

INFORMATION FOR CANDIDATES
MAKLUMAT UNTUK CALON

1. This question paper consists of **50** questions.
Kertas soalan ini mengandungi 50 soalan.
2. Answer **all** questions.
Jawab semua soalan.
3. Each question is followed by four alternative answers, **A,B,C** and **D**. For each question, choose one answer only. Blacken your answer on the objective answer sheet provided.
Tiap-tiap soalan 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.
Sekiranya anda hendak menukar jawapan, padamkan tanda yang telah dibuat. Kemudian hitamkan jawapan yang baru.
6. The diagrams in the questions provided are not drawn to scale unless stated.
Rajah yang mengiringi soalan tidak dilukis mengikut skala kecuali dinyatakan.
7. You may use a non-programmable scientific calculator.
Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogram.

- 1 Carbon-12 and carbon-14 are isotopes.
[Proton number of carbon = 6]

What is the valence electron of carbon-14?

*Karbon-12 dan karbon-14 adalah isotop.
[Nombor proton bagi karbon = 6]*

Berapakah elektron valens bagi karbon-14?

- A 2
B 4
C 6
D 8
- 2 Which ions are present in sodium chloride solution?
Ion-ion manakah yang hadir dalam larutan natrium klorida?
- A Na^+ and Cl^-
B Na^+ , Cl^- , H^+ and O^{2-}
C Na^+ , Cl^- , H^+ and OH^-
D Na^+ , Cl^- , H_3O^+ and O^{2-}
- 3 Diagram 1 below shows elements in The Periodic Table of Elements.
Rajah 1 di bawah menunjukkan unsur-unsur dalam Jadual Berkala Unsur.

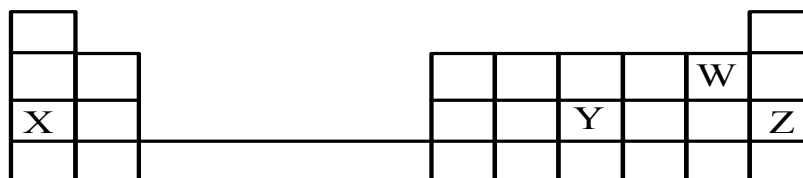


Diagram 1

Which element is a Group 17 element?
Unsur manakah adalah unsur Kumpulan 17?

- A W
B X
C Y
D Z

- 4 Diagram 2 shows the electron arrangement of the P^{2+} ion.
Rajah 2 menunjukkan susunan elektron bagi ion P^{2+} .

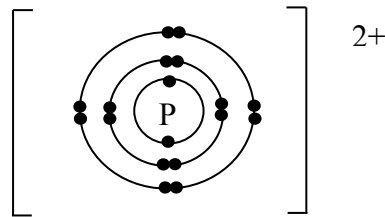


Diagram 2

What is the electron arrangement of atom P?
Apakah susunan elektron bagi atom P?

- A 2.8.2
B 2.8.8
C 2.8.8.2
D 2.8.8.8
- 5 Diagram 3 shows the apparatus set-up for electrolysis.
Rajah 3 menunjukkan susunan radas bagi elektrolisis.

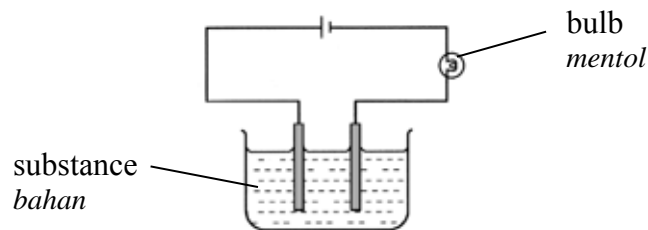


Diagram 3

Which of the following substance could light up the bulb?
Antara bahan berikut, yang manakah dapat menyalakan mentol ?

- A Air
Udara
B Wood
Kayu
C Sugar solution
Larutan gula
D Sodium chloride solution
Larutan natrium klorida

- 6 Which of the following is a monoprotic acid ?
Antara yang berikut, yang manakah asid monoprotik ?
- A Nitric acid, HNO_3
Asid nitrik
 - B Sulphuric acid, H_2SO_4
Asid sulfurik
 - C Phosphoric acid, H_3PO_4
Asid fosforik
 - D Carbonic acid, H_2CO_3
Asid karbonik
- 7 Which of the following substances is an insoluble salt?
Antara bahan berikut, yang manakah garam tak larut ?
- I Sodium chloride, NaCl
Natrium klorida, NaCl
 - II Barium sulphate, BaSO_4
Barium sulfat, BaSO_4
 - III Potassium nitrate, KNO_3
Kalium nitrat, KNO_3
 - IV Lead(II) carbonate, PbCO_3
Plumbum(II) karbonat, PbCO_3
- A I and II
 - B I and III
 - C II and III
 - D II and IV
- 8 Which of the following is a natural polymer?
Yang manakah berikut merupakan polimer semulajadi?
- A Latex
Lateks
 - B Perspex
Perspek
 - C Nylon
Nilon
 - D Teflon
Teflon

- 9 Which of the following mixtures has the highest initial rate of reaction?
Di antara campuran berikut, yang manakah mempunyai kadar tindakbalas awal tertinggi?

- A 5 g zinc powder and 0.1 mol dm⁻³ hydrochloric acid
5 g serbuk zink dan 0.1 mol dm⁻³ asid hidroklorik
- B 10 g zinc powder and 0.2 mol dm⁻³ hydrochloric acid .
10 g serbuk zink dan 0.2 mol dm⁻³ asid hidroklorik
- C 5 g solid zinc metal foil and 0.1 mol dm⁻³ hydrochloric acid
5 g kepingan logam zink dan 0.1 mol dm⁻³ asid hidroklorik
- D 10 g zinc metal foil and 0.2 mol dm⁻³ hydrochloric acid
10 g kepingan logam zink dan 0.2 mol dm⁻³ asid hidroklorik

- 10 When substance Q is added to latex, the coagulation of latex is prevented.
What is Q?

*Apabila bahan Q ditambahkan pada lateks, penggumpalan lateks tidak berlaku.
Apakah Q?*

- A Water
Air
- B Ethanol
Etanol
- C Ethanoic acid
Asid etanoik
- D Aqueous ammonia
Ammonia akueus
- 11 What is the oxidation number of sulphur, S in SO₄²⁻ ion?
Apakah nombor pengoksidaan sulfur, S dalam ion SO₄²⁻?

- A +2
- B - 2
- C +6
- D - 6

- 12** Which statement is correct about exothermic reaction?
Pernyataan manakah yang betul mengenai tindak balas eksotermik?
- A** Heat is released
Haba dibebaskan
 - B** The initial temperature is higher than the final temperature
Suhu awal lebih tinggi daripada suhu akhir
 - C** Container of reaction mixture become cold
Bekas bagi campuran tindak balas menjadi sejuk
 - D** Total energy contents of reactant lower than product
Jumlah kandungan tenaga bahan tindak balas rendah daripada hasil tindak balas
- 13** Which of the following ions reduce the effectiveness of soaps in hard water?
Antara ion-ion berikut, yang manakah mengurangkan keberkesanan sabun dalam air liat?
- A** Calcium ions and sodium ions
Ion kalsium dan ion natrium
 - B** Aluminium ions and iron(II) ions
Ion aluminium dan ion ferum(II)
 - C** Calcium ions and magnesium ions
Ion kalsium dan ion magnesium
 - D** Magnesium ions and potassium ions
Ion magnesium dan ion kalium

- 14 Diagram 4 shows a graph for the cooling of liquid naphthalene.
Rajah 4 menunjukkan graf bagi penyejukan cecair naftalena.

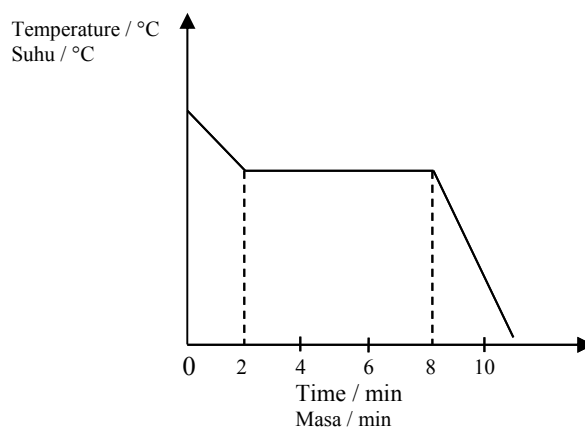


Diagram 4

Which of the following is true about the naphthalene particles at the tenth minute?

Berikut yang manakah benar mengenai zarah naftalena pada minit kesepuluh?

- A** Molecules are packed closely but not in orderly arrangement.
Molekul-molekul tersusun rapat tetapi tidak teratur.
- B** Some of the molecules are free to move.
Sebahagian daripada molekul-molekul bebas bergerak.
- C** Molecules are closely packed and free to move.
Molekul-molekul tersusun rapat dan bebas bergerak.
- D** Molecules are closely packed and vibrate.
Molekul-molekul tersusun rapat dan bergetar.
- 15 The molecule of a compound consists of one carbon atom and four chlorine atoms. What is the name of this compound?
Molekul satu sebatian mengandungi satu atom karbon dan empat atom klorin. Apakah nama sebatian ini ?
- A** Ammonia
Ammonia
- B** Carbon disulphide
Karbon disulfida
- C** Boron trifluoride
Boron trifluorida
- D** Carbon tetrachloride
Karbon tetraklorida

- 16** The following are the properties of three elements in Period 3 of the Periodic Table.

Berikut adalah ciri bagi tiga unsur dalam Kala 3 dalam Jadual Berkala.

- P inert gas that is used to fill electric bulbs.
gas lengai yang digunakan untuk mengisi mentol elektrik.
- Q shiny and soft metal
logam berkilat dan lembut
- R non-metal that is used to make semi-conductors.
bukan logam yang digunakan untuk membuat semikonduktor.

Arrange these elements in the order of increasing proton numbers.

Susun unsur-unsur ini mengikut pertambahan nombor proton.

- A** Q, R, P
- B** Q, P, R
- C** P, Q, R
- D** P, R, Q
- 17** Which of the following compound is an ionic compound?
Antara sebatian yang berikut, yang manakah merupakan sebatian ion?
- A** Magnesium sulphate
Magnesium sulfat
- B** Carbon dioxide
Karbon dioksida
- C** Hydrogen chloride
Hidrogen klorida
- D** Ethyl ethanoate
Etil etanoat

- 18 Diagram 5 shows the apparatus set-up of an electrolysis by using carbon electrodes.

Rajah 5 menunjukkan susunan radas bagi elektrolisis dengan menggunakan elektrod- elektrod karbon.

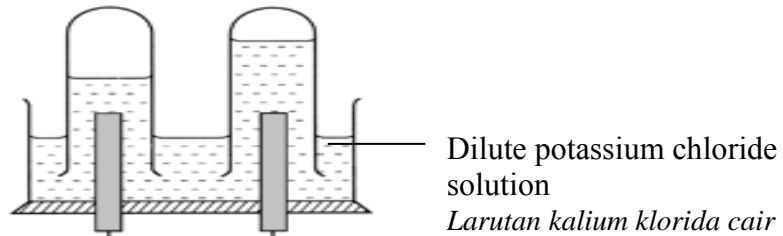


Diagram 5

What are the selectively discharged ions in this reaction?

Apakah ion-ion yang dipilih untuk dinyahcas dalam tindak balas ini?

	Anode <i>Anod</i>	Cathode <i>Katod</i>
A	OH^-	K^+
B	Cl^-	K^+
C	OH^-	H^+
D	Cl^-	H^+

- 19 Which characteristics of sodium hydroxide enable it to show alkaline properties in water?

Yang manakah ciri natrium hidroksida membolehkannya menunjukkan sifat kealkalian dalam air?

- A** Dissolves in water
Larut dalam air
- B** Contains hydrogen ions
Mengandungi ion hidrogen
- C** Contains hydroxide ions
Mengandungi ion hidroksida
- D** Ionises in water to form hydroxide ions
Mengion dalam air untuk membentuk ion-ion hidroksida.

- 20 The following information shows the properties of salt X solution.
Maklumat berikut menunjukkan sifat-sifat larutan garam X.

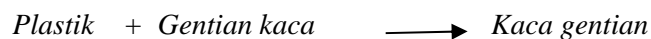
Form yellow precipitate when added to lead(II) nitrate solution.
Membentuk mendakan kuning apabila ditambah kepada larutan plumbum(II) nitrat.

What is salt X?
Apakah garam X?

- A** Zinc nitrate
Zink nitrat
- B** Zinc sulphate
Zink sulfat
- C** Potassium iodide
Kalium iodida
- D** Potassium carbonate
Kalium karbonat
- 21 The equation below shows the formation of fibre glass.



Persamaan di bawah menunjukkan pembentukan gentian kaca.



Why is fibre glass better than common plastic?
Kenapakah kaca gentian lebih baik daripada plastik biasa?

- A** High tensile strength
Kekuatan regangan tinggi
- B** Resistant to corrosion
Tahan kakisan
- C** Able to withstand heat
Tahan haba
- D** Good conductor of electricity
Konduktor elektrik yang baik

- 22 Diagram 6 shows the graph of volume of carbon dioxide gas against time when 5 g of marble chips is added to 50 cm³ of 0.2 mol dm⁻³ hydrochloric acid.
Rajah 6 menunjukkan graf isipadu gas karbon dioksida melawan masa apabila 5g ketulan marmar dimasukkan ke dalam 50 cm³ asid hidroklorik 0.2 mol dm⁻³.

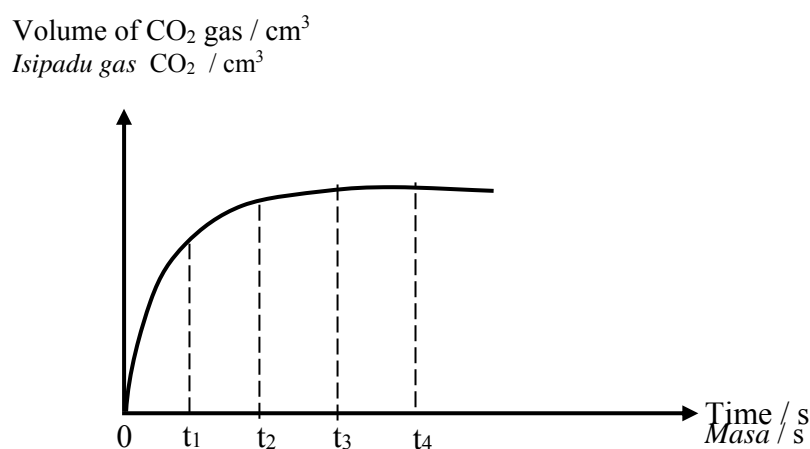


Diagram 6

At what time the rate of reaction is the highest?
Pada masa berapakah kadar tindak balas paling tinggi?

- A t₁
B t₂
C t₃
D t₄
- 23 Diagram 7 below shows molecular formulae of two hydrocarbon compounds.
Rajah 7 di bawah menunjukkan formula molekul bagi dua sebatian hidrokarbon.

C₄H₈ Compound A Sebatian A	C₄H₁₀ Compound B Sebatian B
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Diagram 7

Which of the following is **true** about compounds A and B?
Antara berikut, yang manakah **benar** tentang sebatian A dan B?

- A Compound A is a saturated hydrocarbon
Sebatian A adalah hidrokarbon tepu
- B Compound B is soluble in water.
Sebatian B larut dalam air
- C Compound A produces a lot of soot when burnt in air
Sebatian A menghasilkan banyak jelaga apabila terbakar dalam udara
- D Compound B undergoes addition reaction
Sebatian B mengalami tindak balas penambahan

- 24 The following half- equation represent an oxidation reaction for calcium.
Persamaan setengah berikut menunjukkan tindakbalas pengoksidaan bagi kalsium.

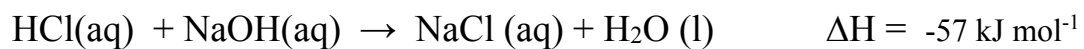


What is meant by oxidation reaction based on the equation?

Apakah yang dimaksudkan dengan tindakbalas pengoksidaan berdasarkan persamaan tersebut ?

- A** Calcium atoms receive protons
Atom kalsium menerima proton
- B** Calcium atoms donate electrons
Atom kalsium menderma elektron
- C** Calcium ions receive electrons
Ion kalsium menerima elektron
- D** Calcium ions donate electrons.
Ion kalsium menderma elektron.
- 25 Which of the following statement is **true** about the cleansing action of soap?
*Antara pernyataan berikut ,yang manakah **benar** tentang tindakan pembersihan bagi sabun?*
- A** The hydrophobic part of soap are soluble in water
Bahagian hidrofobik sabun larut dalam air
- B** Soap form scum with soft water
Sabun membentuk kekat dalam air lembut
- C** Soap form scum with hard water
Sabun membentuk kekat dalam air keras
- D** Soap cause the cloth wet hardly
Sabun menyebabkan pakaian sukar di basahkan

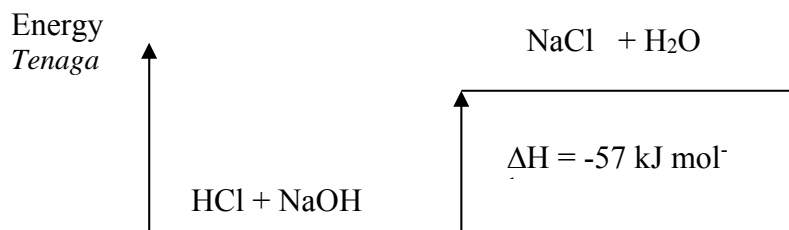
- 26 The equation below shows an exothermic reaction between hydrochloric acid and sodium hydroxide solution. The heat of neutralisation is -57 kJ mol^{-1}
Persamaan di bawah menunjukkan tindak balas eksotermik di antara asid hidroklorik dan larutan natrium hidroksida. Haba peneutralan adalah -57 kJ mol^{-1}



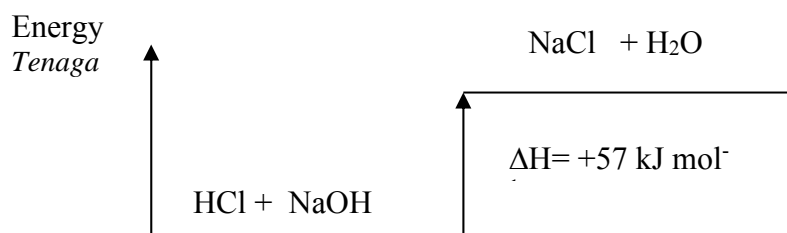
Choose the correct energy level diagram.

Pilih gambarajah aras tenaga yang betul

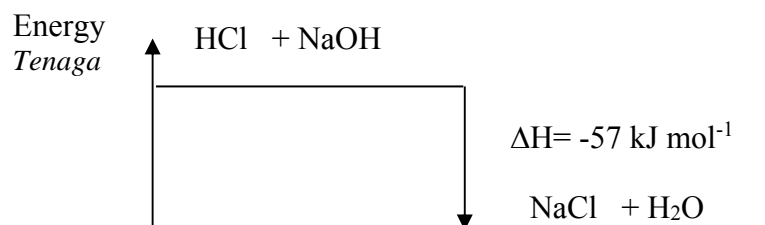
A



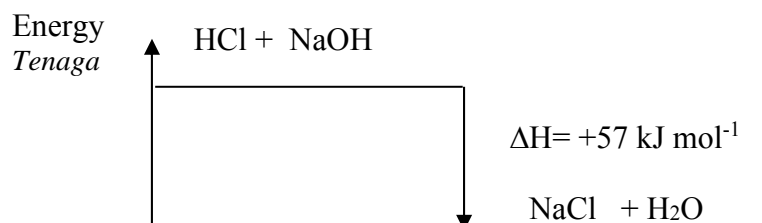
B



C



D



- 27 Table 1 shows the information of particles X and Y.
Jadual 1 menunjukkan maklumat tentang zarah X dan Y.

Particle <i>Zarah</i>	Number of electron <i>Bilangan elektron</i>	Numbers of protons <i>Bilangan proton</i>	Numbers of neutrons <i>Bilangan neutron</i>
X	10	10	11
Y	10	10	14

Table 1

- Which of the following statements is true for particle X and particle Y?
Antara pernyataan berikut yang manakah benar bagi zarah X dan zarah Y?
- A** X and Y are isotopes
X dan Y adalah isotop
- B** X is positive ion
X ialah ion positif
- C** Both X and Y are charged particles
Kedua-dua X dan Y membentuk zarah-zarah bercas
- D** Both X and Y has the same nucleon number.
Kedua-dua X dan Y mempunyai nombor nukleon yang sama
- 28 X nitrate has the formula of XNO_3 . What is the formula of X sulphate salt?
X nitrat mempunyai formula XNO_3 . Apakah formula bagi garam X sulfat?
- A** XSO_4
- B** X_2SO_4
- C** $X_3(SO_4)_3$
- D** $X_2(SO_4)_3$
- 29 The element, rubidium, Rb, is located below lithium, sodium and potassium in Group 1 in the Periodic Table. Which statement about rubidium, Rb is most likely to be correct?
Unsur rubidium, Rb, terletak di bawah litium, natrium dan kalium dalam Kumpulan 1 dalam Jadual Berkala Unsur. Pernyataan manakah tentang rubidium, Rb adalah betul?
- A** It reacts with water to form acidic solution
Ia bertindak balas dengan air membentuk larutan berasid
- B** It forms a sulphate solution Rb_2SO_4
Ia membentuk larutan sulfat Rb_2SO_4
- C** It reacts slowly with water at room temperature
Ia bertindak balas perlahan dengan air dalam suhu bilik.
- D** It has two valence electrons
Ia mempunyai dua elektron valens

- 30 Table 2 shows the electron arrangement of atoms P, Q, R and S.
Jadual 2 menunjukkan susunan elektron bagi atom-atom P, Q, R dan S.

Atom <i>Atom</i>	Electron arrangement <i>Susunan elektron</i>
K	2.4
L	2.8.1
M	2.8.2
N	2.8.7

Table 2

Which pair of atoms from a compound by sharing of electrons?
Pasangan atom yang manakah membentuk sebatian melalui perkongsian elektron?

- A K dan L
 B K dan N
 C M dan N
 D L dan N
- 31 Diagram 8 shows the apparatus set-up of a voltaic cell left after an hour.
Rajah 8 menunjukkan susunan radas bagi suatu sel kimia dibiarkan selepas satu jam

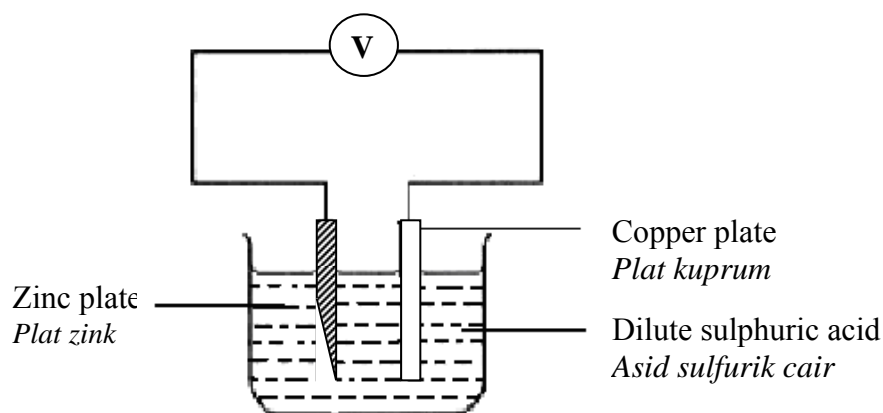


Diagram 8

Which statement is true?
Pernyataan yang manakah benar ?

- A Electrons flow from zinc plate to copper plate through the external circuit
Elektron mengalir dari plat zink ke plat kuprum melalui litar luar
- B Zinc is less electropositive than copper
Zink adalah kurang elektropositif daripada kuprum
- C Zinc plate acts as positive terminal
Plat zink bertindak sebagai terminal positif
- D Copper plate becomes thicker
Plat kuprum menebal

- 32 Which of the following substances react with dilute sulphuric acid to form a blue salt solution?
Antara bahan berikut, yang manakah bertindak balas dengan asid sulfurik cair untuk menghasilkan larutan garam berwarna biru?
- I Copper
Kuprum
 - II Copper(II) carbonate
Kuprum(II) karbonat
 - III Copper(II) hydroxide
Kuprum(II) hidroksida
 - IV Copper(II) oxide
Kuprum(II) oksida
- A I only
B II and IV only
C II, III and IV only
D I, II, III and IV

- 33 Diagram 9 shows the apparatus set-up for the reaction between an acid and a metal to produce a salt.
Rajah 9 menunjukkan susunan radas bagi tindak balas antara asid dengan logam untuk menghasilkan garam.

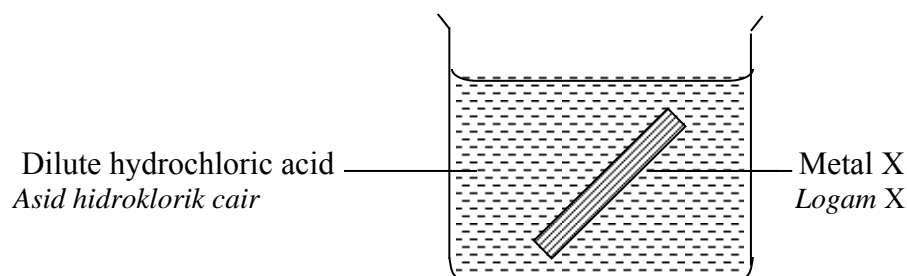


Diagram 9

- Which of the following is not metal X?
Antara berikut, yang manakah bukan logam X?

- A Magnesium
Magnesium
- B Copper
Kuprum
- C Lead
Plumbum
- D Zinc
Zink

- 34 Some synthetic polymers are known to be biodegradable. This is due to the polymers are
Beberapa polimer sintetik adalah diketahui boleh terbiodegradasi. Ini disebabkan polimer tersebut adalah

- A flammable
mudah terbakar
 B resistant to corrosion
tahan kakisan
 C not harmful to living organism
tidak merbahaya kepada organisma hidup
 D easily broken down by bacteria
mudah terurai oleh bakteria

- 3 Diagram 10 shows four stages in the conversion of sulphur to sulphuric acid.
 5 *Rajah 10 menunjukkan empat peringkat dalam pertukaran sulfur kepada asid sulfurik.*

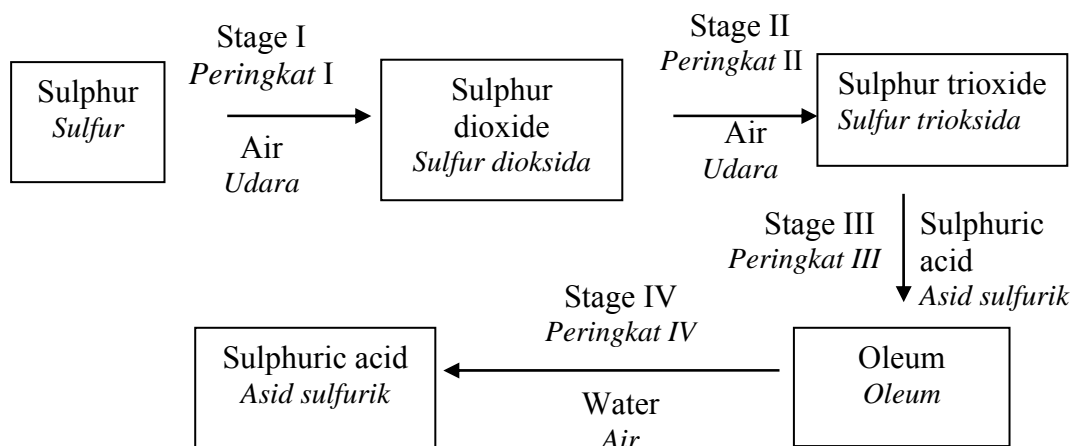
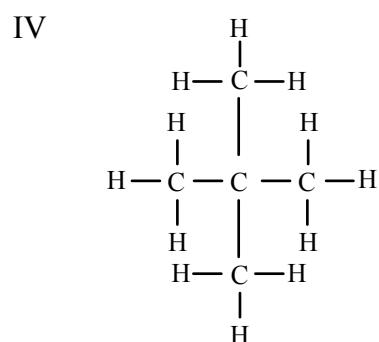
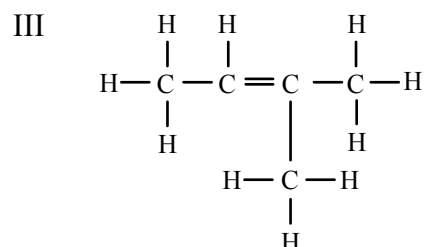
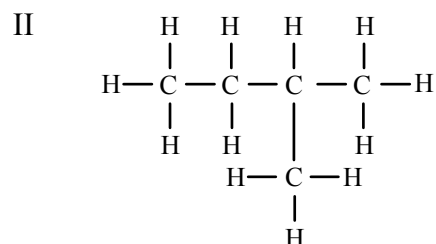
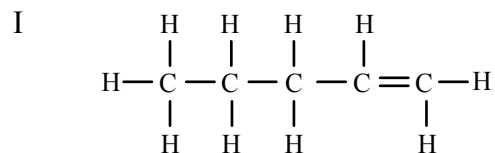


Diagram 10

In which stage is a catalyst used?
Dalam peringkat manakah mungkin digunakan ?

- A Stage I
Peringkat I
 B Stage II
Peringkat II
 C Stage III
Peringkat III
 D Stage IV
Peringkat IV

- 36 Which of the following are isomers of pentane?
 Antara berikut yang manakah merupakan isomer bagi pentana?



- A I and II
 I dan II
- B II and IV
 II dan IV
- C III and IV
 III dan IV
- D II, III and IV
 II, III dan IV

- 37 Diagram 11 shows the set-up of apparatus to study redox reaction. Magnesium and iron are dipped in agar solution with potassium hexacyanoferrate (III). Which of the following statements is true for the reaction?

Rajah 11 menunjukkan susunan radas bagi mengkaji tindak balas redoks. Magnesium dan besi direndam dalam larutan agar-agar dengan kalium heksasianoferat(III). Antara pernyataan berikut, yang manakah benar mengenai tindak balas itu?

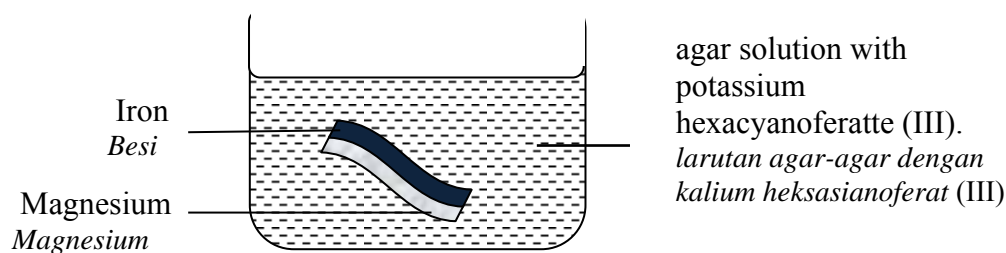
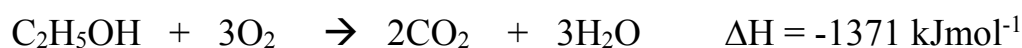


Diagram 11

- A Iron is reduced
Ferum diturunkan
- B Iron is an oxidising agent
Ferum adalah agen pengoksidaan
- C Magnesium releases electron
Magnesium membebaskan elektron
- D The oxidation number of magnesium decreases
Nombor pengoksidaan magnesium berkurang
- 38 The heat of combustion of 1 mole of ethanol is $-1371 \text{ kJ mol}^{-1}$. The chemical reaction is given in the equation below.
Haba pembakaran bagi 1 mol etanol adalah $-1371 \text{ kJ mol}^{-1}$. Tindak balas kimia ditunjukkan seperti persamaan di bawah.



If 0.1 mol of ethanol is burnt in excess oxygen, how much heat is released?
Jika 0.1 mol etanol dibakar dalam oksigen berlebihan, berapakah tenaga haba yang dibebaskan?

- A 1.371 kJ
- B 13.71 kJ
- C 137.1 kJ
- D 13710 kJ

- 39 A psychiatric patient is always having difficulties to sleep .Which of the following medicines is suitable to treat this patient?
Pesakit psikaiatri selalu menghadapi kesukaran untuk tidur. Antara ubat berikut yang manakah sesuai untuk merawat pesakit tersebut?
- A Aspirin
Aspirin
- B Paracetamol
Parasetamol
- C Codeine
Kodeina
- D Haloperidol
Haloperidol
- 40 Diagram 12 shows the electron arrangement of the elements X and Y.
Rajah 12 menunjukkan susunan elektron bagi unsur-unsur X dan Y.

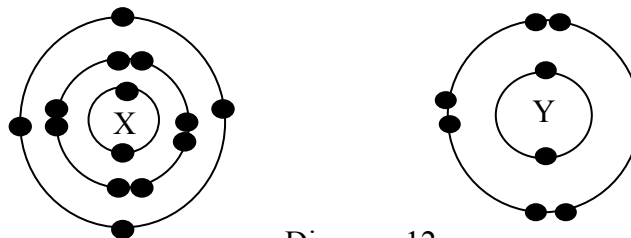


Diagram 12

- Which of the following is true?
Antara berikut, yang manakah benar?
- A X and Y are in period 2
X dan Y berada dalam kala 2
- B X has 3 shells filled with electrons
X mempunyai 3 petala berisi elektron
- C Y has 8 valence electrons
Y mempunyai 8 elektron valens
- D Electron arrangement of Y is 2.4
Susunan elektron bagi Y ialah 2.4
- 41 A compound with formula NaX has a relative formula mass of 58.5
 What is the relative atomic mass of X?
 [Relative atomic mass : Na = 23]
- Suatu sebatian dengan formula X_2SO_4 mempunyai jisim formula relatif sebanyak 58.5*
Apakah jisim atom relatif bagi X?
 [Jisim atom relatif : Na = 23]
- A 35.5
 B 58.5
 C 35.5g
 D 58.5g

- 42 Table 3 shows the proton number of elements X, Y and Z.
Jadual 3 menunjukkan nombor proton bagi unsur X, Y dan Z.

Element <i>Unsur</i>	Proton number <i>Nombor proton</i>
X	11
Y	15
Z	20

Table 3

What is the charge of the ion of element X, Y and Z?
Apakah cas bagi ion unsur X, Y dan Z?

	X ion <i>Ion X</i>	Y ion <i>Ion Y</i>	Z ion <i>Ion Z</i>
A	1-	3+	2-
B	1-	3-	2-
C	1+	3-	2+
D	1+	3+	2+

- 43 Table 4 shows the electron arrangement of atom P and atom Q.
Jadual 4 susunan elektron bagi atom P dan atom Q.

Atom <i>Atom</i>	Electron arrangement <i>Susunan elektron</i>
P	2.8.2
Q	2.8.7

Table 4

Element P reacts with element Q to form a compound.
 Which of the following is **not true** about the reaction?

*Unsur P dan Q bertindakbalas membentuk satu sebatian.
 Antara berikut, yang manakah **tidak benar** tentang tindakbalas tersebut.?*

- A Atom P donates 2 electrons.
Atom P menderma 2 elektron.
- B Atom Q receives 1 electron.
Atom Q menerima 1 elektron.
- C PQ_2 compound is formed.
Sebatian PQ_2 terhasil.
- D The forces of attraction between the particles in the compound formed is weak.
Daya tarikan antara zarah-zarah dalam sebatian adalah lemah.

- 44 Diagram 12 shows the set-up of apparatus for an experiment to construct the electrochemical series by using different pairs of copper and metal M which was dipped in copper (II) sulphate solution.

Rajah 12 menunjukkan susunan radas bagi eksperimen untuk membina siri elektrokimia dengan menggunakan pasangan berbeza kuprum dan logam M yang dicelup dalam larutan kuprum(II) sulfat.

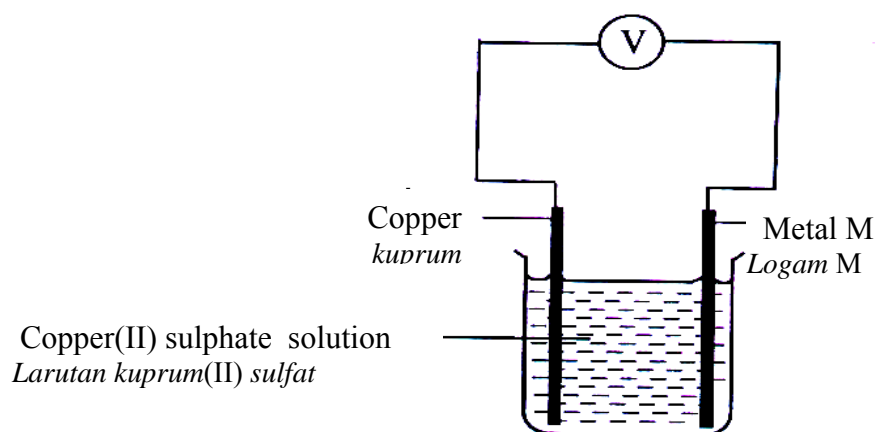


Diagram 12

Table 4 shows the result of the experiment.

Jadual 4 menunjukkan keputusan eksperimen.

Pairs of metals <i>Pasangan logam</i> Cu / M	Voltage cell / V <i>Voltan / V</i>	Negative terminal <i>Terminal negatif</i>
Cu / Fe	0.8	Iron, Fe <i>Besi, Fe</i>
Cu / Al	2.1	Aluminium, Al <i>Aluminium, Al</i>

Table 4

What is the voltage produced by pairs of metal of Al / Fe ?

Apakah nilai voltan yang terhasil oleh pasangan logam Al/Fe ?

- A 0.3 V
- B 1.3 V
- C 1.9 V
- D 2.9 V

- 45 Diagram 13 shows the apparatus set-up for the neutralisation reaction between a strong acid and a strong alkali.
Rajah 13 menunjukkan susunan radas bagi tindak balas penutralan antara asid kuat dan alkali kuat.

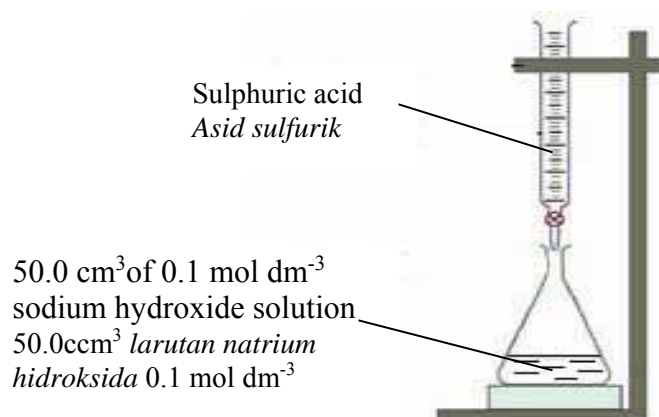
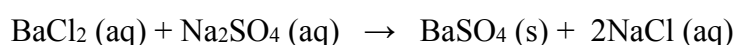


Diagram 13

25.0 cm³ of sulphuric acid neutralises 50.0 cm³ of 1.0 mol dm⁻³ sodium hydroxide solution. What is the molarity of the sulphuric acid?
 25.0 cm³ asid sulfurik meneutralkan 50.0 cm³ larutan natrium hidroksida 1.0 mol dm⁻³ larutan natrium hidroksida. Apakah kemolaran asid sulfurik?

- A 0.10 mol dm⁻³
 B 0.15 mol dm⁻³
 C 0.20 mol dm⁻³
 D 0.40 mol dm⁻³
- 46 The following equation shows a double decomposition reaction.
Persamaan berikut menunjukkan tindak balas penguraian ganda dua.



The ionic equation for this reaction is
Persamaan ion untuk tindak balas ini adalah

- A $\text{Ba}^{2+} + \text{SO}_4^{2-} \rightarrow \text{BaSO}_4$
 B $2\text{Ba}^{2+} + \text{SO}_4^{2-} \rightarrow \text{Ba}_2\text{SO}_4$
 C $\text{Na}^+ + \text{SO}_3^{2-} \rightarrow \text{NaSO}_4$
 D $2\text{Na}^+ + \text{SO}_4^{2-} \rightarrow 2\text{NaSO}_4$

- 47 Substance R is used to manufacture the body frame of a racing bike. Substance R has the following properties:

*Bahan R digunakan untuk menghasilkan binaan kerangka basikal lumba
Bahan R mempunyai ciri berikut:*

Resistant to corrosion Strong Light <i>Tahan kakisan Kuat Ringan</i>

What is substance R?

Apakah bahan R?

- A Steel
Keluli
- B Stainless steel
Keluli nirkarat
- C Cupro-nickel
Kupro-nikel
- D Duralumin
Duralumin

- 48 Table 5 shows three experiments conducted by a group of students to investigate the reaction between excess zinc and the acids.

Jadual 5 menunjukkan tiga eksperimen dijalankan oleh sekumpulan pelajar untuk menyasat tindak balas di antara zink yang berlebihan dengan asid-asid.

Experiment <i>Eksperimen</i>	Acids <i>Asid-asid</i>
I	25 cm ³ hydrochloric acid 2.0 mol dm ⁻³ 25 cm ³ <i>asid hidroklorik</i> 2.0 mol dm ⁻³
II	50 cm ³ hydrochloric acid 1.5 mol dm ⁻³ 50 cm ³ <i>asid hidroklorik</i> 1.5 mol dm ⁻³
III	15 cm ³ sulphuric acid 1.5 mol dm ⁻³ 15 cm ³ <i>asid sulfurik</i> 1.5 mol dm ⁻³

Table 5

Diagram 14 shows the graph of volume of carbon dioxide gas against time for the above experiments

Rajah 14 menunjukkan graf bagi isipadu gas karbon dioksida melawan masa bagi eksperimen di atas.

Volume of carbon dioxide gas /cm³
Isipadu gas karbon dioksida /cm³

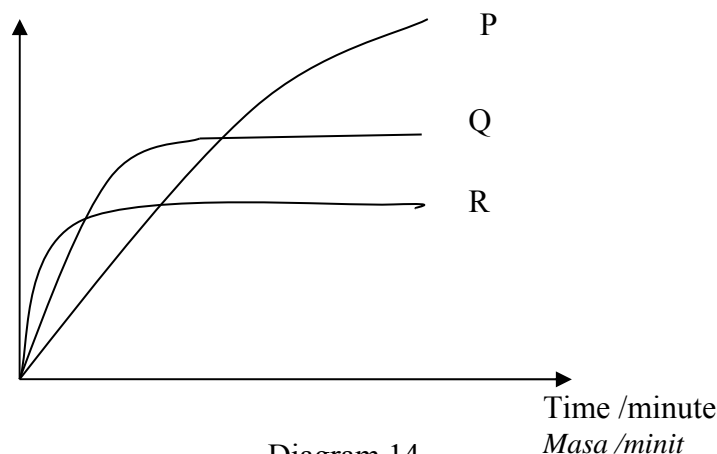


Diagram 14

Which of the following represents the results of the experiments correctly?

Manakah di antara berikut mewakili keputusan-keputusan eksperimen dengan betul?

	I	II	III
A	Q	P	R
B	P	Q	R
C	P	R	Q
D	R	Q	P

- 49 Diagram 15 shows a series of reactions.
Rajah 15 menunjukkan satu siri tindak balas.

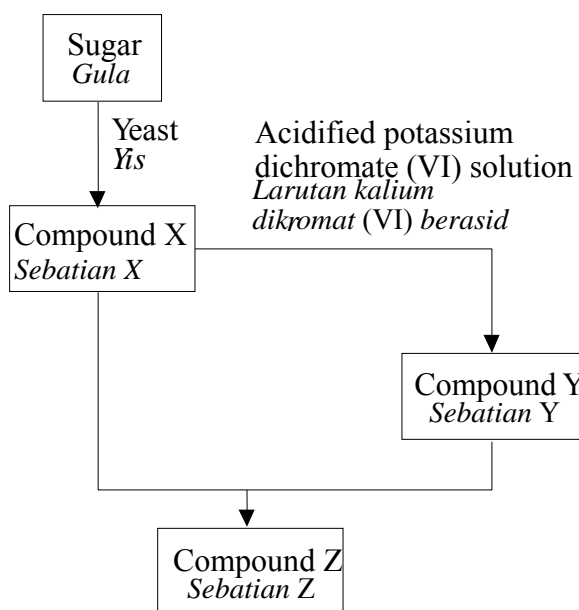


Diagram 15

What is compound Z?
Apakah sebatian Z?

- A Ethanol
Etanol
- B Propanoic acid
Asid propanoik
- C Propyl ethanoate
Propil etanoat
- D Ethyl ethanoate
Etil etanoat

- 50 Table 6 shows two displacement reactions involving metals X, Y and Z.
Jadual 6 menunjukkan dua tindak balas penyesaran melibatkan logam X, Y dan Z.

Reaction I <i>Tindak balas I</i>	$X + Y^{2+}_{(aq)} \longrightarrow Y + X^{2+}_{(aq)}$
Reaction II <i>Tindakbalas II</i>	$Z + X^{2+}_{(aq)} \longrightarrow Z^{2+}_{(aq)} + X$

Table 6

What is the decreasing order of electropositivity for metals X, Y and Z in the electrochemical series?

Apakah susunan menurun bagi keelektropositifan logam - logam X, Y dan Z dalam siri elektrokimia ?

- A X,Z,Y
- B X,Y,Z
- C Z,X,Y
- D Y,X,Z

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

**INFORMATION FOR CANDIDATE
MAKLUMAT UNTUK CALON**

1. This question paper consists of three sections: **Section A, B and C.**
*Kertas soalan ini mengandungi tiga bahagian: **Bahagian A, B dan 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 'writing paper' 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 halaman bergaris di bahagian akhir kertas soalan ini. Jawab **Bahagian B** dan **Bahagian C** dengan terperinci. Anda boleh menggunakan persamaan, gambar rajah, jadual, graf dan cara lain yang sesuai untuk menjelaskan jawapan anda*
4. Show your working. It may help you to get marks.
Tunjukkan kerja mengira. Ini membantu anda mendapatkan markah.
5. If you wish to 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.
6. The diagrams in the questions are not drawn to scale unless stated.
Rajah yang mengiringi soalan tidak dilukiskan mengikut skala kecuali dinyatakan
7. Marks allocated for each question or part question are shown in brackets.
Markah yang diperuntukkan bagi setiap soalan atau ceraihan soalan ditunjukkan dalam kurungan
8. The time suggested to answer **Section A** is 90 minutes, **Section B** is 30 minutes and **Section C** is 30 minutes.
*Masa yang dicadangkan untuk menjawab **Bahagian A** ialah 90 minit, **Bahagian B** ialah 30 minit dan **Bahagian C** ialah 30 minit*
9. You may use a non-programmable scientific calculator.
Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogramkan.
10. Hand in your answer sheets at the end of the examination.
Serahkan semua kertas jawapan anda di akhir peperiksaan

Section A

[60 marks]

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

- 1 Diagram 1.1 shows the inter-conversion of the two states of matter of substance Q.
Rajah 1.1 menunjukkan perubahan dua keadaan jirim bagi bahan Q.

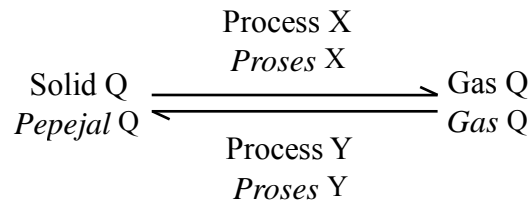


Diagram 1.1

- (a) Name process X.
Namakan proses X.

.....

[1 mark]

- (b) Draw the arrangement of particles of substance Q in solid state.
Lukiskan susunan zarah bahan Q dalam keadaan pepejal.



[1 mark]

- (c) Diagram 1.2 shows the apparatus set up of two experiments.
Rajah 1.2 menunjukkan susunan radas bagi dua eksperimen.

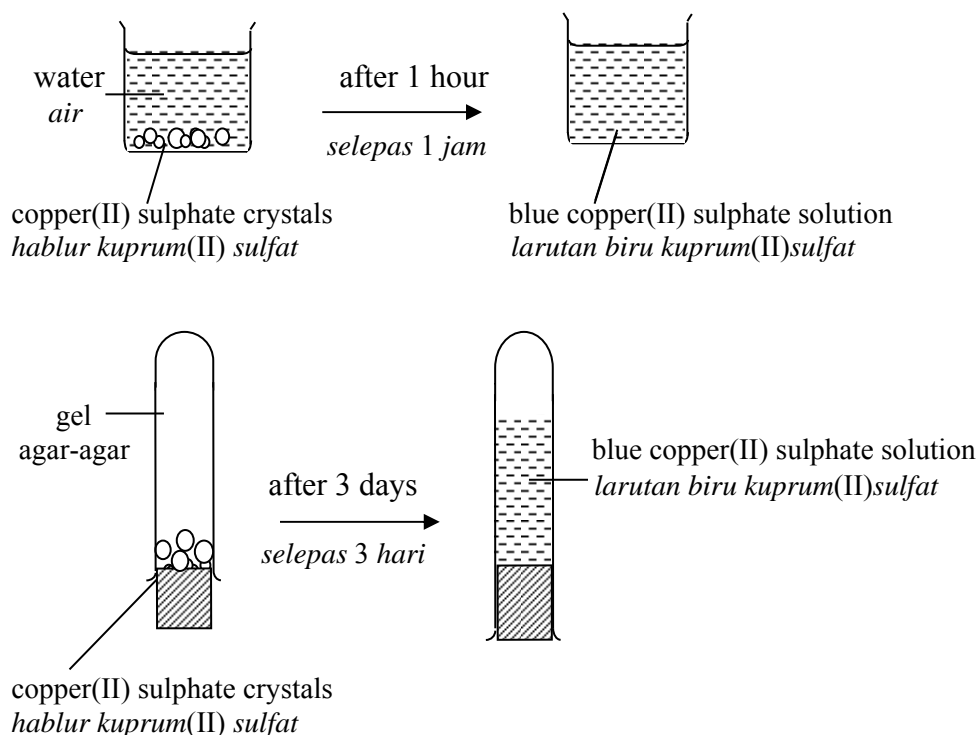


Diagram 1.2

- (i) State the type of particles in copper (II) sulphate crystal.
Nyatakan jenis zarah yang terdapat dalam hablur kuprum(II) sulfat.

[1 mark]

- (ii) Based on the two experiments in Diagram 1.2, explain the differences in the observation by using kinetic theory of matter.
Berdasarkan pada dua eksperimen dalam Rajah 1.2, terangkan perbezaan dalam pemerhatian dengan menggunakan teori kinetik jirim.

[3 marks]

- (d) When solid copper (II) nitrate is heated strongly, it decomposes into copper (II) oxide, nitrogen dioxide gas and oxygen gas.

Bila pepejal kuprum(II) nitrat dipanaskan dengan kuat, ia terurai kepada kuprum(II) oksida, gas nitrogen dioksida dan gas oksigen.

- (i) Complete the chemical equation for the reaction.

Lengkapkan persamaan kimia bagi tindak balas tersebut.



[1 mark]

- (ii) 37.6g of solid copper (II) nitrate is heated strongly.
Calculate the volume of oxygen gas released at room condition.

[Relative atomic mass: Cu = 64; O = 16; N = 14;

Avogadro Constant: $6.02 \times 10^{23} \text{ mol}^{-1}$;

Molar volume: $24 \text{ dm}^3 \text{ mol}^{-1}$ at room condition]

37.6g pepejal kuprum(II) nitrat dipanaskan dengan kuat.

Hitungkan isipadu gas oksigen yang terbebas pada keadaan bilik.

[Jisim atom relatif : Cu = 64; O = 16; N = 14;

Pemalar Avogadro: $6.02 \times 10^{23} \text{ mol}^{-1}$;

Isipadu molar: $24 \text{ dm}^3 \text{ mol}^{-1}$ pada keadaan bilik]

[3 marks]

2. Table 2 shows the information about atom P and Q.
Jadual 2 menunjukkan maklumat bagi atom P dan Q.

Atom <i>Atom</i>	P	Q
Number of proton <i>Bilangan proton</i>	11	17
Number of electron <i>Bilangan elektron</i>		17
Number of neutron <i>Bilangan neutron</i>	12	18
Nucleon number <i>Nombor nukleon</i>		

Table 2

- (a) Complete Table 2.
Lengkapkan Jadual 2. [3 marks]
- (b) Write the formula of
Tuliskan formula bagi
- (i) P ion :
ion P:..... [1 mark]
- (ii) Q ion :
ion Q:..... [1 mark]
- (c) Element P reacts with element Q to form a compound.
Unsur P bertindak balas dengan unsur Q untuk membentuk satu sebatian.
- (i) Write the formula of this compound.
Tuliskan formula bagi sebatian ini.
 [1 mark]
- (ii) Draw the electron arrangement of the compound formed.
Lukis susunan elektron bagi sebatian yang terbentuk.

[2 marks]

(iii) Name the bond formed between these particles.

Namakan jenis ikatan yang terbentuk di antara zarah-zarah tersebut.

..... [1 mark]

(iv) State one physical property of this compound.

Nyatakan satu sifat fizik bagi sebatian ini.

..... [1 mark]

- 3 Table 3 shows an experiment to investigate the effect of heat on copper (II) carbonate.
Jadual 3 di menunjukkan satu eksperimen untuk mengkaji kesan haba ke atas kuprum (II) karbonat.

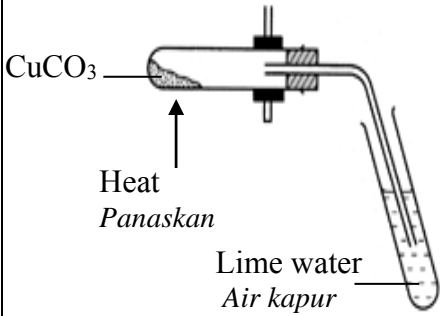
Diagram <i>Gambar rajah</i>	Procedure <i>Prosedur</i>	Observation <i>Pemerhatian</i>
	<p>Copper(II) carbonate is heated. The colourless gas produced is passed through lime water.</p> <p><i>Kuprum(II) karbonat dipanaskan dan gas tanpa warna yang terhasil dialirkan melalui air kapur.</i></p>	<p>Green solid turns black. Lime water turns chalky.</p> <p><i>Pepejal hijau menjadi hitam. Air kapur menjadi keruh.</i></p>

Table 3

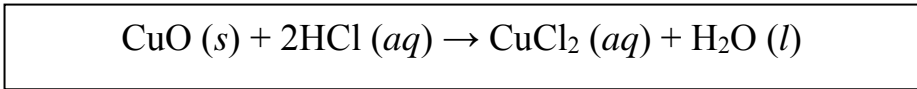
(a) Complete the table below.

Lengkapkan jadual di bawah.

Substance <i>Bahan</i>	Name <i>Nama</i>
Black solid <i>Pepejal hitam</i>	
Colourless gas <i>Gas tanpa warna</i>	

[2 marks]

- (b) Copper (II) chloride salt can be prepared based on equation below :
Garam kuprum(II) klorida boleh disediakan berdasarkan persamaan di bawah :



- (i) State an observation during the reaction
Nyatakan satu pemerhatian semasa tindak balas

.....

[1 mark]

- (ii) Based on the equation, complete the statement below :
Berdasarkan persamaan tersebut, lengkapkan pernyataan di bawah :

0.2 mol of HCl produce mol of copper (II) chloride
 0.2 mol HCl menghasilkan mol kuprum(II) klorida

0.2 mol of HCl produce g of copper (II) chloride
 0.2 mol HCl menghasilkan g kuprum(II) klorida

[molar mass of $\text{CuCl}_2 = 135 \text{ g mol}^{-1}$]
 [jisim molar $\text{CuCl}_2 = 135 \text{ g mol}^{-1}$]

Hint :
Petunjuk :

Mass of $\text{CuCl}_2 = \text{number of mole} \times \text{molar mass of } \text{CuCl}_2$
Jisim } \text{CuCl}_2 = \text{bilangan mol} \times \text{jisim molar } \text{CuCl}_2

= mol $\times 135 \text{ g mol}^{-1}$

=g

[2 marks]

- (iii) 30 cm³ of 1.0 mol dm⁻³ hydrochloric acid is needed to dissolve completely 1.2 g of copper (II) oxide.
 Predict the volume of 1.0 mol dm⁻³ sulphuric acid needed to replace hydrochloric acid. Explain your answer.

*30 cm³ asid hidroklorik 1.0 mol dm⁻³ diperlukan untuk melarutkan 1.2 g kuprum(II) oksida dengan lengkap.
 Ramalkan isipadu asid sulfurik 1.0 mol dm⁻³ yang diperlukan untuk menggantikan asid hidroklorik. Terangkan jawapan anda.*

.....

[2 marks]

- (c) Diagram 3 shows the preparation of an insoluble salt.
Rajah 3 menunjukkan penyediaan suatu garam tak terlarutkan.

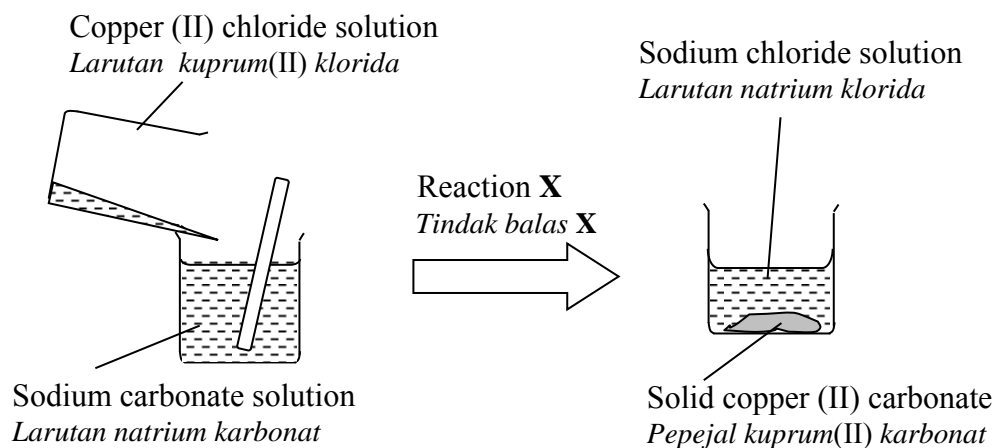


Diagram 3

- (i) Tick (\checkmark) in the box below to represent reaction X.
Tandakan (\checkmark) dalam kotak dibawah bagi mewakili tindak balas X.

Neutralisation <i>Peneutralan</i>	
Double decomposition <i>Penguraian ganda dua</i>	

[2 marks]

- (ii) Write an ionic equation for the formation of the insoluble salt.
Tuliskan persamaan ion bagi pembentukan garam tak terlarutkan tersebut.
-

[2 marks]

- 4 Diagram 4 shows the set up of the apparatus for an experiment to investigate electron transfer at a distance.
Rajah 4 menunjukkan susunan radas bagi satu eksperimen untuk mengkaji pemindahan elektron pada satu jarak.

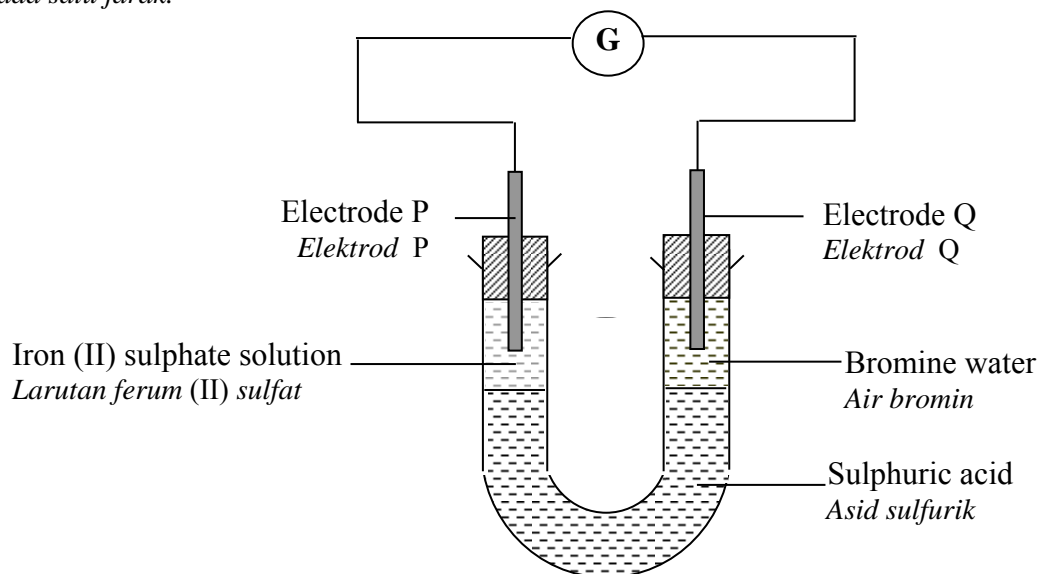


Diagram 4

Based on diagram 4, answer the following questions.
Berdasarkan Rajah 4, jawab soalan-soalan berikut.

- (a) Draw the flow of electron in Diagram 4
Lukiskan arah aliran elektron dalam Rajah 4.

[1 mark]

- (b) State the function of sulphuric acid.
Nyatakan fungsi asid sulfurik.

.....

[1 mark]

- (c) State the observations for iron(II) sulphate solution and bromine water.
Nyatakan pemerhatian untuk larutan ferum(II) sulfat dan air bromin.

Solution <i>Larutan</i>	Observation <i>Pemerhatian</i>
Iron(II) sulphate <i>Ferum(II) sulfat</i>	
Bromine water <i>Air bromin</i>	

[2 marks]

- (d) Write the half equation for the reactions that occur at electrode P and Q.
Tuliskan setengah persamaan bagi tindak balas yang berlaku pada elektrod P dan Q.

(i) Electrode P

.....

(ii) Electrode Q

.....

[2 marks]

- (e) State the oxidising agent and the reducing agent.
Nyatakan agen pengoksidaan dan agen penurunan.

(i) Oxidising agent

Agen pengoksidaan:

.....

ii) Reducing agent

Agen penurunan:

.....

[2 marks]

- (f) State the change of oxidation number for iron in iron(II) sulphate solution.
Nyatakan perubahan nombor pengoksidaan bagi ferum dalam larutan ferum(II) sulfat.

.....

[1 mark]

- (g) Name one chemical substance that can be used to replace bromine water.

Namakan satu bahan kimia yang boleh digunakan untuk menggantikan air bromin.

.....

[1 mark]

5. Table 5 shows the time taken for the reaction between 20.0 cm^3 of 1.0 mol dm^{-3} nitric acid and excess marble to produce 50 cm^3 of carbon dioxide gas.

Jadual 5 menunjukkan masa yang diambil untuk tindak balas antara 20.0 cm^3 1.0 mol dm^{-3} asid nitrik dan marmar berlebihan bagi menghasilkan 50 cm^3 gas karbon dioksida terbebas.

Experiment	Reactant <i>Bahan tindak balas</i>	Time / s <i>Time/s</i>
I	20.0 cm^3 of 1.0 mol dm^{-3} nitric acid and excess marble chips <i>20.0 cm^3 asid nitrik 1.0 mol dm^{-3} dan ketulan marmar</i>	25
II	20.0 cm^3 of 1.0 mol dm^{-3} nitric acid and excess marble powder <i>20.0 cm^3 asid nitrik 1.0 mol dm^{-3} dan serbuk marmar</i>	16

Table 5

- (a) Based on Table 5, state the factor affecting the rate of reaction.
Berdasarkan Jadual 5, nyatakan faktor yang mempengaruhi kadar tindak balas itu.

[1 mark]

- (b) Write a balanced equation for the reaction for both experiments.
Tulis persamaan kimia yang seimbang untuk kedua-dua eksperimen ini.

[2 marks]

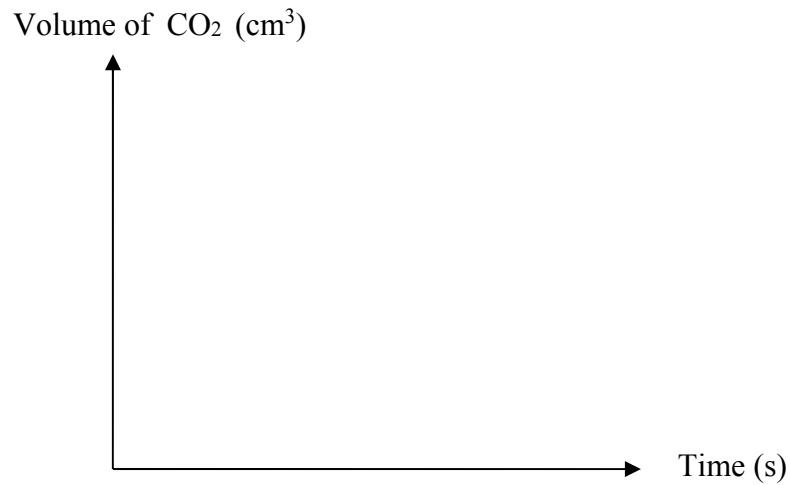
- (c) Referring to Table 5, calculate the average rate of reaction of:
Merujuk kepada Jadual 5, kirakan kadar tindak balas purata bagi:

(i) Experiment I

(ii) Experiment II

[2 marks]

- d) (i) Sketch the curves that you would expect to obtain in the space given.
Lakarkan graf yang mungkin terhasil dalam ruang yang diberikan.



[2 marks]

- (ii) From the graph sketched in (d)(i), explain why there is a difference in the rate of reaction with reference to the collision theory.
Berdasarkan graf yang dilakarkan dalam (d)(i), terangkan mengapa terdapat perbezaan dalam kadar tindak balas mengikut teori pelanggaran.

.....

.....

.....

[3 marks]

6. Diagram 6 shows a chemical cell.
Rajah 6 menunjukkan satu sel kimia.

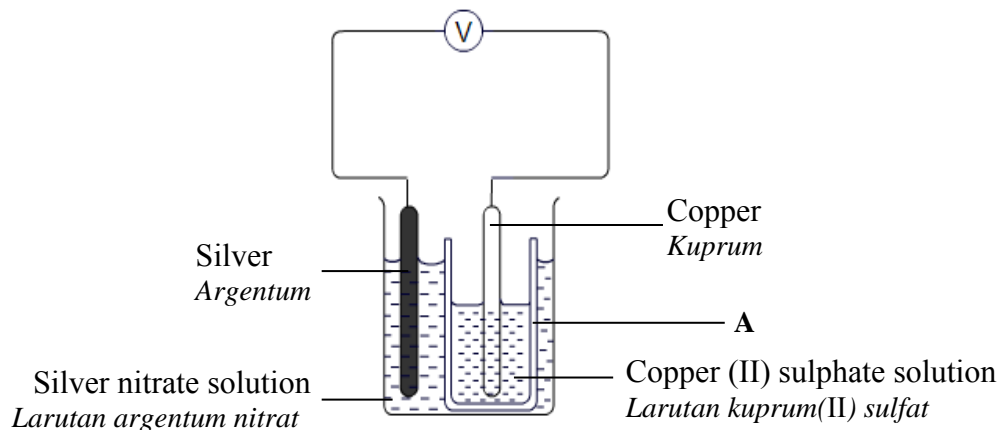


Diagram 6

- (a) (i) State the name of apparatus A.
Nyatakan nama bagi radas A.
-
[1 mark]
- (ii) What is the function of apparatus in (a) (i).
Apakah fungsi radas dalam (a) (i).
-
[1 mark]
- (b) (i) State one observation at the silver plate.
Nyatakan satu pemerhatian pada kepingan argentum.
-
[1 mark]
- (ii) Write the half equation for the reaction that occurs at the silver plate.
Tuliskan setengah persamaan bagi tindak balas yang berlaku pada kepingan argentum.
-
[1 mark]
- (c) What is the type of reaction occur at copper plate?
Apakah jenis tindak balas yang berlaku pada kepingan kuprum?
-
[1 mark]
- (d) Draw the flow of electron in Diagram 6.1.
Lukiskan arah pengaliran elektron pada Rajah 6.1.
-
[1 mark]

- (e) The silver plate in the chemical cell above is replaced by magnesium metal and silver nitrate solution is replaced by magnesium sulphate solution.

Kepingan argentum dalam sel kimia di atas ditukar dengan logam magnesium dan larutan argentum nitrat ditukar dengan larutan magnesium sulfat.

- (i) What will happen to the direction of electron flow?
Apakah yang akan berlaku kepada arah pengaliran elektron?

.....

[1 mark]

- (ii) Give a reason for your answer.
Berikan satu sebab untuk jawapan anda.

.....

[1 mark]

- (f) Another experiment is carried out by replacing the silver plate with metal P and Q.

Table 3.2 shows the results .

Satu eksperimen lain dijalankan dengan menggantikan kepingan argentum dengan logam P dan Q.

Jadual 3.2 menunjukkan keputusan yang telah diperolehi.

Pair of metal <i>Pasangan logam</i>	Voltage / V <i>Voltan / V</i>	Negative terminal <i>Terminal negatif</i>
P and Cu	2.0	P
Q and Cu	0.5	Q

Table 3.2

- (i) Arrange metals P, Q and Cu in ascending order of electropositivity.
Susunkan logam P, Q dan Cu mengikut tertib menaik keelektropositifan.

.....

[1 mark]

- (ii) Predict the voltage for chemical cell using pair of metal P and Q.
Ramalkan voltan bagi sel kimia yang menggunakan pasangan logam P dan Q.

.....

[1 mark]

Section B

[20 marks]

Answer any **one** question.*Jawab mana-mana satu soalan.*

- 7 Diagram 7.1 and 7.2 show the electron arrangement for atoms of the element R from Group 1 and element P from Group 18 respectively in the Periodic Table of Elements.
Rajah 7.1 dan 7.2 menunjukkan susunan elektron bagi atom unsur R dari Kumpulan 1 dan unsur P dari Kumpulan 18 dalam Jadual Berkalan Unsur.

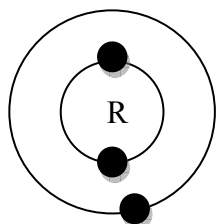


Diagram 7.1

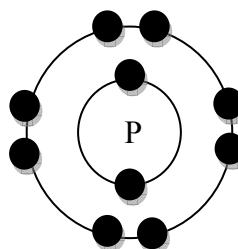


Diagram 7.2

- (a) Based on Diagram 7.1
Berdasarkan Rajah 7.1

- (i) Write the electron arrangement for the atom of the element R and name element R.
Tulis susunan elektron bagi atom unsur R dan namakan unsur R.

[2 marks]

- (ii) Write the chemical equation for the reaction between element R and water.
Tulis persamaan kimia bagi tindak balas antara unsur R dengan air.

[2 marks]

- (iii) Compare the reactivity of element R and P. Explain your answer based on their valence electron respectively.
Bandingkan kereaktifan unsur R dan P. Terangkan jawapan anda berdasarkan elektron valens masing-masing.

[6 marks]

- (iv) Element R is kept in paraffin oil. Explain why.
Unsur R disimpan di dalam minyak paraffin. Terangkan kenapa.

[2 marks]

- (c) Diagram 7.3 shows the apparatus set up to determine the empirical formula of powdered copper (II) oxide.
Rajah 7.3 menunjukkan susunan radas untuk menentukan formula empirik bagi serbuk kuprum(II) oksida

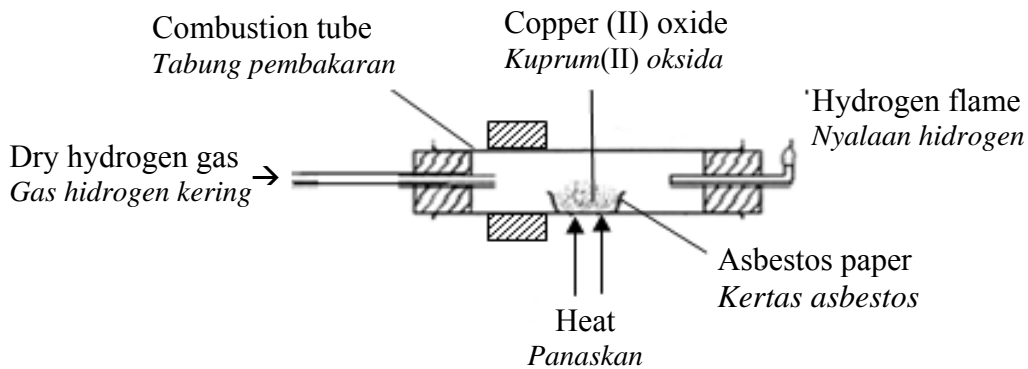


Diagram 7.3

- (i) State two precautions that must be taken in this experiment.
Nyatakan dua langkah berjaga yang perlu diambil di dalam eksperimen ini.

[2 marks]

Mass of combustion tube + asbestos paper <i>Jisim tiub pembakaran + kertas asbestos</i>	58.36 g
Mass of combustion tube + asbestos paper + copper(II) oxide <i>Jisim tiub pembakaran + kertas asbestos + kuprum(II) oksida</i>	91.96 g
Mass of combustion tube + asbestos paper + copper <i>Jisim tiub pembakaran + kertas asbestos + kuprum</i>	85.24 g

Table 7.4

[Relative atomic mass / *Jisim atom relatif* : O = 16 ; Cu = 64]

- (ii) Based on Table 7.4, determine the empirical formula of copper(II) oxide.
Berdasarkan Jadual 7.4, tentukan formula empirik bagi kuprum(II) oksida

Write a chemical equation for the reaction between copper (II)oxide and hydrogen gas.
Tuliskan persamaan kimia bagi tindak balas antara kuprum(II) oksida dengan gas hidrogen.

[6 marks]

8. (a) Diagram 8.1 shows the flow chart of production of an alloy in industry.
Rajah 8.1 menunjukkan carta alir penghasilan aloi dalam industri.

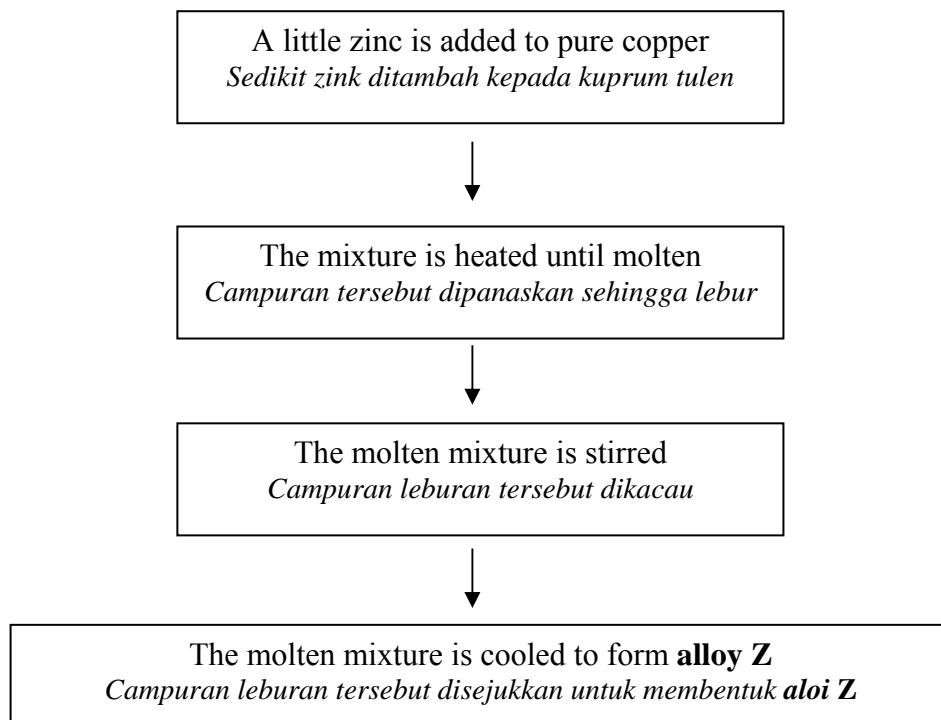


Diagram 8.1

- (i) Name alloy Z.
Draw the arrangement of atoms in pure copper and alloy Z.
Namakan aloi Z.
Lukiskan susunan atom-atom dalam kuprum tulen dan aloi Z. [3 marks]
- (ii) Explain the role of zinc atoms in the alloy Z. [2 marks]
Terangkan peranan atom-atom zink dalam aloi Z.
- (iii) State two properties of alloy Z compared to pure copper. [2 marks]
Nyatakan dua sifat aloi Z berbanding kuprum tulen .

- (b) Diagram 8.2 shows a polymerisation process that produce polymer M.
Rajah 8.2 menunjukkan proses pempolimeran dimana hasilnya ialah polimer M.

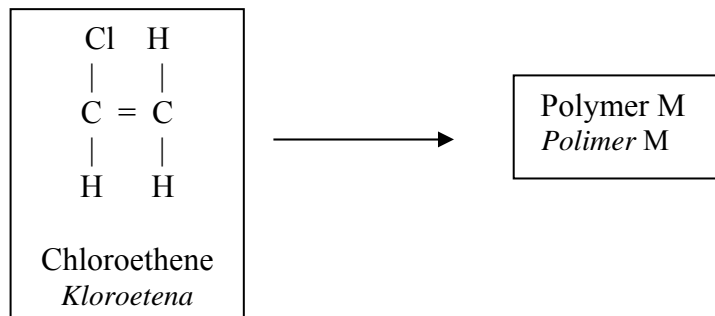


Diagram 8.2

- (i) Name the polymer M.
 Draw the structural formula of polymer M.
Namakan polimer M.
Lukiskan formula struktur bagi polimer M [2 marks]
- (ii) State one use and its respective property of polymer M
Nyatakan satu kegunaan polimer M dan sifatnya [2 marks]
- (iii) Polymer M is a type of synthetic polymer.
 Explain how synthetic polymer can cause environmental pollution .
Polimer M adalah sejenis polimer sintetik.
Terangkan bagaimana polimer sintetik boleh menyebabkan pencemaran alam sekitar. [3 marks]
- (c) Table 8 shows three different composite materials and their uses.
Jadual 8 menunjukkan tiga bahan komposit berlainan dan kegunaannya.

Composite materials <i>Bahan komposit</i>	Uses <i>Kegunaan</i>
P	To construct bridges,highways and airport runways <i>Untuk membina jambatan,lebuhraya dan landasan kapal terbang</i>
Q	To make helmets and water storage tanks <i>Untuk membuat topi keledar dan tangki penyimpanan air</i>
R	To make smaller and faster computer chips <i>Untuk membuat komponen computer yang kecil dan pantas</i>

Table 8

Based on Table 8, identify the composite material P, Q and R whether fibre glass, superconductor or reinforced concrete.

Give the specific properties of each material to support your answer.

Berdasarkan Jadual 8, kenalpastikan identiti bahan komposit P, Q dan R tersebut sama ada kaca gentian,superkonduktor atau konkrit diperkukuhkan.

Berikan sifat khusus bagi setiap bahan tersebut untuk menyokong jawapan anda .

[6 marks]

Section C

[20 marks]

Answer any **one** question.*Jawab mana-mana satu soalan.*

9. Diagram 9 shows the energy level diagram for two reactions.
Rajah 9 menunjukkan gambarajah aras tenaga bagi dua tindak balas.

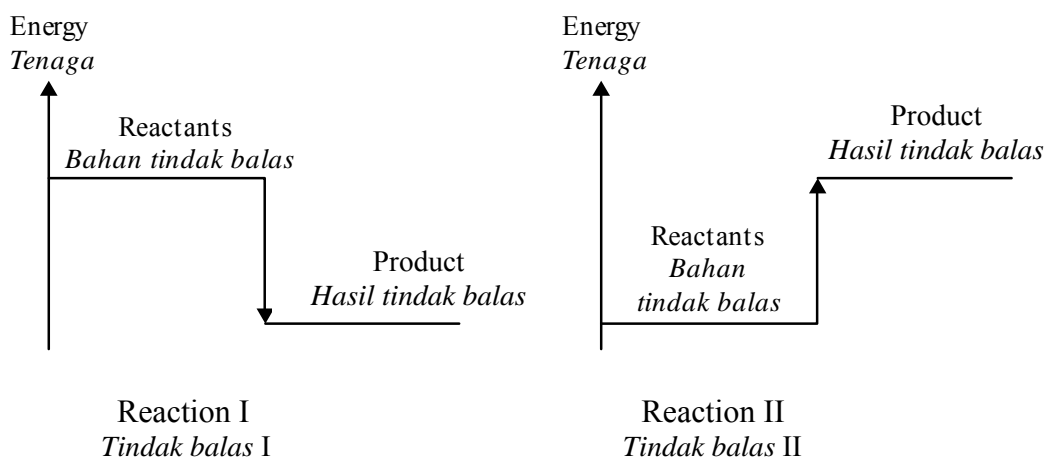


Diagram 9

- (a) Compare and contrast between the energy level diagrams for Reaction I and Reaction II.

Banding bezakan di antara gambarajah aras tenaga bagi Tindak balas I dan Tindak balas II.

[4 marks]

- (b) Table 9 shows the molecular formula and the heat of combustion for ethanol and propanol.
Jadual 9 menunjukkan formula molekul dan haba pembakaran bagi etanol dan propanol.

Alcohol <i>Alkohol</i>	Molecular formula <i>Formula molekul</i>	Heat of combustion/kJ mol ⁻¹ <i>Haba pembakaran /kJ mol⁻¹</i>
Ethanol <i>Etanol</i>	C ₂ H ₅ OH	-1376
Propanol <i>Propanol</i>	C ₃ H ₇ OH	-2026

Table 9

Based on the information in Table 9, compare the heat of combustion between ethanol and propanol. Explain why there is a difference in the values of the heat of combustion between ethanol and propanol.

Berdasarkan maklumat dalam Jadual 9, bandingkan haba pembakaran di antara etanol dan propanol. Terangkan mengapa terdapat perbezaan nilai haba pembakaran bagi etanol dan propanol.

[4 marks]

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

Your answer should include the following :

Jawapan anda perlu mengandungi perkara-perkara berikut :

- Diagram of apparatus set-up
Gambarajah susunan radas
- Procedure of the experiment
Prosedur eksperimen
- Three precautionary steps to get better results
Tiga langkah berjaga-jaga untuk mendapat keputusan lebih baik

[12 marks]

10.

Table 10 shows the structural formulae of hydrocarbon compounds A and B with materials and apparatus to differentiate the hydrocarbons.

Jadual 10 menunjukkan formula struktur bagi sebatian hidrokarbon A dan B dengan bahan-bahan dan alat radas yang boleh digunakan untuk membezakan kedua-duanya.

Compound A <i>Sebatian A</i>	$ \begin{array}{cccccc} & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} \\ & & & & & & \\ \text{H} & - \text{C} & - \text{C} & - \text{C} & - \text{C} & - \text{C} & - \text{C} - \text{H} \\ & & & & & & \\ & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} \end{array} $
Compound B <i>Sebatian B</i>	$ \begin{array}{cccccc} & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} \\ & & & & & & \\ \text{H} & - \text{C} & = \text{C} & - \text{C} & - \text{C} & - \text{C} & - \text{H} \\ & & & & & & \\ & \text{H} & & \text{H} & \text{H} & \text{H} & \end{array} $
Materials and apparatus <i>Bahan dan radas</i>	Acidified potassium manganate (VII) solution, wooden splinter, dropper, filter paper, test tubes, porcelain dishes, bromine water <i>Larutan kalium manganat (VII) berasid, kayu uji berbara, penitis, kertas turas, tabung uji, piring porselin, air bromin</i>

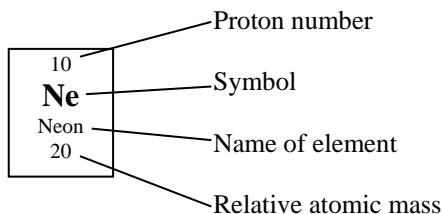
Table 10

- (a) (i) Based on Table 10, name molecule A and B.
Identify the molecule based on their saturated properties.
Berdasarkan Jadual 10, namakan molekul A dan B.
Kenalpasti molekul-molekul tersebut berdasarkan sifat ketepuan masing-masing
[4 marks]
- (ii) State a different in chemical properties of compound A and B.
Explain how to determine the molecules by using the materials and apparatus in Table 10.
Nyatakan satu perbezaan sifat kimia bagi sebatian A dan B.
Jelaskan kaedah untuk mengenalpasti sebatian-sebatian tersebut dengan menggunakan bahan dan alat radas dalam Jadual 10.
[8 marks]
- (b) Compound B can be converted into compound A.
Name the process involved and write the equation of the reaction.
State the conditions needed for the reaction.
Sebatian B boleh ditukarkan kepada sebatian A.
Namakan proses yang terlibat dan tuliskan persamaan bagi tindakbalas tersebut.
Nyatakan keadaan-keadaan bagi tindakbalas tersebut.
[5 marks]
- (c) Compound A and B occur in different isomers.
Draw three isomers of either compound A **or** B.
Sebatian A dan B wujud dalam berbagai isomer.
Lukiskan tiga isomer bagi sebatian A atau B.
[3 marks]

END OF QUESTION PAPER

PERIODIC TABLE OF THE 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 Fluorine 19	10 Ne Neon 20
11 Na Sodium 23	12 Mg Magnesium 24											13 Al Aluminium 27	14 Si Silicon 28	15 P Phosphorus 31	16 S Sulphur 32	17 Cl Chlorine 35	18 Ar Argon 40
19 K Potassium 39	20 Ca Calcium 40	21 Sc Scandium 45	22 Ti Titanium 48	23 V Vanadium 51	24 Cr Chromium 52	25 Mn Manganese 55	26 Fe Iron 56	27 Co Cobalt 59	28 Ni Nickel 59	29 Cu Copper 64	30 Zn Zinc 65	31 Ga Gallium 70	32 Ge Germanium 73	33 As Arsenic 75	34 Se Selenium 79	35 Br Bromine 80	36 Kr Krypton 84
37 Rb Rubidium 86	38 Sr Strontium 88	39 Y Yttrium 89	40 Zr Zirconium 91	41 Nb Niobium 93	42 Mo Molybdenum 96	43 Tc Technetium 98	44 Ru Ruthenium 101	45 Rh Rhodium 103	46 Pd Palladium 106	47 Ag Silver 108	48 Cd Cadmium 112	49 In Indium 115	50 Sn Tin 119	51 Sb Antimony 122	52 Te Tellurium 128	53 I Iodine 127	54 Xe Xenon 131
55 Cs Caesium 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 Unnilquadium 257	105 Unp Unnilpentium 260	106 Unh Unnilhexium 263	107 Uns Unnilseptium 262	108 Uno Unniloctium 265	109 Une Unnilennium 266									



**MODUL PENINGKATAN PRESTASI AKADEMIK SPM
TAHUN 2013**

PERATURAN PEMARKAHAN

CHEMISTRY

PAPER		MARKS
Paper 1		50
Paper 2		100
Paper 3		50
	Total	200

Jumlah markah diskalakan kepada 100%

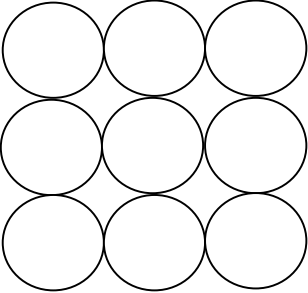
CHEMISTRY

Paper 1

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

A = 13 ; B = 12 ; C = 13 ; D = 12

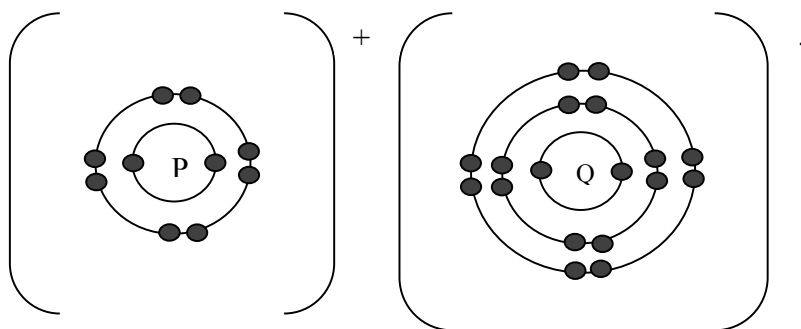
Question 1

1	Mark Scheme	Marks
	a) Sublimation	1
	b) <div style="text-align: center;">  </div> <p>At least: 3 x 2</p>	1
	c(i) Ion	1
	(ii) <ul style="list-style-type: none"> ● Copper(II) sulphate is made up of tiny particles ● The spaces between particles in gel are smaller than in water ● Copper(II) sulphate particles diffuse slower in gel particles. 	1 1 1
	d(i) $2\text{Cu}(\text{NO}_3)_2 \rightarrow 2\text{CuO} + \underline{4}\text{NO}_2 + \text{O}_2$	1
	(ii) <p>No of mol of copper(II) nitrate = $\frac{37.6 \text{ g}}{188}$ = 0.2mol</p> <p>No of mol of oxygen 2 mol of copper(II) nitrate produce 1 mol of oxygen 0.2mol of copper(II) nitrate produce 0.1 mol of oxygen</p> <p>Volume of oxygen = $0.1 \text{ mol} \times 24 \text{ dm}^3\text{mol}^{-1}$ = 2.4dm^3</p>	1 1 1

2.

(a) (i) P^+ [1 mark](ii) Q^- [1 mark](b) (i) $PQ // NaCl$ [1 mark]

- (ii) - Diagram showing correct number of electrons between P and Q with label/nucleus
 - Correct number of charge in each atom



Accept: P is Na and Q is Cl

[2 marks]

(iii) Ionic [1 mark]

(iv) The relative atomic mass of $P = 23$ and $Q = 35$ [3 mark]
 Thus the relative formula mass of $PQ = 23 + 2(35) = 23 + 70 = 93$

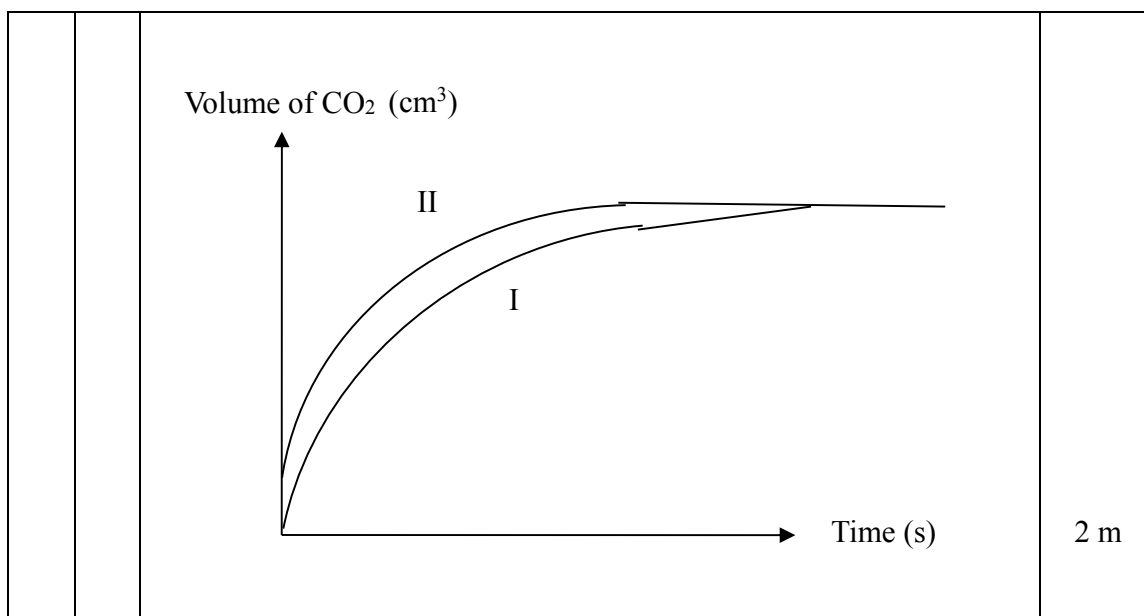
(v) It dissolves in water // can conduct electricity in molten/liquid or aqueous /solution// high melting and boiling point [1 mark]

3	(a)	<table border="1"> <thead> <tr> <th>Substance <i>bahan</i></th> <th>Name <i>Nama</i></th> </tr> </thead> <tbody> <tr> <td>Black solid</td> <td>Copper(II) oxide</td> </tr> <tr> <td>Colourless gas</td> <td>Carbon dioxide</td> </tr> </tbody> </table>		Substance <i>bahan</i>	Name <i>Nama</i>	Black solid	Copper(II) oxide	Colourless gas	Carbon dioxide	1
		Substance <i>bahan</i>	Name <i>Nama</i>							
Black solid	Copper(II) oxide									
Colourless gas	Carbon dioxide									
			1							
	(b)	(i)	Colourless solution turns blue//black solid dissolved	1						
		(ii)	0.1 Mol 27 g	1 1						
		(iii)	1. 15 cm ³ 2. Sulphuric acid is diprotic acid but hydrochloric acid is monoprotic acid // the concentration of hydrogen ion in sulphuric acid is double than hydrochloric acid	1 1						
	(c)	(i)	<table border="1"> <tbody> <tr> <td>Neutralisation</td> <td></td> </tr> <tr> <td>Double decomposition</td> <td>√</td> </tr> </tbody> </table>	Neutralisation		Double decomposition	√			
Neutralisation										
Double decomposition	√									
		(ii)	$\text{Cu}^{2+} + \text{CO}_3^{2-} \rightarrow \text{CuCO}_3$ 1. Correct formula of reactant and product 2. Correct balancing							

4	(a)	\longrightarrow	1	
	(b)	To allow ions to move through it	1	
	(c)	Iron(II) sulphate : green to brown Bromine water: brown to colourless	1 1	
	(d)	(i)	$\text{Fe}^{2+} \longrightarrow \text{Fe}^{3+} + \text{e}$ $\text{Br}_2 + 2\text{e} \longrightarrow 2\text{Br}^-$	1 1

	(c) (i)	Bromine water	1
	(ii)	Iron (II) sulphate solution	1
	(f)	+2 to +3	1
	(e) (i)	Chlorine water // Acidified potassium manganate(VII) solution	1
		TOTAL	10

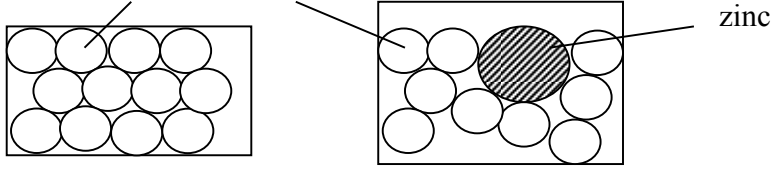
5.	(a)	State the factor	
		Size of the reactant / Total surface area	1 m
	(b)	Balanced equations	
		$\text{CaCO}_3 + 2\text{HNO}_3 \longrightarrow \text{Ca}(\text{NO}_3)_2 + \text{H}_2\text{O} + \text{CO}_2$	2 m
	(c)	Able to calculate the average rate of reaction	
	(i)	$= \frac{50 \text{ cm}^3}{25 \text{ s}} = 2 \text{ cm}^3 \text{ s}^{-1}$	
	(i)	$= \frac{50 \text{ cm}^3}{16 \text{ s}} = 3.125 \text{ cm}^3 \text{ s}^{-1}$	
	(d) (i)	Able to sketch the graph for both experiments	

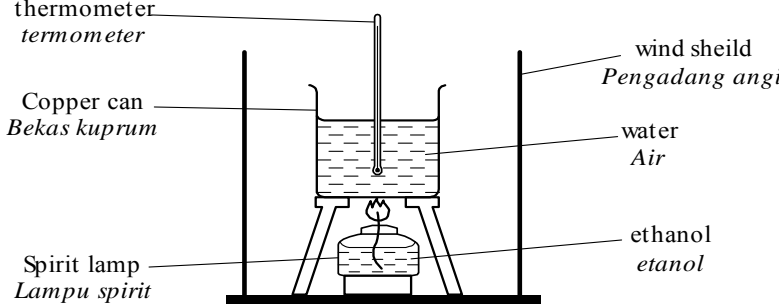


6	(a) (i)	Porous pot	1	
	(ii)	To allow the movement of ion	1	
	(b) (i)	Shiny grey solid deposited	1	
	(ii)	$\text{Ag}^+ + \text{e} \rightarrow \text{Ag}$	1	
	(c)	oxidation	1	
	(d)	<i>[Zn to Ag through external circuit]</i>	1	
	(e) (i)	Opposite // From Mg to Cu	1	
		Mg is more electropositive than Cu	1	
	(f) (i)	Cu, Q, P	1	
	(ii)	1.5 V	1	
	TOTAL			10

7	(a) (i)	2.1 Lithium	1 1	2																								
	(ii)	$2R + 2H_2O \longrightarrow 2ROH + H_2$ [a: Li]	1 1	2																								
	(iii)	R is more reactive than P Atom R has 1 valence electron Donate 1 electron to achieve duplet electron arrangement Atom P has 8 valence electrons Do not accept or share electrons	1 1 1 1 1 1	6																								
	(iv)	React with air / oxygen React with water	1 1	2																								
	(c)(i)	Allow hydrogen in for a few minutes before heating Repeat heating, cooling and weighing until constant mass is obtained [any other suitable answers]	1 1	2																								
	(b)	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;"></td> <td style="width: 20%; text-align: center;">Cu</td> <td style="width: 20%; text-align: center;">O</td> <td style="width: 45%;"></td> </tr> <tr> <td>Mass/g</td> <td style="text-align: center;">26.88</td> <td style="text-align: center;">6.72</td> <td></td> </tr> <tr> <td>Mole</td> <td style="text-align: center;">26.88/ 64</td> <td style="text-align: center;">6.72/16</td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;">0.42</td> <td style="text-align: center;">0.42</td> <td></td> </tr> <tr> <td>Simplest</td> <td style="text-align: center;">1</td> <td style="text-align: center;">1</td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;">CuO</td> <td></td> <td></td> </tr> </table> $CuO + H_2 \longrightarrow Cu + H_2O$ Pt 1: correct reactants Pt 2: correct products		Cu	O		Mass/g	26.88	6.72		Mole	26.88/ 64	6.72/16			0.42	0.42		Simplest	1	1			CuO			1 1 1 1 1 1	4 2
	Cu	O																										
Mass/g	26.88	6.72																										
Mole	26.88/ 64	6.72/16																										
	0.42	0.42																										
Simplest	1	1																										
	CuO																											
		TOTAL	10																									

8	(a)	(i)	Brass	1
		(ii)	copper	

		 <p>Pure copper</p> <p>brass</p> <p>zinc</p>	1+1												
	(iii)	<ol style="list-style-type: none"> 1.zinc atom disrupt the orderly arrangement of copper atom 2.prevent the sliding over the layers of copper atom easily 	1 1												
	(iv)	<ol style="list-style-type: none"> 1.Z is more harder than copper 2.Z has more attractive appearance than copper 	1 1												
	(b) (i)	<p>Polychloroethene/polyvinyl chloride</p> $\left[\begin{array}{cc} \text{Cl} & \text{H} \\ & \\ -\text{C} & - & \text{C}- \\ & \\ \text{H} & \text{H} \end{array} \right]_n$	1 1												
	(ii)	<p>Use: pipe</p> <p>Property : do not rust</p>	1 1												
	(iii)	<ol style="list-style-type: none"> 1.non biodegradable 2.burning of synthetic polymer release toxic gases 3.cause flash flood if thrown in drainage system by clogging the water stream 4.sore eye if not dispose correctly/accumulate in a area <p>Any three</p>	1 1 1												
	(c)	<table border="1"> <thead> <tr> <th>Material</th> <th>Identity</th> <th>Specific properties</th> </tr> </thead> <tbody> <tr> <td>P</td> <td>Reinforced concrete</td> <td>Strong and withstand tensile force</td> </tr> <tr> <td>Q</td> <td>Fibre glass</td> <td>Light and strong</td> </tr> <tr> <td>R</td> <td>superconductur</td> <td>Conduct electric at high temperature</td> </tr> </tbody> </table>	Material	Identity	Specific properties	P	Reinforced concrete	Strong and withstand tensile force	Q	Fibre glass	Light and strong	R	superconductur	Conduct electric at high temperature	1+1 1+1 1+1
Material	Identity	Specific properties													
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9.	(a)	<table border="1"> <thead> <tr> <th>Reaction I</th> <th>Reaction II</th> </tr> </thead> <tbody> <tr> <td>Exothermic reaction</td> <td>Endothermic reaction</td> </tr> <tr> <td>The temperature of reaction mixture rise</td> <td>The temperature of reaction mixture drop</td> </tr> <tr> <td>Heat is released to the surrounding</td> <td>Heat is absorbed from the surrounding</td> </tr> <tr> <td>Energy level of reactants is higher than products</td> <td>Energy level of products is higher than reactants</td> </tr> <tr> <td>Heat released during bond formation is higher than heat absorbed during breaking of bond</td> <td>Heat released during bond formation is lower than heat absorbed during breaking of bond</td> </tr> </tbody> </table>	Reaction I	Reaction II	Exothermic reaction	Endothermic reaction	The temperature of reaction mixture rise	The temperature of reaction mixture drop	Heat is released to the surrounding	Heat is absorbed from the surrounding	Energy level of reactants is higher than products	Energy level of products is higher than reactants	Heat released during bond formation is higher than heat absorbed during breaking of bond	Heat released during bond formation is lower than heat absorbed during breaking of bond	1	
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			1													
			1													
			1													
			1													
				max 4												
	(b)	<ol style="list-style-type: none"> 1. The heat of combustion of propanol is higher than ethanol 2. The number of carbon atoms / molecular size of propanol is higher than ethanol 3. The intermolecular / van der waals forces increases 4. More heat is needed to overcome these forces 	1													
			1													
			1													
			1	4												
	(c)	 <p>Procedure :</p> <ol style="list-style-type: none"> 1. [100-250 cm³] of water is measured and poured into a copper can and the copper can is placed on a tripod stand. 2. The initial temperature of the water is measured and recorded. 3. A spirit lamp with ethanol is weighed and its mass is recorded. 4. The lamp is then placed under the copper can and the wick of the lamp is lighted up immediately 5. The water in the can is stirred continuously until the temperature of the water increases by about 30°C 6. The flame is put off and the highest temperature reached by the water is recorded. 	2													
			1													
			1													
			1													
			1													
			1													
			1													

	7. The lamp and its content are weighed and the mass is recorded	1	
	Precautionary steps (any three)		
	- Flame must touch the bottom of copper can	*1	12
	- Use wind shield	*1	
	- No wire gauze used	*1	
	- Lamp must be weighed immediately after the flame is put off	*1	
		*(choose 3)	
			20

10

(a) (i)	Molecule A : Hexane	1 m
	Molecule B : Hex – 2 – ene	1 m
	Molecule A : saturated hydrocarbon // contains single bond only	1 m
	Molecule B : unsaturated hydrocarbon // contains at least one double bond	1 m
		<i>Total</i>
		<i>4 m</i>
		[4 marks / 4 markah]

(ii) Chemical properties	
1. A burn in oxygen and released less soot but B burn in oxygen and released sootier flame //	
2. A does not change the purple colour of acidified potassium manganate (VII) solution but B decolourised the purple colour of acidified potassium manganate (VII) solution	
3. A does not change the brown colour of bromine water but B decolourised the brown colour of bromine water	2 m
<u>Experiment 1/ Eksperimen 1</u>	
Materials : Compound A and Compound B	1 m
Apparatus : Wooden splinter, filter paper, porcelain dishes.	1 m
Procedure :	
1. About 1 cm ³ of compound A and B are poured separately into two porcelain dishes	
2. The liquids are ignited with a lighted wooden splinter	
3. When the liquids start to burn, the sootiness of the flame produced is observed.	
4. A piece of filter paper is placed above the flame to collect the soot produced.	
5. The amount of soot collected on the filter paper is compared.	4 m
Or	
<u>Experiment 11</u>	
Materials : Compound A and Compound B	1 m
Apparatus : Acidified potassium manganate (VII) solution, dropper, test tubes	1 m
Procedure :	
1. About 1 cm ³ of acidified potassium manganate (VII) solution is poured into a test tube.	
2. About 2 cm ³ of compound A is added to the test tube	
3. The mixture is shaken well	
4. The colour change of the solution in the test tube is recorded	
5. Steps 1 to 4 are repeated with compound B	4 m
or	

Experiment 111

Materials : Compound A and Compound B

Apparatus : Bromine water, dropper, test tubes

1 m

1 m

Procedure :

1. About 1 cm³ of compound A is poured into a test tube.
2. 3 drops of bromine in 1,1,1-trichloroethane are added to the compound A in the test tube
3. The mixture is shaken well
4. The colour change of the solution in the test tube is recorded
5. Steps 1 to 4 are repeated with compound B

4 m

*Total**8 m*

[8 marks / 8 markah]

(b) Name of reaction : Addition of hydrogen // Hydrogenation

1 m

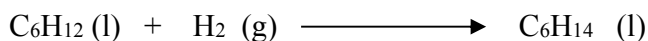
Catalyst : Nickel or platinum

1 m

Temperature : 180°C

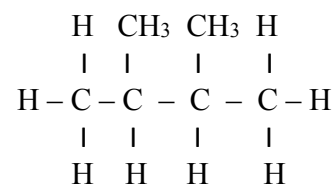
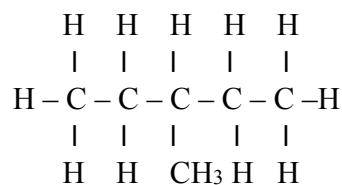
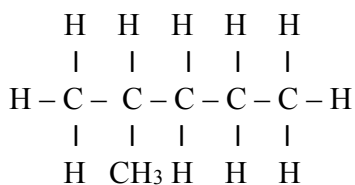
1 m

Equation of reaction :



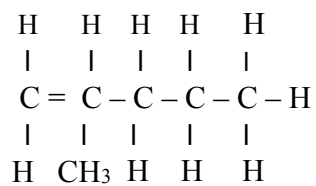
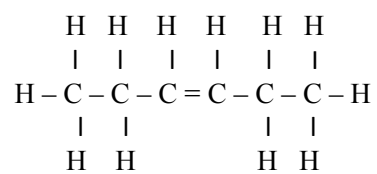
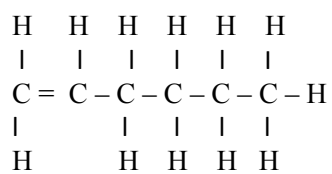
2 m

[5 marks/5 markah]

(c) Compound A / *sebatian A*

or

Compound B / *sebatian B*



[3 marks/3 markah]

END OF MARKING SCHEME

PAPER 3: CHEMISTRY 2013

Question	Rubric	Score																		
<p>1(a)</p>	<p>Able to construct a table with correct headings and unit</p> <p>1. temperature $^{\circ}\text{C}$</p> <p>2. time (s)</p> <p>3. 1/time s^{-1} (3 decimal places)</p> <p>Sample answer</p> <table border="1" data-bbox="320 745 1174 1010"> <tbody> <tr> <td>temperature $^{\circ}\text{C}$</td> <td>25</td> <td>30</td> <td>35</td> <td>40</td> <td>45</td> </tr> <tr> <td>time , s</td> <td>55</td> <td>49</td> <td>41</td> <td>37</td> <td>32</td> </tr> <tr> <td>1/time , s^{-1}</td> <td>0.018</td> <td>0.020</td> <td>0.024</td> <td>0.027</td> <td>0.031</td> </tr> </tbody> </table>	temperature $^{\circ}\text{C}$	25	30	35	40	45	time , s	55	49	41	37	32	1/time , s^{-1}	0.018	0.020	0.024	0.027	0.031	<p>3</p>
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	<p>Able to construct a table with correct headings or unit</p> <p>Sample answer</p> <table border="1"> <tr> <td>Temperature// °C</td> <td>25</td> <td>30</td> <td>35</td> <td>40</td> <td>45</td> </tr> <tr> <td>time // , s</td> <td>55</td> <td>49</td> <td>41</td> <td>37</td> <td>32</td> </tr> <tr> <td>1/time //, s⁻¹</td> <td>0.018</td> <td>0.02</td> <td>0.024</td> <td>0.027</td> <td>0.03</td> </tr> </table>	Temperature// °C	25	30	35	40	45	time // , s	55	49	41	37	32	1/time //, s ⁻¹	0.018	0.02	0.024	0.027	0.03	1
Temperature// °C	25	30	35	40	45															
time // , s	55	49	41	37	32															
1/time //, s ⁻¹	0.018	0.02	0.024	0.027	0.03															
1(b)	<p>Able to plot graph with</p> <p>1.label axis with unit 1 m</p> <p>2.transfer all points correctly 1m</p> <p>3.a straight line 1m</p>	3																		
1(c)i	<p>Able to predict correctly</p> <p>34.48s</p>	3																		
	<p>Able to predict less accurately</p> <p>34s < t < 36s</p>	2																		
	<p>>34s</p>	1																		
	<p>No response given / wrong response</p>	0																		
1(c)ii	<p>Able to write conclusion correctly</p> <p>Sample answer</p> <p>When the temperature of sodium thiosulphate solution increases, the rate of reaction increases// time taken for mark X to disappear from sight decreases// 1/time increases</p>	3																		
	<p>Able to write conclusion less accurately</p> <p>Sample answer</p> <p>Temperature of sodium thiosulphate solution is directly proportional to 1/time</p>	2																		

	Able to give an idea of conclusion Sample answer Temperature affect the time taken of the reaction	1
	No response given / wrong response	0
1(d)	Able to list the 3 variables correctly Manipulated variable: temperature of sodium thiosulphate solution Responding variable: time taken for mark X to disappear// rate of reaction Constant variable: Volume and concentration of HCl / Na ₂ SO ₃ // HCl / Na ₂ SO ₃	3
	Any 2 variables correctly	2
	Any 1 variable correctly	1
	No response given / wrong response	0
Question	Rubric	Score
2(a)	Able to state the two observation correctly <u>Sample answer:</u> 1. Burns very rapidly// burns vigorously 2. Produces white fumes	3
	Able to state any one answer correctly	2
	Able to give an idea of the observation <u>Sample answer:</u> Burns// white solid// produces solid// burns rapidly	1
	No response given / wrong response	0

Question	Rubric	Score
2(b)	Able to state the relationship correctly <u>Sample answer:</u> Going down the Group 1 element, the reactivity towards oxygen increase.	3
	Able to state the relationship less accurately. <u>Sample answer:</u> Different type of Group 1 element, different reactivity towards oxygen.	2
	Able to give an idea of relationship <u>Sample answer:</u> Position of Group 1 element affected the reactivity.	1
	No response given / wrong response	0

Question	Rubric	Score
2(c)	Able to give the inference correctly <u>Sample answer:</u> Alkaline solution produced.	3
	Able to give the inference less accurately <u>Sample answer:</u> Lithium hydroxide formed	2
	Able to give an idea of the inference. <u>Sample answer:</u> Alkali metal	1
	No response given / wrong response	0

Question	Rubric	Score
2(d)	Able to state the hypothesis correctly with direction <u>Sample answer:</u> As going down group I, reactivity towards oxygen increases	3
	Able to state the hypothesis correctly <u>Sample answer:</u> As going down group I, reactivity increases	2
	Able to state an idea of the hypothesis <u>Sample answer:</u> Potassium, so reactivity increase	1
	No response given / wrong response	0

Question	Rubric	Score				
2(e)	Able to write the operational definition correctly [procedure] <u>Sample answer:</u> Group I metals burn in oxygen, show high reactivity	3				
	Able to write the operational definition The brighter the flame, the higher is the reactivity of the element in group 1	2				
	Able have an idea.	1				
	No response given / wrong response	0				
2f	Able to classify all the substances correctly <u>Sample answer:</u> <table border="1" style="margin-left: 40px;"> <tbody> <tr> <td>Acidic substances</td> <td>Alkaline substances</td> </tr> <tr> <td>Vinegar</td> <td>Baking powder</td> </tr> </tbody> </table>	Acidic substances	Alkaline substances	Vinegar	Baking powder	3
Acidic substances	Alkaline substances					
Vinegar	Baking powder					

	Soft drinks	toothpaste-	
	Sample answer		2
	3 corrects		
	2 correct		1
	No response given / wrong response		0

Question	Marks Scheme	Marks
3(a)	<p><i>Able to state the aim by relating to the following 3 information correctly:</i></p> <ol style="list-style-type: none"> 1. <i>different metals / metals X and Y</i> 2. <i>contact</i> 3. <i>rusting</i> <p>Sample answer</p> <p>To investigate the effect of metals X, Y / different metals when in contact with iron to the rusting of iron.</p>	3
	<p><i>Able to state the aim of the experiment.</i></p> <p>Sample answer</p> <p>To investigate the effect of metals X, Y / different metals on the rusting of iron.</p>	2
	<p><i>Able to give an idea of statement of the problem.</i></p> <p><u>Sample answer:</u></p> <p>To investigate the effect of metals on rusting</p> <p>// To investigate rusting</p>	1
	<i>No response or wrong response.</i>	0

Question	Marks Scheme	Marks
3(b)	<p><i>Able to state all variables correctly:</i></p> <p><u>Sample answer:</u></p> <p><i>Manipulated variable:</i> metal X and metal Y // stating 2 metals which one metal is less electropositive and one metal is more electropositive than iron.// pairs of X-Fe and Y-Fe</p> <p><i>Responding variable:</i> the rusting of iron // iron rusts or does not rust // [any suitable observations: e.g. the formation of blue spot// the formation of pink colour // the formation of brown solid]</p> <p><i>Fixed variable:</i> iron nail// electrolyte/(named) // agar/jelly solution //temperature</p>	3
	<i>Able to state any two variables correctly.</i>	2
	<i>Able to state any one variable correctly.</i>	1
	<i>No response or wrong response.</i>	0

Question	Marks Scheme	Marks
3(c)	<p><i>Able to state the relationship between the manipulated variable and the responding variable with direction correctly:</i></p> <p><u>Sample answer:</u></p> <p>Metal Y causes iron nail rusting while metal X does not.// A more electropositive metal/(metal X) will prevent iron from rusting while a less electropositive metal (metal Y) will be rusting iron.</p>	3
	<p><i>Able to state the relationship between the manipulated variable and the responding variable:</i></p> <p><u>Sample answer:</u></p> <p>Metal Y speeds up iron nail rusting while metal X slows down</p>	2

	rusting.	
	<i>Able to state an idea of hypothesis:</i> <u>Sample answer:</u> Metal X / Y affect the rusting of iron.	1
	<i>No response or wrong response.</i>	0

Question	Marks Scheme	Marks
3(d)	<i>Able to give a complete list of materials and apparatus that involves the following:</i> <ol style="list-style-type: none"> 1. iron nails 2. 1 metal above iron in electrochemical series 3. 1 metal below iron in electrochemical series 4. A suitable electrolyte, test-tubes, sand paper <u>Sample answer:</u> Iron nails, magnesium/zinc/aluminium strip, tin/copper/lead/silver strip, [potassium hexacyanoferrate(III) solution+phenolphthalein indicator] / [any suitable electrolyte] / [water], test-tubes/ boiling-tubes, sand paper	3
	<i>Able to give a list of materials and apparatus that involves the following:</i> <ol style="list-style-type: none"> 1. 1 metal above iron in electrochemical series 2. 1 metal below iron in electrochemical series 3. Any suitable electrolyte, any suitable container 	2
	<i>Able to give a list of materials and apparatus that involves the following:</i> <ol style="list-style-type: none"> 1. 1 metal above/below iron in electrochemical series// any suitable electrolyte. 2. any container 	1
	<i>No response or wrong response.</i>	0

Question	Marks Scheme	Marks
3(e)	<p><i>Able to state the following 6 steps:</i></p> <ol style="list-style-type: none"> 1. <i>[Clean the iron nails and metals strip with sand paper]</i> 2. <i>[Coil iron nails with the metals]</i> 3. <i>[Place iron nails in separate container]</i> 4. <i>[Pour/add/fill the [named electrolyte] into the container]</i> 5. <i>[Leave them aside for several days]</i> 6. <i>[Record your observation]</i> <p><u>Sample answer:</u></p> <ol style="list-style-type: none"> 1. Clean iron nails, magnesium ribbon and copper strip with sand paper. 2. Coil two iron nails tightly with magnesium ribbon and copper strip. 3. Place all the iron nails in separate test tubes. 4. Pour the hot agar containing potassium hexacyanoferrate(III) solution and phenolphthalein indicator into the test tubes. 5. Keep the test tubes in a test tube rack and leave them aside for 3 days. 6. Record your observations. 	3
	Steps 2,4,6	2
	Step 2[coil iron nail with Mg/Cu], 4	1
	<i>No response or wrong response.</i>	0

Question	Marks Scheme	Marks
3(f)	<p><i>Able to exhibit the tabulation of data that includes the following four information.</i></p> <ol style="list-style-type: none"> 1. <i>Heading for the manipulated variables</i> <i>Set//pair of metals</i> 2. <i>Examples of Sets//pair of metals</i> <i>I, II//Mg-Fe, Cu-Fe</i> 3. <i>Heading for responding variable</i> <i>observation</i> 4. <i>2x3 or 3x2 table</i> 	2

	<p><u>Sample answer:</u></p> <table border="1" data-bbox="336 416 1219 622"> <thead> <tr> <th data-bbox="336 416 772 483">Set//Pair of metals</th> <th data-bbox="772 416 1219 483">Observation</th> </tr> </thead> <tbody> <tr> <td data-bbox="336 483 772 551">I//Mg-Fe</td> <td data-bbox="772 483 1219 551"></td> </tr> <tr> <td data-bbox="336 551 772 618">II//Cu-Fe</td> <td data-bbox="772 551 1219 618"></td> </tr> </tbody> </table>	Set//Pair of metals	Observation	I//Mg-Fe		II//Cu-Fe		
Set//Pair of metals	Observation							
I//Mg-Fe								
II//Cu-Fe								
	<p><i>Able to exhibit the tabulation of data that includes the following two information.</i></p> <p><i>1. 1/3 from score 2</i></p> <p><i>2. 2x2 table</i></p> <p><u>Sample answer:</u></p> <table border="1" data-bbox="336 1267 1219 1406"> <thead> <tr> <th data-bbox="336 1267 772 1335">Set//Pair of metals</th> <th data-bbox="772 1267 1219 1335">Observation</th> </tr> </thead> <tbody> <tr> <td data-bbox="336 1335 772 1402"></td> <td data-bbox="772 1335 1219 1402"></td> </tr> </tbody> </table>	Set//Pair of metals	Observation			1		
Set//Pair of metals	Observation							
	<i>No response or wrong response.</i>	0						

END OF MARKING SCHEME

<http://edu.joshuatly.com/>
<http://fb.me/edu.joshuatly>