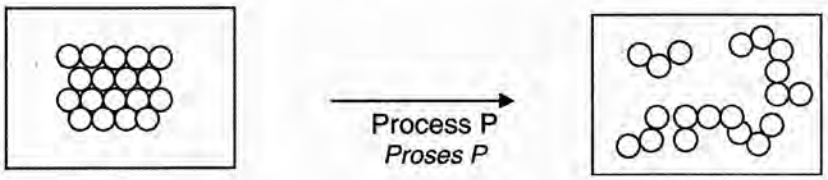


Diagram 1
Rajah 1

What is process P?
Apakah proses P?

A Boiling
Pendidihan
B Melting
Peleburan
C Freezing
Pembekuan
D Sublimation
Pemejalwapan

6 Which of the following is a composite material?
Antara berikut, yang manakah bahan komposit?

A Ceramic
Seramik
B Polythene
Politena
C Fiber glass
Kaca gentian
D Stainless steel
Keluli nirkarat

7 Diabetic patients are advised **not** to take too much of sugar.
Which of the food additives can replace sugar?
*Pesakit diabetes dinasihatkan **tidak** mengambil terlalu banyak gula.*
Antara bahan tambah makanan berikut, yang manakah boleh menggantikan gula?

A Sodium nitrate
Natrium nitrat
B Sodium citrate
Natrium sitrat
C Aspartame
Aspartam
D Gelatine
Gelatin

8 Table 1 shows the electron arrangement of elements P, Q, R, S and T.
Jadual 1 menunjukkan susunan elektron unsur-unsur P, Q, R, S dan T.

Element *Unsur*	Electron arrangement *Susunan elektron*
P	2.8.6
Q	2.8.7
R	2.8.1
S	2.4
T	2.2

Table 1
Jadual 1

Which of the following pairs of elements can react to form a covalent compound?
Antara pasangan unsur berikut, yang manakah bertindak balas membentuk sebatian kovalen?

I P and T
P dan T
II R and T
R dan T
III S and Q
S dan Q
IV P and S
P dan S

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

9 What is the homologous series of propyl propanoate?
Apakah siri homolog bagi propil propanoat?

A Ester
Ester
B Alkene
Alkena
C Alcohol
Alkohol
D Carboxylic acid
Asid karboksilik

10 What is the oxidation number of oxygen in manganate(VII) ion, MnO_4^- ?
Apakah nombor pengoksidaan bagi oksigen dalam ion manganat(VII), MnO_4^- ?

A +7
B +3
C -2
D -3

11 Which of the following is a reduction process?
Antara yang berikut, yang manakah proses penurunan?

A Lead metal gains oxygen
Logam plumbum menerima oksigen
B Chlorine gas gains electrons
Gas klorin menerima elektron
C Magnesium atom loses 2 electrons
Atom magnesium kehilangan 2 elektron
D Hydrogen sulphide loses its hydrogen
Hidrogen sulfida kehilangan hidrogen

12 Which of the following is true about a weak akali?
Antara berikut, yang manakah benar tentang alkali lemah?

A Unable to neutralise acid
Tidak boleh meneutralkan asid
B pH value is less than 7
Nilai pH kurang daripada 7
C Able to change blue litmus paper to red
Boleh menukarkan warna kertas litmus biru kepada merah
D Ionises partially in water to produce hydroxide ions
Mengion separa lengkap dalam air untuk menghasilkan ion hidroksida

13 Which of the following substances is an insoluble salt?
Antara bahan berikut, yang manakah garam tak terlarutkan?

A Calcium chloride
Kalsium klorida
B Copper(II) chloride
Kuprum(II) klorida
C Copper(II) sulphate
Kuprum(II) sulfat
D Calcium sulphate
Kalsium sulfat

14 Which of the following is an ionic compound?
Antara bahan berikut, yang manakah sebatian ion?

A Calcium oxide
Kalsium oksida
B Sulphur trioxide
Sulfur trioksida
C Nitrogen dioxide
Nitrogen dioksida
D Carbon monoxide
Karbon monoksida

15 Which of the following reactions releases heat to the surroundings?
Antara tindak balas berikut, yang manakah membebaskan haba ke persekitaran?

A Adding sodium hydrogen carbonate to nitric acid
Menambahkan natrium hidrogen karbonat kepada asid nitrik
B Adding copper(II) oxide to hydrochloric acid
Menambahkan kuprum(II) oksida kepada asid hidroklorik
C Dissolving potassium sulphate in water
Melarutkan kalium sulfat dalam air
D Dissolving ammonium nitrate in water
Melarutkan ammonium nitrat dalam air

16 Which of the following is the property of sodium chloride?
Antara berikut, yang manakah sifat bagi natrium klorida?

A High volatility
Mudah meruap
B Insoluble in water
Tidak larut dalam air
C High melting and boiling points
Takat lebur dan takat didih yang tinggi
D Cannot conduct electricity in molten or aqueous solution
Tidak boleh mengkonduksi elektrik dalam keadaan leburan atau larutan akueus

17 Sodium and argon are placed in the same period in the Periodic Table of Element. Which of the following is true about the atoms of sodium and argon?
Natrium dan argon berada pada kala yang sama dalam Jadual Berkala Unsur. Antara berikut, yang manakah benar tentang atom natrium dan atom argon?

A Have the same number of protons
Mempunyai bilangan proton yang sama
B Have the same number of neutrons
Mempunyai bilangan neutron yang sama
C Have the same number of valence electrons
Mempunyai bilangan elektron valens yang sama
D Have the same number of shells filled with electrons
Mempunyai bilangan petala terisi elektron yang sama

18 Which of the following ions will produce white precipitate that is insoluble in excess aqueous ammonia solution?
Antara ion berikut, yang manakah akan menghasilkan mendakan putih yang tidak larut dalam ammonia akueus berlebihan?

I Mg^{2+}
II Ca^{2+}
III Pb^{2+}
IV Al^{3+}

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

19 Table 2 shows the electron arrangement of atoms W, X, Y and Z.
Jadual 2 menunjukkan susunan elektron bagi atom-atom W, X, Y dan Z.

Atom *Atom*	Electron arrangement *Susunan elektron*
W	2.1
X	2.2
Y	2.8.4
Z	2.8.6

Table 2
Jadual 2

Which of the following atoms is placed in Period 3 and Group 16 in the Periodic Table of Element?
Antara atom-atom berikut, yang manakah berada dalam Kala 3 dan Kumpulan 16 dalam Jadual Berkala Unsur?

A W
B X
C Y
D Z

20 Which of the following is the molecular formula for butanol?
Antara berikut, yang manakah merupakan formula molekul bagi butanol?

A C_4H_8
B C_4H_{10}
C $C_4H_{10}O$
D $C_4H_{10}O_2$

21 Which of the following is a reducing agent?
Antara berikut, yang manakah suatu agen penurunan?.

A Oxygen
Oksigen
B Zinc metal
Logam zink
C Bromine water
Air bromin
D Acidified potassium dichromate(VI) solution
Larutan kalium dikromat(VI) berasid

22 Diagram 2 shows the diffusion of bromine gas
Rajah 2 menunjukkan resapan gas bromin.

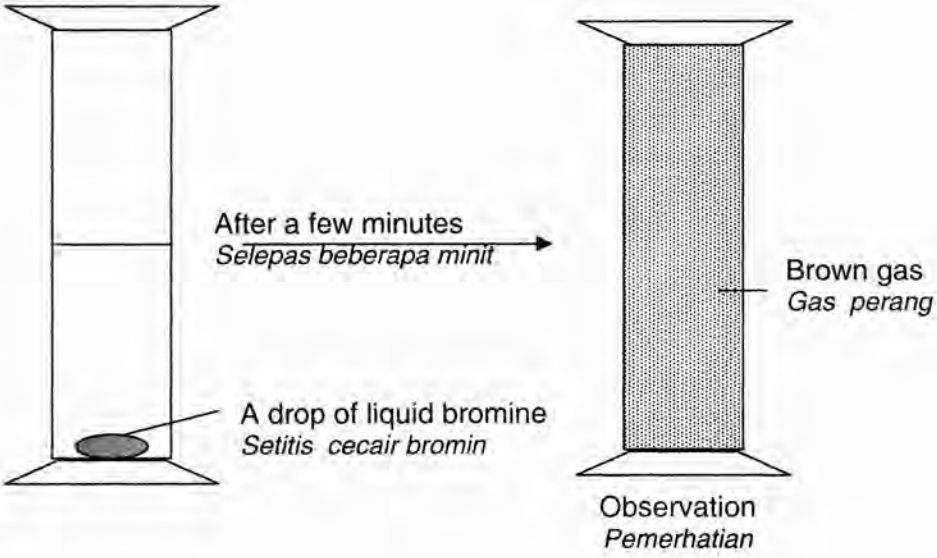


Diagram 2
Rajah 2

Which of the following statements explained the observation?
Antara pernyataan berikut, yang manakah menerangkan pemerhatian itu?

A Bromine particles move randomly
Zarah-zarah bromin bergerak secara rawak
B Bromine particles is bigger than air particles
Zarah-zarah bromin lebih besar daripada zarah-zarah udara
C Both bromine and air particles collide effectively
Kedua-dua zarah bromin dan udara berlanggar secara berkesan
D Bromine particles move in empty spaces between air particles
Zarah-zarah bromin bergerak dalam ruang kosong antara zarah-zarah udara

23 The following chemical equation shows the reaction between silver nitrate solution and sodium chloride solution.
Persamaan kimia berikut menunjukkan tindak balas antara larutan argentum nitrat dan larutan natrium klorida

$$AgNO_{3\,(aq)} + NaCl_{(aq)} \longrightarrow AgCl_{(s)} + NaNO_{3\,(aq)} \quad \Delta H = -65.5 \text{ kJ mol}^{-1}$$

Which of the following statements is true?
Antara pernyataan berikut, yang manakah benar?

A The reaction is endothermic
Tindak balas adalah endotermik
B The heat is absorbed from the surroundings
Haba diserap dari persekitaran
C The temperature of the mixture solution increases
Suhu larutan campuran meningkat
D 65.5 kJ of heat energy is absorbed to form 1 mole of silver chloride
65.5 kJ tenaga haba diserap untuk membentuk 1 mol argentum klorida

24 The following chemical equation shows the reaction between magnesium and iron(II) sulphate solution.
Persamaan kimia berikut menunjukkan tindak balas antara magnesium dengan larutan ferum(II) sulfat.

$$Mg + FeSO_4 \longrightarrow MgSO_4 + Fe$$

Which of the following increases the frequency of effective collisions of the reacting particles?
Antara berikut yang manakah meningkatkan frekuensi perlanggaran berkesan bahan tindak balas?

A Increase the mass of magnesium
Menambahkan jisim magnesium
B Decrease the size of magnesium
Mengurangkan saiz magnesium
C Increase the volume of iron(II) sulphate solution
Menambahkan isipadu larutan ferum(II) sulfat
D Decrease the temperature of iron(II) sulphate solution
Merendahkan suhu larutan ferum(II) sulfat

25 Choose the correct match between the detergent additive and its function.
Pilih padanan yang betul terhadap bahan tambah detergen dan fungsinya.

	Detergent additive ***Bahan tambah detergen***	**Function** ***Fungsi***
A	Sodium sulphate *Natrium sulfat*	Remove protein stains *Menanggalkan kotoran berprotein*
B	Sodium phosphate *Natrium fosfat*	Whiten the fabric *Memutihkan pakaian*
C	Sodium perborate *Natrium perborat*	Soften the water *Melembutkan air*
D	Silicone *Silikone*	Control the foaming *Mengawal penghasilan buih*

26 Diagram 3 shows the set-up of the apparatus to study the electrical conductivity of substances P and Q.
Rajah 3 menunjukkan susunan radas untuk mengkaji kekonduksian elektrik bahan P dan bahan Q.

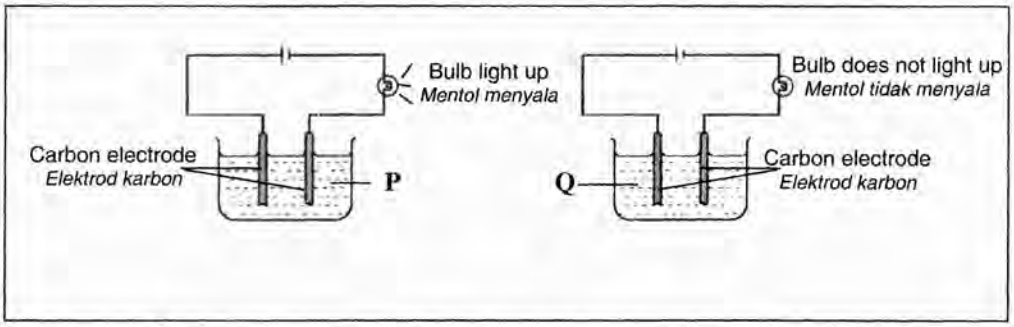


Diagram 3
Rajah 3

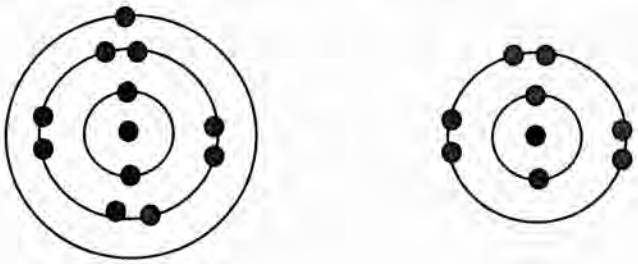
What are P and Q?
Apakah P dan Q?

	P	Q
A	Sodium chloride solution *Larutan natrium klorida*	Glacial ethanoic acid *Asid etanoik glasial*
B	Glucose solution *Larutan glukosa*	Absolute ethanol *Etanol mutlak*
C	Methylbenzene *Metilbenzena*	Copper(II) chloride solution *Larutan kuprum(II) klorida*
D	Acetone *Aseton*	Hydrochloric acid *Asid hidroklorik*

27 Substance Q exists in solid state at 50°C.
Which of the following are the melting and boiling points of substance Q?
Bahan Q wujud dalam keadaan pepejal pada suhu 50°C.
Antara berikut, yang manakah takat lebur dan takat didih bahan Q?

	Melting point(°C) ***Takat lebur(°C)***	**Boiling point(°C)** ***Takat didih(°C)***
A	80	196
B	10	45
C	-20	10
D	-13	55

28 Diagram 4 shows the electron arrangement diagram for atom X and atom Y.
Rajah 4 menunjukkan gambarajah susunan elektron bagi atom X dan atom Y.



Atom X Atom Y

Diagram 4
Rajah 4

Which of the following statements are true when atom X reacts with atom Y?
Antara pernyataan berikut, yang manakah benar apabila atom X bertindak balas dengan atom Y?

I The compound formed is soluble in organic solvent but insoluble in water
Sebatian yang terbentuk larut dalam pelarut organik tetapi tidak larut dalam air

II The compound formed is an ionic compound with the formula of X_2Y
Sebatian yang terbentuk adalah sebatian ionik dengan formula X_2Y

III Atom Y contributes two electrons to be shared with one atom X
Atom Y menyumbangkan dua elektron untuk dikongsi dengan satu atom X

IV Atom X donates one electron to atom Y
Atom X menderma satu elektron kepada atom Y

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

29 The following information shows the properties of glass M.
Maklumat berikut menunjukkan sifat-sifat bagi kaca M.

- Easy to be shape
  Mudah untuk dibentuk
- Expand a lot when it is heated and contract a lot when it is cooled
  Mengembang dengan banyak apabila dipanaskan dan mengecut dengan banyak apabila disejukkan

What is M?
Apakah M?

A Soda lime glass
Kaca soda kapur
B Fused silica glass
Kaca silica terlakur
C Borosilicate glass
Kaca borosilikat
D Lead crystal glass
Kaca plumbum

30 Diagram 5 shows the set-up of the apparatus to study the electrolysis of copper(II) chloride solution.
Rajah 5 menunjukkan susunan radas untuk mengkaji elektrolisis larutan kuprum(II) klorida.

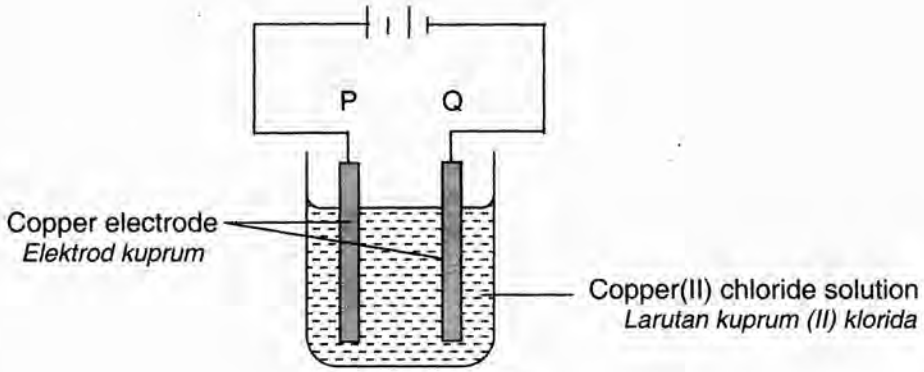


Diagram 5
Rajah 5

Which of the following statements is true?
Antara pernyataan berikut, yang manakah benar?

A Electrode Q becomes thinner
Elektrod Q menipis
B Electrode P becomes thicker
Elektrod P menebal
C Greenish yellow gas is produced at electrode P
Gas kuning kehijauan dibebaskan pada elektrod P
D The intensity of the blue colour solution does not change
Keamatan warna biru larutan tidak berubah

31 Which of the following substances **does not** produce gas at the anode and the cathode during electrolysis process?
*Antara bahan berikut, yang manakah **tidak** akan menghasilkan gas pada anod dan katod semasa proses elektrolisis?*

A Sulphuric acid
Asid sulfurik
B Sodium sulphate solution
Larutan natrium sulfat
C Copper(II) nitrate solution
Larutan kuprum(II) nitrat
D Potassium nitrate solution
Larutan kalium nitrat

32 Diagram 6 shows the cooling curve of molten naphthalene.
Rajah 6 menunjukkan lengkung penyejukan bagi leburan naftalena.

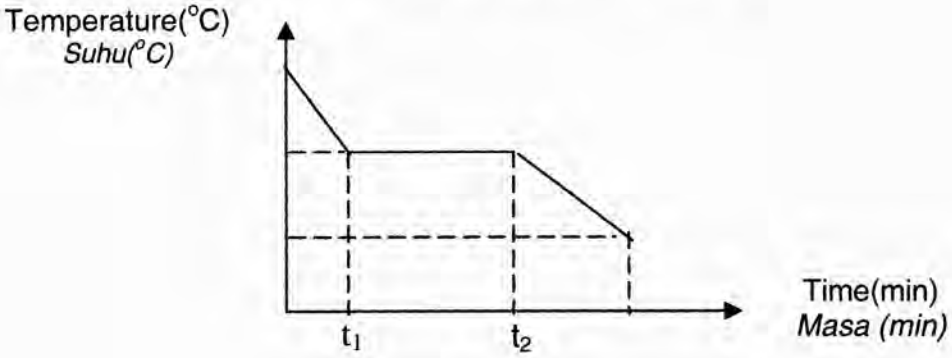
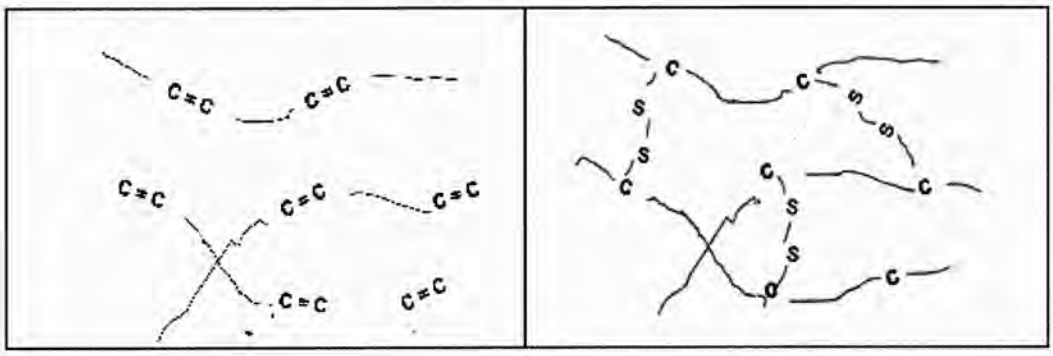


Diagram 6
Rajah 6

Which of the following statements explains about t_1 to t_2
Antara pernyataan berikut, yang manakah menerangkan tentang t_1 ke t_2?

A Heat is absorbed from the surroundings
Haba diserap dari persekitaran
B All particles are closely packed together
Zarah-zarah tersusun dengan padat
C The temperature decreases evenly
Suhu menurun secara seragam
D Naphthalene exists as solid and liquid
Naftalena wujud sebagai pepejal dan cecair

33 Diagram 8 shows the structure of Rubber U and Rubber V.
Rajah 8 menunjukkan struktur Getah U dan Getah V.



Rubber U
Getah U

Rubber V
Getah V

Diagram 8
Rajah 8

Choose the correct match between Rubber U and Rubber V.
Pilih padanan yang betul mengenai Getah U dan Getah V.

	Rubber U ***Getah U***	**Rubber V** ***Getah V***
A	More elastic *Lebih kenyal*	Less elastic *Kurang kenyal*
B	Stronger and harder *Kuat dan keras*	Weaker and softer *Lemah dan lembut*
C	High melting point *Takat lebur tinggi*	Low melting point *Takat lebur rendah*
D	Easily oxidized *Mudah teroksida*	Difficult to oxidize *Tidak mudah teroksida*

34 Which of the following acids has the highest concentration of hydrogen ions?
Antara asid berikut, yang manakah mempunyai kepekatan ion hidrogen yang paling tinggi?

A 50 cm^3 of 1.0 mol dm^{-3} nitric acid
50 cm^3 asid nitrik1.0 mol dm^{-3}
B 50 cm^3 of 1.0 mol dm^{-3} ethanoic acid
50 cm^3 asid etanoik 1.0 mol dm^{-3}
C 50 cm^3 of 1.0 mol dm^{-3} sulphuric acid
50 cm^3 asid sulfurik 1.0 mol dm^{-3}
D 50 cm^3 of 1.0 mol dm^{-3} hydrochloric acid
50 cm^3 asid hidroklorik 1.0 mol dm^{-3}

35 Diagram 8 shows the set-up of the apparatus to study the effect of metal X on the rusting of iron.
Rajah 8 menunjukkan susunan radas untuk mengkaji kesan logam X ke atas pengaratan besi.

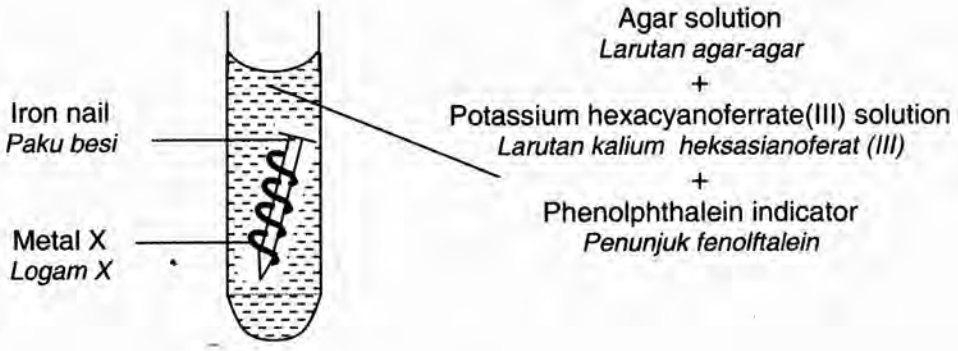


Diagram 8
Rajah 8

After a few days, blue colouration is observed around the iron nail.
What is metal X?
Selepas beberapa hari, warna biru diperhatikan di sekeliling paku besi.
Apakah logam X?

A Zinc
Zink
B Copper
Kuprum
C Aluminium
Aluminium
D Magnesium
Magnesium

36 Table 3 shows the electron arrangement for atom P and atom Q.
Jadual 3 menunjukkan susunan elektron bagi atom P dan atom Q.

Atom *Atom*	**Electron arrangement** *Susunan elektron*
P	2.4
Q	2.8.6

Table 3
Jadual 3

Choose the correct match between the formula and the type of bond formed between atom P and atom Q.
Pilih padanan yang betul mengenai formula dan jenis ikatan yang terbentuk antara atom P dan atom Q.

	Formula *Formula*	**Type of bond** *Jenis ikatan*
A	PQ_2	Ionic bond *Ikatan ion*
B	PQ_2	Covalent bond *Ikatan kovalen*
C	P_2Q	Ionic bond *Ikatan ion*
D	P_2Q	Covalent bond *Ikatan kovalen*

37 What are the number of moles of Fe^{3+} and O^{2-} in 0.2 moles of Fe_2O_3 ?
Berapakan bilangan mol Fe^{3+} dan O^{2-} dalam 0.2 mol Fe_2O_3 ?

	Number of moles of Fe^{3+} *Bilangan mol Fe^{3+}*	**Number of moles of O^{2-}** *Bilangan mol O^{2-}*
A	0.4	0.6
B	0.6	0.4
C	0.2	0.3
D	0.4	0.3

38 A sample of oxide of M contains 2.7 g of M and 2.4 g of oxygen.
What is the empirical formula for this compound?
[Relative atomic mass: O, 16; M, 27]
Suatu sampel oksida M mengandungi 2.7 g M dan 2.4 g oksigen.
Apakah formula empirik bagi sebatian ini?
[Jisim atom relatif: O, 16; M, 27]

A M_3O_2
B M_2O_3
C MO_2
D MO

39 A man is diagnosed as a psychiatric patient. He always restless and normally experience difficulties in sleeping.
Which medicine is suitable to treat him?
Seorang lelaki disahkan sebagai pesakit psikiatrik. Dia sentiasa resah dan biasanya mengalami masalah sukar untuk tidur.
Ubat yang manakah sesuai digunakan untuk merawat lelaki itu ?

A Aspirin
Aspirin
B Codeine
Kodeina
C Barbiturate
Barbiturat
D Streptomycin
Streptomisin

40 The following chemical equation shows the reaction between sodium and oxygen.
Persamaan kimia berikut menunjukkan tindak balas antara natrium dan oksigen.

$$4Na + O_2 \longrightarrow 2Na_2O$$

4.6 g of sodium burns completely with oxygen.
What is the mass of the product?
[Relative atomic mass: Na, 23; O, 16]

4.6 g natrium terbakar lengkap dengan oksigen.
Berapakah jisim hasil tindak balas itu?
[Jisim atom relatif: Na, 23; O, 16]

A 6.2 g
B 7.8 g
C 12.4 g
D 24.8 g

41 Diagram 9 shows the set-up of the apparatus of a chemical cell.
Rajah 9 menunjukkan susunan radas bagi suatu sel kimia.

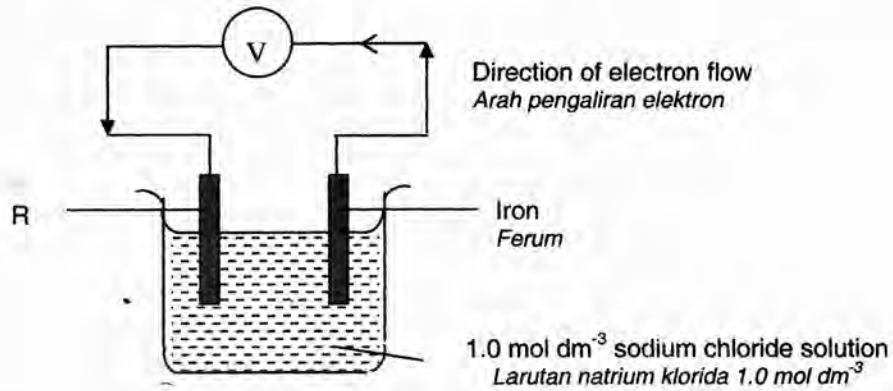


Diagram 9
Rajah 9

What is R?
Apakah R?

A Zinc
Zink
B Lead
Plumbum
C Aluminium
Aluminium
D Magnesium
Magnesium

42 The molecular formula of magnesium ethanoate is $(CH_3COO)_2Mg$.
Calculate the relative molecular mass of magnesium ethanoate.
[Relative atomic mass: H= 1, C= 12, O= 16, Mg= 24]

Formula molekul bagi magnesium etanoat ialah $(CH_3COO)_2Mg$.
Hitungkan jisim molekul relatif bagi magnesium etanoat.
[Jisim atom relatif: H= 1, C= 12, O= 16, Mg= 24]

A 83
B 107
C 118
D 142

43 The following chemical equation shows the reaction between magnesium and hydrochloric acid.
Persamaan kimia berikut menunjukkan tindak balas antara magnesium dan asid hidroklorik .

$$Mg + 2HCl \longrightarrow MgCl_2 + H_2$$

What is the minimum mass of magnesium required to react with excess hydrochloric acid when 360 cm^3 of hydrogen gas is produced at room conditions?
[Molar volume of gas =24 dm^3 mol^{-1} at room conditions;
Relative atomic mass: Mg = 24]

Berapakah jisim minimum magnesium yang diperlukan untuk bertindak balas dengan asid hidroklorik yang berlebihan apabila 360 cm^3 gas hidrogen dihasilkan pada keadaan bilik?
[Isipadu molar gas= 24 dm^3 mol^{-1} pada keadaan bilik;
Jisim atom relatif: Mg = 24]

A 0.24 g
B 0.36 g
C 3.60 g
D 8.64 g

44 Which substance contains the same number of atoms as in 0.5 mol of helium?
[Avogadro's constant: 6.02 X 10^{23} mol^{-1}]

Bahan manakah yang mengandungi bilangan atom yang sama dengan 0.5 mol helium?
[Pemalar Avogadro's constant: 6.02 X 10^{23} mol^{-1}]

A 0.1 mol of oxygen
0.1 mol oksigen
B 0.1 mol of nitrogen
0.1 mol nitrogen
C 0.1 mol of methane
0.1 mol metana
D 0.1 mol of carbon dioxide
0.1 mol karbon dioksida

45 Diagram 10 shows the set-up of the apparatus of an electrolysis process.
Rajah 10 menunjukkan susunan radas bagi suatu proses elektrolisis.

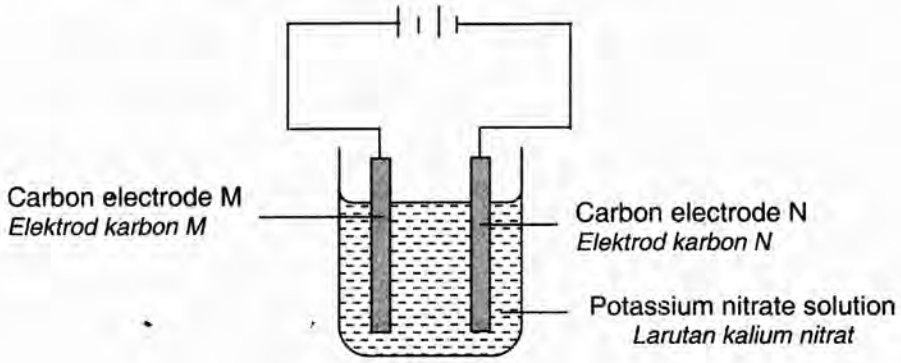


Diagram 10
Rajah 10

Choose the correct match between the half equation at electrode M and electrode N.
Pilih padanan yang sesuai antara setengah persamaan pada elektrod M dan elektrod N.

	Electrode M ***Elektrod M***	**Electrode N** ***Elektrod N***
A	$4OH^- \longrightarrow O_2 + 2H_2O + 4e$	$2H^+ + 2e \longrightarrow H_2$
B	$2H^+ + 2e \longrightarrow H_2$	$4OH^- \longrightarrow O_2 + 2H_2O + 4e$
C	$4OH^- \longrightarrow O_2 + 2H_2O + 4e$	$K^+ + e \longrightarrow K$
D	$O^{2-} \longrightarrow O_2 + 4e$	$2H^+ + 2e \longrightarrow H_2$

46 The following chemical equation shows the decomposition of calcium carbonate.
Persamaan kimia berikut menunjukkan penguraian kalsium karbonat.

$$CaCO_3 \xrightarrow[\Delta]{} CaO + CO_2$$

What is the mass of calcium oxide formed when 5 g of calcium carbonate is heated strongly?
[Relative atomic mass: C= 12, O= 16, Ca= 40]

Berapakah jisim kalsium oksida yang terbentuk apabila 5 g kalsium karbonat dipanaskan dengan kuat?
[Jisim atom relatif: C= 12, O= 16, Ca= 40]

A 0.28 g
B 2.80 g
C 4.60 g
D 8.90 g

47 Table 4 shows information about three voltaic cells.
Jadual 4 menunjukkan maklumat tentang tiga sel voltan.

Pair of metals *Pasangan logam*	**Positive terminal** *Terminal positif*	**Potential difference(V)** *Beza keupayaan (V)*
W, Z	Z	3.1
X, Y	Y	0.3
W, X	X	1.8

Table 4
Jadual 4

What is a potential difference of the voltaic cell when metal Y is paired with metal Z?
Berapakah beza keupayaan bagi sel voltan itu apabila pasangan logam Y dan logam Z digunakan?

A 1.0 V
B 1.3 V
C 2.1 V
D 2.8 V

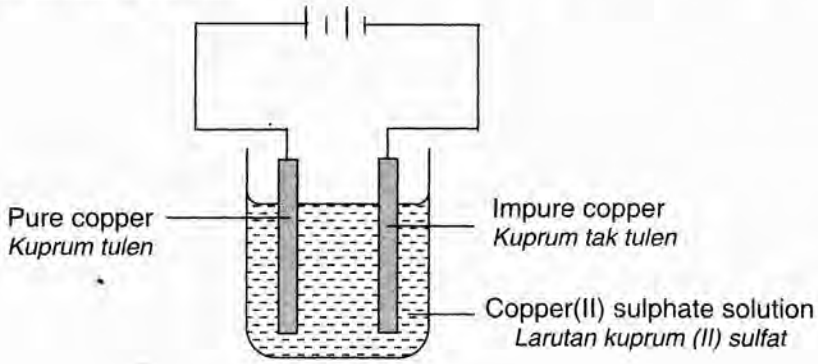
48 How many molecules are there in 100 cm^3 of chlorine gas at room conditions?
[Avogadro's constant: 6.02 X 10^{23} mol^{-1};
Molar volume of gas= 24 dm^3 mol^{-1} at room conditions]

Berapakah bilangan molekul dalam 100 cm^3 gas klorin pada keadaan bilik?
[Pemalar Avogadro: 6.02 X 10^{23} mol^{-1};
Isipadu molar gas= 24 dm^3 mol^{-1} pada keadaan bilik]

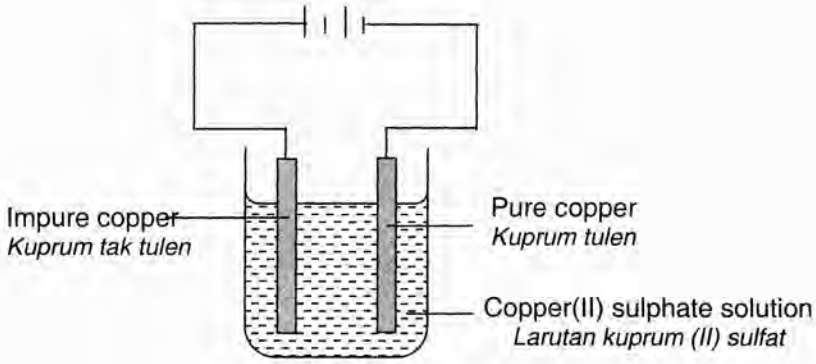
A 2.51 X 10^{21}
B 2.51 X 10^{24}
C 6.02 X 10^{21}
D 6.02 X 10^{25}

49 Which of the following set-up of the apparatus is correct to purify impure copper by using electrolysis method?
Antara susunan radas berikut, yang manakah betul untuk menulenkan kuprum tak tulen dengan menggunakan kaedah electrolisis?

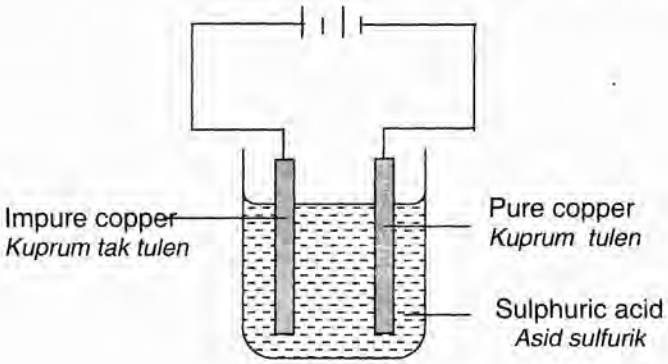
A



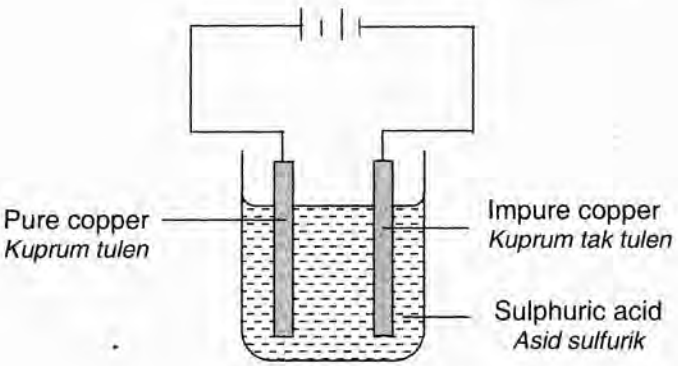
B



C



D



50 Diagram 11 shows the structural formula of an ester.
Rajah 11 berikut menunjukkan formula struktur bagi suatu ester.

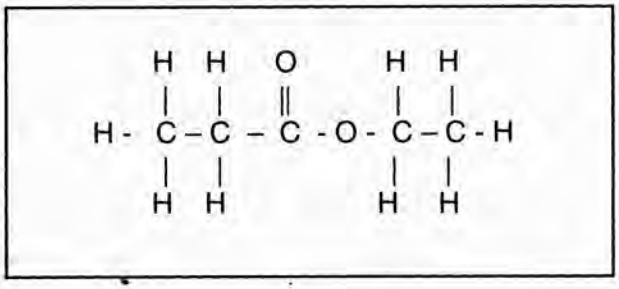


Diagram 11
Rajah 11

Choose the correct match between the alcohol and carboxylic acid used to produce that ester.
Pilih padanan yang sesuai antara alkohol dan asid karboksilik yang digunakan untuk menghasilkan ester itu.

	Alcohol ***Alkohol***	**Carboxylic acid** ***Asid karboksilik***
A	Ethanol *Etanol*	Methanoic acid *Asid metanoik*
B	Methanol *Metanol*	Ethanoic acid *Asid etanoik*
C	Ethanol *Etanol*	Propanoic acid *Asid propanoik*
D	Buthanol *Butanol*	Ethanoic acid *Asid etanoik*

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

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** or **D**. For each question, choose **one** answer only. Blacken your answer on the objective answer sheet provided.
   *Tiap-tiap soalan diikuti oleh empat pilihan jawapan, iaitu **A, B, C** dan **D**. Bagi setiap soalan, pilih **satu** jawapan sahaja. Hitamkan jawapan anda pada kertas jawapan objektif yang disediakan.*

4. If you wish to change your answer, erase the blackened mark that you have made. Then blacken the new answer.
   Jika anda hendak menukar jawapan, padamkan tanda yang telah dibuat. Kemudian hitamkan jawapan yang baru.

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

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

SULIT
4541/2
Chemistry
Kertas 2
2010
2½ Jam

NAMA: .....

NO. KAD PENGENALAN

						–			–				

PEPERIKSAAN PERCUBAAN BERSAMA SIJIL PELAJARAN MALAYSIA 2010

ANJURAN
PERSIDANGAN KEBANGSAAN PENGETUA-PENGETUA SEKOLAH MENENGAH MALAYSIA CAWANGAN PERLIS

CHEMISTRY

KERTAS 2

Dua jam tiga puluh minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Tuliskan* **nombor kad pengenalan** *dan* **nama** *anda pada ruang yang disediakan.*
2. *Kertas soalan ini adalah dalam dwibahasa.*
3. *Soalan dalam Bahasa Inggeris mendahului soalan yang sepadan dalam Bahasa Melayu.*
4. *Calon dibenarkan menjawab keseluruhan atau sebahagian soalan sama ada dalam Bahasa Melayu atau Bahasa Inggeris.*
5. *Calon dikehendaki membaca maklumat di halaman 24.*

Kod Pemeriksa			
Bahagian	**Soalan**	**Markah Penuh**	**Markah Diperoleh**
A	1	9	
	2	9	
	3	10	
	4	10	
	5	10	
	6	12	
B	7	20	
	8	20	
C	9	20	
	10	20	
JUMLAH			

Kertas soalan ini mengandungi **25** halaman bercetak

Section A
Bahagian A

[60 marks]
[60 markah]

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

1. Diagram 1 shows the symbols which represent of four elements W, Q, R and S.
Rajah 1 menunjukkan simbol yang mewakili empat unsur W, Q, R dan S.

$^{12}_{6}W$	$^{14}_{6}Q$	$^{16}_{8}R$	$^{20}_{10}S$

Diagram 1
Rajah 1

(a) (i) What is the nucleon number for W?
Apakah nombor nukleon bagi W?

.....

[1 mark]

(ii) Write the electron arrangement of atom W.
Tuliskan susunan elektron bagi atom W.

.....

[1 mark]

(iii) State the position of element R in Periodic Table of Elements. Explain your answer.
Nyatakan kedudukan unsur R dalam Jadual Berkala. Jelaskan jawapan anda.

.....

.....

.....

[3 marks]

(b) (i) State the atoms that are isotopes.
Nyatakan atom – atom yang merupakan isotop.

.....

[1 mark]

(ii) State the reason for your answer in (b)(i).
Nyatakan sebab bagi jawapan anda di (b)(i).

.....

[1 mark]

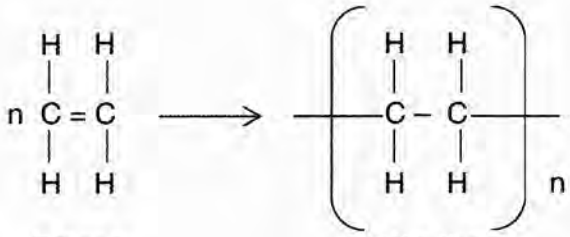
(c) Which elements in Diagram 1 is a monoatomic gas?
Explain your answer.
Antara unsur–unsur dalam Rajah 1, yang manakah gas monoatom?
Terangkan jawapan anda.

.....

.....

.....

[2 marks]



Ethene
Etene

Polyethene
Polietena

Diagram 2
Rajah 2

2. Diagram 2 shows the equation for the formation of polyethene. Polyethene is a synthetic polymer.
Rajah 2 menunjukkan persamaan pembentukan polietena. Polietena merupakan polimer sintetik.

a) (i) What is meant by polymer?
Apakah yang dimaksudkan dengan polimer?

.....

.....

[1 mark]

(ii) Name the process for the formation of polyethene.
Namakan proses bagi pembentukan polietena.

.....

[1 mark]

(iii) State one use of polyethene in our daily live.
Nyatakan satu kegunaan polietena dalam kehidupan harian.

.....

[1 mark]

b) Synthetic polymers are widely used today, but they are difficult to dispose.
Polimer sintetik mempunyai banyak kegunaan pada masa kini, tetapi ia sangat sukar untuk dilupuskan.

(i) It is not wise to dispose synthetic polymers by open burning. Explain why.
Adalah tidak bijak melupuskan polimer sintetik dengan kaedah pembakaran terbuka. Terangkan mengapa.

.....

.....

[1 mark]

(ii) State two ways to overcome the problem in b(i).
Nyatakan dua cara untuk mengatasi masalah di b(i).

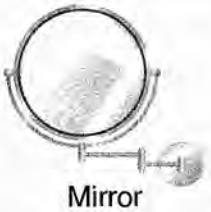
.....

.....

[2 marks]

c) Table 2 shows three types of glass used in our daily lives.
Jadual 2 menunjukkan tiga jenis kaca yang digunakan dalam kehidupan harian.

Complete Table 2 below.
Lengkapkan Jadual 2 di bawah.

Type of glass *Jenis kaca*	Component *Komponen*	Example of glass *Contoh kaca*
.....	Silica *Silika*	 Mirror *Cermin*
Borosilicate glass *Kaca borosilikat*	Silica *Silika* ..... Calcium oxide *Kalsium oksida* Sodium oxide *Natrium oksida* Aluminium oxide *Aluminium oksida*	 Glass lid of slow cooker *Penutup kaca alat memasak*
.....	Silica *Silika* Sodium oxide *Natrium oksida* Calcium oxide *Kalsium oksida*	 Water Jug *Jag air*  Glass cup *Cawan kaca*

[3 marks]

Table 2
Jadual 2

3. The mixture of 5.0 cm^3 palm oil and 50 cm^3 of 5 mol dm^{-3} sodium hydroxide solutions are boiled in a beaker. Glass rod is used to stir the mixture.
Then 3 spatula of solid sodium chloride and 50 cm^3 of distilled water are added.
The mixture is heated for another 5 minutes and then allowed to cool.

Campuran 5.0 cm^3 minyak sawit dan 50 cm^3 larutan natrium hidroksida 5 mol dm^{-3} dididihkan dalam bikar. Rod kaca digunakan untuk mengacau campuran itu.
3 spatula pepejal natrium klorida dan 50 cm^3 air suling ditambahkan.
Campuran dipanaskan lagi selama 5 minit dan kemudian disejukkan.

a) (i) Name the process involved.
Namakan proses yang terlibat.

.....

[1 mark]

(ii) Sodium chloride added to the mixture. Why?
Natrium klorida ditambah kepada campuran. Mengapa?

.....

[1 mark]

b) Diagram 3.1 shows part of the washing action of soap particles on a cloth stained with grease.

Rajah 3.1 menunjukkan sebahagian daripada tindakan pencucian oleh zarah-zarah sabun ke atas kotoran bergris pada kain.

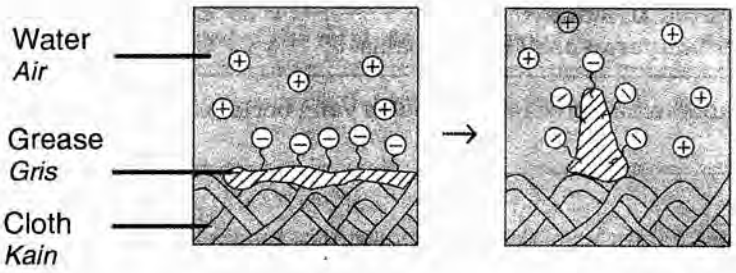


Diagram 3.1
Rajah 3.1

(i) State the part of a soap particle that is soluble in water.
Nyatakan bahagian zarah sabun yang larut dalam gris.

.....

[1 mark]

(ii) What is the effect of soap on the surface tension of water?
Apakah kesan sabun ke atas ketegangan permukaan air?

.....

[1 mark]

(iii) Based on diagram 3.1, explain how does the anion of soap act on grease?
Berdasarkan rajah 3.1, terangkan bagaimana anion sabun bertindak ke atas gris?

.....

.....

.....

[2 marks]

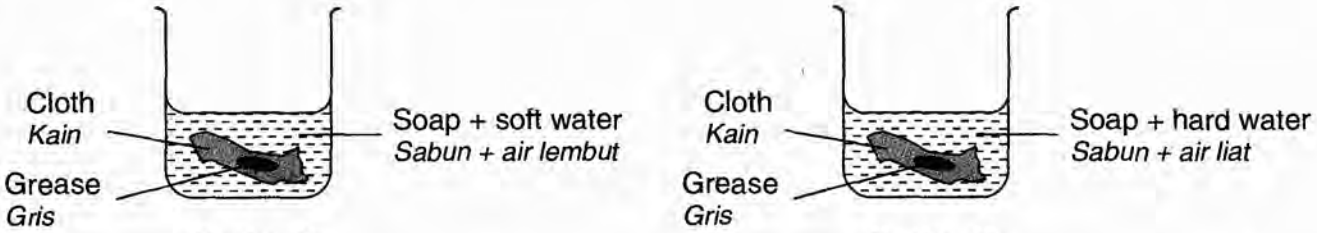


Diagram 3.2
Rajah 3.2

c) Based on Diagram 3.2
Berdasarkan Rajah 3.2

(i) What is the difference between soft water and hard water?
Apakah perbezan antara air lembut dan air liat?

.....

.....

[2 marks]

(ii) In which beaker is the soap more effective as cleaning agent? Explain why.
Dalam bikar manakah sabun bertindak lebih berkesan sebagai agen pembersih?Terangkan mengapa.

.....

.....

[2 marks]

4. A student carried out an experiment to construct an ionic equation for the formation of barium chromate(VI).
Seorang pelajar telah menjalankan satu eksperimen untuk membina persamaan ion bagi pembentukan barium kromat(VI).

Step I 5.0 cm^3 of 0.5 mol dm^{-3} of potassium chromate(VI) solution is poured into each test tube labeled 1 to 8.

Step II 1.0 cm^3 of 0.5 mol dm^{-3} of barium chloride solution is added into test tube 1.

Step III Step II is repeated by using test tube 2 to test tube 8 using the volume of barium chloride solution as shown in Table 4.

Step IV All the test tube are shaken and put in the rack to allow barium chromate(VI) to precipitate. The height of the precipitate is measured and recorded.

Langkah I *5.0 cm^3 larutan kalium kromat (VI) 0.5 mol dm^{-3} dimasukkan ke dalam setiap tabung uji yang berlabel 1 hingga 8.*

Langkah II *1.0 cm^3 larutan barium klorida 0.5 mol dm^{-3} ditambah ke dalam tabung uji 1.*

Langkah III *Langkah 2 diulangi bagi tabung uji 2 hingga 8 dengan menggunakan isipadu larutan barium klorida seperti dalam Jadual 4*

Langkah IV *Semua tabung uji digoncangkan dan diletakkan dalam rak supaya barium kromat(VI) termendak. Tinggi mendakan yang terbentuk diukur dan dicatatkan.*

The result of the experiment is shown in Table 4.
Keputusan eksperimen ditunjukkan dalam Jadual 4.

Test tube *Tabung uji*	1	2	3	4	5	6	7	8
Volume of barium chloride/ cm^3 *Isipadu barium klorida / cm^3*	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0
Height of precipitate / cm *Tinggi mendakan / cm*	1.2	1.4	1.6	1.8	2.0	2.0	2.0	2.0

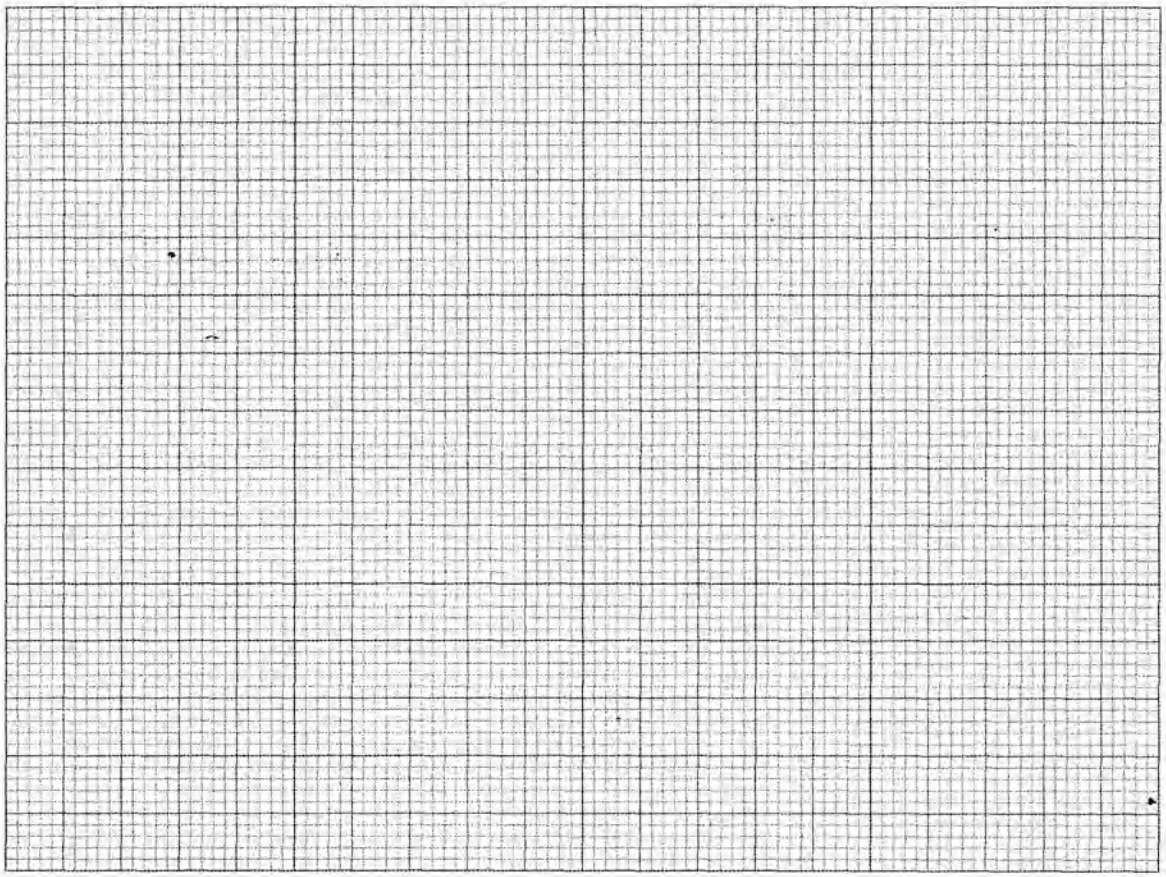
Table 4
Table 4

a) What is the colour of the precipitate formed?
Apakah warna mendakan yang terbentuk?

.....

[1 mark]

b) Based on Table 4, plot a graph of the height of precipitate against the volume of barium chloride solution.
Berdasarkan Jadual 4, lukis graf tinggi mendakan melawan isipadu barium klorida.



[3 marks]

c) Based on the plotted graph in (b)
Berdasarkan graf yang telah dilukis di (b),

(i) Determine the minimum volume of barium chloride solution needed to react completely with 5.0 cm^3 of 1.0 mol dm^{-3} potassium chromate (VI) solution.
Tentukan isipadu minimum larutan barium klorida yang diperlukan untuk bertindakbalas lengkap dengan 5.0 cm^3 larutan kalium kromat (VI) 1.0 mol dm^{-3}.

[1 mark]

(ii) Calculate the number of moles of barium ions, Ba^{2+}.
Hitungkan bilangan mol bagi ion barium, Ba^{2+}.

[1 mark]

(iii) Calculate the number of moles of chromate(VI) ions, CrO_4^{2-}.
Hitungkan bilangan mol bagi ion kromat(VI), CrO_4^{2-}.

[1 mark]

(iv) Calculate the number of moles of chromate(VI) ions, CrO_4^{2-} that has reacted with 1 mole of barium ions, Ba^{2+} .
Hitungkan bilangan mol bagi ion kromat(VI), CrO_4^{2-} yang telah bertindakbalas dengan 1 mol ion barium, Ba^{2+}.

[1 mark]

(v) Based on your answer in (iv), write the ionic equation for the formation of barium chromate(VI).
Berdasarkan jawapan anda dalam (iv), tuliskan persamaan ion bagi pembentukan barium kromat(VI).

.....

[1 mark]

d) The height of precipitate in test tubes 5,6,7 and 8 remains unchanged. Explain why.
Tinggi mendakan dalam tabung uji 5,6,7 dan 8 tidak berubah. Terangkan mengapa.

.....

.....

[1 mark]

5. Diagram 5 shows the set-up of apparatus to investigate the reaction occurred in test tubes A and B.
Rajah 5 menunjukkan susunan radas bagi mengkaji tindak balas yang berlaku di dalam tabung uji A dan B.

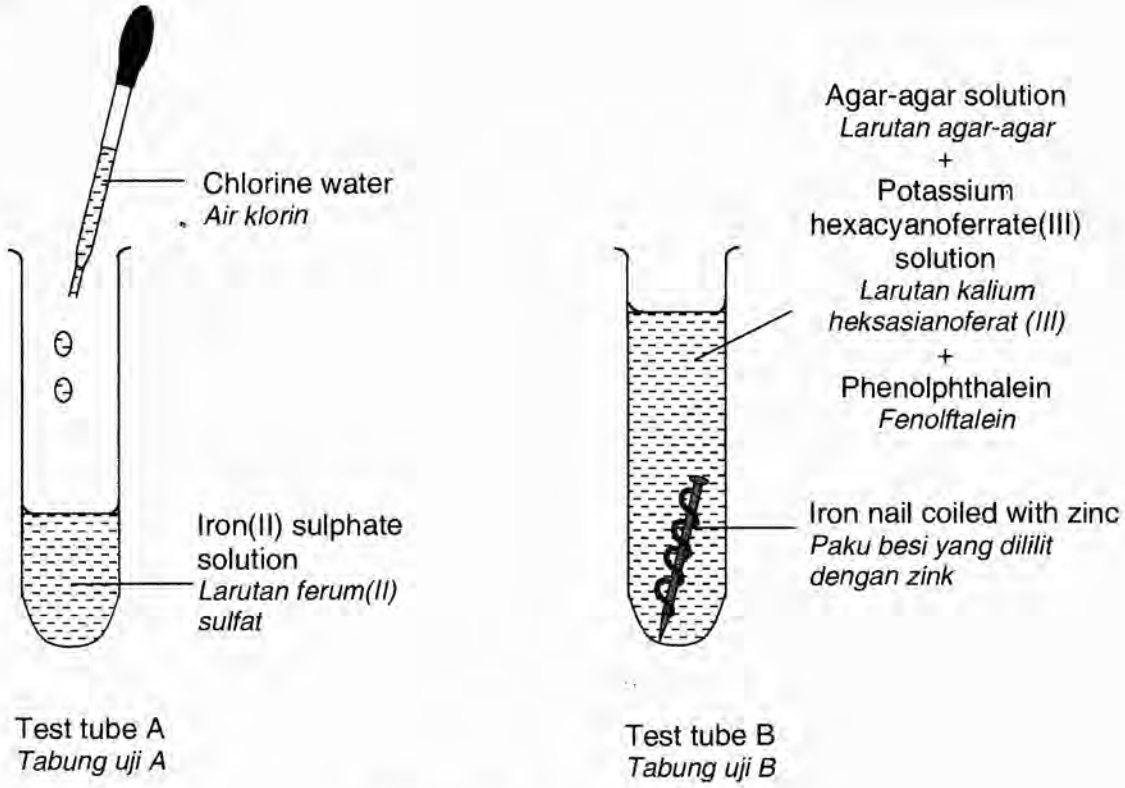


Diagram 5
Rajah 5

(a) Based on test tube A,
Berdasarkan tabung uji A,

(i) name the reaction occurred.
namakan tindak balas yang berlaku.

.....

[1 mark]

(ii) write the ionic equation for the reaction.
tuliskan persamaan ion bagi tindak balas tersebut.

.....

[2 marks]

(iii) state a chemical test to verify the product formed.
nyatakan satu ujian kimia untuk mengesahkan hasil yang terbentuk.

.....

.....

[2 marks]

(b) Based on test tube B,
Berdasarkan tabung uji B,

(i) state the observation involved.
nyatakan pemerhatian yang terlibat.

.....

[1 mark]

(ii) Experiment is repeated by using copper to replace zinc.
State the observation involved.
Eksperimen diulangi dengan menggunakan kuprum bagi menggantikan zink.
Nyatakan pemerhatian yang terlibat.

.....

[1 mark]

(c) Compare the answer in (b)(i) and (b) (ii) and explain why there is a difference in the observation.
Bandingkan jawapan di (b)(i) dan (b) (ii) dan terangkan kenapa terdapat perbezaan dalam pemerhatian.

.....

.....

[2 marks]

(d) When iron is exposed to water and oxygen, it rusts easily. State one method to prevent the rusting of iron.

Apabila besi terdedah kepada air dan oksigen, ia mudah berkarat. Nyatakan satu kaedah untuk mengelakkan besi daripada berkarat.

.....

[1 mark]

6. The equation for combustion of propanol in excess oxygen is given below.
Persamaan tindak balas pembakaran propanol dalam oksigen berlebihan diberikan seperti berikut.

$$C_3H_7OH + \frac{9}{2}O_2 \longrightarrow 3CO_2 + 4H_2O \qquad \Delta H = -2015 \text{ kJ mol}^{-1}$$

(a) State one information that can be obtained from the given equation.
Nyatakan satu maklumat yang boleh diperolehi daripada persamaan yang diberikan.

.....

[1 mark]

(b) Heat given out from the complete combustion of 1.2 g propanol is used to heat 200 cm^3 of water.
Haba yang terbebas daripada pembakaran lengkap 1.2 g propanol digunakan untuk memanaskan 200 cm^3 air.

Calculate:
Hitung:

(i) The heat energy given out in the reaction.
Tenaga haba yang dibebaskan dalam tindak balas ini.

[Molar mass of propanol, C_3H_7OH = 60 $gmol^{-1}$]
[Jisim molar bagi propanol, C_3H_7OH = 60 $gmol^{-1}$]

[2 mark]

(ii) The temperature change in the reaction.
Perubahan suhu dalam tindak balas ini.

[Spesific heat capacity of water = 4.2 Jg^{-1} $^oC^{-1}$; Density of water = 1 gcm^{-3}]
[Muatan haba tentu bagi air = 4.2 Jg^{-1} $^oC^{-1}$; Ketumpatan air = 1 gcm^{-3}]

[2 marks]

(c) Draw the energy level diagram for this reaction.
Lukis gambarajah aras tenaga bagi tindak balas ini.

[3 marks]

(d) The value of the heat of combustion of propanol obtained from the experiment is less than the theoretical value. Suggest one precaution step that should be taken in order to get a more accurate result.

Nilai haba pembakaran propanol yang diperolehi daripada eksperimen ini lebih rendah daripada nilai teori. Cadangkan satu langkah berjaga-jaga yang perlu diambil untuk memperolehi keputusan yang lebih tepat.

.....

[1 mark]

(e) Table 6 shows the molecular formula and the heat of combustion for methanol and ethanol.
Jadual 6 menunjukkan formula molekul dan haba pembakaran bagi methanol dan etanol.

Alcohol *Alkohol*	Molecular formula *Formula molekul*	Heat of combustion/kJmol^{-1} *Haba pembakaran/kJmol^{-1}*
Methanol *Methanol*	CH_3OH	-728
Ethanol *Etanol*	C_2H_5OH	-1376

Table 6
Jadual 6

Based on the information in Table 6, explain why there is a difference in the value of heat of combustion between methanol and ethanol.
Berdasarkan maklumat dalam Jadual 6, terangkan mengapa terdapat perbezaan nilai haba pembakaran antara methanol dan etanol.

.....

.....

.....

.....

[3 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) Food can be cooked faster when smaller pieces of charcoal are used compare to bigger pieces of charcoal. Explain why.
Makanan akan lebih cepat masak apabila menggunakan arang yang bersaiz kecil berbanding arang bersaiz besar. Terangkan mengapa.

[4 marks]

(b) A group of students carried out three experiments to investigate the factors affecting the rate of reaction between sulphuric acid and zinc.
Sekumpulan pelajar menjalankan tiga eksperimen untuk mengkaji faktor-faktor yang mempengaruhi kadar tindak balas di antara asid sulfurik dan zink.

Table 7 shows the results of the experiments.
Jadual 7 menunjukkan keputusan bagi eksperimen itu.

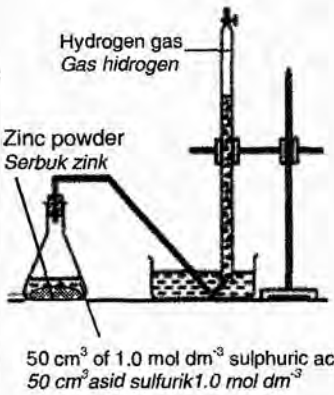
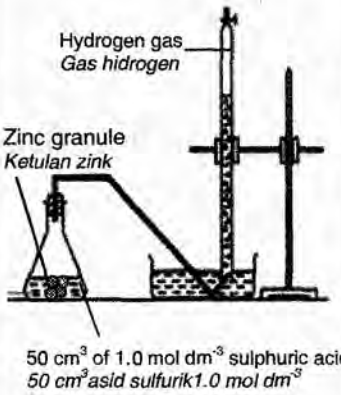
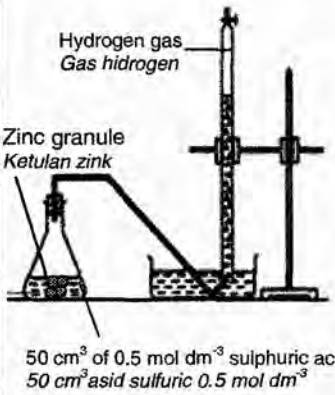
Experiment *Eksperimen*	I	II	III
Set-up of apparatus *Susunan radas*			
Time taken to collect 40 cm^3 of hydrogen gas/s *Masa yang diambil untuk mengumpulkan 40 cm^3 gas hydrogen/s*	80	160	240

Table 7
Jadual 7

(i) Calculate the average rate of reaction for experiment II.
Hitungkan kadar tindak balas purata bagi eksperimen II.

[1 mark]

(ii) Write the chemical equation for the reaction between zinc and sulphuric acid.
Calculate the maximum volume of hydrogen gas produced in Experiment III.
[1 mol of gas occupies the volume of 24 dm^3 at room temperature and pressure]

Tuliskan persamaan kimia bagi tindak balas antara zink dengan asid sulfurik.
Hitungkan isipadu maksimum gas hidrogen yang terhasil dalam Eksperimen III.
[1 mol gas menempati isipadu sebanyak 24 dm^3 pada suhu dan tekanan bilik]

[5 marks]

(iii) Based on Table 7, compare the rate of reaction between
Berdasarkan Jadual 7 bandingkan kadar tindak balas antara

- Experiment I and experiment II
  Eksperimen I and eksperimen II
- Experiment II and experimen III
  Eksperimen II dan eksperimen III

In each case, explain the difference in the rate of reaction with reference to the Collision Theory.
Bagi setiap kes, terangkan perbezaan kadar tindak balas dengan merujuk kepada Teori Perlanggaran.

[10 marks]

8 (a) Diagram 8.1 shows the set-up of the apparatus to study the electrolysis of potassium iodide solution.
Rajah 8.1 menunjukkan susunan radas untuk mengkaji elektrolisis larutan kalium iodida.

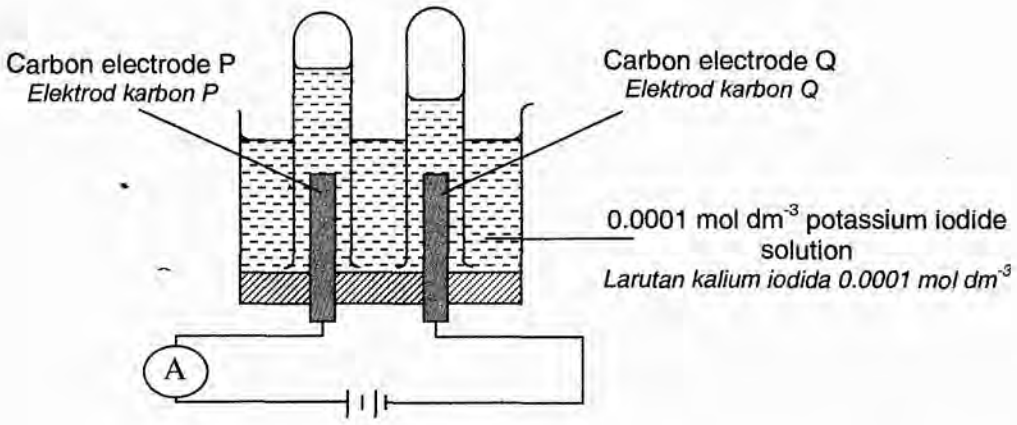


Diagram 8.1
Rajah 8.1

(i) State the ions attracted at electrode P and electrode Q.
Nyatakan ion-ion yang tertarik pada elektrod P dan elektrod Q.

[2 marks]

(ii) Name the products formed at electrode P and electrode Q.
Namakan hasil yang terbentuk pada elektrod P dan elektrod Q.

[2 marks]

(iii) If the experiment is repeated by using 1.0 mol dm^{-3} of potassium iodide solution:
- Name the products formed at electrode P and electrode Q
- Write half equations for both electrodes
- Describe a confirmatory test to verify the presence of the product formed at electrode P

Sekiranya eksperimen ini diulangi dengan menggunakan larutan kalium iodida 1.0 mol dm^{-3}:
- *Namakan hasil yang terbentuk pada elektrod P dan elektrod Q*
- *Tulis setengah persamaan bagi kedua-dua elektrod*
- *Huraikan ujian pengesahan untuk mengesahkan kehadiran hasil yang terbentuk pada elektrod P*

[6 marks]

(b) Diagram 8.2 shows two type of cells.
Rajah 8.2 menunjukkan dua jenis sel.

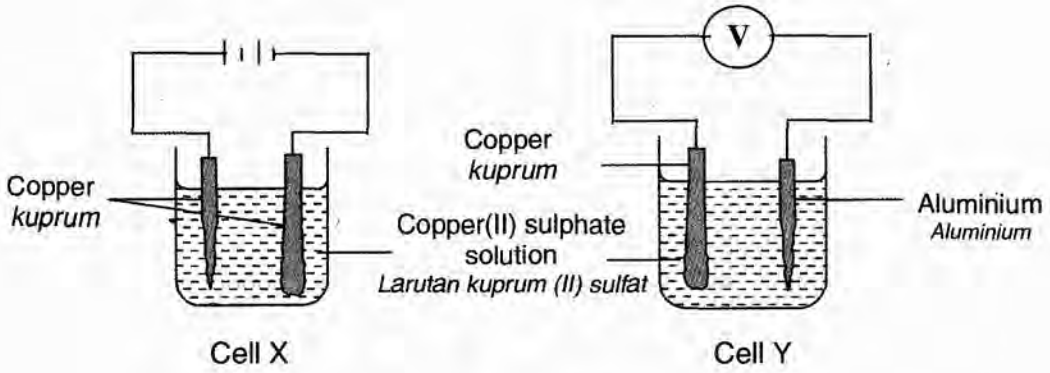


Diagram 8.2
Rajah 8.2

Compare and contrast cell X and cell Y in term of:

- Type of cell
- The energy change
- The terminals of the cells
- Ions presence in the electrolyte
- Observation
- Half equation for both electrodes
- Name of the processes occurred at the positive terminal of each cell

Banding dan beza sel X dan sel Y dari segi:
- *Jenis sel*
- *Perubahan tenaga*
- *Terminal bagi kedua-dua sel*
- *Ion-ion yang hadir dalam elektrolit*
- *Pemerhatian*
- *Setengah persamaan bagi kedua-dua elektrod*
- *Nama proses yang berlaku pada terminal positif kedua-dua sel*

[10 marks]

Section C
Bahagian C

[20 *marks*]
[20 markah]

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

9. (a) Alkene X contains four carbon atoms and is able to show isomerism. Draw and name the structural formulae of two isomers of alkene X.
Alkena X mengandungi empat atom karbon dan boleh menunjukkan keisomeran. Lukis dan namakan dua formula struktur bagi dua isomer alkena X.

[4 marks]

(b) Table 9 shows the information of compound P and compound Q.
Jadual 9 menunjukkan maklumat mengenai sebatian P dan sebatian Q.

Compound P *Sebatian P*	Compound Q *Sebatian Q*
• Has 4 carbon atoms *Mempunyai 4 atom karbon* • Unsaturated hydrocarbon *Hidrokarbon tidak tepu*	• Has 4 carbon atoms *Mempunyai 4 atom karbon* • Saturated hydrocarbon *Hidrokarbon tepu*

Table 9
Jadual 9

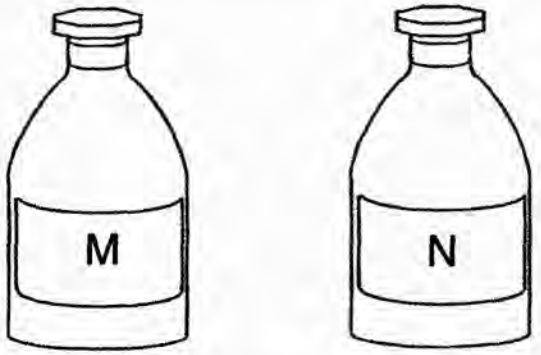
Based on the information in Table 9
Berdasarkan maklumat dalam Jadual 9

- draw the structural formulae
lukis formula struktur
- name the functional group
namakan kumpulan berfungsi
- write the general formula
tulis formula am

for compound P and compound Q.
untuk sebatian P dan sebatian Q.

[6 marks]

(c) Diagram 9 shows two reagent bottles M and N. One of the bottles contains ethanol while another bottle contains ethanoic acid.
Rajah 9 menunjukkan dua botol reagen M dan N. Satu daripada botol-botol tersebut mengandungi etanol dan satu lagi botol mengandungi asid etanoik.



Daigram 9
Rajah 9

Describe a chemical test that can be used to verify ethanol and ethanoic acid in each bottle. Your explanation should include:
Huraikan satu ujian kimia yang boleh digunakan untuk mengenal pasti etanol dan asid etanoik dalam setiap botol. Penerangan anda hendaklah mengandungi:

- List of apparatus and materials
  Senarai bahan dan radas
- Procedure
  Prosedur
- Observations
  Pemerhatian

[10 marks]

10. a) Isotopes have important uses in our daily lives, for example in medicine, industry, agriculture and archeology.
Choose **two** of the above examples.
State an isotope and its purposes in each example that you have chosen.

Isotop mempunyai kegunaan yang penting dalam kehidupan harian, contohnya dalam bidang perubatan, industri, pertanian dan arkeologi.
Pilih dua contoh di atas.
Nyatakan isotop dan kegunaannya dalam setiap contoh yang anda pilih.

[4 marks]

b) Table 10.1 shows the electron arrangement diagram of compound X and Y.
Jadual 10.1 menunjukkan gambarajah susunan elektron bagi sebatian X dan Y.

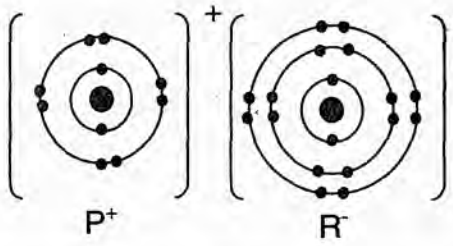
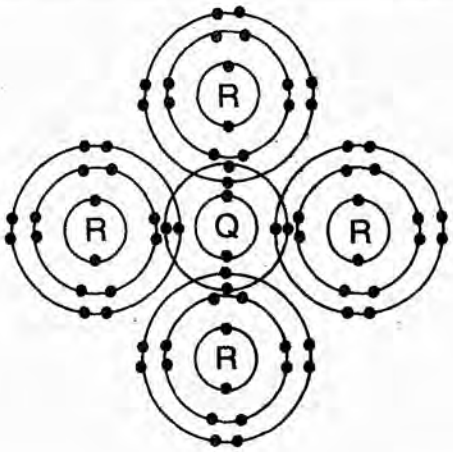
Compound *Sebatian*	Electron arrangement diagram *Gambarajah susunan elektron*
X	
Y	

Table 10.1
Jadual 10.1

(i) Based on Table 10.1, determine the types of compound X and Y.
Berdasarkan Jadual 10.1, tentukan jenis sebatian X dan Y.

[2 marks]

(ii) Compound X and compound Y have different physical properties.
Choose **one** of the physical properties that can differentiate between compound X and Y.
Explain the difference in the physical properties between compound X and Y.

Sebatian X dan sebatian Y mempunyai sifat fizik yang berbeza.
*Pilih **satu** sifat fizik tersebut yang dapat membezakan antara sebatian X and Y.*
Terangkan perbezaan sifat fizik tersebut di antara sebatian X dan Y.

[2 marks]

c) Table 10.2 shows the electron arrangement for atoms W, X, Y and Z. These letters are not the actual symbols of the elements.
Jadual 10.2 menunjukkan susunan elektron bagi atom-atom W, X, Y and Z. Huruf-huruf ini bukanlah merupakan simbol sebenar unsur.

Element *Unsur*	Electron arrangement *Susunan elektron*
W	2.4
X	2.6
Y	2.8.1
Z	2.8.2

Table 10.2
Jadual 10.2

Using the information in Table 10.2, choose any two elements and explain how ionic compound and covalent compound are formed.
Gunakan maklumat dalam Jadual 10.2, pilih mana-mana dua unsur dan terangkan bagaimana sebatian ion dan sebatian kovalen terbentuk.

[10 marks]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

INFORMATION FOR CANDIDATES
MAKLUMAT UNTUK CALON

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

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

3. Answer **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 are 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.

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 Oxygen 16	9 F Flourine 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	48 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 Unnilennium 266									

10 Ne Neon 20 — Proton number; Symbol; Name of element; Relative atomic mass

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 Yterbium 173	71 Lu Lutetium 175
90 Th Thorium 232	91 Pa Proactinium 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 Ein-steinium 254	100 Fm Fermium 253	101 Md Mendele-vium 256	102 No Nobelium 254	103 Lr Lawrensium 257

Reference: Chang, Raymond (1991). Chemistry. McGraw-Hill, Inc.

SULIT
4541/3
Chemistry
Kertas 3
2010
1 1/2 Jam

NAMA: .....

NO. KAD PENGENALAN

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PEPERIKSAAN PERCUBAAN BERSAMA SIJIL PELAJARAN MALAYSIA 2010

ANJURAN
PERSIDANGAN KEBANGSAAN PENGETUA-PENGETUA SEKOLAH MENENGAH MALAYSIA CAWANGAN PERLIS

CHEMISTRY

KERTAS 3

Satu jam tiga puluh minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Tuliskan* **nombor kad pengenalan** *dan* **nama** *anda pada ruang yang disediakan.*
2. *Kertas soalan ini adalah dalam dwibahasa.*
3. *Soalan dalam Bahasa Inggeris mendahului soalan yang sepadan dalam Bahasa Melayu.*
4. *Calon dibenarkan menjawab keseluruhan atau sebahagian soalan sama ada dalam Bahasa Melayu atau Bahasa Inggeris.*
5. *Calon dikehendaki membaca maklumat di halaman 8.*

Kod Pemeriksa		
Soalan	**Markah Penuh**	**Markah Diperoleh**
1	9	
2	9	
JUMLAH		

Kertas soalan ini mengandungi **8** halaman bercetak

For Examiner's use

Answer **all** *the questions.*
Jawab semua soalan.

1. Diagram 1.1 shows the set-up of apparatus used in an experiment to construct the electrochemical series by referring to the potential difference of four pairs of metals.

Rajah 1.1 *menunjukkan susunan radas yang digunakan dalam satu eksperimen untuk membina siri elektrokimia dengan merujuk kepada beza keupayaan bagi empat pasangan logam.*

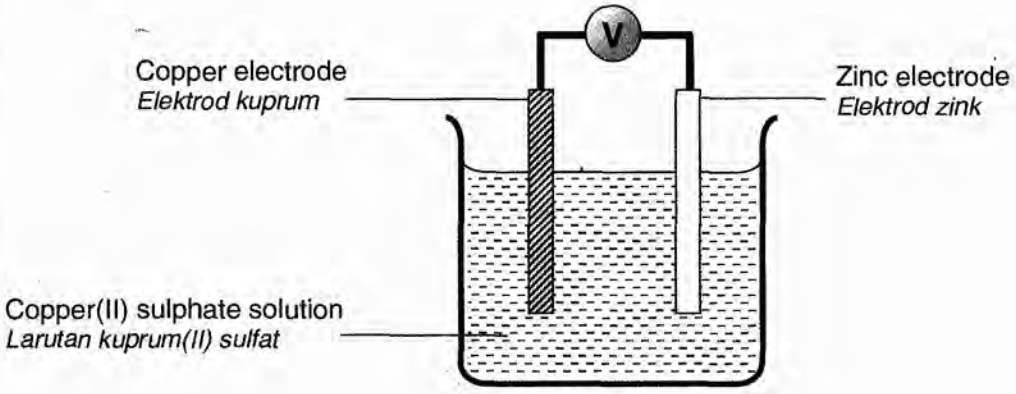


Diagram 1.1
Rajah 1.1

Diagram 1.2 shows the result obtained from the experiment after 30 minutes.
Rajah 1.2 *menunjukkan keputusan yang diperoleh daripada eksperimen selepas 30 minit.*

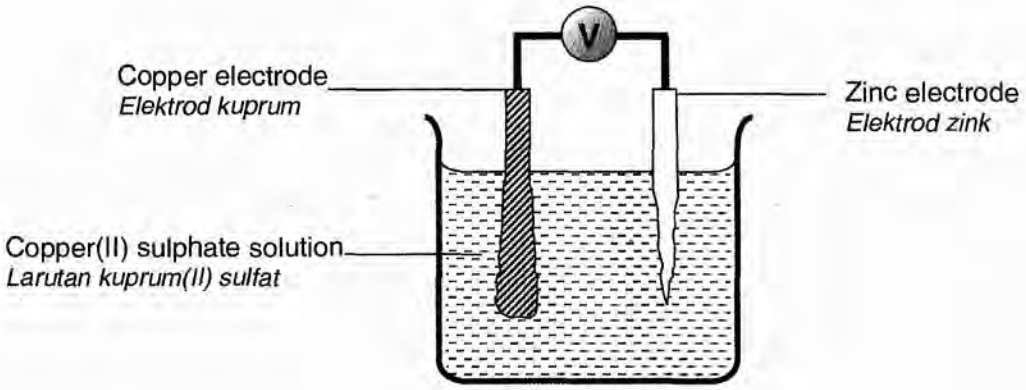


Diagram 1.2
Rajah 1.2

For Examiner's use

1(a)

(a) State **three** different observations and the corresponding inferences in Table 1.1.
*Nyatakan **tiga** pemerhatian yang berbeza dan inferens yang sepadan dalam Jadual* 1.1.

Observation *Pemerhatian*	Inference *Inferens*
1	
2	
3	

Table 1.1
Jadual 1.1

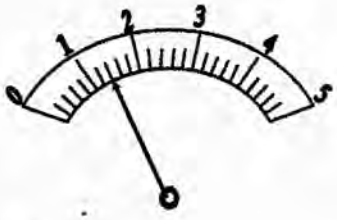
[6 marks]

(b) The experiment is repeated by replacing zinc with metals P, Q and R. Copper electrode remains as the positive terminal in each of the experiments. Fresh copper(II) sulphate solution is used in each of the experiments.

Eksperimen diulangi dengan menggantikan zink dengan logam P, Q dan R. Elektrod kuprum kekal sebagai terminal positif bagi setiap eksperimen. Larutan kuprum(II) sulfat yang baru digunakan bagi setiap eksperimen.

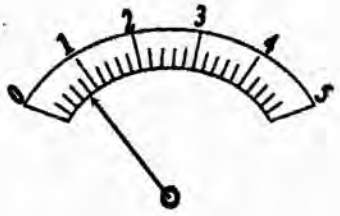
Diagram 1.3 shows the four voltmeter readings of the experiments.
Rajah 1.3 *menunjukkan empat bacaan voltmeter bagi semua eksperimen.*

Zinc and Copper
Zink dan kuprum



Reading:
Bacaan: .....

P and Copper
P dan kuprum



Reading:
Bacaan: .....

For Examiner's use

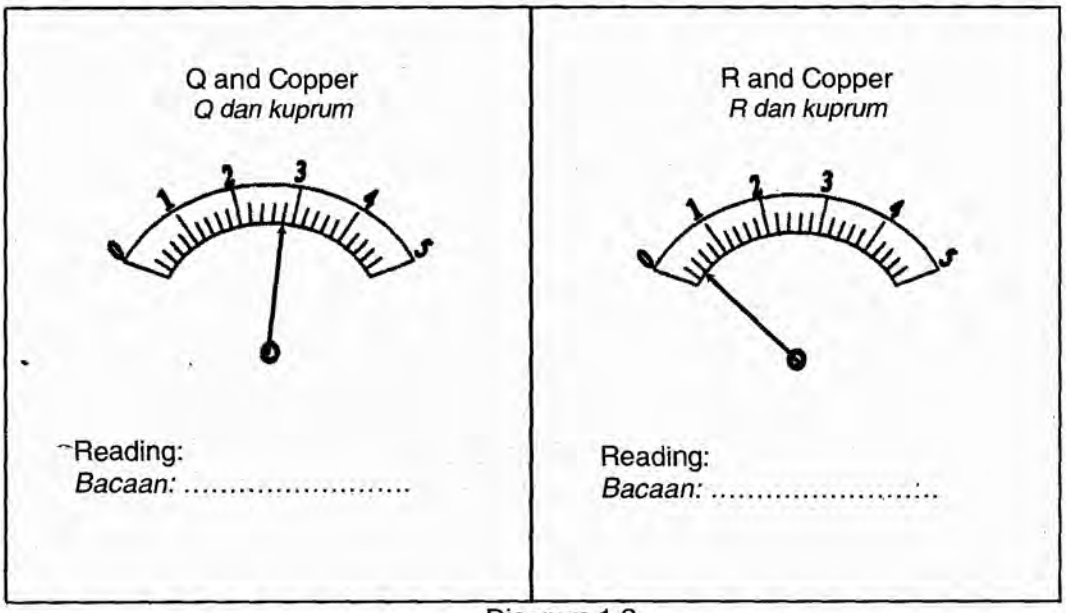


Diagram 1.3
Rajah 1.3

1(b)

Record the voltmeter readings in the spaces provided in Diagram 1.3.
Catatkan bacaan voltmeter pada ruang yang disediakan dalam Rajah 1.3.

[3 marks]

(c) Construct a table to record the voltmeter reading for four pairs of metals.
Bina satu jadual untuk merekodkan bacaan voltmeter untuk empat pasangan logam.

1(c)

[3 marks]

For Examiner's use

1(d)

(d) Based on the voltmeter readings and the copper electrode that acts as the positive terminal in pair of metals, arrange metal Zn, Cu, P, Q, and R in ascending order of electropositivity of metals in the electrochemical series.
Berdasarkan bacaan voltmeter dan elektrod kuprum yang bertindak sebagai terminal positif, susun logam Zn, Cu, P, Q dan R secara tertib menaik keelektropositifan dalam siri elektrokimia.

.....

[3 marks]

1(e)

(e) Based on this experiment, state the:
Berdasarkan eksperimen ini, nyatakan:

i) Manipulated variable
Pemboleh ubah dimanipulasikan

.....

ii) Responding variable
Pemboleh ubah bergerak balas

.....

iii) Constant variable
Pemboleh ubah dimalarkan

.....

[3 marks]

1(f)

(f) State the hypothesis for the experiment.
Nyatakan hipotesis bagi eksperimen ini.

.....

[3 marks]

1(g)

(g) Based on the experiment, state the operational definition for the potential difference.
Berdasarkan eksperimen, nyatakan definisi secara operasi bagi beza upaya.

.....

[3 marks]

1(h)

(h) Classify all the ions present in copper(II) sulphate solution into cations and anions.
Kelaskan ion-ion yang terdapat di dalam larutan kuprum(II) sulfat kepada kation dan anion.

Cations *Kation*	
Anions *Anion*	

[3 marks]

For Examiner's use

1(i)

(i) Predict the positive terminal and the voltage for the pair of metals P and Q.
Ramalkan terminal positif dan nilai voltan bagi pasangan logam P and logam Q.

Pair of Metals *Pasangan logam*	Positive Terminal *Terminal Positif*	Voltage / V *Voltan / V*
P and Q *P dan Q*		

[3 marks]

(j) A student carried out two experiments as shown in Diagram 1.4.
In the experiments, zinc and magnesium electrodes corroded.

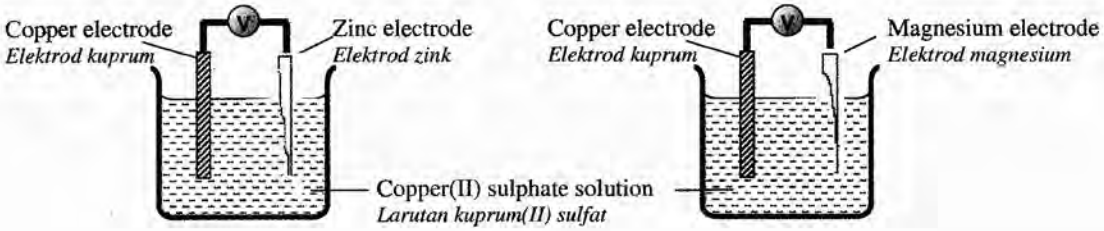


Diagram 1.4
Rajah 1.4

Based on the experiments, zinc electrode takes a longer time to corrode compared to magnesium electrode. Explain why.

Seorang pelajar menjalankan dua eksperimen seperti ditunjukkan dalam Rajah 1.4. Dalam eksperimen ini, elektrod zink dan elektrod magnesium terkakis. Berdasarkan eksperimen, elektrod zink memerlukan masa yang lebih panjang untuk terkakis berbanding dengan elektrod magnesium. Terangkan.

.....

.....

.....

.....

1(j)

[3 marks]

For Examiner's use

2.

Metal reacts with acid to form salt and hydrogen gas.
Logam bertindak balas dengan asid untuk membentuk garam dan gas hydrogen.

Referring to the situation above, plan a laboratory experiment to investigate the effect of concentration **or** catalyst on the rate of reaction between a **named acid** and a **named metal.**

Merujuk kepada situasi di atas, rancangkan satu eksperimen dalam makmal untuk mengkaji kesan kepekatan ***atau*** *kesan mangkin terhadap kadar tindak balas antara suatu* ***asid yang dinamakan*** *dan* suatu ***logam yang dinamakan***

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

(a) Problem statement
Pernyataan masalah

(b) All the variables
Semua pemboleh ubah

(c) Hypothesis
Hipotesis

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

(e) Procedure
Prosedur

(f) Tabulation of data
Penjadualan data

[17 marks]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

INFORMATION FOR CANDIDATES
MAKLUMAT UNTUK CALON

1. This question paper consists of two questions: **Question 1** and **Question 2**.
*Kertas soalan ini mengandungi dua soalan: **Soalan 1** dan **Soalan 2**.*

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

3. Write your answers for **Question 2** on the 'helaian tambahan' provided by the invigilators. You may use equations, diagrams, tables, graphs and other suitable methods to explain your answers.
*Jawapan anda bagi **Soalan 2** hendaklah ditulis dalam helaian tambahan yang dibekalkan oleh pengawas peperiksaan. Anda boleh menggunakan persamaan, rajah, jadual, graf dan cara lain sesuai untuk menjelaskan jawapan anda.*

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

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

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

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

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

9. You are advised to spend 45 minutes to answer **Question 1** and 45 minutes for **Question 2**.
*Anda dinasihati supaya mengambil masa 45 minit untuk menjawab **Soalan 1** dan 45 minit untuk **Soalan 2**.*

10. Tie the 'helaian tambahan' together with this question paper and hand in to the invigilator at the end of the examination.
Ikat helaian tambahan bersama-sama kertas soalan ini dan serahkan kepada pengawas peperiksaan pada akhir peperiksaan.

4541/ 2 (PP)
Kimia
Peraturan
Pemarkahan
2010

PERSIDANGAN KEBANGSAAN PENGETUA-PENGETUA
SEKOLAH MENENGAH NEGERI PERLIS

PEPERIKSAAN PERCUBAAN BERSAMA
SIJIL PELAJARAN MALAYSIA 2010

CHEMISTRY

PERATURAN PEMARKAHAN

UNTUK KEGUNAAN PEMERIKSA SAHAJA

PEPERIKSAAN PERCUBAAN SPM 2010
PERLIS INDERA KAYANGAN

CHEMISTRY

Paper 1

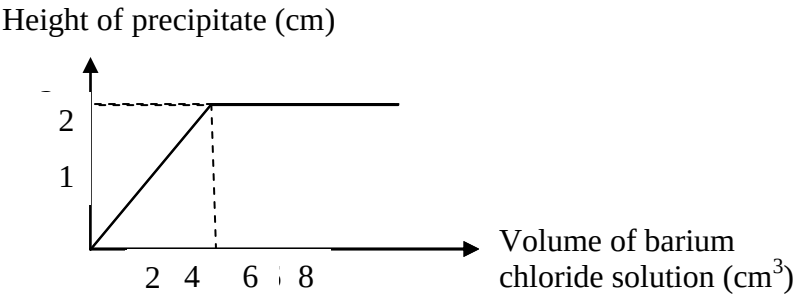
1	**A**
2	**D**
3	**A**
4	**B**
5	**B**
6	**C**
7	**C**
8	**D**
9	**A**
10	**C**
11	**B**
12	**D**
13	**D**
14	**A**
15	**B**
16	**C**
17	**D**
18	**C**
19	**D**
20	**C**
21	**B**
22	**D**
23	**C**
24	**B**
25	**D**

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

1.	(a)	(i)	12	1
		(ii)	2.4	1
		(iii)	Group 16 and period 2 Group 16 because atom R has 6 valence electrons Period 2 because atom R has 2 shells filled with electrons	1 1 1
	(b)	(i)	W and Q	1
		(ii)	Both have same number of proton but different number of neutron//same proton number but different nucleon number.	1
	(c)		S Because its outermost occupied shell is filled with 8 electrons//outermost occupied shell is full// it does not share, donate or receive electrons.	1 1
			TOTAL	9

2	(a)	i)	Long chain/big molecules formed by joining together many repeating subunits/monomer.	**1**
		ii)	Polymerization//polymerisation	**1**
		iii)	Plastic bags//containers//toys//battery cases//pails.	**1**
	(b)	i)	Produce toxic gases//cause air pollution	**1**
		ii)	1. Use biodegradable synthetic polymer 2. Reduse, reuse and recycle synthetic polymers	**1** **1**
	(c)		Type of glass: Fused glass Component: Boron oxide Type of glass: Soda-lime glass	**1** **1** **1**
			TOTAL	**9**

3	(a)	i)	Saponification	1
		ii)	to precipitate the soap//reduce solubility of soap	1
	(b)	i)	Reduce water surface tension	1
		ii)	1. Hydrophilic part soluble in water, hydrophobic part soluble in grease. 2. Anion of soap surround/lifted/loosened the stains/grease from the cloth.	1 1
		iii)	Forming an emulsion	1
	(c)	i)	Soft water does not contain calcium ions and magnesium ions. Hard water contains calcium ions and magnesium ions	1 1
		ii)	Container Q because soap forms scum	1 1
			TOTAL	10

4	(a)	Yellow	1
	(b)	 Axis with correct label and unit Transfer all points correctly Draw the graph correctly	 1 1 1
	(c)	(i) 5.0 cm^3 (ii) 5×0.5/1000 mol // 0.0025 mol (iii) 5×0.5/1000 mol //0 .0025 mol iv) 1 mol v) $Ba^{2+} + CrO_4^{2-} \longrightarrow BaCrO_4$	1 1 1 1 1
	(d)	(All) CrO_4^{2-} react completely // (All) CrO_4^{2-} are used up	1
		TOTAL	10

5	(a)	(i)	Redox reaction	1
		(ii)	$2Fe^{2+} + Cl_2 \rightarrow 2Fe^{3+} + 2Cl^-$ Correct chemical formulae of reactants and products Balance the equation correctly.	 1 1
		(iii)	2 cm^3 of the product formed is put into a test tube. Sodium hydroxide solution is added slowly until in excess. Brown precipitate that is insoluble in excess sodium hydroxide solution is produced	 1 1
	(b)	(i)	Pink colouration / spot is observed	1
		(ii)	Blue colouration / spot is observed	1
	(c)		When iron is in contact with zinc, iron does not rust. When iron is in contact with copper, iron rusts.	1 1
	(d)		Apply grease ont the surface//apply paint on the surface // galvanising // tin plating	1

6	(a)		The reaction is an exothermic reaction /heat released to the sorroundings// 1 mole of propanol burnt in excess oxygen released 2015 kJ of heat energy	1
	(b)	(i)	No. of mol of C3H7OH= 1.2/60 // 0.02 Heat released= 2015 X 0.02 //40.3 kJ//40300 J	1 1
		(ii)	$\Theta = \frac{40.3 \times 1000}{200 \times 4.2}$ // $\frac{40300}{200 \times 4.2}$ $= 47.98\ ^0C$	1 1
	(c)		Energy $C_3H_7OH + 9/2\ O_2$ $H = -2015\ kJ\ mol^{-1}$ $3CO_2 + 4H_2O$ l.Arrow upwards with energy labelled and two energy level shown 2. Reactants and products are at the correct energy level 3. $H = -2015\ kJ\ mol^{-1}$	1 1 1
	(d)		Use wind shield//use thin copper can//never use wire gauze//stir the water with thermometer//weigh the spirit lamp immediately before and after burning	1
	(e)		1.The heat of combustion of ethanol is higher 2.Number of carbon atoms per molecule in ethanol is higher 3. more carbon dioxide and water molecules are produced// more heat is released	1 1 1

Section B

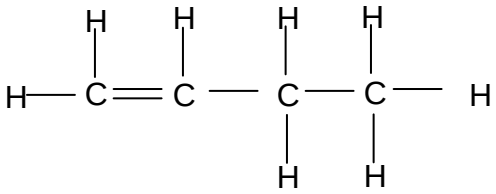
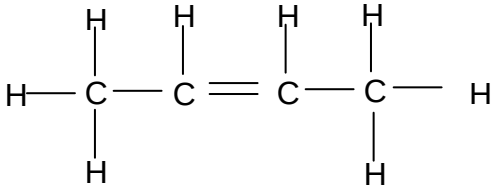
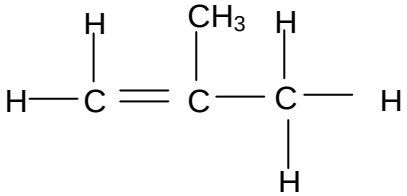
7	(a)	1.Smaller pieces of charcoal has **<u>larger/bigger total surface total area</u>** 2.Smaller pieces of charcoal is easier to burn when exposed to oxygen 3.More heat is produced by smaller pieces of charcoal than big pieces 4.More heat is absorbed by the food	1 1 1 1 4
	(b)	(i)) 40/160 // 0.25 $cm^3 s^{-1}$	1 1
		(ii)) Zn + H_2SO_4 ⟶ $ZnSO_4$ + H_2 1. Correct formula od reactants 2. Correct formula of products 3. Mol of H_2SO_4 = 0.5 X 50/1000 // 0.025 From equation, 1 mol of H_2SO_4 ⟶ 1 mol of H_2 4. If 0.025 mol of H_2SO_4 ⟶ 0.025 mol of H_2 5. Volume of H_2 = 0.025 x 24 dm^3 //0.6 dm^3 // 0.025 x 24000//600 cm^3	1+1 1 1 1 5
		(iii) <u>Expt I and II</u> 1.Rate of reaction of expt I is higher 2.The size of zinc in Expt I is smaller 3.Total surface area of zinc in Expt I is bigger/larger 4.The frequency of collision between **<u>zinc atom and hydrogen ion/H^+</u>** in Expt I is higher 5. The frequency of effective collisionbetween particles in Exp I is higher <u>Expt II and III</u> 1. Rate of reaction in Expt II is higher 2.The concentration of sulphuric acid in Exp II is higher 3. The no. of H^+ per unit volume in Expt II is higher/greater in Expt II// the concentration of hydrogen ion in Expt II is higher 4. The frequency of collision between zinc atom and H^+ in Expt II is higher 5. The frequency of effective collision in Expt II is higher	 1 1 1 1 1 1 1 1 1 1 10
		Total	20

8	(a)	(i) Electrode P: iodide ion/I^- and hydroxide ion/OH^- Electrode Q: hydrogen ion/H^+ and potassium ion/K^+	1 1
		(ii)Electrode P: oxygen molecule/ gas//oxygen Electrode Q: hydrogen molecule/gas//hydrogen **r: formula**	 1 1
		(iii) Electrode P: iodine molecule//iodine Electrode Q: hydrogen molecule/gas//hydrogen ½ equation: P: $2I^- \longrightarrow I_2 + 2e$ Q: $2H^+ + 2e \longrightarrow H_2$ Confirmatory test at P: - Starch solution is added into the solution around electrode P , -blue colouration / precipitate is formed	 1 1 1 1 1 1

(b)

	Cell X	Cell Y
Type of cell	Electrolytic cell	Voltaic cell
The energy change	Electrical energy to chemical energy	Chemical energy to electrical energy
The terminal of the cell	Positive terminal / anode: Copper Negative terminal / cathode: copper	Positive terminal / cathode: copper Negative terminal / anode: aluminium
Ions present in the electrolyte	Cu^{2+}, H^+ SO_4^{2-}, OH^-	
Observation	Anode: Thinner Cathode: brown deposit//brown solid is deposited//thicker	Negative terminal/Aluminium plate: thinner Positive terminal/Copper plate: brown deposit//brown solid is deposited//thicker
Half equation for both electrodes	Anode: $Cu \rightarrow Cu^{2+} + 2e$ Cathode: $Cu^{2+} + 2e \rightarrow Cu$	Al plate/- terminal: $Al \rightarrow Al^{3+} + 3e$ Cu plate//+ terminal: $Cu^{2+} + 2e \rightarrow Cu$

		Name of the process occurred at both electrodes/terminal	Anode/Al plate:Oxidation Cathode/Copper plate//negative terminal: Reduction	10
			Total	**20**

9	(a)		 But-1-ene  But-2-ene  2-methylpropene Choose any two structural formula and correct name	1 1 1 1 1 1 4
	(b)		**P**: Draw structural formula of any one isomer of butene **Q**: Draw structural formula of any one isomer of butane **P**: Carbon-carbon double bond **Q**: Single covalent bond **P**: C_nH_{2n}, n=2,3,……. **Q**: C_nH_{2n+2}, n=1, 2, 3……	1+1 1+1 1+1 6

	(c)	Method 1: Apparatus: test tube Materials: Liquid in bottle M, liquid in bottle N, magnesium ribbon, wooden splinter, matches. Procedure: 1. 5 cm^3 of liquid in bottle M is poured into a test tube. 2. A piece/2 cm of magnesium ribbon is put into the test tube. 3. If the effervescence occurs, test the gas by put a burning wooden splinter at the mouth of the test tube. 4. Any observation is recorded. 5. Steps 1 to 3 are repeated using liquid in bottle N to replace liquid in bottle M. **OR** Method 2 : Apparatus: test tubes and delivery tube fix with stopper Materials: Liquid in bottle M, liquid in bottle N, marble chips, lime water. Procedure: 1. 5 cm^3 of liquid in bottle M is poured into a test tube. 2. A spatula of marble chips is put into the test tube. 3. If the effervescence occurs, test the gas by flow it into lime water. 4. Any observation is recorded. 5. Steps 1 to 3 are repeated using liquid in bottle N to replace liquid in bottle M. Observation: Liquid in bottle M/N: 'Pop sound' is heard // lime water turns milky/cloudy/chalky Liquid in bottle M/N: No change Liquid in bottle M/N is ethanoic acid Liquid in bottle M/N is ethanol	1 1 1 1 1 1 1+1 1 1 10
		Total		20
10	(a)	Medicine- Cobalt-60 ,use to kill cancer cell Archeology- carbon-14, use to determine the age of the fossils [any suitable isotopes and uses]		1+1 1+1 4
	(b)	(i)	Compound X: ionic Compound Y: Covalent	1 1 2
		(ii)	-The melting point of compound X is higher than compound Y -More heat is needed to overcome the strong forces in compound X	1 1

			OR -Compound X can conduct electricity in molten and aqueous solution whereas compound Y cannot conduct electricity in all state -the ions in molten and aqueous solution are freely to move in compound X, no ions/molecules are present in compound Y	 1 1
	(c)		Ionic compound.(Z and X// Y and X) 1. Atom Z releases two electrons to atom X 2. and achieve a stable octet electron arrangement. 3. Z^{2+} formed//Z positive ion formed 4. Atom Y receives two electrons and achieve a stable octet electron arrangement. 5. Y^{2-} formed// Y negative ion formed. 6. Z^{2+} and Y^{2-} are attracted by a strong electrostatic forces // ionic bond Covalent compound(W and X) 1.atom W needs 4 electrons to achieve a stable octet electron arrangement 2. Atom X needs 2 electrons to achieve a stable octet electron arrangement 3. One atom of W contribute four electrons to be shared with two atoms X 4. Two atoms X will contribute two electrons each to be share with one atom W 5. One atom W shares four pairs of electrons with two atoms X, forming two double covalent bonds // The formula of the compound is WX_2/ or can deduce from the diagram	 1 1 1 1 1 1 1 1 1 10
			Total	20

MARKING SCHEME FOR PAPER 3 2010 trial Perlis

<table>
<tr><th>Question</th><th>Rubric</th><th>Score</th></tr>
<tr><td>1(a)</td><td>Able to state all the observations and inferences correctly

<u>Sample answers:</u>

<table>
<tr><th>Observations</th><th>Inferences</th></tr>
<tr><td>1. Zinc electrode become thinner</td><td>Zinc atom ionised to zinc ions</td></tr>
<tr><td>2. Brown deposite is formed at copper electrode</td><td>Copper atom is formed</td></tr>
<tr><td>3. Blue solution turn to Colourless/ become paler // The intensity of blue solution decrease</td><td>Copper(II) ions is discharged to copper atom</td></tr>
</table></td><td>6</td></tr>
<tr><td></td><td>Able to state any 5 answers correctly</td><td>5</td></tr>
<tr><td></td><td>Able to state any 4 answers correctly</td><td>4</td></tr>
<tr><td></td><td>Able to state any 3 answers correctly</td><td>3</td></tr>
<tr><td></td><td>Able to state any 2 answers correctly</td><td>2</td></tr>
<tr><td></td><td>Able to state any 1 answers correctly</td><td>1</td></tr>
<tr><td></td><td>No response or wrong response</td><td>0</td></tr>
</table>

Question	Rubric	Score
1(b)	*Able to state all the voltmeter readings accurately with unit* <u>Sample answer:</u> Zinc and copper : 1.4 V P and copper : 0.8 V Q and copper : 2.8 V R and copper : 0.4 V	3
	Able to state all the voltmeter readings accurately without unit//correct reading with unit. <u>Sample answer:</u> Zinc and copper : 1.40V /1.4 P and copper : 0.80V /0.8 Q and copper : 2.80V/2.8 R and copper : 0.40V/0.4	2
	Able to stateany 2 readings correctly without unit	1
	No response or wrong response	0

<table>
<tr><th>Question</th><th>Rubric</th><th>Score</th></tr>
<tr><td>1(c)</td><td>Able to construct a table to record the voltmeter reading for each pair of metals accurately
<u>Sample answer:</u>

<table><tr><td>Pairs of metals</td><td>Voltage / V</td></tr><tr><td>Zinc and copper</td><td>1.4</td></tr><tr><td>P and copper</td><td>0.8</td></tr><tr><td>Q and copper</td><td>2.8</td></tr><tr><td>R and copper</td><td>0.4</td></tr></table></td><td>3</td></tr>
<tr><td></td><td>Able to construct a table to record the voltmeter reading without unit for each pair of metals

<table><tr><td>Pairs of metals</td><td>Voltage</td></tr><tr><td>Zinc and copper</td><td>1.4</td></tr><tr><td>P and copper</td><td>0.8</td></tr><tr><td>Q and copper</td><td>2.8</td></tr><tr><td>R and copper</td><td>0.4</td></tr></table></td><td>2</td></tr>
<tr><td></td><td>Able to construct a table to record any 2 voltmeter readings without unit.</td><td>1</td></tr>
<tr><td></td><td>No response or wrong response</td><td>0</td></tr>
</table>

Question	Rubric	Score
1(d)	*Able to arrange all the metals in ascending order in electrochemical series* Sample answer: Copper, R, P, Zinc, Q	3
	Able to arrange any four metals in correct ascending order	2
	Able to arrange any three metals in correct ascending order// arrange all the metals in decending order	1
	No response or wrong response	0

Question	Rubric	Score
1(e)	*Able to state the relationship between the manipulated variable and the responding variable with direction.* Sample answer: The further the distance between two metals in the electrochemical series the higher/larger/bigger the voltage value.	3
	Able to state the relationship between the manipulated variable and responding variable. Sample answer: The further the distance between two metals, the higher/larger/bigger the voltage value.	2
	Able to state the idea of hypothesis Sample answer: Different pair of metals have different voltage value	1
	No response or wrong response	0

Question	Rubric	Score
1(f)	*Able to state all the three variables correctly* Sample answer: **Manipulated variable**: Pairs of metals **Responding variable**: Voltmeter reading/voltage **Constant variable**: copper electrode, copper(II) sulphate solution	3
	Able to state any two variables correctly	2
	Able to state any one variable correctly	1
	No response or wrong response	0

Question	Rubric	Score
1(g)	*Able to state the operational definition for the potential difference accurately* Sample answer: The potential difference is the voltmeter reading when two metals are dipped in an electrolyte.	3
	Able to state the operational definition for the potential difference correctly Sample answer: The potential difference is the voltmeter reading when two metals are used.	2
	Able to state an idea for the potential difference Sample answer: Different metals shows different voltmeter reading	1
	No response or wrong response	0

<table>
<tr><th>Question</th><th>Rubric</th><th>Score</th></tr>
<tr><td>1(h)</td><td>Able to classify the cations and anions in copper(II)sulphate solution correctly
<u>Sample answer:</u>
<table><tr><td>Cations</td><td>Cu^{2+}, H^{+}</td></tr><tr><td>anions</td><td>SO_4^{2-}, OH^{-}</td></tr></table></td><td>3</td></tr>
<tr><td></td><td>Able to classify one cation and one anion // cations or anions correctly</td><td>2</td></tr>
<tr><td></td><td>Able to classify one cation or one anion correctly</td><td>1</td></tr>
<tr><td></td><td>No response or wrong response</td><td>0</td></tr>
</table>

<table>
<tr><th>Question</th><th>Rubric</th><th>Score</th></tr>
<tr><td>1(i)</td><td>Able to predict the positive terminal and the voltage value correctly
<u>Sample answer:</u>
<table><tr><td>Positive terminal</td><td>Voltage /V</td></tr><tr><td>P</td><td>2.0</td></tr></table></td><td>3</td></tr>
<tr><td></td><td>Able to predict any one answers correctly</td><td>2</td></tr>
<tr><td></td><td>Able to predict</td><td>1</td></tr>
<tr><td></td><td>No response or wrong response</td><td>0</td></tr>
</table>

<table>
<tr><th>Question</th><th>Rubric</th><th>Score</th></tr>
<tr><td>1(i)</td><td>Able to explain the relationship between the time for negative terminal to corrode and the position in electrochemical series accurately

<u>Sample answer:</u>
The distance between magnesium and copper in electrochemical series further</td><td>3</td></tr>
<tr><td></td><td>Able to explain the relationship between the time for negative terminal to corrode and the position in electrochemical series correctly
<u>Sample answer:</u>
The distance between magnesium and copper further</td><td>2</td></tr>
<tr><td></td><td>Able to state an idea of the relationship between the time for negative terminal to corrode and the position in electrochemical series correctly
<u>Sample answer:</u>
The position magnesium higher than zinc</td><td>1</td></tr>
<tr><td></td><td>No response or wrong response</td><td>0</td></tr>
</table>

Question	Rubric	Score
2(a)	*Able to state the statement of the problem accurately* Sample answer Does the higher the concentration of acid , the higher the rate of reaction?	3
	Able to state the statement of the problem correctly Sample answer Does the concentration of acid increase the rate of reaction? // To investigate the effect of concentration of acid on the rate of reaction.	2
	Able to give an idea of the statement of the problem Sample answer Concentration effect the rate of reaction	1
	No response or wrong response	0

Question	Rubric	Score
2(b)	*Able to state the three variables correctly* Sample answer **Manipulated variable** : Concentration of acid **Responding variable** : Rate of reaction **Constant variable :** Volume of acid //mass of metal	3
	Able to state any two variables correctly	2
	Able to state any one variable correctly	1
	No response or wrong response	0

Question	Rubric	Score
2(c)	*Able to state the relationship correctly between the manipulated variable and the responding variable with direction* Sample answer The higher the concentration of acid the higher the rate of reaction.	3
	Able to state the relationship between the manipulated variable and the responding variable without direction Sample answer The concentration of acid increases the rate of reaction	2
	Able to state the idea of hypothesis Sample answer Different concentration different rate of reaction	1
	No response or wrong response	0

Question	Rubric	Score
2(d)	*Able to state the materials and apparatus accurately* Sample answer **Materials** Zinc, acid [0.5 – 2.0] mol dm^{-3} , water **Apparatus** Conical flask, measuring cylinder, stopper, delivery tube, basin, burette, stopwatch .	3
	Able to give a list of substances and apparatus correctly Sample answer **Materials** Zinc, acid **Apparatus** Conical flask, measuring cylinder, stopper, delivery tube, basin, burette, stopwatch .	2
	Able to give at least one material and one apparatus	1
	No response or wrong response	0

Question	Rubric	Score
2(e)	*Able to state the steps correctly* Sample answer 1. A burette is filled with water and inverted into a basin of water. The initial burette reading is recorded 2. (50-100) cm^3 of acid [0.5 – 2.0] mol dm^{-3} acid is measured and poured into a conical flask. 3. 2 g of zinc powder is added into conical flask 4. The conical flask is closed immediately. 5. At the same time, the stopwatch is started.. 6. The volume of gas is collected in 30 seconds interval for 5 minutes 7. The experiment is repeated using the same volume of acid with different concentration.	3
	Able to state steps 1, 2, 3, 5, 6 and 7	2
	Able to state steps 2 and 3	1
	No response or wrong response	0

<table>
<tr><th>Question</th><th>Rubric</th><th>Score</th></tr>
<tr><td>2(f)</td><td>Able to exhibit the tabulation of data that includes the following information:
1. Heading for manipulated with unit
2. Heading for responding with unit
3. 3 x 12 table
<u>Sample answer</u>

<table>
<tr><td>Time(s)</td><td>0</td><td>30</td><td>60</td><td>90</td><td>120</td><td>150</td><td>180</td><td>210</td><td>240</td><td>270</td><td>300</td></tr>
<tr><td>Burette Reading(cm^3)</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
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</table></td><td>3</td></tr>
<tr><td></td><td>Able to exhibit the tabulation of data that includes the following information:
1 Heading for manipulated with unit// without unit
2. Heading for responding with unit//without unit
3. 3 x 10// 3 x 12 table

Sample answer

<table>
<tr><td>Time(s)</td><td>0</td><td>30</td><td>60</td><td>90</td><td>120</td><td>150</td><td>180</td><td>210</td><td>240</td></tr>
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<tr><td></td><td>Able to exhibit the tabulation of data that includes the following information:
1.Heading for manipulated without unit
2.Heading for responding without unit
3. At least 3 x 8 table

<table>
<tr><td>Time</td><td>0</td><td>30</td><td>60</td><td>90</td><td>120</td><td>150</td><td>180</td></tr>
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</table></td><td>1</td></tr>
<tr><td></td><td>No response or wrong response or empty table</td><td>2</td></tr>
</table>

Question	Rubric	Score
2(a)	*Able to state the statement of the problem accurately* Sample answer Does the presence of catalyst, copper(II) sulphate , increase the rate of reaction?	3
	Able to state the statement of the problem correctly Sample answer Does the presence of a catalyst , increase the rate of reaction?// To investigate the effect of a catalyst on the rate of reaction.	2
	Able to give an idea of the statement of the problem Sample answer Catalyst effect the rate of reaction	1
	No response or wrong response	0

Question	Rubric	Score
2(b)	*Able to state the three variables correctly* Sample answer **Manipulated variable** : Catalyst **Responding variable** : Rate of reaction **Constant variable** **:** Volume and concentration of acid //mass of metal	3
	Able to state any two variables correctly	2
	Able to state any one variable correctly	1
	No response or wrong response	0

Question	Rubric	Score
2(c)	*Able to state the relationship correctly between the manipulated variable and the responding variable with direction* Sample answer The presence of catalyst, copper(II) sulphate , increase the rate of reaction?	3
	Able to state the relationship between the manipulated variable and the responding variable without direction Sample answer A catalyst increases the rate of reaction	2
	Able to state the idea of hypothesis Sample answer Catalyst effect the rate of reaction	1
	No response or wrong response	0

Question	Rubric	Score
2(d)	*Able to state the materials and apparatus accurately* Sample answer **Materials** Zinc powder, copper(II)sulphate solution, water, acid [0.5 – 1.0] mol dm^{-3} **Apparatus** Conical flask cm^3, measuring cylinder, stopper with delivery tube, basin, burette, stopwatch .	3
	Able to give a list of substances and apparatus correctly Sample answer **Materials** Zinc powder, copper(II)sulphate solution, water, acid **Apparatus** Conical flask, measuring cylinder, stopper with delivery tube, basin, burette, stopwatch .	2
	Able to give at least one material and one apparatus	1
	No response or wrong response	0

Question	Rubric	Score
2(e)	*Able to state the steps correctly* Sample answer 1. A burette is filled with water and inverted into a basin of water. The initial burette reading is recorded 2. (50-100) cm^3 of acid [0.5 – 1.0] mol dm^{-3} acid is measured and poured into a conical flask. 3. 5 cm^3 of acid 0.5 mol dm^{-3} copper(II)sulphate solution is added into conical flask 4. 2 g of zinc powder is added into conical flask 5. The conical flask is closed immediately. 6. At the same time, the stopwatch is started.. 7. The volume of gas is collected in 30 seconds interval for 5 minutes 8. The experiment is repeated without adding copper(II) sulphate solution	3
	Able to state steps 1, 2, 3, 4, 6, 7and 8	2
	Able to state steps 2, 3 and 4	1
	No response or wrong response	0

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11. 3 x 12 table
<u>Sample answer</u>

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2. Heading for responding with unit//without unit
3. 3 x 10// 3 x 12 table

Sample answer

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</table>

END OF MARKING SCHEME