BAHAGIAN PENGURUSAN SEKOLAH BERASRAMA PENUH
DAN SEKOLAH KECEMERLANGAN

PENTAKSIRAN DIAGNOSTIK AKADEMIK SBP 2015
PERCUBAAN SIJIL PELAJARAN MALAYSIA

CHEMISTRY

Kertas 1

Satu Jam Lima Belas Minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

Arahan:

1. *Kertas soalan ini mengandungi **50** soalan.*
2. *Jawab **semua** soalan*
3. *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. *Jika anda hendak menukar jawapan, padamkan tanda yang telah dibuat, kemudian hitamkan jawapan yang baru.*
5. *Rajah yang mengiringi soalan tidak dilukiskan mengikut skala kecuali dinyatakan*
6. *Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogramkan.*

1 Diagram 1 shows an atomic model proposed by a scientist.
Rajah 1 menunjukkan satu model atom yang dicadangkan oleh seorang saintis.

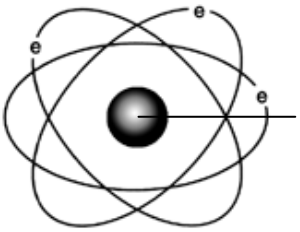


Diagram 1
Rajah 1

Who was the scientist?
Siapakah saintis itu?

A Neils Bohr
B J.J Thomson
C James Chadwick
D Ernest Rutherford

2 The average mass of magnesium atom is 24 times greater than $\frac{1}{12}$ of the mass of carbon-12 atom.
What is the relative atomic mass of magnesium?
Purata jisim satu atom magnesium ialah 24 *kali lebih besar daripada* $\frac{1}{12}$ *jisim satu atom karbon-12.*
Apakah jisim atom relatif bagi magnesium?

A 2
B 24
C 36
D 288

3 Atoms of the elements that involved in the formation of ionic compound will
Atom-atom bagi unsur yang terlibat dalam pembentukan sebatian ion akan

A share electrons
kongsi elektron
B accept electrons
terima elektron
C donate electrons
derma elektron
D transfer electrons
pindah elektron

4 Diagram 2 shows the uses of elements X and Y in our daily life. These elements are located in Period 3 of The Periodic Table of Elements.
Rajah 2 menunjukkan kegunaan unsur-unsur X dan Y dalam kehidupan seharian kita. Unsur-unsur ini terletak dalam Kala 3 Jadual Berkala Unsur.

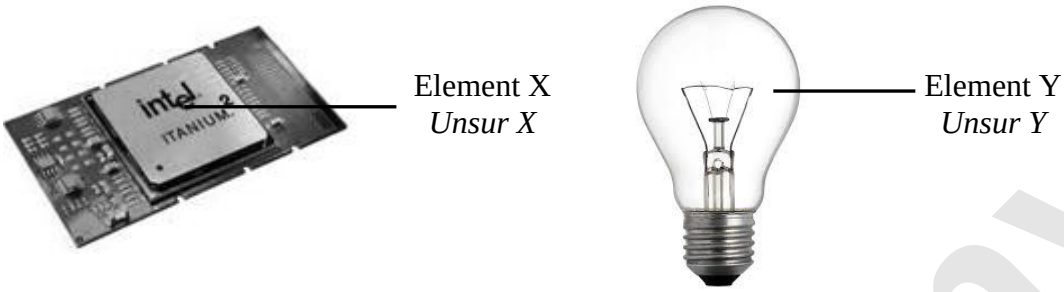


Diagram 2
Rajah 2

In which group do elements X and Y located?
Dalam kumpulan manakah unsur-unsur X dan Y terletak?

	X	Y
A	Group 14 *Kumpulan 14*	Group 18 *Kumpulan 18*
B	Group 16 *Kumpulan 16*	Group 18 *Kumpulan 18*
C	Group 14 *Kumpulan 14*	Group 16 *Kumpulan 16*
D	Group 16 *Kumpulan 16*	Group 14 *Kumpulan 14*

5 Which substance is acidic?
B*ahan yang manakah bersifat asid?*

A Lithium oxide
Litium oksida
B Sulphur dioxide
Sulfur dioksida
C Sodium hydroxide
Natrium hidroksida
D Magnesium oxide
Magnesium oksida

6 The following information shows the arrangement of some cations in the electrochemical series.

Na^+, Mg^{2+}, Al^{3+}, Zn^{2+}, Fe^{2+}, **X**, H^+, **Z**

⟶ Tendency to discharge increases

Maklumat berikut menunjukkan susunan beberapa kation dalam siri elektrokimia.

Na^+, Mg^{2+}, Al^{3+}, Zn^{2+}, Fe^{2+}, **X**, H^+, **Z**

⟶ *Kecenderungan untuk nyahcas bertambah*

What are X and Z?
Apakah X dan Z?

	X	Z
A	Ca^{2+}	Ag^+
B	Pb^{2+}	Cu^{2+}
C	Cu^{2+}	Pb^{2+}
D	Ag^+	Ca^{2+}

7 Which salt is soluble in water?
Garam yang manakah larut dalam air?

A Barium sulphate
Barium sulfat

B Zinc carbonate
Zink karbonat

C Calcium sulphate
Kalsium sulfat

D Potassium carbonate
Kalium karbonat

8 Which statement explains the effective collision?
Pernyataan yang manakah menerangkan perlanggaran berkesan?

A The collision that causes a reaction
Perlanggaran yang menyebabkan tindak balas berlaku

B The collision which takes place after a reaction
Perlanggaran yang berlaku selepas tindak balas

C The collision which takes place before a reaction
Perlanggaran yang berlaku sebelum tindak balas

D The collision produces less energy than the activation energy
*Pelanggaran menghasilkan tenaga kurang daripada tenaga pengaktif*an

9 Diagram 3 shows two glasses which are made from material M.
Rajah 3 menunjukkan dua gelas yang diperbuat daripada bahan M.

Diagram 3
Rajah 3

The glasses only suitable to fill cold drinks such as juices and wine.
What is material M?
Gelas ini hanya sesuai mengisi minuman sejuk seperti jus dan wain.
Apakah bahan M?

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

10 Which substance is a natural polymer?
Bahan manakah adalah polimer semula jadi?

A Polyethene
Polietena
B Polystyrene
Polistirena
C Polyisoprene
Poliisoprena
D Polyvynil chloride
Polivinil klorida

11 Diagram 4 shows the apparatus set-up to study the reactivity of a metal with oxygen.
Rajah 4 menunjukkan susunan radas untuk mengkaji kereaktifan satu logam dengan oksigen.

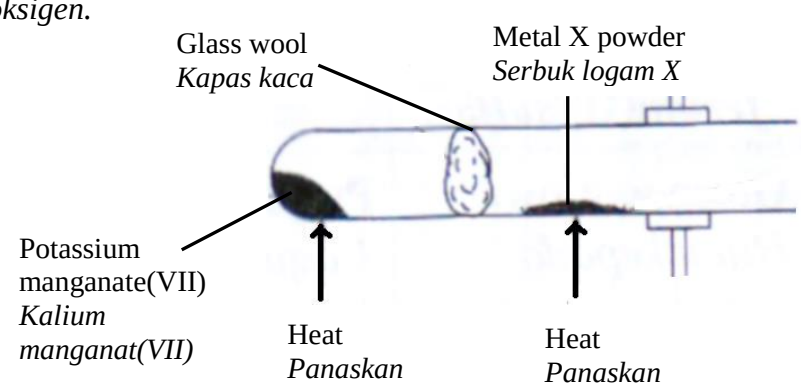


Diagram 4
Rajah 4

Metal X is heated strongly to produce white residue.
What is X?
Logam X dipanaskan dengan kuat menghasilkan baki berwarna putih.
Apakah X?

A Iron
Ferum
B Lead
Plumbum
C Copper
Kuprum
D Magnesium
Magnesium

12 Streptomycin and penicillin are two examples of medicine Y.
What is the type of medicine Y?
Streptomisin dan penisilin adalah dua contoh ubat Y.
Apakah jenis ubat Y?

A Hormone
Hormon
B Antibiotic
Antibiotik
C Analgesic
Analgesik
D Psychotherapeutic
Psikoterapeutik

13 Photo 1 shows a student who suffering from cramps during the race run on school sports day. The teacher uses a packet containing material Z to relieve her pain. What is material Z?
Foto 1 menunjukkan seorang pelajar mengalami kekejangan otot semasa berlumba lari pada hari sukan sekolah. Gurunya menggunakan satu bungkusan yang berisi bahan Z untuk melegakan kesakitannya.
Apakah bahan Z?

Material Z
Bahan Z

Photo 1
Foto 1

A Ammonium nitrate powder and water
Serbuk ammonium nitrat dan air

B Magnesium powder and zinc sulphate solution
Serbuk magnesium dan larutan zink sulfat

C Sulphuric acid and potassium hydroxide solution
Asid sulfurik dan larutan kalium hidroksida

D Barium nitrate solution and sodium sulphate solution
Larutan barium nitrat dan larutan natrium sulfat

14 The equation represents a reaction to prepare a soluble sulphate salt.
Persamaan mewakili satu tindak balas untuk menyediakan garam sulfat terlarutkan.

$H_2SO_4 + M \longrightarrow$ sulphate salt + H_2O
$H_2SO_4 + M \longrightarrow$ *garam sulfat* + H_2O

What is substance M?
Apakah bahan M?

A Copper(II) oxide
Kuprum(II) oksida

B Lead(II) oxide
Plumbum(II) oksida

C Barium hydroxide
Barium hidroksida

D Calcium hydroxide
Kalsium hidroksida

15 Photo 2 shows a child who is suffering from a swollen gland at his neck.
He lost weight drastically and body temperature often gets hot and then suddenly become cold.
Foto 2 menunjukkan seorang kanak-kanak yang mengalami pembengkakan kelenjar pada lehernya. Dia mengalami penurunan berat badan secara drastik dan suhu badannya sering menjadi panas kemudian tiba-tiba menjadi dingin.

Photo 2
Foto 2

Which substance can be used to overcome the child's problem?
Bahan yang manakah boleh digunakan untuk mengatasi masalah kanak-kanak ini?

A Streptomycin
Streptomisin

B Tranquiliser
Trankuilizer

C Cobalt-60
Kobalt-60

D Iodine-131
Iodin-131

16 Diagram 5 shows the apparatus set-up to determine the empirical formula of copper(II) oxide.
Rajah 5 menunjukkan susunan radas untuk menentukan formula empirik bagi kuprum(II) oksida.

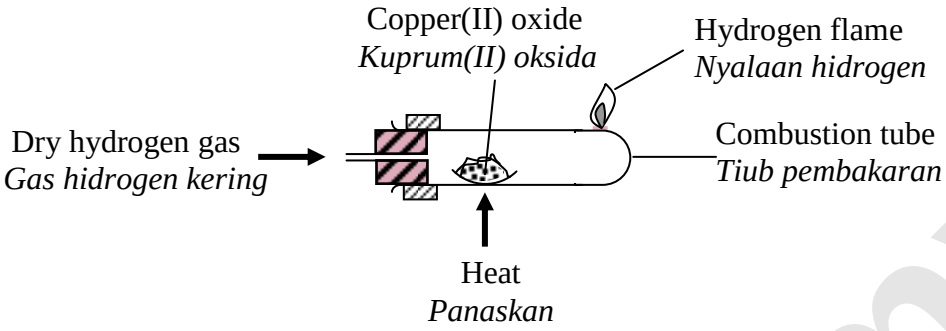


Diagram 5
Rajah 5

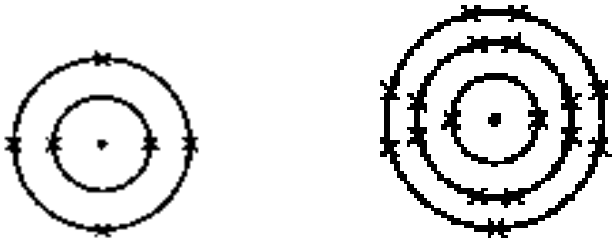
The flow of dry hydrogen gas must be continued during the cooling process.
What is the reason for this action?
Aliran gas hidrogen kering mesti dialirkan semasa proses penyejukan.
Apakah sebab tindakan ini diambil?

A To remove the air from the combustion tube
Untuk menyingkirkan udara daripada tiub pembakaran
B To avoid the oxidation of copper to copper(II) oxide
Untuk mengelakkan pengoksidaan kuprum kepada kuprum(II) oksida
C To ensure the complete conversion of copper to copper(II) oxide
Untuk memastikan pertukaran lengkap kuprum kepada kuprum(II) oksida
D To increase the mass of copper formed in the combustion tube
Untuk meningkatkan jisim kuprum yang terbentuk dalam tiub pembakaran

17 The element astatine located in the same group as chlorine in the Periodic Table of Elements.
Which of the following is the property of astatine?
Unsur astatin terletak dalam kumpulan yang sama dengan klorin dalam Jadual Berkala Unsur.
Antara berikut yang manakah sifat astatin?

A Forms a basic oxide
Membentuk satu oksida berbes
B Exist as gas at room temperature
Wujud sebagai gas pada suhu bilik
C Reacts with iron to form brown solid
Bertindak balas dengan ferum untuk menghasilkan pepejal perang
D Forms a ionic compound when reacts with oxygen gas
Membentuk satu sebatian ion apabila bertindak balas dengan gas oksigen

18 Diagram 6 shows the electron arrangement of atoms of elements X and Y. Both elements react to form a compound.
Gambarajah 6 menunjukkan susunan elektron bagi atom-atom unsur X dan Y. Kedua-dua unsur bertindak balas untuk membentuk satu sebatian.



Atom X Atom Y

Diagram 6
Rajah 6

Which statement is correct about the physical property of the compound formed?
Pernyataan yang manakah betul tentang sifat fizik sebatian yang terbentuk itu?

A Conducts electricity in molten and aqueous state
Mengkonduksikan elektrik dalam keadaan leburan dan larutan akueus

B Solid at room temperature
Pepejal pada suhu bilik

C Low melting point
Takat lebur rendah

D Soluble in water
Larut dalam air

19 Diagram 7 shows a voltaic cell prepared by a group of students. They dipping two electrodes in a lemon and connected the electrodes to the volmeter.
Rajah 7 menunjukkan satu sel volta yang disediakan oleh sekumpulan pelajar. Mereka mencucuk dua elektrod ke dalam buah limau dan menyambungkan elektrod-elektrod kepada voltmeter.

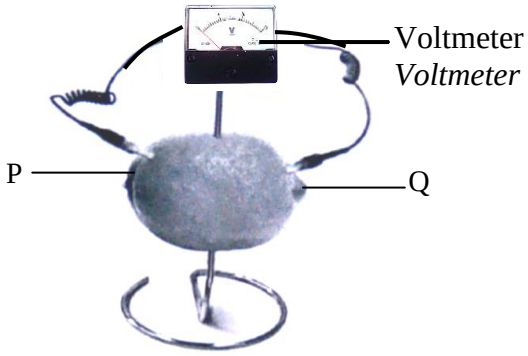


Diagram 7
Rajah 7

Which pair of electrodes, P and Q will make the needle of voltmeter deflect?
Manakah pasangan elektrod, P dan Q yang akan menyebabkan jarum voltmeter terpesong?

	P	Q
A	Carbon *Karbon*	Sulphur *Sulfur*
B	Sulphur *Sulfur*	Zinc *Zink*
C	Copper *Kuprum*	Copper *Kuprum*
D	Copper *Kuprum*	Zinc *Zink*

20 The following equation represents a redox reaction.
Persamaan berikut mewakili satu tindak balas redoks.

$$H_2S + Cl_2 \longrightarrow 2HCl + S$$

Which statement is correct?
Pernyataan yang manakah betul?

A Chlorine acts as a reducing agent
Klorin bertindak sebagai agen penurunan

B Hydrogen sulphide undergoes oxidation
Hidrogen sulfida mengalami pengoksidaan

C The oxidation number of hydrogen increases
Nombor pengoksidaan hidrogen meningkat

D The oxidation number of sulphur changes from 0 to -2
Nombor pengoksidaan sulfur berubah dari 0 kepada -2

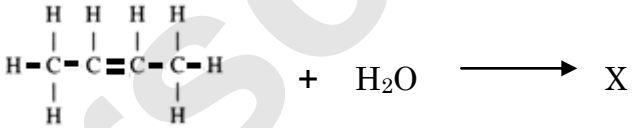
21

Photo 3
Foto 3

Photo 3 shows the car's engine block which made of ceramic.
What property of ceramic makes it suitable to be used for for making engine block?
Foto 3 menunjukkan blok enjin kereta yang diperbuat daripada seramik.
Apakah sifat seramik yang menyebabkannya sesuai digunakan dalam pembuatan blok enjin ini?

A It is very hard
Ia sangat keras
B It is strong
Ia adalah kuat
C Resistant to chemical corrosion
Tahan kepada kakisan kimia
D Withstand high temperature
Tahan kepada suhu tinggi

22 The following equation represents a reaction of a compound.
Persamaan berikut mewakili tindak balas bagi satu sebatian.



What is X?
Apakah X?

A Butan-2-ol
Butan-2-ol
B Butan-3-ol
Butan-3-ol
C 1-methylpropan-1-ol
1-metilpropan-1-ol
D 1-methylpropan-2-ol
1-metilpropan-2-ol

23 Diagram 8 shows the set-up of apparatus to investigate a chemical property of nitric acid.
Rajah 8 menunjukkan susunan radas untuk mengkaji satu sifat kimia asid nitrik.

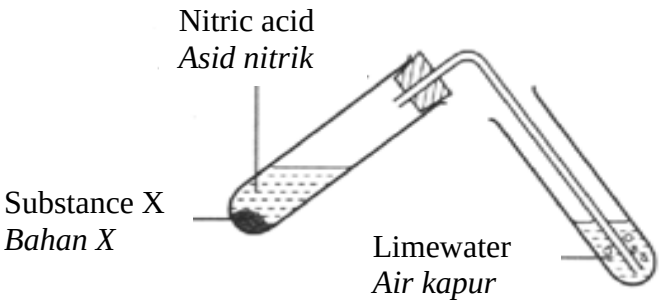


Diagram 8
Rajah 8

Which statement is correct about the property?
Pernyataan yang manakah betul tentang sifat tersebut?

A Nitric acid reacts with substance X to produce salt and water
Asid nitrik bertindak balas dengan bahan X menghasilkan garam dan air

B Nitric acid reacts with substance X to produce salt and hydrogen gas
Asid nitrik bertindak balas dengan bahan X menghasilkan garam dan gas hidrogen.

C Nitric acid reacts with substance X to produce salt, water and hydrogen gas.
Asid nitrik bertindak balas dengan bahan X menghasilkan garam, air dan gas hidrogen.

D Nitric acid reacts with substance X to produce salt, water and carbon dioxide.
Asid nitrik bertindak balas dengan bahan X menghasilkan garam, air dan gas karbon dioksida

24 Atom X has 18 protons and 22 neutrons in its nucleus.
What is the number of electrons in atom X?
Atom X mempunyai 18 proton dan 22 neutron dalam nukleusnya.
Berapakah bilangan elektron dalam satu atom X?

A Equal with the number of protons
Sama dengan bilangan proton

B Equal with the number of neutrons
Sama dengan bilangan neutron

C Equal with the number of valence electron
Sama dengan bilangan elektron valens

D Equal with the total number of protons and neutron
Sama dengan jumlah bilangan proton dan neutron

25 The following information shows the effect of a particular factor on the rate of reaction.
Maklumat berikut menunjukkan kesan satu faktor yang mempengaruhi kadar tindak balas.

- The kinetic energy of particles increase
  Tenaga kinetik zarah meningkat
- Frequency of collision between particles increases
  Frekuensi perlanggaran antara zarah meningkat
- Frequency of effective collision increases
  Frekuensi perlanggaran berkesan meningkat

Which of the following cause the above effect?
Manakah antara berikut memberikan kesan di atas?

A Adding a catalyst.
Menambah mangkin

B Increasing the temperature of reactants
Menaikkan suhu bahan tindak balas

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

D Using larger total surface area of reactants
Menggunakan jumlah luas permukaan bahan tindak balas yang lebih besar

26 Ahmad is a mechanic. He faces the same problem every day. His shirt is always stained with grease.
Which additive will remove the grease stain on Ahmad's shirt effectively?
Ahmad ialah seorang mekanik. Dia menghadapi masalah yang sama setiap hari. Bajunya sentiasa mempunyai kesan gris.
Bahan tambah manakah akan menghilangkan kesan kotoran gris pada baju Ahmad dengan berkesan?

A Fragrance agent
Agen pewangi

B Stabilising agent
Agen penstabil

C Suspension agent
Agent antienapan

D Biological enzyme
Enzim biologi

27 Table 1 shows the heat of neutralisation for the reaction between hydrochloric acid with sodium hydroxide solution and ammonia solution.
Jadual 1 menunjukkan haba peneutralan bagi tindak balas antara asid hidroklorik dengan larutan natrium hidroksida dan larutan ammonia.

Reactants ***Bahan tindak balas***	**Heat of neutralisation** ***Haba peneutralan*** ***(kJ mol^{-1})***
Hydrochloric acid and ammonia solution *Asid hidroklorik dan larutan ammonia*	- 54.0
Hydrochloric acid and sodium hydroxide solution *Asid hidroklorik dan larutan natrium hidroksida*	-57.0

Table 1
Jadual 1

Which statement is the best to explain the data?
Pernyataan yang manakah paling baik untuk menerangkan data itu?

A Ammonia solution ionises partially in water
Larutan ammonia mengion separa dalam air

B Ammonia is weak alkali and sodium hydroxide is strong alkali
Ammonia ialah alkali lemah dan natrium hidroksida ialah alkali kuat

C Reaction between ammonia solution and hydrochloric acid is an exothermic reaction
Tindak balas antara larutan ammonia dan asid hidroklorik adalah tindak balas eksotermik

D Ammonia solution absorbs some of the heat energy released to complete its ionisation in water
Larutan ammonia menyerap sebahagian daripada tenaga yang dibebaskan untuk melengkapkan pengionannya dalam air

28 Element P is located above element Q in a Periodic Table of Elements.
Both elements dissolve in water to produce hydroxide ions.
Which of the following is correct about P and Q?
Unsur P terletak di atas unsur Q dalam Jadual Berkala Unsur. Kedua-dua unsur melarut dalam air untuk menghasilkan ion hidroksida.
Antara berikut yang manakah betul tentang P dan Q?

A Atom P has bigger atomic radius than atom Q.
Atom P mempunyai jejari atom yang lebih besar daripada atom Q.

B Element P has a lower melting point than element Q.
Unsur P mempunyai takat lebur lebih rendah daripada unsur Q.

C Element P burns more vigorously than element Q in oxygen gas.
Unsur P terbakar dengan lebih marak daripada unsur Q dalam gas oksigen.

D Atom P has a lower tendency to release its valence electron than atom Q.
Atom P mempunyai kecenderungan lebih rendah untuk melepaskan elektron valensnya daripada atom Q.

29 Table 2 shows the group number for elements R and T.
Jadual 2 menunjukkan nombor kumpulan bagi unsur-unsur R dan T.

Element ***Unsur***	**Group** ***Kumpulan***
R	14
T	16

Table 2
Jadual 2

What is the chemical formula and the type of bond of the compound formed when element R reacts with element T?
Apakah formula kimia dan jenis ikatan bagi sebatian yang terbentuk apabila unsur R bertindak balas dengan unsur T?

	Chemical formula ***Formula kimia***	**Type of bond** ***Jenis ikatan***
A	RT_2	Ionic *Ion*
B	RT_2	Covalent *Kovalen*
C	R_2T	Ionic *Ion*
D	R_2T	Covalent *Kovalen*

30 Pn. Farizah holds a wedding ceremony for her daughter. She used 7 trays made of bronze. She found one of the tray falls but not dented.
Which statement explains the situation above?
Pn. Farizah mengadakan satu majlis perkahwinan untuk anaknya. Dia menggunakan 7 dulang yang diperbuat daripada gangsa. Dia mendapati salah sebuah dulang terjatuh tetapi tidak kemek.
Pernyataan yang manakah menerangkan keadaan di atas?

A Foreign atom makes strong bonds between the pure copper atom
Atom asing membina ikatan yang kuat dengan atom-atom kuprum tulen

B Foreign atom fill in all the empty spaces between pure copper atom
Atom asing mengisi semua ruangan kosong antara atom-atom logam tulen

C Foreign atom compresses the arrangement of atom in pure copper.
Atom asing memampatkan susunan atom dalam kuprum tulen

D Foreign atom reduced the layer of pure copper atoms from sliding.
Atom asing mengurangkan lapisan atom kuprum tulen daripada menggelongsor

31 Diagram 9 shows the set-up of apparatus in an experiment to investigate the electrolysis process of two different substances.
Rajah 9 menunjukkan susunan radas dalam satu eksperimen untuk menyiasat proses elektrolisis bagi dua bahan berbeza.

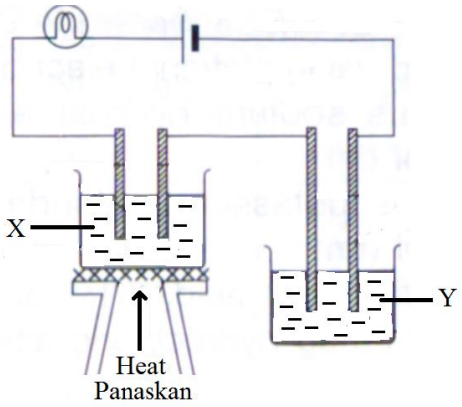


Diagram 9
Rajah 9

What are substances X and Y that will light up the bulb?
Apakah bahan X dan Y yang akan menyalakan mentol?

	X	Y
A	Molten lead(II) bromide *Leburan plumbum (II) bromida*	Ethanoic acid *Asid etanoik*
B	Molten sodium chloride *Leburan natrium klorida*	Glucose solution *Larutan glukosa*
C	Molten sulphur *Leburan sulfur*	Hydrochloric acid *Asid hidroklorik*
D	Molten naphthalene *Leburan naftalena*	Sodium chloride solution *Larutan natrium klorida*

32 One day, Mak Minah having dinner with her family at a restaurant. Suddenly power failure. The restaurant owner lights up candles.
What are the products formed when candle is burnt in excess air?
Pada satu hari, Mak Minah makan malam bersama keluarganya di sebuah restoran. Tiba-tiba bekalan elektrik terputus. Pengusaha restoran menyalakan lilin.
Apakah bahan yang terhasil apabila lilin di bakar dalam udara berlebihan?

A Carbon
Karbon
B Carbon dioxide
Karbon dioksida
C Carbon dioxide and water
Karbon dioksida dan air
D Carbon monoxide and water
Karbon monoksida dan air

33 Diagram 10 shows a golf stick which its head make from material P.
Rajah 10 menunjukkan satu batang kayu golf di mana bahagian kepalanya diperbuat daripada bahan P.

Diagram 10
Rajah 10

Material P has the following properties:
Bahan P mempunyai sifat berikut:

- Strong
  Kuat
- Light
  Ringan
- Can withstand corrosion
  Tahan kakisan

What is material P?
Apakah bahan P?

A Polymer
Polimer

B Ceramic
Seramik

C Composite
Komposit

D Glass
Kaca

34 The following are the information of two solutions.
Berikut adalah maklumat tentang dua larutan.

0.2 mol dm^{-3} sodium hydroxide solution 0.2 mol dm^{-3} *larutan natrium hidroksida*	pH = 13
0.2 mol dm^{-3} ammonia solution 0.2 mol dm^{-3} *larutan ammonia*	pH = 9

Which of the following statements are true about the two solutions?
Penyataan yang manakah betul tentang kedua-dua larutan itu?

I The solubility of sodium hydroxide in water is higher than ammonia
Keterlarutan natrium hidroksida dalam air lebih tinggi daripada ammonia

II The concentration of OH^- ion in sodium hydroxide solution is higher than in ammonia solution
Kepekatan ion OH^- dalam larutan natrium hidroksida lebih tinggi daripada larutan ammonia

III The degree of dissociation of sodium hydroxide solution in water is lower than the degree of dissociation of ammonia solution
Darjah penceraian larutan natrium hidroksida dalam air adalah lebih rendah daripada darjah penceraian larutan ammonia

IV Ammonia solution is a weak alkali while sodium hydroxide solution is a strong alkali.
Larutan ammonia adalah alkali lemah manakala larutan natrium hidroksida adalah alkali kuat.

A I and II
I *dan* II

B I and III
I *dan* III

C II dan IV
II *dan* IV

D III and IV
III *dan* IV

35 Diagram 11 shows a series of tests conducted on mixture Q containing two types of salts.
Rajah 11 menunjukkan satu siri ujian yang dijalankan ke atas campuran Q yang mengandungi dua jenis garam.

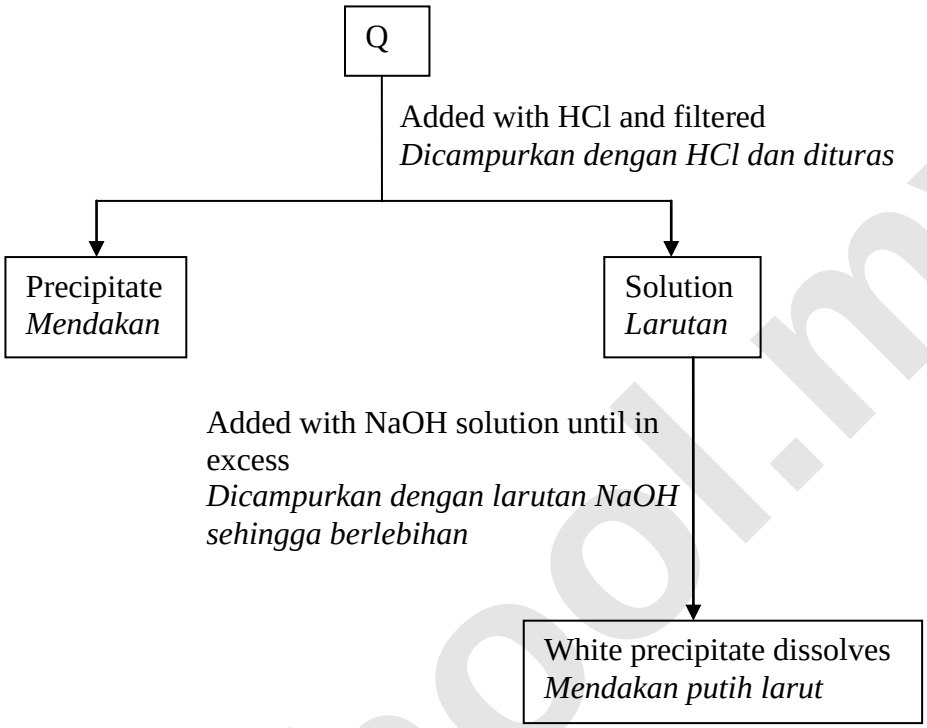


Diagram 11
Rajah 11

Which of the following are possible salts found in mixture Q?
Antara berikut, garam yang manakah mungkin terdapat dalam campuran Q?

A Barium nitrate and copper(II) nitrate
Barium nitrat dan kuprum(II) nitrat

B Barium nitrate and magnesium nitrate
Barium nitrat dan magnesium nitrat

C Lead(II) nitrate and zinc nitrate
Plumbum(II) nitrat dan zink nitrat

D Lead(II) nitrate and calcium nitrate
Plumbum(II) nitrat dan kalsium nitrat

36 Diagram 12 shows a graph of two experiments conducted to investigate the rate of reaction between calcium carbonate powder and hydrochloric acid.
Rajah 12 menunjukkan graf bagi dua eksperimen yang dijalankan untuk mengkaji kadar tindak balas antara serbuk kalsium karbonat dan asid hidroklorik.

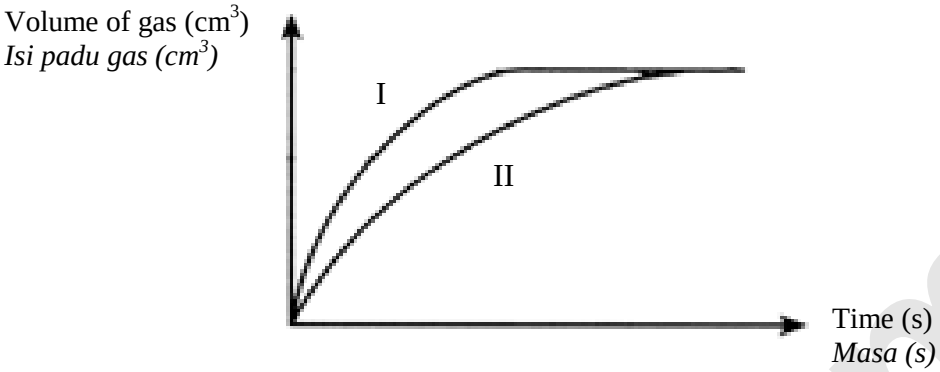


Diagram 12
Rajah 12

Experiment I was conducted by using 25 cm^3 of 1.0 mol dm^{-3} of hydrochloric acid. What is the concentration and volume of hydrochloric acid to obtain curve II?
Eksperimen I dijalankan dengan menggunakan 25 cm^3 asid hidroklorik 1.0 mol dm^{-3}. Apakah kepekatan dan isipadu asid hidroklorik mendapatkan lengkung II?

	Concentration of HCl (mol dm^{-3}) *Kepekatan HCl (mol dm^{-3})*	Volume of HCl (cm^3) *Isi padu HCl (cm^3)*
A	0.5	50
B	1.0	50
C	2.0	25
D	0.5	25

37 Displacement of silver occurs when copper is added into silver nitrate solution. Which of the following is correct about the reaction?
Penyesaran argentum berlaku apabila kuprum ditambah ke dalam larutan argentum nitrat.
Antara berikut yang manakah betul tentang tindak balas tersebut?

A Silver ion is oxidised
Ion argentum dioksidakan

B Copper is an oxidising agent
Kuprum adalah agen pengoksidaan

C Colourless solution becomes blue at the end of experiment
Larutan tak berwarna menjadi biru pada akhir eksperimen

D Mass of silver produce increases when copper powder is used compared to copper granule
Jisim argentum terhasil bertambah apabila serbuk kuprum digunakan berbanding ketulan kuprum

38 Diagram 13 shows an energy profile for a reaction.
Rajah 13 menunjukkan profil tenaga bagi satu tindak balas.

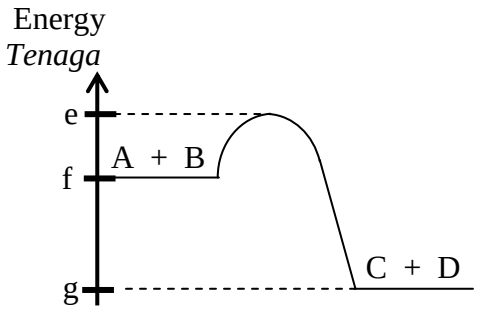


Diagram 13
Rajah 13

What is the heat change in the reaction?
Apakah perubahan tenaga dalam tindak balas itu?

A e kJ
B g kJ
C (e – g) kJ
D (f – g) kJ

39 A doctor advised a patient to complete the whole course of an antibiotic prescribed to him even if he feels better.
Which statement is correct about the usage of the medicine?
Seorang doktor menasihati pesakitnya untuk menghabiskan antibiotik yang diberikan kepadanya walaupun dia telah sihat.
Pernyataan yang manakah betul tentang penggunaan ubat tersebut?

A To relieve the pain
Untuk mengurangkan kesakitan
B To reduce anxiety
Untuk mengurangkan kebimbangan
C To make sure all the bacteria are kill
Untuk memastikan semua bakteria telah mati
D To stimulate the production of more hormones in body
Untuk merangsang penghasilan lebih banyak hormon dalam badan

40 Table 3 shows the information of an atom of element X.
Jadual 3 menunjukkan maklumat bagi satu atom unsur X.

Nucleon number *Nombor nukleon*	7
Number of neutrons *Bilangan neutron*	4

Table 3
Jadual 3

Atom X releases electron to form an ion X^+.
What is the number of protons and electrons in ion X^+.
Atom X menderma elektron untuk membentuk satu ion X^+.
Apakah bilangan proton dan elektron dalam ion X^+.

	Proton *Proton*	Electron *Elektron*
A	3	2
B	3	3
C	4	3
D	4	7

41 Ions S^+, T^{2+} and U^{3+} have the same number of electrons which is 10.
Which of the following is correct?
Ion-ion S^+, T^{2+} *dan* U^{3+} *mempunyai bilangan elektron yang sama iaitu 10.*
Antara berikut yang manakah betul?

A The strength of the nucleus to attract electrons in increasing order is U, T, S
Kekuatan nukleus untuk menarik elektron tertib menaik adalah U, T, S

B The atomic size in increasing order is U, T, S
Saiz atom tertib menaik adalah U, T, S

C The number of proton in an atom in decreasing order is S, T, U
Bilangan proton dalam atom tertib menaik adalah S, T, U

D The tendency of atom to release valence electrons in increasing order is S, T, U
Kecenderungan atom melepaskan electron valens tertib menaik adalah S, T, U

42 Table 4 shows the relative molecular masses of two gases.
Jadual 4 menunjukkan jisim molekul relatif bagi dua gas.

Gas *Gas*	Oxygen, O_2 *Oksigen*	Carbon dioxide, CO_2 *Karbon dioksida*
Relative molecular mass *Jisim molekul relatif*	32	44

Table 4
Jadual 4

Which of the following are correct?
[Molar volume of gas at room temperature = 24 mol dm^{-3};
Relative atomic mass: C = 12, O = 16]
Antara berikut, yang manakah betul?
[Isi padu molar bagi gas pada suhu bilik = 24 mol dm^{-3} ;
Jisim atom relatif : C=12, O=16]

A 1 mole of oxygen has the same mass as 1 mole of carbon dioxide
1 mol oksigen mempunyai jisim yang sama dengan 1 mol karbon dioksida

B 1 mole of oxygen has the same volume as 1 mole of carbon dioxide
1 mol oksigen mempunyai isipadu yang sama dengan 1 mol karbon dioksida

C 3 moles of oxygen has the same number of atom as 3 moles of carbon dioxide
3 mol oksigen mempunyai bilangan atom yang sama dengan 3 mol karbon dioksida

D 0.5 mole of oxygen has the same number of molecules as 1 mole of carbon dioxide
0.5 mol oksigen mempunyai bilangan molekul yang sama dengan 1 mol karbon dioksida

43 The equation represents the reaction between magnesium carbonate and sulphuric acid.
Persamaan mewakili tindak balas antara magnesium karbonat dan asid sulfurik.

$$MgCO_3 + H_2SO_4 \longrightarrow MgSO_4 + H_2O + CO_2$$

12.6 g of magnesium carbonate reacts with 200 cm^3 of 0.3 mol dm^{-3} sulphuric acid. What is the mass of magnesium carbonate which is not reacted?
[Relative atomic mass : H = 1, C = 12, O = 16, Mg = 24, S = 32]
Jika 12.6 g magnesium karbonat bertindak balas dengan 200 cm^3 asid sulfurik 0.3 mol dm^{-3}, berapakah jisim magnesium karbonat yang tidak bertindak balas?
[Jisim atom relatif : H = 1, C = 12, O = 16, Mg = 24, S = 32]

A 2.52 g
B 5.04 g
C 6.25 g
D 7.56 g

44 Diagram 14 shows the electron arrangement of a compound.
Rajah 14 menunjukkan susunan elektron satu sebatian.

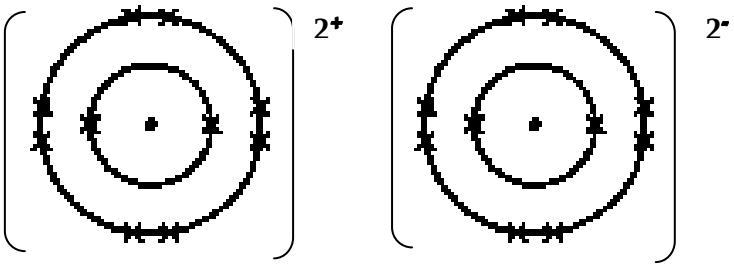


Diagram 14
Rajah 14

Which compounds have the same physical properties as the compound in Diagram 14?
Sebatian manakah yang mempunyai sifat fizik yang sama seperti sebatian dalam Rajah 14?

I Limestone
Batu kapur
II Bauxite
Bauksit
III Glucose
Glukosa
IV Glycerol
Gliserol
A I and II
I *dan* II
B I and III
I *dan* III
C II and IV
II *dan* IV
D III and IV
III *dan* IV

45 Diagram 15 shows a simple voltaic cell.
Rajah 15 menunjukkan satu sel volta ringkas.

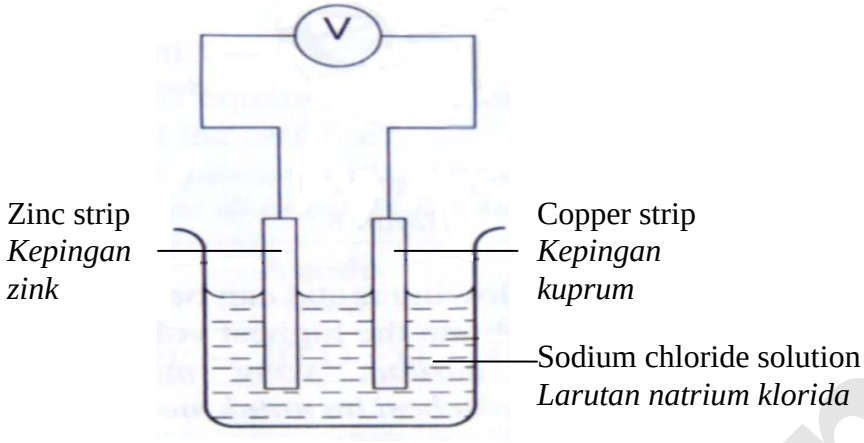


Diagram 15
Rajah 15

Which half-equations represent the reactions at the positive terminal and the negative terminal of the cell?
Setengah persamaan yang manakah mewakili tindak balas di terminal positif dan terminal negatif bagi sel itu?

	Positive terminal *Terminal positif*	Negative terminal *Negatif terminal*
A	$2H^+ + 2e \longrightarrow H_2$	$Cu \longrightarrow Cu^{2+} + 2e$
B	$Cu^{2+} + 2e \longrightarrow Cu$	$Zn \longrightarrow Zn^{2+} + 2e$
C	$2H^+ + 2e \longrightarrow H_2$	$Zn \longrightarrow Zn^{2+} + 2e$
D	$Na^+ + e \longrightarrow Na$	$4OH^- \longrightarrow O_2 + 2H_2O + 4e$

46 Ant bite contains acid.
Which substance is the most suitable to be applied on ant bite?
Gigitan semut mengandungi asid.
Bahan manakah yang paling sesuai diletakkan pada gigitan semut?

A Tootpaste
Ubat gigi
B Detergent
Detergen
C Vinegar
Cuka
D Sugar
Gula

47 Table 5 shows the volume of carbon dioxide gas released at half minutes intervals when hydrochloric acid reacts with marble chips.
Jadual 5 menunjukkan isi padu gas karbon dioksida terbebas bagi setiap setengah minit apabila asid hidroklorik bertindak balas dengan marmar.

Time (min) *Masa (min)*	0.0	0.5	1.0	1.5	2.0	2.5	3.0
Volume of CO_2 (cm^3) *Isi padu gas CO_2 (cm^3)*	0	170	260	305	340	350	350

Table 5
Jadual 5

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

A 80.0 $cm^3\ min^{-1}$
B 170.0 $cm^3\ min^{-1}$
C 220.0 $cm^3\ min^{-1}$
D 340.0 $cm^3\ min^{-1}$

48 Diagram 16 shows the structural formula of a compound.
Rajah 16 menunjukan formula struktur bagi satu sebatian.

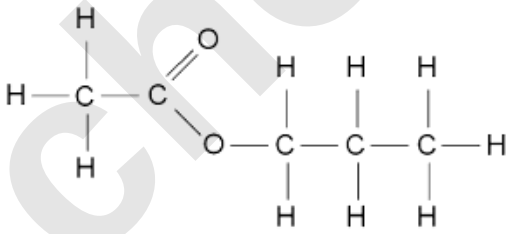


Diagram 16
Rajah 16

What is the name of the compound?
Apakah nama sebatian itu?

A Methyl ethanoate
Metil etanoat
B Ethyl propanoate
Etil propanoat
C Methyl butanoate
Metil butanoat
D Propyl ethanoate
Propil etanoat

49 Diagram 17 shows the apparatus set-up to determine the position of carbon and other metals in the reactivity series of metal.
Rajah 17 menunjukan susunan radas untuk menentukan kedudukan karbon dan logam-logam lain siri kereaktifan logam.

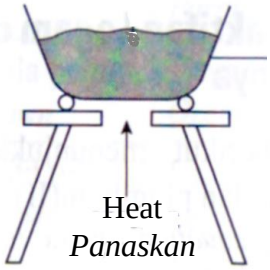


Diagram 17
Rajah 17

The experiment is repeated by replacing oxide of metal M with oxide of metal N and oxide of metal R. Table 6 shows the results obtained.
Eksperimen itu diulangi dengan menggantikan oksida M dengan oksida N dan oksida R. Jadual 6 menunjukkan keputusan yang didapati.

Mixture ***Campuran***	**Observation** **Pemerhatian**
Carbon + M oxide *Karbon + oksida M*	Glows dimly, grey solid formed *Membara malap, pepejal kelabu terbentuk*
Carbon + N oxide *Karbon + oksida N*	No changes *Tiada perubahan*
Carbon + R oxide *Karbon + oksida R*	Burns brightly, grey solid formed *Menyala terang, pepejal kelabu terbentuk*

Table 6
Jadual 6

Which of the following is the correct arrangement in descending order of carbon, M, N and R in the reactivity series of metal?
Antara berikut, yang manakah susunan tertib menurun yang betul bagi karbon, M, N dan R dalam siri kereaktifan logam?

A Carbon, M, R, N
N, karbon, R, M

B M, N, carbon, R
M, N, karbon, R

C N, carbon, M, R
N, karbon, M, R

D R, M, carbon, N
R, M, karbon, N

50 The following information shows the results of an experiment to study the heat of combustion of butanol, C_4H_9OH.
Maklumat berikut menunjukkan keputusan bagi satu eksperimen untuk mempelajari haba pembakaran butanol, C_4H_9OH.

- Volume of water in the metal container = 250 cm^3
  Isipadu air dalam bekas logam = 250 cm^3
- Initial temperature of water = 25.0°C
  Suhu awal air = 25.0°C
- Highest temperature of water = T°C
  Suhu tertinggi air = T°C

What is the highest temperature, T°C obtained in this experiment if 1.11 g of butanol is completely burnt?
[Specific heat capacity of water = 4.2 $Jg^{-1}\,°C^{-1}$;
Relative molecular mass of butanol=74,
Heat of combustion of butanol = - 2 450 kJ mol^{-1}]
Apakah suhu tertinggi, T°C yang dicapai dalam eksperimen ini, jika 1.11 g butanol dibakar lengkap?
[Muatan haba tentu air = 4.2 $Jg^{-1}\,°C^{-1}$, Jisim molekul relatif butanol=74
Haba pembakaran butanol = - 2 450 kJ mol^{-1}]

A 60.0°C
B 42.0°C
C 35.0°C
D 30.0°C

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

NAMA : …….. TINGKATAN : .....…..……....

KEMENTERIAN PENDIDIKAN MALAYSIA

BAHAGIAN PENGURUSAN SEKOLAH BERASRAMA PENUH DAN SEKOLAH KECEMERLANGAN

PENTAKSIRAN DIAGNOSTIK AKADEMIK SBP 2015
PERCUBAAN SIJIL PELAJARAN MALAYSIA

CHEMISTRY

Kertas 2

Dua Jam Tiga Puluh Minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

Arahan:

1. *Tuliskan Nama dan Tingkatan pada ruang yang disediakan.*
2. *Jawab semua soalan daripada **Bahagian A**. Tuliskan jawapan anda dalam ruang yang disediakan.*
3. *Jawab satu soalan daripada **Bahagian B** dan satu soalan daripada **Bahagian C***
4. *Anda diminta menjawab dengan lebih terperinci untuk Bahagian B dan Bahagian C. Jawapan mestilah jelas dan logik. Persamaan, gambar rajah, jadual, graf dan cara lain yang sesuai untuk menjelaskan jawapan anda boleh digunakan.*
5. *Penggunaan kalkulator saintifik yang tidak boleh diprogramkan adalah dibenarkan.*

Untuk Kegunaan Pemeriksa			
Bahagian	**Soalan**	**Markah penuh**	**Markah diperoleh**
A	1	9	
	2	9	
	3	10	
	4	10	
	5	11	
	6	11	
B	7	20	
	8	20	
C	9	20	
	10	20	
Jumlah			

Kertas soalan ini mengandungi **24** halaman bercetak.

Section A
Bahagian A

[60 marks]
[60 markah]

Answer **all** questions
*Jawab **semua** soalan dalam bahagian ini*

1 Table 1 shows the structure formulae of compound M and compound N with their physical properties.
Jadual 1 menunjukkan formula struktur sebatian M dan sebatian N dengan sifat fizikal masing-masing.

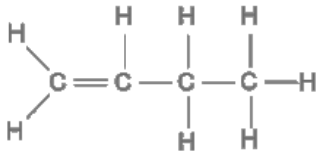
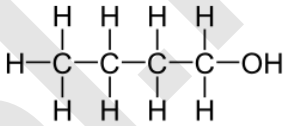
Compound *Sebatian*	M	N
Structure formula *Formula struktur*		
Physical properties *Sifat-sifat fizikal*	• Gas • Insoluble in water • Melting point -185^{o}C	• Liquid • Insoluble in water • Melting point -89^{o}C

Table 1
Jadual 1

(a) State the general formula and the homologous series for compound M.
Nyatakan formula am dan siri homolog bagi compound M.

General formula: ……
Formula am

Homologous series: ……
Siri homolog

[2 *marks*]

(b) Based on compound N,
Berdasarkan sebatian N,

(i) state the functional group of compound N
nyatakan kumpulan berfungsi bagi sebatian N

……..
[1 mark]

(ii) name the compound N using IUPAC nomenclature.
namakan sebatian N menggunakan penamaan IUPAC.

……
[1 *mark*]

(c) (i) Compound M undergoes Q process to produce compound N.
Name the Q process.
Sebatian M mengalami proses Q menghasilkan sebatian N.
Namakan proses Q.

……
[1 mark]

(ii) Compound N has four isomers. Draw one of the structural formulae of the isomers of compound N and name it.
Sebatian N mempunyai empat isomer. Lukiskan satu daripada formula struktur bagi isomer sebatian N dan namakan.

Structure formula:
Formula struktur

Name: ……
Nama

[2 marks]

(d) Esterification is a process to produce ester. Ester naturally found in fruits. Pentyl ethanoate is an example of ester that found in bananas. Diagram 1 shows the structure formula of pentyl ethanoate.
Pengesteran adalah proses menghasilkan ester. Ester wujud secara semulajadi di dalam buah-buahan. Pentil etanoat adalah contoh ester yang terdapat di dalam buah pisang. Rajah 1 menunjukkan formula struktur pentil etanoat.

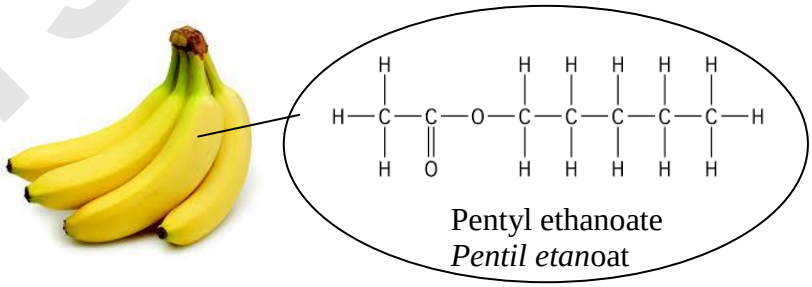


Diagram 1
Rajah 1

Write a chemical equation to produce ester in Diagram 1.
Tuliskan persamaan kimia untuk menghasilkan ester di dalam Rajah 1

……..
[2 marks]

2 Diagram 2 shows the production of sulphuric acid and its uses. In the process, 99.5% of gas Y is converted to sulphur trioxide gas. Whereas, 0.5% of gas Y is absorbed by limestone and some of them are released to the atmosphere. The gas released can affect health and environment.
Rajah 2 menunjukkan penghasilan asid sulfurik dan kegunaannya. Dalam proses ini, 99.5% gas Y ditukarkan kepada gas sulphur trioksida. Manakala 0.5% gas Y diserap oleh batu kapur dan sebahagian daripadanya terbebas ke atmosfera. Gas yang terbebas boleh memudaratkan kesihatan dan alam sekitar.

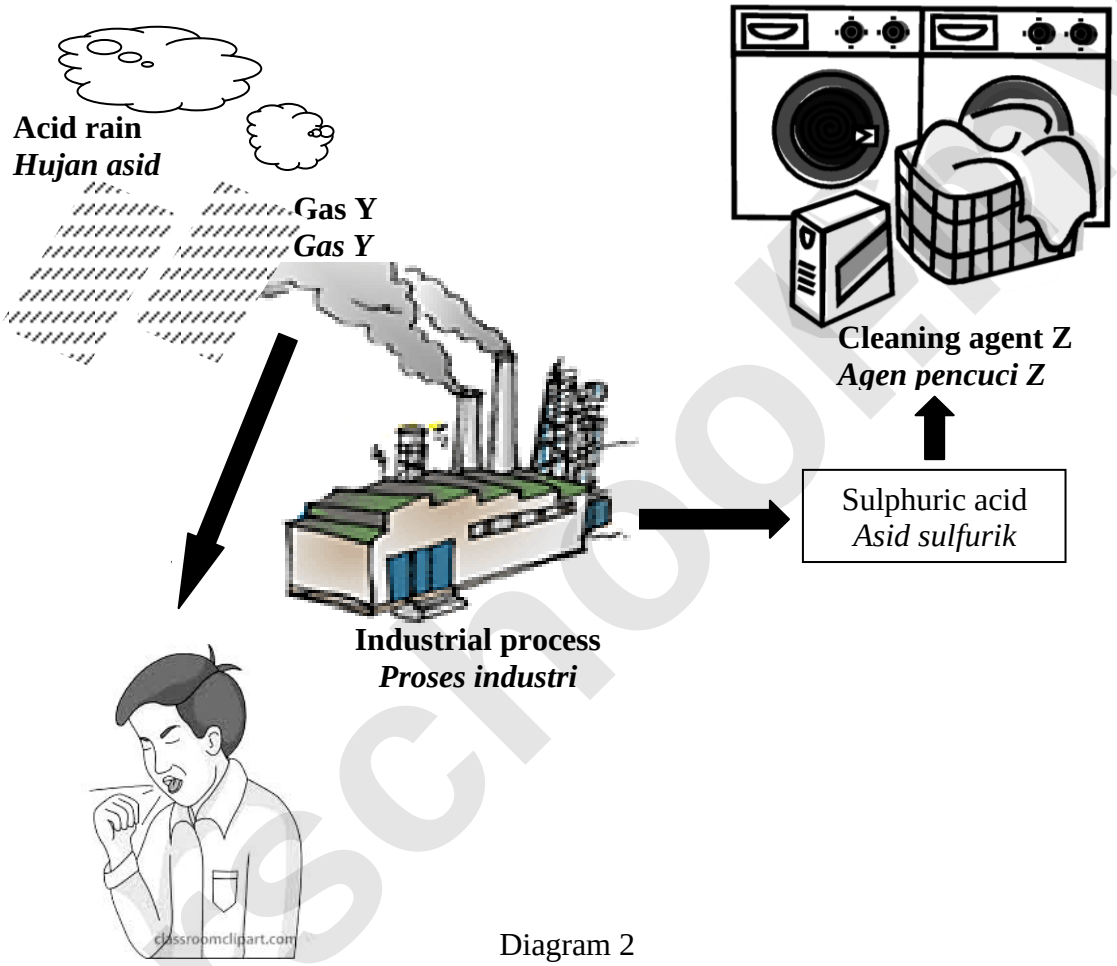


Diagram 2
Rajah 2

(a) Based on the information in Diagram 2:
Berdasarkan maklumat dalam Rajah 2:

(i) Name the process to produce sulphuric acid in industry.
Namakan proses untuk menghasilkan asid sulfurik dalam industri.

……..
[1 mark]

(ii) State **one** condition for the process in (a)(i).
*Nyatakan **satu** keadaan bagi proses di (a)(i).*

……..
[1 mark]

(iii) Water is one of the raw materials to produce sulphuric acid. State another two raw materials used in the process.
Air adalah salah satu bahan mentah untuk menghasilkan asid sulfurik. Nyatakan dua lagi bahan mentah yang digunakan dalam proses ini.

……..
[1 mark]

(b) Gas Y releases to atmosphere and causes the respiratory problem.
A man in Diagram 2 shows a symptom of disease caused by inhaling gas Y.
Gas Y terbebas ke atmosfera dan boleh menyebabkan masalah pernafasan. Lelaki dalam Rajah 2 menunjukkan simpton penyakit akibat terhidu gas Y.

Suggest the medicine should be given to the men to recover.
Cadangkan ubat yang perlu diberi kepadanya untuk pulih.

……
[1 mark]

(c) In food processing industries, gas Y can also be used as a food additive.
Dalam industri pemprosesan makanan, gas Y juga boleh digunakan sebagai bahan tambah makanan.

(i) What is the type of the food additive?
Apakah jenis bahan tambah makanan tersebut?

……..
[1 mark]

(ii) State the side effect of the food additive if it's consume excessively in a long term.
Nyatakan kesan sampingan bahan tambah makanan ini jika diambil secara berlebihan dalam tempoh lama.

……..
[1 mark]

(d) Kesuma's dress has greasy stains. The following is the conversation between Kesuma and her friend, Melati.
Kesuma: Melati, why are there white precipitates stuck on my dress even though I've used lots of soap?
Melati: I suggest you to use cleaning agent Z.
Kesuma:Thank you for your suggestion.
When Kesuma used cleaning agent Z, the grease was removed.

Pakaian Kesuma telah terkena gris. Berikut adalah perbualan antara Kesuma dan sahabatnya, Melati.
Kesuma: Melati, mengapakah pakaian yang saya basuh terdapat mendakan putih yang melekat padanya walaupun saya telah menggunakan sabun yang banyak?
Melati: Saya cadangkan awak menggunakan agen pencuci Z
Kesuma: Terima kasih atas cadangan awak.
Apabila Kesuma menggunakan agen pencuci Z, didapati kesan gris hilang.

(i) What is cleaning agent Z?
Apakah agen pencuci Z?

……..
[1 mark]

(ii) Why cleaning agent Z can act as an effective cleaning agent?
Mengapakah agen pencuci Z boleh bertindak sebagai agen pencuci yang berkesan?

……

……..

……..
[2 marks]

3 5 Ibnu Sina students is learning about voltaic cell. It is a chemical cell that converts chemical energy to electrical energy.
Diagram 3 shows an apparatus set-up of a voltaic cell that had been used to help them to understand more about the process involved.
Pelajar 5 Ibnu Sina sedang mempelajari tentang sel volta. Ia adalah sebuah sel kimia yang menukarkan tenaga kimia kepada tenaga eletrik.
Rajah 3 menunjukkan susunan alat radas sel volta yang digunakan untuk membantu mereka lebih memahami proses yang terlibat.

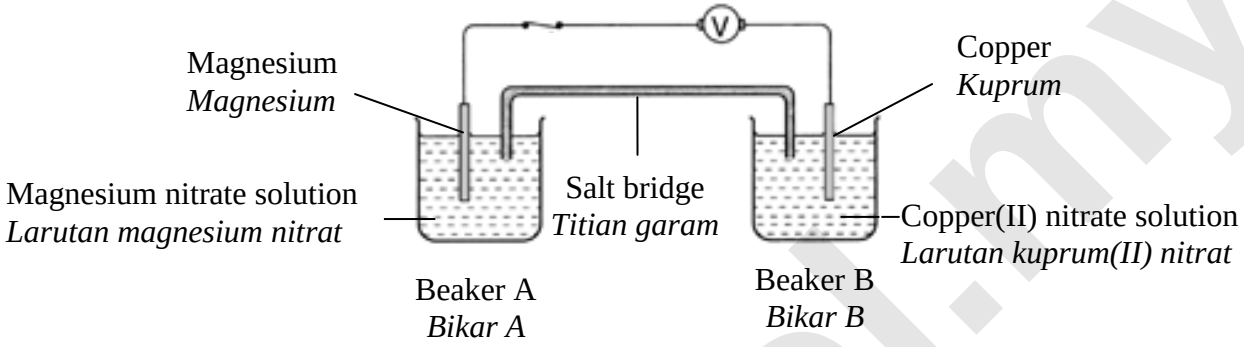


Diagram 3
Rajah 3

(a) State all ions present in Beaker A.
Nyatakan semua ion yang hadir dalam Bikar A.

……..... [1 mark]

(b) Dilute sulphuric acid is used as a salt bridge in the cell. Suggest another chemical substance that can replace sulphuric acid.
Asid sulfurik cair telah digunakan sebagai titian garam dalam sel tersebut. sulfurik. Cadangkan bahan kimia lain yang boleh menggantikan asid sulfurik.

……... [1 mark]

(c) (i) Referring to beaker B, state the process that occurs at copper electrode.
Merujuk kepada bikar B, nyatakan proses yang berlaku di elektrod kuprum

……
[1 mark]

(ii) Explain your answer in (c)(i) based on the change in oxidation number.
Jelaskan jawapan anda di (c)(i) berdasarkan perubahan nombor pengoksidaan.

……
[1 mark]

(d) Write the half-equations for the reaction occurred at both terminals.
Tuliskan persaamaan setengah bagi tindak balas yang berlaku pada kedua-dua terminal.

Negative terminal: ……
Terminal negative

Positive terminal: ……
Terminal positif

[2 marks]

(e) Ahmad and Ali want to investigate the potential differences of a pair of metals. They are using the same materials and apparatus as in Diagram 3. The voltmeter reading of the investigation is 2.7V.
Ahmad dan Ali ingin menyiasat beza keupayaan sepasang logam. Mereka menggunakan bahan dan radas yang sama seperti dalam Rajah 3.
Bacaan voltmeter dalam penyiasatan itu ialah 2.7V.

Predict the potential difference if Ahmad replace the copper electrode with silver electrode.
Ramalkan beza upaya jika Ahmad menggantikan elektrod kuprum dengan elektrod argentum

……
[1 mark]

(f) Magnesium and magnesium nitrate solution in Diagram 3 are replaced with silver and silver nitrate solution.
Magnesium dan larutan magnesium nitrat dalam Rajah 3 digantikan dengan argentum dan larutan argentum nitrat.

(i) State the flow of electron in the cell.
Nyatakan arah pengaliran elektron dalam sel tersebut.

……
[1 mark]

(ii) Write the ionic equation for the reaction occurs in the cell in (f)(i).
Tulis persamaan ion bagi tindak balas yang berlaku dalam sel di (f)(i).

……..

[2 marks]

4 Diagram 4 shows the symbols of atom for element P, Q and R.
Rajah 4 *menunjukkan simbol- simbol atom bagi unsur P, Q and R.*

$^{23}_{11}P$	$^{35}_{17}Q$	$^{40}_{18}R$

Diagram 4
Rajah 4

(a) What is represented by the number 17 in $^{35}_{17}Q$

Apakah yang diwakili oleh nombor 17 dalam $^{35}_{17}Q$

.....

[1 *mark*]

(b) Which element exists as a diatomic molecule?
Unsur manakah yang wujud sebagai molekul dwiatom

.....

[1 *mark*]

(c) (i) Elements P and Q are located in the same period of the Periodic table of elements. Compare the atomic size of element P and Q.
Unsur P dan Q terletak di dalam kala yang sama dalam Jadual Berkala Unsur. Bandingkan saiz atom unsur P dan Q.

.....

[1 *mark*]

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

.....

.....

[2 *marks*]

(d) When element P is put into water, an alkaline solution and hydrogen gas are released.
Apabila unsur P *dimasukkan ke dalam air, suatu larutan alkali dan gas hidrogen dibebaskan.*

(i) Write the balanced chemical equation for the reaction.
Tuliskan persamaan kimia seimbang bagi tindak balas.

.....

[2 marks]

(ii) If 0.5 mol element P is used in the reaction, calculate the maximum volume of hydrogen gas released at room condition.
[1 mol of gas occupied 24 dm^3 at room condition]
Sekiranya 0.5 mol unsur P digunakan dalam tindak balas, hitungkan isipadu maksimum gas hidrogen yang terbebas pada keadaan bilik.
[1 mol gas menempati 24 dm^3 pada keadaan bilik]

[1 mark]

(e) Gas R is widely used in daily life. For example gas R is used in light bulb. The following are the characteristics of gas R that makes it very suitable for this purpose.

- Exist as monoatomic gas
- Chemically unreactive
- Colourless gas
- Non-flammable

Gas R digunakan secara meluas dalam kehidupan seharian. Sebagai contoh gas R digunakan dalam mentol. Berikut adalah ciri-ciri gas R yang menjadikannya sangat sesuai untuk kegunaan tersebut.

- *Wujud sebagai gas monoatom*
- *Tidak reaktif secara kimia*
- *Gas tanpa warna*
- *Tidak mudah terbakar*

Explain why gas R is suitable to fill the light bulb.
Terangkan mengapa gas R sesuai untuk mengisi mentol.

.....

.....

[2 marks]

5 Table 5 shows the method to prepare four different solutions.
Jadual 5 menunjukkan kaedah untuk mmenyediakan empat jenis larutan berbeza.

Solution *Larutan*	Method to prepare the solution *Kaedah untuk mmenyediakan larutan*
P	Dissolving dry ammonia gas in distilled water *Larutkan gas ammonia kering ke dalam air suling*
Q	Dissolving dry ammonia gas in trichloromethane *Larutkan gas ammonia kering ke dalam triklorometana*
R	Dissolving sodium oxide powder in distilled water *Larutkan serbuk natrium oksida ke dalam air suling*
S	Dissolving hydrogen chloride gas in distilled water *Larutkan gas hidrogen klorida ke dalam air suling*

Table 5
Jadual 5

(a) What is meant by weak alkali?
Apakah maksud alkali lemah.

.....

[1 mark]

(b) Among solutions P, Q, R and S, which is a weak alkali?
Antara larutan P, Q, R dan S, yang manakah adalah alkali lemah?

.....

[1 mark]

(c) Draw a labelled diagram to show the apparatus set-up to prepare solution P.
Lukis rajah berlabel untuk menunjukkan susunan radas bagi menyediakan larutan P.

[2 marks]

(d) Arrange solutions P, Q, R and S in ascending order of pH value.
Susun larutan P, Q, R dan S dalam tertib menaik bagi nilai pH.

.....
[1 mark]

(e) A piece of red litmus paper is dipped into solutions P and Q respectively.
Sehelai kertas litmus merah dicelup ke dalam larutan P dan larutan Q masing-masing.

(i) Which solution can turn the red litmus paper to blue?
Larutan yang manakah boleh menukar kertas litmus merah kepada biru?

.....
[1 mark]

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

……

……
[2 marks]

(f) Solution S is expected as an acidic solution. Without using any indicator, describe briefly one chemical test to verify the solution S is an acid.
Larutan S dijangkakan sejenis larutan berasid. Tanpa menggunakan sebarang penunjuk, huraikan secara ringkas satu ujian kimia untuk menentusahkan larutan S adalah sejenis asid.

.....

.....

.....
[3 marks]

6 Table 6 shows the heats of combustion of some common fuels.
Jadual 6 menunjukkan haba pembakaran beberapa bahan api yang biasa digunakan.

Fuel *Bahan api*	Heat of combustion (kJ mol^{-1}) *Haba pembakaran* (kJ mol^{-1})
Methane *Metana*	-890
Propane *Propana*	-2 230
Ethanol *Etanol*	-1 376
Propanol *Propanol*	-2 016

Table 6
Jadual 6

(a) The combustion of the fuels is an exothermic reaction.
What is meant by exothermic reaction?
Pembakaran bahan api adalah tindak balas eksotermik.
Apakah yang dimaksudkan dengan tindak balas eksotermik?

……

……

[1 mark]

(b) Diagram 6 shows the energy profile for the combustion of ethanol.
Rajah 6 menunjukkan profil tenaga bagi pembakaran etanol.

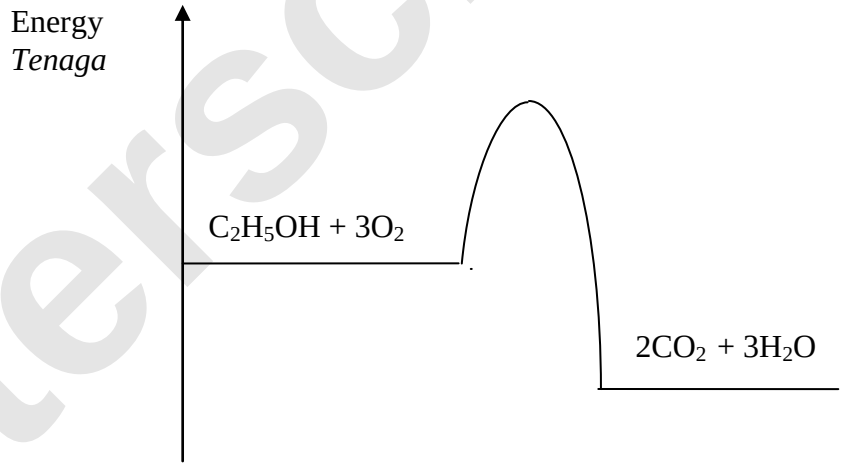


Diagram 6
Rajah 6

Mark ΔH for the reaction in Diagram 6.
Tandakan ΔH *bagi tindak balas itu dalam Rajah 6.*

[1 mark]

(c) (i) Compare the heat of combustion of methane and propane.
Bandingkan haba pembakaran metana dan propana.

……..
[1 mark]

(ii) Explain your answer in (c)(i).
Terangkan jawapan anda di (c)(i)

……..

……..

……..

……..
[3 marks]

(d) Calculate the fuel value of propanol.
[Molar mass of propanol, C_3H_7OH = 60 g mol^{-1}]
Hitungkan nilai bahan api bagi propanol.
[Jisim Molar propanol, C_3H_7OH = 60 g mol^{-1}]

[2 marks]

(e) During a football game, a player found that his knee was swollen after being hit by the opponent player.
Semasa perlawanan bola sepak, seorang pemain mendapati lututnya bengkak selepas berlanggar dengan pemain lawan.

A physiotherapy put ice cubes on his knee to relieve the pain.
As a chemistry student, suggest another method to help the player.
Explain how the method you choose will help the player.
Seorang ahli fisioterapi meletakkan ketulan ais pada lutut pemain itu untuk mengurangkan kesakitan.
Sebagai seorang pelajar kimia, cadangkan kaedah lain untuk membantu pemain itu.
Terangkan bagaimana kaedah yang dipilih dapat membantu pemain itu.

……

……

……

……

[3 marks]

Section B
Bahagian B

[20 marks]
[20 markah]

Answer **one** question in this section.
*Jawab **satu** soalan dalam bahagian ini.*

7 (a) Properties of compound W are shown in the box below.
Sifat-sifat sebatian W ditunjukkan dalam kotak di bawah.

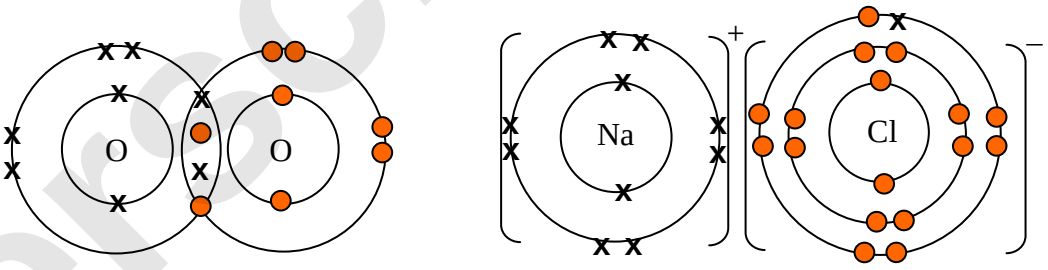
- Colourless liquid at room condition
  Cecair tidak berwarna pada keadaan bilik
- Have melting point of -27^{O}C and boiling point of 77 ^{O}C
  Mempunyai takat lebur -27^{O}C dan takat didih 77 ^{O}C
- Does not mix with water
  Tidak bercampur dengan air

(i) Is compound W an ionic or covalent compound? Explain your answer
Adakah sebatian W merupakan sebatian ion atau sebatian kovalen? Terangkan jawapan anda.

(ii) State one more property of compound W.
Nyatakan satu lagi sifat bagi sebatian W.

[4 marks]

(b) Diagram 7 shows electron arrangement of compounds P and Q.
Rajah 7 menunjukkan susunan elektron bagi sebatian P dan sebatian Q.



Compound P
Sebatian P

Compound Q
Sebatian Q

Diagram 7
Rajah 7

(i) Compare compound P and compound Q in terms of
- Type of bonds
- Type of particles forms
- Type of attraction force between the particles
- Way for the atoms to achieve the stable octet electron arrangement

Bandingkan sebatian P dan sebatian Q dari segi

- *Jenis ikatan*
- *Jenis zarah-zarah yang terbentuk*
- *Jenis daya tarikan antara zarah-zarah*
- *Cara bagi atom untuk mencapai susunan elekton oktet yang stabil*

[8 marks]

(ii) Oxygen atoms can react with sodium atoms to produce a compound.
Draw the electron arrangement of compound formed.
Atom oksigen boleh bertindak balas dengan atom natrium untuk menghasilkan satu sebatian. Lukiskan susunan elektron bagi sebatian yang terbentuk.

[2 marks]

(c) Tartaric acid is a covalent compound which is widely used as a flavouring in soft drinks. The composition according to the mass of tartaric acid is 32% carbon, 4% hydrogen and 64% oxygen.
Asid tartarik merupakan sebatian kovalen yang banyak digunakan sebagai perasa dalam minuman ringan. Komposisi menurut jisim bagi asid tartarik ialah 32% karbon, 4% hidrogen dan 64% oksigen.

(i) Determine empirical formula of tartaric acid
Tentukan formula empirik bagi asid tartarik.

[4 marks]

(ii) Molar mass of tartaric acid is 150 g mol^{-1}. Determine molecular formula of tartaric acid.
Jisim molar asid tartarik ialah 150 g mol^{-1}. Tentukan formula molekul bagi asid tartarik.
[Atomic relative mass : H, 1; C, 12; O, 16]
[Jisim atom relatif : H, 1; C, 12; O, 16]

[2 marks]

8 Three sets of experiments are carried out to investigate the factors affecting the rate of reaction. Table 8.1 shows the reactants used in the three sets of experiments.
Tiga set eksperimen telah dijalankan untuk mengkaji faktor-faktor yang mempengaruhi kadar tindak balas. Jadual 8.1 menunjukkan bahan tindak balas yang digunakan dalam ketiga-tiga set eksperimen tersebut.

Experiment ***Eksperimen***	**Reactants** ***Bahan tindak balas***	
Set I	Excess calcium carbonate *Kalsium karbonat berlebihan*	50 cm^3 of 2.0 mol dm^{-3} hydrochloric acid *50 cm^3 asid hidroklorik 2.0 mol dm^{-3}*
Set II	Excess calcium carbonate *Kalsium karbonat berlebihan*	50 cm^3 of 2.0 mol dm^{-3} ethanoic acid *50 cm^3 asid etanoik 2.0 mol dm^{-3}*
Set III	Excess calcium carbonate *Kalsium karbonat berlebihan*	50 cm^3 of 2.0 mol dm^{-3} sulphuric acid *50 cm^3 asid sulfurik 2.0 mol dm^{-3}*

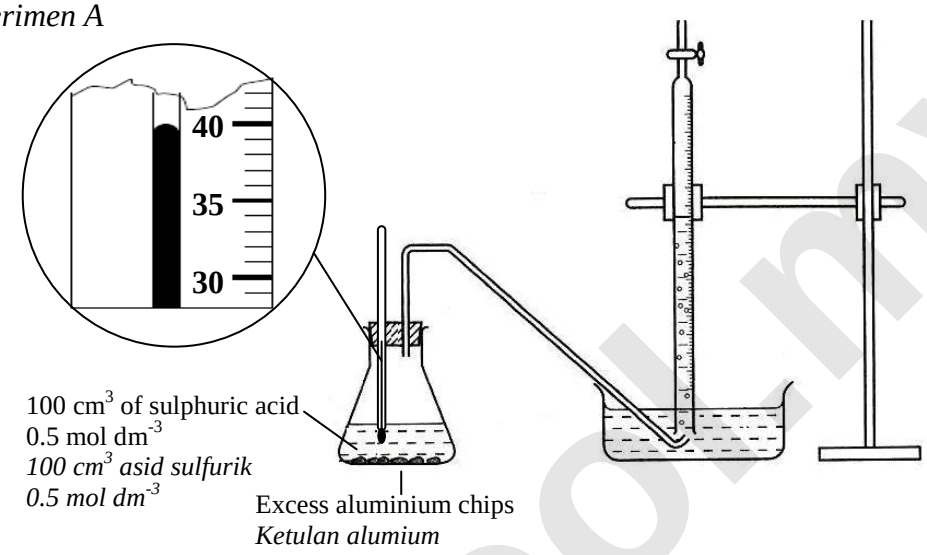
Table 8.1
Jadual 8.1

(a) Referring to the condition of the experiments in Set I, Set II and Set III, arrange the three sets of experiments in descending order of the rate of reaction.
Explain your answer.
Merujuk kepada eksperimen pada Set I, Set II dan Set III, susun tiga set eksperimen tersebut berdasarkan turutan menurun kadar tindak balas.
Terangkan jawapan anda.

[4 marks]

(b) A group of students carried out two sets of experiments to investigate the effects of temperature on the rate of reaction. Diagram 8.2 shows the apparatus set-up for each experiment.
Sekumpulan pelajar menjalankan dua set eksperimen untuk mengkaji kesan suhu ke atas kadar tindak balas. Rajah 8.2 menunjukkan susunan radas bagi setiap eksperimen.

Experiment A
Eksperimen A



Experiment B
Eksperimen B

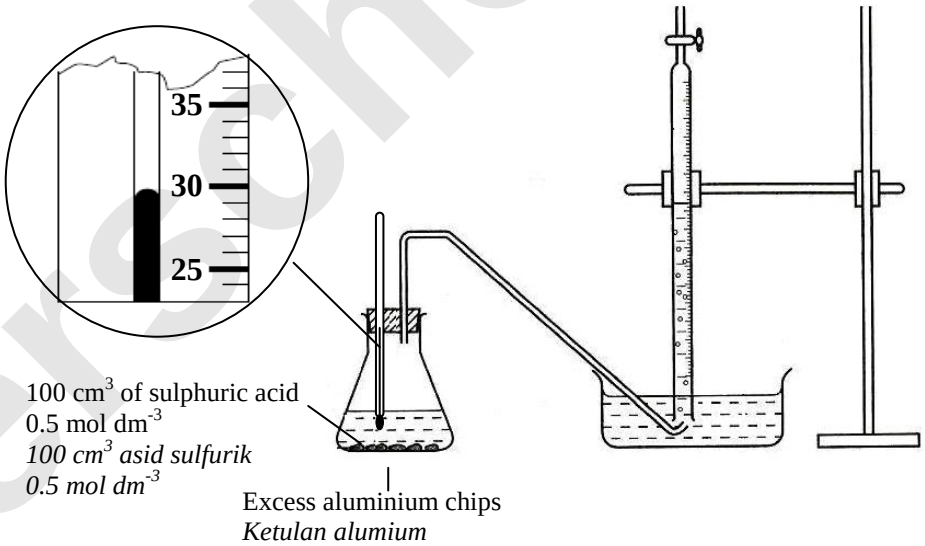


Diagram 8.2
Rajah 8.2

Based on Diagram 8.2,
Berdasarkan Rajah 8.2,

(i) Copy and rewrite the balanced chemical equation for the reaction between aluminium and sulphuric acid that have been provided below.
Salin dan tulis semula persamaan kimia yang seimbang bagi tindak balas antara aluminium asid sulfurik yang diberikan di bawah.

$$\ldots\ldots Al + \ldots\ldots H_2SO_4 \rightarrow Al_2(SO_4)_3 + \ldots\ldots H_2$$

[2 marks]

(ii) calculate the maximum volume of hydrogen gas produced at room condition when 100 cm^3 of 0.5 mol dm^{-3} sulphuric acid reacts completely with excess aluminium chips in this reaction.
[Molar gas volume at room condition = 24.0 $dm^3\,mol^{-1}$]
hitungkan isipadu maksimum gas hidrogen yang terhasil dalam keadaan bilik apabila 100 cm^3 asid sulfurik 0.5 $moldm^{-3}$ bertindak balas lengkap dengan kepingan aluminium pada tindak balas tersebut.
[*isipadu molar dalam keadaan bilik* = 24.0 $dm^3 mol^{-1}$]

[2 marks]

(iii) sketch the graph of the volume of hydrogen gas against time for both set of reaction on the same axes.
lakarkan graf isipadu gas hidrogen melawan masa bagi kedua-dua set tindak balas pada paksi yang sama.

[2 marks]

(iv) compare the rate of reaction between experiment A and experiment B.
Explain your answer based on collision theory.
Bandingkan kadar tindak balas antara eksperimen A dan eksperimen B.
Jelaskan jawapan anda berdasarkan teori perlanggaran.

[6 marks]

(c) Anti-acids contain ingredients, such as aluminium hydroxide and magnesium hydroxide. Anti-acids can provide almost instant relief for indigestion. Normally we have to chew antacid tablets before swallowing it.
Explain why.
Anti-asid mengandungi bahan seperti aluminium hidroksida dan magnesium hidroksida. Anti-asid boleh memberikan kelegaan serta-merta bagi masalah ketidakhadaman. Kebiasaanya kita perlu mengunyah tablet anti-asid sebelum menelannya.
Terangkan mengapa.

[4 marks]

Section C
Bahagian C

[20 marks]
[20 markah]

Answer **one** question in this section.
*Jawab **satu** soalan dalam bahagian ini.*

9 (a) Diagram 9.1 shows the displacement reaction and its observation. Metal M powder is added to silver nitrate solution in a beaker.
Rajah 9.1 menunjukkan tindak balas penyesaran dan pemerhatiannya. Serbuk logam M ditambah ke dalam larutan argentum nitrat di dalam sebuah bikar.

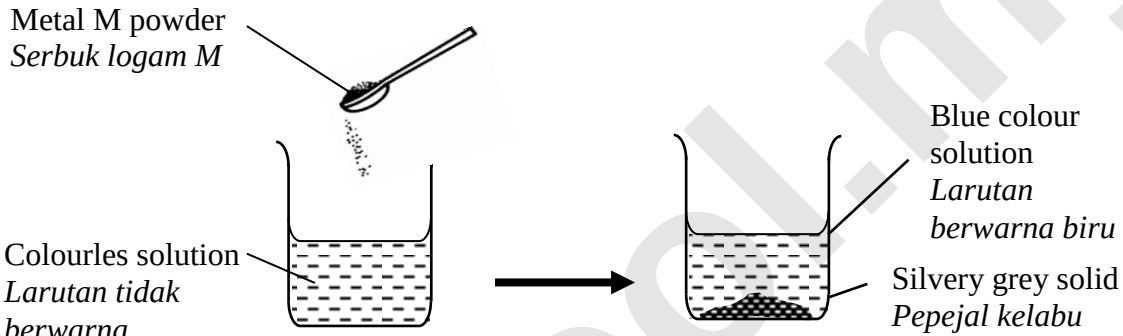


Diagram 9.1
Rajah 9.1

Based on Diagram 9.1, state the identity of metal M.
Write the half-equations to represent the oxidation and reduction.
State the change in the oxidation number for silver.
Berdasarkan Rajah 9.1, nyatakan identiti logam M.
Tulis setengah persamaan untuk mewakili pengoksidaan dan penurunan.
Nyatakan perubahan nombor pengoksidaan bagi argentum.

[4 marks]

(b) Diagram 9.2 shows an apparatus set-up for an experiment to investigate a redox reaction.
Rajah 9.2 menunjukkan susunan radas bagi suatu eksperimen untuk mengkaji suatu tindak balas redoks.

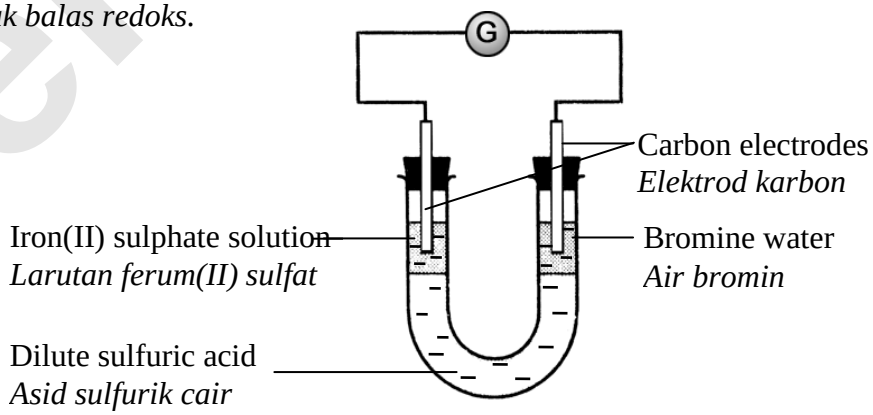


Diagram 9.2
Rajah 9.2

Describe the oxidation and reduction that occurs in Diagram 9.2.
Your answer must include:

- role of each reactant
- the transfer of electron of each reactant
- the colour changes that can be observed after 15 minutes.

Huraikan pengoksidaan dan penurunan yang berlaku di Rajah 9.2.
Jawapan anda mesti mengandungi:

- *peranan setiap bahan tindak balas*
- *pemindahan elektron yang berlaku ke atas setiap bahan tindak balas*
- *perubahan warna yang dapat diperhatikan selepas 15 minit.*

[6 marks]

(c) You are required to determine the position of carbon in the Reactivity Series of Metals towards oxygen by using all the chemicals in the box below.
Anda diminta untuk menentukan kedudukan karbon dalam Siri Kereaktifan Logam terhadap oksigen dengan menggunakan semua bahan kimia seperti dalam kotak di bawah:

Carbon powder /*Serbuk karbon*
Magnesium oxide powder /*Serbuk magnesium oksida*
Copper(II) oxide powder /*Serbuk kuprum(II) oksida*

Your answer must include the following:

- The procedure of the experiment
- The observation
- Explanation on how to determine the position of carbon in the reactivity series.
- Arrangement of carbon, magnesium and copper in ascending order of reactivity towards oxygen.

Jawapan anda mesti mengandungi:

- *Prosedur eksperimen*
- *Pemerhatian*
- *Penerangan bagaimana menentukan kedudukan karbon dalam siri kereaktifan.*
- *Susunan karbon, magnesium dan kuprum dalam tertib menaik kereaktifan terhadap oksigen.*

[10 marks]

10 (a) Neutralisation reactions is used in various fields such as agriculture and industries. Explain one use of neutralisation in each field.
Tindak balas peneutralan banyak digunakan di dalam pelbagai bidang seperti pertanian dan industri. Terangkan satu kegunaan proses peneutralan bagi setiap bidang.

[4 marks]

(b) You are given a bottle containing a zinc chloride solution. Describe how you can identify the cation and anion in the given salt solution by using the following reagent:
- silver nitrate solution
- ammonia solution
- nitric acid

Anda diberikan sebiji botol mengandungi larutan zink klorida. Huraikan bagaimana anda dapat mengesahkan kation dan anion dalam larutan garam yang diberikan dengan menggunakan reagen-reagen berikut :
- *larutan argentum nitrat*
- *larutan ammonia*
- *asid nitrik*

[6 marks]

(c) Diagram 10 shows the preparation of zinc sulphate salt solution by added solid X into acid Y solution.
Rajah 10 menunjukkan penyedian larutan garam zink sulfat dengan menambahkan pepejal X ke dalam larutan asid Y.

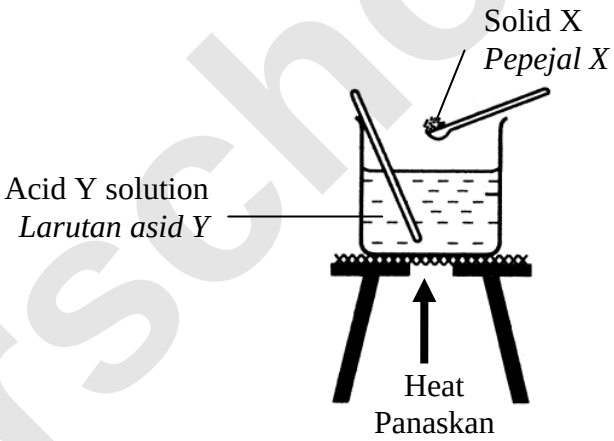


Diagram 10
Rajah 10

Suggest a suitable solid X and acid Y solution.
Describe how you can prepare a dry zinc sulphate salt by using solid X and acid Y.
Cadangkan pepejal X dan larutan asid Y yang sesuai.
Huraikan bagaimana anda dapat menyediakan garam zink sulfat yang kering dengan menggunakan pepejal X dan larutan asid Y.

[10 marks]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

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** Flourine 19	10 **Ne** Neon 20
11 **Na** Sodium 23	12 **Mg** Magnesium 24											13 **Al** Aluminum 27	14 **Si** Silicon 28	15 **P** Phosphorus 31	16 **S** Sulfur 32	17 **Cl** Chlorine 35.5	18 **Ar** Argon 40
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 — Proton number
Ne — Symbol
Neon — Name of element
20 — 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** Ytterbium 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** Berkerium 247	98 **Cf** Californium 249	99 **Es** Einsteinium 254	100 **Fm** Fermium 253	101 **Md** Mendele-vium 256	102 **No** Nobelium 254	103 **Lr** Lawrensium 257

Chemistry
Kertas 3
Ogos 2015
1 ½ Jam

Nama : …….. Tingkatan : .....…..……

KEMENTERIAN PENDIDIKAN MALAYSIA

BAHAGIAN PENGURUSAN SEKOLAH BERASRAMA PENUH DAN SEKOLAH KECEMERLANGAN

PENTAKSIRAN DIAGNOSTIK AKADEMIK SBP 2015
PERCUBAAN SIJIL PELAJARAN MALAYSIA

CHEMISTRY

Kertas 3

Satu Jam Tiga Puluh Minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Tuliskan nama dan tingkatan pada ruang yang disediakan.*
2. *Kertas soalan ini adalah dalam dwibahasa.*
3. *Soalan dalam bahasa Inggeris mendahului soalan yang sepadan dalam bahasa Melayu.*

Untuk Kegunaan Pemeriksa		
Soalan	**Markah Penuh**	**Markah Diperoleh**
1	18	
2	15	
3	17	
JUMLAH	50	

Kertas soalan ini mengandungi **12** halaman bercetak.

INFORMATION FOR CANDIDATES
MAKLUMAT UNTUK CALON

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

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

3. Write your answers for **Question 3** on the lined pages at the end of the question paper in detail. You may use equations, diagrams, tables, graphs and any other suitable methods to explain your answer.
Tuliskan jawapan bagi **Soalan 3** *pada halaman bergaris di bahagian akhir kertas soalan ini 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 you have done. Then write down the new answer.
Sekiranya anda hendak menukar jawapan, batalkan jawapan yang telah dibuat. Kemudian tulis jawapan yang baru.

6. Diagrams in the questions are not drawn to scale unless stated.
Rajah yang mengiringi soalan tidak dilukis mengikut skala kecuali dinyatakan sebaliknya.

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

8. Time suggested for answering **Question 1 and 2** is 45 minutes and **Question 3** is 45 minutes.
Masa yang dicadangkan untuk menjawab **Soalan 1 dan 2** *ialah 45 minit dan* **Soalan 3** *ialah 45 minit.*

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

10. Hand in this question paper at the end of the examination.
Serahkan semua kertas jawapan anda di akhir peperiksaan.

Marks awarded:

Mark	Description
3	**Excellent:** The best response
2	**Satisfactory** : An average answer
1	**Weak** : An inaccurate response
0	No response or wrong response

Pemberian Markah:

Skor	Penerangan
3	**Cemerlang**: Respons yang paling baik
2	**Memuaskan**: Respons yang sederhana
1	**Lemah**: Respons yang kurang tepat
0	Tiada respons atau respons salah

Answer all question
Jawab semua soalan

1. Diagram 1 shows two electrolytic cells.
Rajah 1 menunjukkan dua sel elektrolisis.

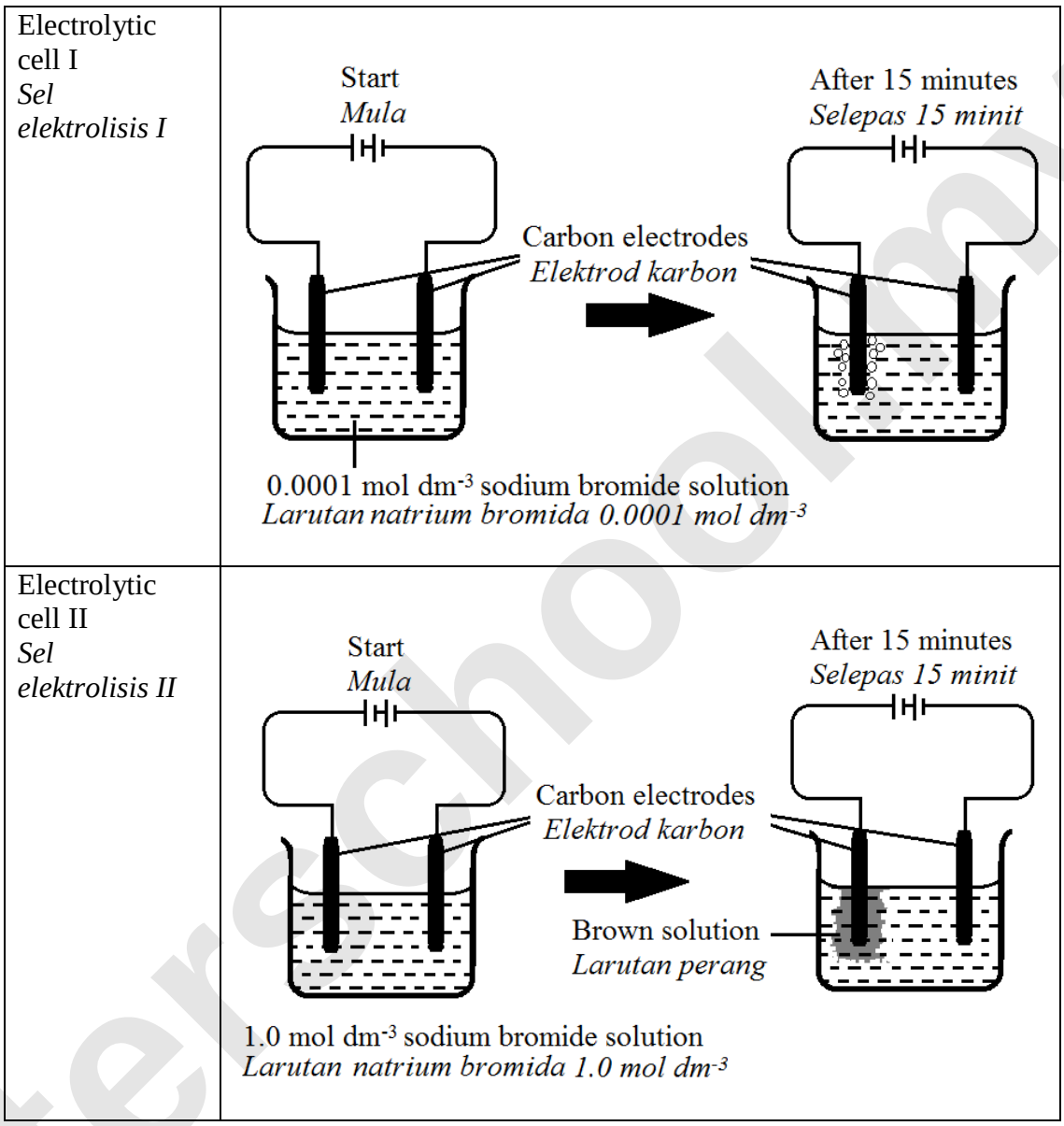


Diagram 1
Rajah 1

Electrolytic cell I uses 0.0001 mol dm^{-3} sodium bromide solution and electrolytic cell II uses 1.0 mol dm^{-3} sodium bromide solution.
Sel elektrolisis I menggunakan larutan natrium bromide 0.0001 mol dm^{-3} dan sel elektrolisis II menggunakan larutan natrium bromide 1.0 mol dm^{-3}.

For Examiner's use

(a) State observation at anode in Table 1
Nyatakan pemerhatian di anod dalam Jadual 1

Electrolytic cell Sel elektrolisis	Observation Pemerhatian
I	
II	

Table 1
Jadual 1

[3 marks] 1(a) 3

(b) State an inference for observation in 1(a).
Nyatakan inferens bagi pemerhatian dalam 1(a).

……

……

[3 marks] 1(b) 3 3

(c) For this experiment, state :
Bagi eksperimen ini, nyatakan :

(i) The manipulated variable :
Pembolehubah yang dimanipulasikan :

……

(ii) The responding variable :
Pembolehubah yang bergerakbalas :

……
.

(iii) The constant variable :
Pembolehubah yang ditetapkan :

……

[3 marks] 1(c) 3

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

……

……

…… 1(d) 3

[3 marks]

(e) The experiment is repeated by replace 1.0 mol dm^{-3} sodium bromide solution to 1.0 mol dm^{-3} copper(II) sulphate solution. Predict the name of product formed at anode.
Eksperiment diulangi dengan menggantikan larutan natrium bromide 1.0 mol dm^{-3} digantikan dengan larutan kuprum(II) sulphate 1.0 mol dm^{-3}. Ramalkan nama hasil yang terbentuk di anode.

For Examiner's use

……

……

[3 marks]

1(e) 3

(f) The following are example of chemical substances.
Berikut adalah beberapa contoh bahan kimia

Benzene *Benzena*	Molten lead(II) chloride *Leburan Plumbum(II) klorida*	Molten naphthalene *Leburan naftalena*
Potassium carbonate solution *Larutan kalium karbonat*		Glucose solution *Larutan glukosa*

Classify the chemical substances into electrolyte and non electrolyte.
Kelaskan bahan-bahan kimia tersebut kepada elektrolit dan bukan elektrolit.

[3 marks]

1(f) 3 3

JUMLAH 18

2. Diagram 2.1 shows the apparatus set-up for an experiment to investigate the effect of temperature on the rate of reaction between sodium thiosulphate solution and sulphuric acid. In each set of the experiment, the size of conical flask used is 250 cm^3.

50 cm^3 of 0.05 mol dm^{-3} of sodium thiosulphate solution at 30°C is poured into a conical flask and 10 cm^3 of 1.0 mol dm^{-3} of sulphuric acid is added immediately into the sodium thiosulphate solution. The conical flask is shaken and then placed on a white paper with mark 'X' as shown in Diagram 1.1. The time taken for the mark 'X' to disappear from sight is recorded.

Rajah 2.1 menunjukkan susunan radas bagi eksperimen untuk mengkaji kesan suhu ke atas kadar tindak balas antara larutan natrium tiosulfat dan asid sulfurik. Dalam setiap eksperimen, saiz kelalang kon yang digunakan adalah 250 cm^3.

50 cm^3 larutan natrium tiosulfat 0.05 mol dm^{-3} pada suhu 30°C dimasukkan ke dalam sebuah kelalang kon dan 10 cm^3 asid sulfurik 1.0 mol dm^{-3} ditambah dengan cepat kepada larutan natrium tiosulfat itu . Kelalang kon itu digoncangkan dan kemudian diletakkan di atas kertas putih yang ditanda 'X' seperti yang ditunjukkan pada Rajah 2.1. Masa untuk tanda 'X' hilang dari pandangan dicatatkan.

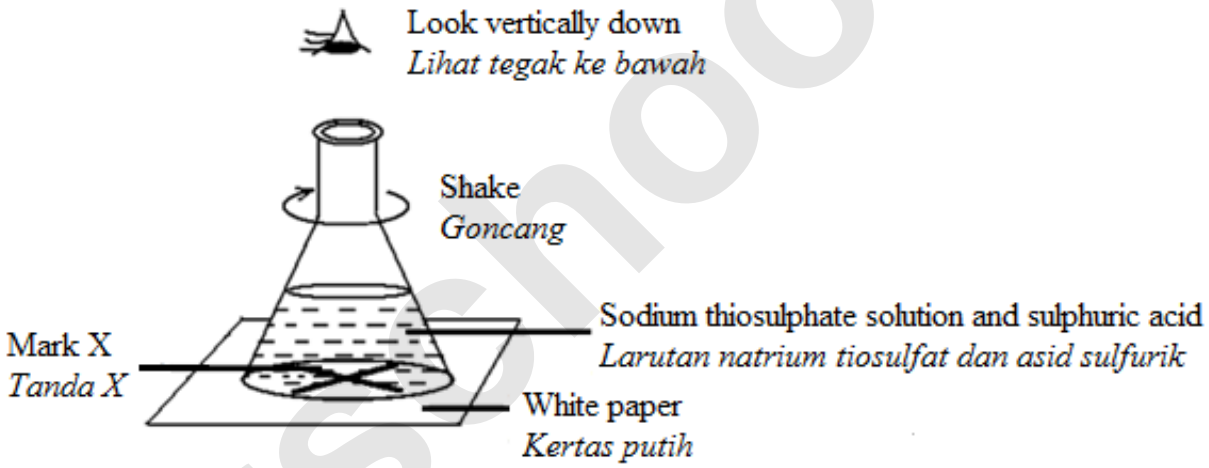
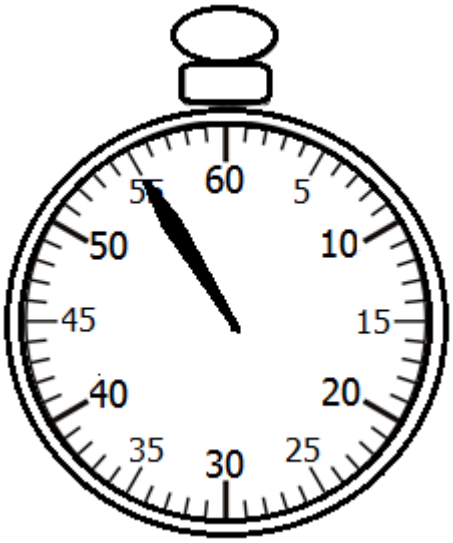
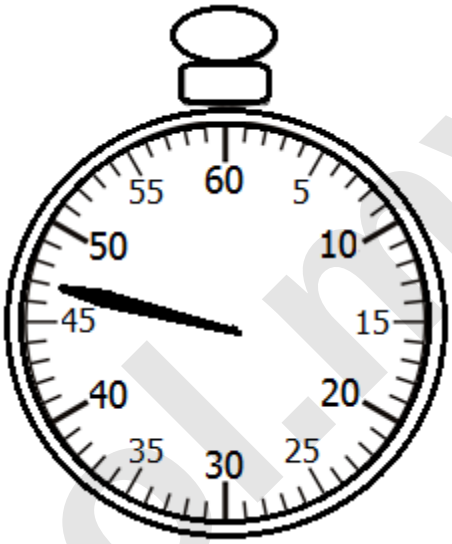
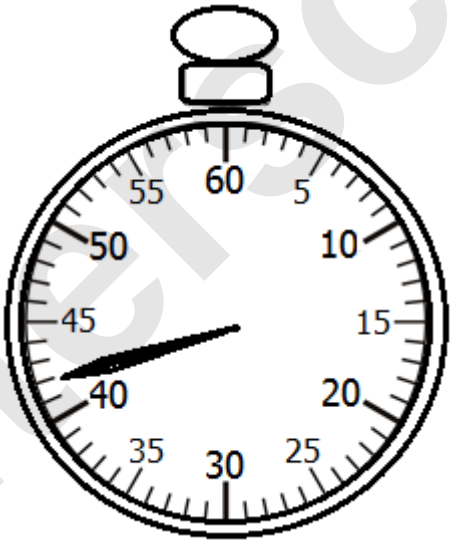
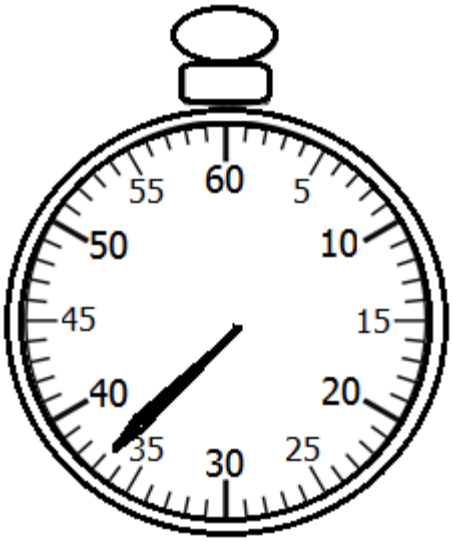


Diagram 2.1
Rajah 2.1

The experiment is repeated by the same volume and concentration of sodium thiosulphate solution which are heated to 35°C, 40°C, 45°C and 50°C. Diagram 2.2 shows the readings of the stopwatch in each experiment.

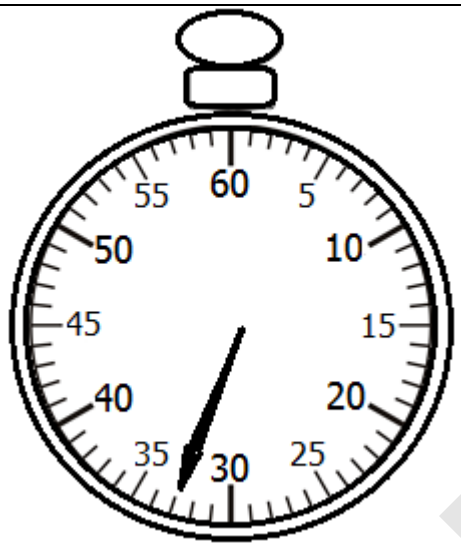
Eksperimen itu diulangi untuk larutan natrium tiosulfat dengan isipadu dan kepekatan yang sama dipanaskan pada suhu 35°C, 40°C, 45°C dan 50°C. Rajah 2.2 menunjukkan bacaan jam randik bagi setiap eksperimen.

(a) Record the stopwatch readings in the space provided in Diagram 2.2 below.
Catatkan bacaan jam randik pada ruang yang disediakan pada Rajah 2.2 di bawah

Set I *Set I*	**Set II** *Set II*
	
Temperature = 30°C *Suhu* Time, t_1 = _____ *masa*	Temperature = 35°C *Suhu* Time, t_2 = _____ *masa*
Set III *Set III*	**Set IV** *Set IV*
	
Temperature = 40°C *Suhu* Time, t_3 = _____ *masa*	Temperature = 45°C *Suhu* Time, t_4= _____ *masa*

For Examiner's use

Set V
Set V



Temperature = 50°C
Suhu

Time, t_5 = _____
masa

Diagram 2.2
Rajah 2.2

2(a)

[3 marks] 3

(b) Construct a table and record temperature, time and 1/time for this experiment.
Bina satu jadual dan rekodkan suhu, masa dan 1/masa untuk eksperimen ini

2(b)

[3 marks] 3

For Examiner's use

(c) Plot a graph of temperature of sodium thiosulphate solution against 1/time on the graph paper provided.
Lukiskan graf kepekatan natrium tiosulfat melawan 1/masa di atas kertas graf yang disediakan.

[3 marks]

2(c) 3

(d) Based on the graph, state the relationship between the temperature of sodium thiosulphate solution and the rate of reaction.
Berdasarkan graf, nyatakan hubungan antara kepekatan larutan natrium tiosulfat dengan kadar tindak balas.

……
.

……..……
…

……
.

[3 marks]

2(d) /3 3

(e) State the operational definition for the rate of reaction based on this experiment.
Nyatakan definisi secara operasi bagi kadar tindak balas berdasarkan eksperimen ini.

.....
.

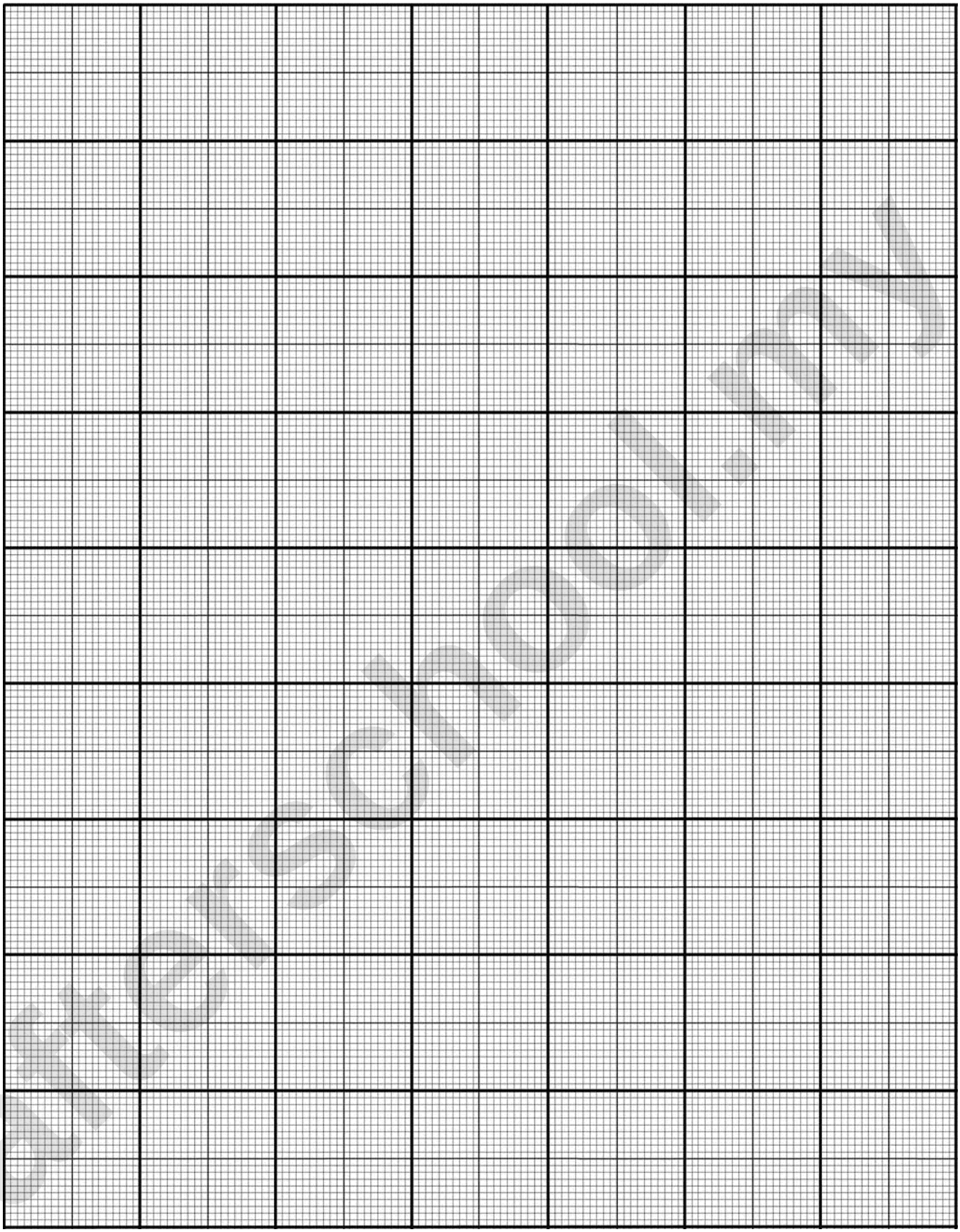
.....
.

.....
.

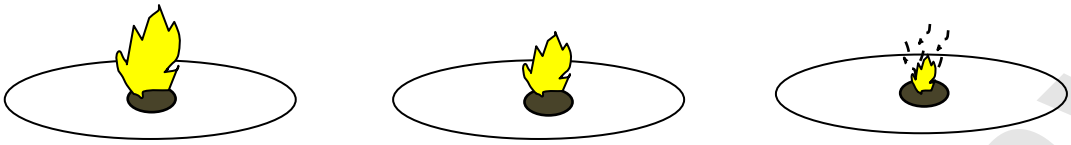
[3 marks]

1(e) /3 3

JUMLAH 15



3 Alkali metals are reactive toward oxygen gas. Once the alkali metal is taken out from the paraffin oil and dried it will burn easily. Diagram 3 shows the burning of three different alkali metals on a filter paper.
Logam-logam alkali adalah reaktif terhadap gas oksigen. Apabila suatu logam alkali dikeluarkan daripada minyak parafin dan dikeringkan ia akan mudah terbakar. Rajah 3 menunjukkan tiga logam alkali yang berbeza terbakar di atas kertas turas.



Potassium
Kalium

Sodium
Natrium

Lithium
Litium

Diagram 3
Rajah 3

Based on given situation, plan a laboratory experiment to compare the reactivity of alkali metals towards oxygen gas.
Berdasarkan situasi yang diberi, rancangkan satu eksperimen makmal untuk membandingkan kereaktifan logam-logam alkali terhadap gas oksigen.

Your planning, you must include the following aspects:
Perancangan anda hendaklah mengandungi aspek-aspek berikut:

(a) Problem statement
Pernyataan masalah

(b) All the variables
Semua pemboleh ubah

(c) Hypothesis
Pernyataan hipotesis

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

(e) Procedure of the experiment
Prosedur eksperimen

(f) Tabulation of data
Penjadualan data

[17 marks]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

PENTAKSIRAN DIAGNOSTIK AKADEMIK SBP 2015
SKEMA JAWAPAN
CHEMISTRY 4541/2

PENTAKSIRAN DIAGNOSTIK AKADEMIK SBP 2015
SKEMA KERTAS 1
CHEMISTRY 4541/1

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

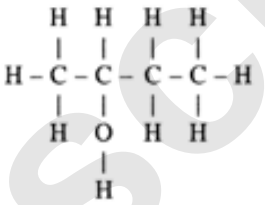
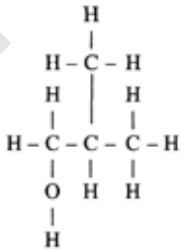
[Lihat Sebelah

PENTAKSIRAN DIAGNOSTIK AKADEMIK SBP 2015
SKEMA KERTAS 2
CHEMISTRY 4541/2

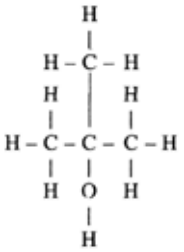
<table>
<tr><th>QUESTION NO.</th><th>MARK SCHEME</th><th>MARK</th><th>TOTAL</th></tr>
<tr><td>1(a)</td><td>General Formula
Formula Am : C_nH_{2n}
Homologous series
Siri Homolog : Alkene</td><td>1

1</td><td>2</td></tr>
<tr><td>(b) (i)</td><td>Hydroxyl group</td><td>1</td><td rowspan="2">2</td></tr>
<tr><td>(ii)</td><td>Butan-1-ol</td><td>1</td></tr>
<tr><td>(c) (i)</td><td>Hydration</td><td>1</td><td rowspan="3">3</td></tr>
<tr><td>(ii)</td><td>• Able to draw structural formula correctly
• State the name of isomer correctly.

Suggestion answer :

<table>
<tr><th>Structure formula
Formula struktur</th><th>Name
Nama</th></tr>
<tr><td>  </td><td>Butan-2-ol</td></tr>
<tr><td>  </td><td>2-methylpropan-1-ol</td></tr>
</table>
</td><td>1
1</td></tr>
</table>

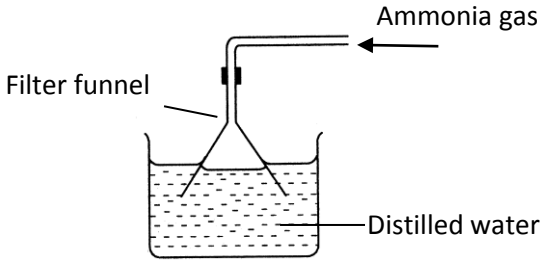
[Lihat Sebelah

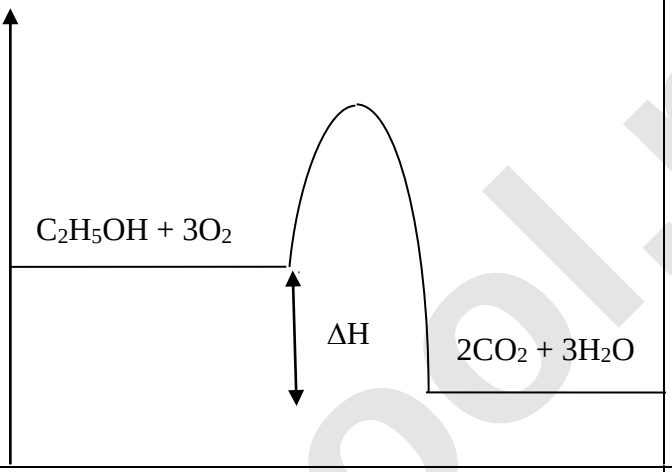
	 2-methylpropan-2-ol *Any one pair of structure formula and it's correct name*		
(d)	$C_5H_{11}OH + CH_3COOH \rightarrow CH_3COOC_5H_{11} + H_2O$ • *Correct formulae of reactants* • *Correct formulae of products*	1 1	2
	TOTAL		**9**

Question			**Answer**	**Mark**	**TOTAL**
2	(a)	(i)	Contact Process	1	3
		(ii)	Temperature: 450^{o}C// Pressure: 1 atm// Catalyst: vanadium(V) oxide	1	
		(iii)	Sulphur and oxygen/air	1	
	(b)	(i)	Codeine	1	3
	(c)	(i)	Food preservative	1	
		(ii)	Nausea//sore throat// asthma// allergy	1	
	(d)	(i)	Detergent	1	3
		(ii)	• Detergent ion reacts with calcium ion/ Ca^{2+} /magnesium ion/ Mg^{2+} • produces soluble salt // not produce scum	1 1	
			TOTAL		**9**

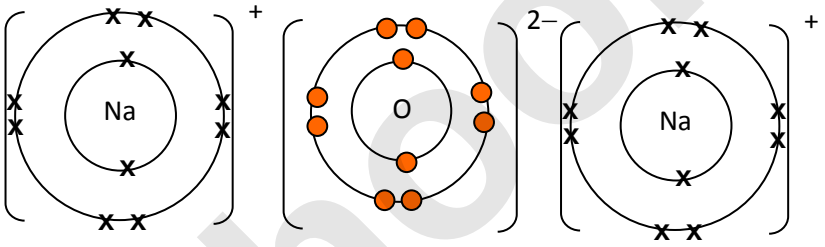
NO.			RUBRIC	MARK	TOTAL
3	a		Mg^{2+}, NO_3^-, H^+, OH^- // Magnesium ion, nitrate ion, hydrogen ion and hydroxide ion	1	1
	b	(i)	Potassium nitrate solution// potassium chloride solution // Potassium sulphate solution // Sodium nitrate solution// Sodium chloride solution// Sodium sulphate solution Accept: any electrolyte which will not form precipitate	1	1
	c	(i)	Reduction	1	2
		(ii)	The oxidation number of copper change from +2 to 0	1	
	d		Negative terminal: $Mg \rightarrow Mg^{2+} + 2e$ Positive terminal: $Cu^{2+} + 2e \rightarrow Cu$	1 1	2
	e		Increases		
	f	(i)	From copper to silver through connecting wires/ external circuit.	1	1
		(ii)	$Cu + 2Ag^+ \rightarrow Cu^{2+} + 2Ag$ Correct formulae of ions Balanced equation	**1** **1**	**2**
			TOTAL		**10**

No			Rubric	Mark	Total
4	a)		Proton number *Nombor proton* r : number of proton	1	1
	b)		Q	1	1
	c)	i)	the atomic size of Q is <u>smaller</u> than P // the atomic size of P is <u>bigger</u> than Q	1	1
		ii)	1. <u>proton number</u> of Q is bigger than P 2. the <u>force of attraction between nucleus of Q toward electron</u> in the shell become stronger.	1 1	2
	d)	(i)	$2P + 2H_2O \rightarrow 2POH + H_2$// $2Na + 2H_2O \rightarrow 2NaOH + H_2$ Correct formula of reactant and product Balanced equation	1 1	2
		(ii)	0.25 x 24 // 6 dm^3 // 6000 cm^3	1	1
	e)		• Provide an inert atmosphere • The hot filament in the light bulb does not burn	1 1	2
Total					10

No		Rubric	Mark	Total
5	(a)	Chemical substances which ionises partially in water to produce low concentration of hydroxide ions.	1	**1**
	(b)	P	1	**1**
	(c)		1 1	**2**
	(d)	S, Q, P, R	1	**1**
	(e)	(i) P	1	**1**
	(ii)	(ii) In solution P, ammonia ionise to produce hydroxide ion. In solution Q, ammonia exits as neutral molecule.	1 1	**2**
	(f)	Method: Add calcium carbonate into solution S. Then flow the gas produced into lime water Observation : colourless lime water become chalky/milky/cloudy **OR** Method: Add magnesium/zinc into a test tube containing solution S. Put lighted wooden splinter into the test tube. Observation: "pop" sound produces	1 1 1 1 1 1	**3**
			Total	**11**

No		Mark scheme	Sub Mark	Total Mark
6	(a)	Reaction that gives out / released heat to the surroundings.	1	1
	(b)		1	1
	(c)	(i) Heat of combustion of propane is higher than methane	1	1
		(ii) • The number of carbon / hydrogen atoms per molecule propane is higher • More carbon dioxide / water produced when propane is burnt • More heat energy released	1 1 1	3
	(d)	Molar mass of propanol, C_3H_7OH = 60 g mol^{-1} 60 g of C_3H_7OH burnt released 2016 kJ // 1 g C_3H_7OH burnt released $\frac{1 \times 2016}{60}$ kJ = 33.6 kJ g^{-1} (correct answer with correct unit)	1 1	2
	(e)	• place the cold packs on his swollen knee • to absorbs heat from his swollen knee • constrict blood vessels and slows down blood flow / reduce the formation of fluid in the affected area.	1 1 1	3
		TOTAL		**11**

Section B [20 marks]

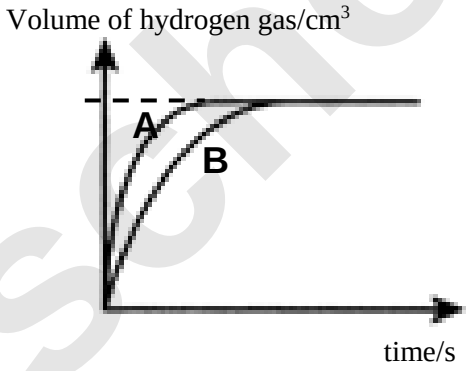
<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Mark</th></tr>
<tr><td>7</td><td>(a)</td><td>(i)</td><td>Covalent
Has low melting point /boiling point
Cannot dissolve in water</td><td>1
1
1</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>Cannot conduct electricity / volatile</td><td>1</td></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td>
<table>
<tr><th></th><th>Compound P</th><th>Compound Q</th></tr>
<tr><td>Type of bonds</td><td>Covalent</td><td>Ionic</td></tr>
<tr><td>Type of particles forms</td><td>Molecule</td><td>Ion</td></tr>
<tr><td>Type of attraction force between the particles</td><td>Intermolecular force / Van der Waals</td><td>Electrostatic force</td></tr>
<tr><td>Way for the atoms to achieve the stable octet electron arrangement</td><td>Sharing the electron</td><td>Transferring of electron // sodium atom donates electron and chlorine atom accept electron</td></tr>
</table>
</td><td>1+1
1+1
1+1
1+1</td></tr>
<tr><td></td><td></td><td>(ii)</td><td> 

Correct electron arrangement
Correct number of charge</td><td>
1
1</td></tr>
<tr><td></td><td>(c)</td><td>(i)</td><td>
<table>
<tr><td>Element</td><td>C</td><td>H</td><td>O</td></tr>
<tr><td>Mass (g)</td><td>32</td><td>4</td><td>64</td></tr>
<tr><td>Number of moles of atoms</td><td>$\frac{32}{12} = 2.667$</td><td>$\frac{4}{1} = 4$</td><td>$\frac{64}{16} = 4$</td></tr>
<tr><td>ratio</td><td>$\frac{2.667}{2.667} = 1$</td><td>$\frac{4}{2.667} = 1.5$</td><td>$\frac{4}{2.667} = 1.5$</td></tr>
<tr><td>Simplest ratio</td><td>2</td><td>3</td><td>3</td></tr>
</table>
Empirical formula = $C_2H_3O_3$</td><td>1
1
1
1</td></tr>
<tr><td></td><td></td><td></td><td>Relative molecular mass of $(C_2H_3O_3)n = 150$

$(24+3+48)\ n = 150$
$75n = 150$
$n = 2$
Therefore, the molecular formula is $C_4H_6O_6$</td><td>

1
1</td></tr>
<tr><td></td><td></td><td></td><td>Sub total</td><td>20</td></tr>
</table>

[Lihat Sebelah

Question			Answer	Mark
8	**(a)**		P1: III, I, II P2: Sulphuric acid in experiment III is a strong diprotic acid //ionises completely in water to produce 0.2 mole of hydrogen ion P3: Hydrochloric acid in experiment I is a strong monoprotic acid // ionises completely in water to produce 0.1 mole of hydrogen ion P4: Ethanoic acid in experiment II is a weak acid // ionises partially in water to produce less than 0.1 mole of hydrogen ion/ low concentration of hydrogen ion.	1 1 1 1
	(b)	(i)	$\underline{\mathbf{2}}\ Al + \underline{\mathbf{3}}\ H_2SO_4 \rightarrow Al_2(SO_4)_3 + \underline{\mathbf{3}}\ H_2$ *Balance reactants* *Balance product*	 1 1
		(ii)	P1: Mole H_2SO_4 = (0.5)(100)/1000 // 0.05 mol P2: From the equation: 1 mole of sulphuric acid produce 1 mole of hydrogen gas 0.05 mole of sulphuric acid produce 0.05 mole of hydrogen gas P3: Volume of hydrogen gas = 0.05 x 24 = 1.2 dm^3	**1** **1** **1**
		(iii)	 P1: x-axis and y-axis with title and unit and the graph curve P2: Label A and B	 1 1
		(iv)	P1: The rate of reaction in experiment A is higher than experiment B P2: The temperature in experiment A is higher P3 : The **kinetic energy** of the hydrogen ions/ H^+ ion in experiment A is higher P4: The frequency of collision between **aluminium atom** and **hydrogen ion** in experiment A is higher P5: The **frequency of effective collision** in experiment A is higher	1 1 1 1 1

	(c)	1. The size of antacid become smaller. 2. Total surface area exposed become bigger 3. Frequency of effective collision between anti-asid/aluminium hidroxide/magnesium hidroxyde and stomach acid / gastric acid / hydrogen ion higher. 4. The rate of reaction become higher.// The indisgetion can be cured faster.// The neutralization occured faster. 5.	1 1 1 1
		Sub total	**20**

Section B [20 marks]

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Mark</th></tr>
<tr><td>9</td><td>(a)</td><td>(i)</td><td>Metal M : Copper/ kuprum
Half-equation for oxidation: $Cu \rightarrow Cu^{2+} + 2e^-$
Half-equation for reduction: $Ag^+ + e^- \rightarrow Ag$
Oxidation number change : +1 to 0</td><td>1
1
1
1</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>
<table>
<tr><th>Reactant</th><th>Iron(II) sulphate</th><th>Bromine water</th></tr>
<tr><td>Role</td><td>Reducing agent</td><td>Oxidising agent</td></tr>
<tr><td>Transfer of electron</td><td>donates electron // Iron(II) /Fe^{2+} ion donates electron to produce iron(III)/ Fe^{3+} ion</td><td>accept/receive electron // Bromine/ Br_2 accepts electron to produce bromide/ Br^- ion</td></tr>
<tr><td>Colour change</td><td>Green/pale green to brown/yellowish-brown</td><td>Brown to colourless</td></tr>
</table>
</td><td>1+1
1+1
1+1</td></tr>
<tr><td></td><td></td><td></td><td>Procedure:
1. One spatula of copper(II) oxide powder and one spatula of carbon powder is placed into a crucible
2. The crucible and its content are heated strongly.
3. The observation is recorded.
4. Steps 1 to 3 are repeated by replacing copper(II) oxide powder with magnesium oxide powder.

Observation
<table>
<tr><th>Mixture</th><th>Observation</th></tr>
<tr><td>Carbon and copper(II) oxide</td><td>The mixture burns brightly.
//The black powder turns brown</td></tr>
<tr><td>Carbon and magnesium oxide</td><td>No Changes</td></tr>
</table>
Explanation
Carbon can react with copper(II) oxide.
Carbon more reactive than copper / carbon is above copper in the Reactivity Series
Carbon cannot react with magnesium oxide
Carbon less reactive than magnesium / carbon is below magnesium in the Reactivity Series

Arrangement
Copper, carbon, magnesium</td><td>1
1
1
1

1
1

1
1

1
Max 10</td></tr>
<tr><td></td><td></td><td>Sub total</td><td></td><td>20</td></tr>
</table>

Question		Answer	Mark
10	(a)	1. Neutralized acidic soil/ lakes Treated with calcium oxide/ calcium hydroxide / calcium carbonate 2. Treating factory waste such as SO_2 Using powder calcium carbonate (*Any suitable answer*)	1 1 1 1
		To verify zinc ion **Procedure** • Pour zinc chloride solution into a test tube • Add ammonia solution into the test tube until in excess **Observation** • White precipitate formed and dissolve in excess ammonia solution shows the presence of zinc ion **To verify chloride ion** **Procedure** • Pour zinc chloride solution into a test tube • Add nitric acid and silver nitrate solution into the test tube **Observation** • White precipitate formed shows the presence of chloride ion.	 1 1 1 1 1 1
		Suggestion Solid X : Zinc oxide / zinc carbonate , zinc Acid Y : sulphuric acid **Preparation of zinc sulphate solution** P1 : Pour [50 -100 cm^3] of [0.1 - 1.0 mol dm^{-3}] sulphuric acid into a beaker and heat slowly. P2 : Add zinc oxide / zinc carbonate / zinc powder into the acid P3 : stir P4 : stop adding zinc oxide / zinc carbonate / zinc when the solid cannot dissolve/ in excess P5 : filter the mixture solution P6 : transfer the filtrate to a evaporating dish and heat until saturated. P7 : cool down to room temperature P8 : Filter to obtain the crystal form P9 : dry the crystal by pressing between filter paper	 1 1 1 1 1 1 1 1 1 1 1 1 **Max 10**
		Sub total	**20**

MARKING SCHEME
PENTAKSIRAN DIAGNOSTIK KIMIA TINGKATAN 5 TAHUN 2015
4541/3 CHEMISTRY PAPER 3

<table>
<tr><th>QUESTION</th><th>RUBRIC</th><th>SCORE</th></tr>
<tr><td rowspan="4">1(a)</td><td>Able to state two observation correctly

Answer:
<table><tr><th>Electrolytic cell</th><th>Observation</th></tr><tr><td>I</td><td>Gas bubbles released//
Effervescenes</td></tr><tr><td>II</td><td>Brown solution formed</td></tr></table>.</td><td>3</td></tr>
<tr><td>Able to state one observation correctly</td><td>2</td></tr>
<tr><td>Able to state an idea of observation

<u>Sample answer :</u>
Gas released //
Colour of solution changed</td><td>1</td></tr>
<tr><td>No response given / wrong answer</td><td>0</td></tr>
</table>

<table>
<tr><th>QUESTION</th><th>RUBRIC</th><th>SCORE</th></tr>
<tr><td rowspan="4">1(b)</td><td>Able to state any related inference correctly

<u>Sample answer:</u>
<table><tr><th>Observation</th><th>Inference</th></tr><tr><td>Gas bubbles released //
Effervescenes</td><td>Oxygen gas released//
OH^- ion discharged</td></tr><tr><td>Brown solution formed</td><td>Bromine solution formed//
Bromine molecules formed//
Bromine water formed//
Br^- ion discharged</td></tr></table>.</td><td>3</td></tr>
<tr><td>Able to state inference less correctly

<u>Sample answer :</u>
Colourless gas released //
Halogen solution</td><td>2</td></tr>
<tr><td>Able to state any idea of inference

<u>Sample answer :</u>
Gas produced/released</td><td>1</td></tr>
<tr><td>No response given / wrong answer</td><td>0</td></tr>
</table>

[Lihat Sebelah

QUESTION	RUBRIC	SCORE
1(c)	*Able to state all variables correctly* Sample answer : Manipulated variable : Concentration of sodium bromide solution// 0.0001 mol dm^{-3} sodium bromide solution and 1.0 mol dm^{-3} sodium bromide solution Responding variable : product of electrolysis//product at anode Constant variable : Type of electrolyte// Sodium bromide solution// Type of electrode// Carbon electrodes	3
	Able to state any two variables correctly	2
	Able to state any one variables correctly	1
	No response given / wrong answer	0

QUESTION	RUBRIC	SCORE
1(d)	*Able to give the hypothesis correctly* Sample answer: When the concentration of sodium bromide solution is higher, product at anode is bromine solution and when the concentration of sodium bromide solution is lower, product at anode is oxygen gas// Concentrated sodium bromide solution produces bromine solution and diluted sodium bromide solution produces oxygen gas.	3
	Able to give the hypothesis almost correct Sample answer: When the concentration of sodium bromide solution is higher, product at anode is bromine solution// When the concentration of sodium bromide solution is lower, product at anode is oxygen gas// Concentrated sodium bromide solution produce bromine // Diluted sodium bromide solution produces oxygen gas//	2
	Able to state an idea of the hypothesis Sample answer: Concentration of electrolyte affect product formed// Different concentration of sodium bromide, different product at anode	1
	No response given / wrong answer	0

[Lihat Sebelah

<table>
<tr><th>QUESTION</th><th>RUBRIC</th><th>SCORE</th></tr>
<tr><td rowspan="4">1(e)</td><td>Able to predict the product formed at anode correctly

<u>Answer :</u>
Oxygen gas/molecule</td><td>3</td></tr>
<tr><td>Able to predict the product at anode less correctly

<u>Sample answer:</u>
Colourless gas//
Gas</td><td>2</td></tr>
<tr><td>Able to state an idea of product at anode

<u>Sample answer:</u>
Hydroxide ion//OH^-</td><td>1</td></tr>
<tr><td>No response given / wrong answer</td><td>0</td></tr>
</table>

<table>
<tr><th>QUESTION</th><th>RUBRIC</th><th>SCORE</th></tr>
<tr><td rowspan="4">1(f)</td><td>Able to classify all the chemical substances correctly

<u>Answer :</u>
<table>
<tr><th>Electrolyte</th><th>Non-electrolyte</th></tr>
<tr><td>Potassium carbonate solution
Molten lead (II) chloride</td><td>Benzene
Glucose solution
Molten naphthalene</td></tr>
</table></td><td>3</td></tr>
<tr><td>Able to classify any three chemical substances correctly</td><td>2</td></tr>
<tr><td>Able to classify any two chemical substances correctly or give opposite answer

<u>Sample answer:</u>
<table>
<tr><th>Electrolyte</th><th>Non-electrolyte</th></tr>
<tr><td>Benzene
Glucose solution
Molten naphthalene</td><td>Potassium carbonate solution
Molten lead (II) chloride</td></tr>
</table>.</td><td>1</td></tr>
<tr><td>No response given / wrong answer</td><td>0</td></tr>
</table>

<table>
<tr><th>QUESTION</th><th>RUBRIC</th><th>SCORE</th></tr>
<tr><td rowspan="4">2(a)</td><td>Able to record all reading accurately to one decimal point with unit

<u>Answer :</u>
Set I = 55.0 s
Set II = 47.0 s
Set III = 42.0 s
Set IV = 37.0 s
Set V = 33.0 s</td><td>3</td></tr>
<tr><td>Able to record any 4 reading accurately//
Able to record all reading without decimal place//
Able to record all reading without unit</td><td>2</td></tr>
<tr><td>Able to record any 3 reading accurately</td><td>1</td></tr>
<tr><td>No response given / wrong answer</td><td>0</td></tr>
</table>

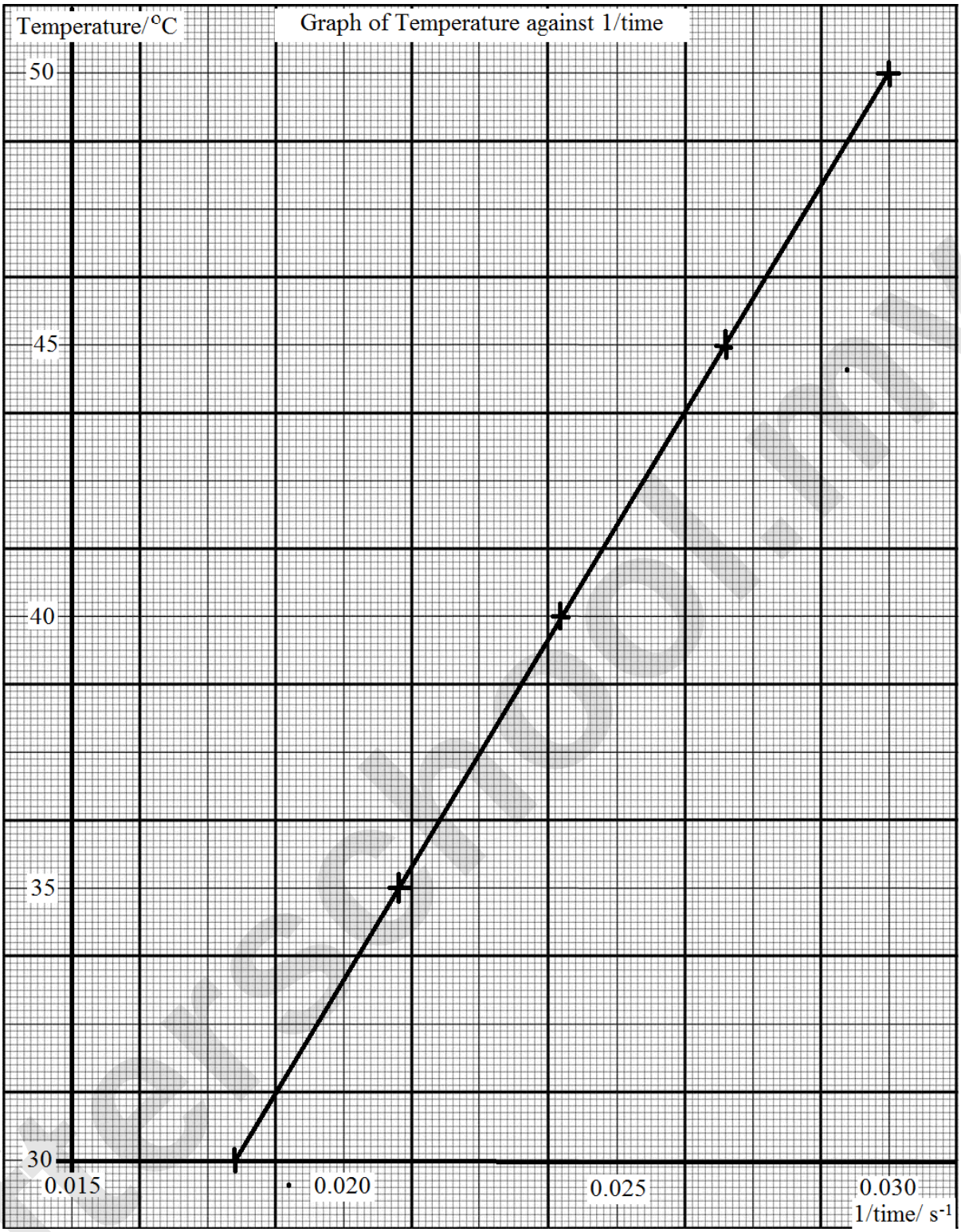
<table>
<tr><th>QUESTION</th><th>RUBRIC</th><th>SCORE</th></tr>
<tr><td rowspan="4">2(b)</td><td>Able to construct a table that contains the following information:

1. Heading in the table : temperature, time and 1/time with unit.
2. Transfer all temperature and time reading from (a) correctly.
3. Value of 1/time is uniform/consistent and with three decimal places.

<table>
<tr><th>Set</th><th>Temperature, ^oC</th><th>Time, s</th><th>1/time, s^{-1}</th></tr>
<tr><td>I</td><td>30</td><td>55.0</td><td>0.018</td></tr>
<tr><td>II</td><td>35</td><td>47.0</td><td>0.021</td></tr>
<tr><td>III</td><td>40</td><td>42.0</td><td>0.024</td></tr>
<tr><td>IV</td><td>45</td><td>37.0</td><td>0.027</td></tr>
<tr><td>V</td><td>50</td><td>33.0</td><td>0.030</td></tr>
</table>
</td><td>3</td></tr>
<tr><td>Able to construct a table that contain following information:

1. Heading in the table : temperature, time and 1/time without unit.
2. Transfer all temperature and time reading from (a) correctly.</td><td>2</td></tr>
<tr><td>Able to state an idea to construct a table</td><td>1</td></tr>
<tr><td>No response given / wrong answer</td><td>0</td></tr>
</table>

QUESTION	RUBRIC	SCORE
2(c)	*Able to draw a graph correctly* 1. Correct axis with unit Vertical axis : temperature / ^{o}C, horizontal axis : 1/time / s^{-1} 2. Consistent scale for temperature and 1/time 3. The graph at least half of the graph paper 4. All the point are transferred correctly 5. Best fit straight line and smooth	3
	Able to draw a graph incorrectly 1. Correct axis without unit // Inversed axis Vertical axis : temperature , horizontal axis : 1/time 2. Consistent scale for temperature and 1/time 3. About 3 point are transferred correctly 4. Best fit straight line and smooth	2
	Able to state an idea to draw the graph 1. Draw the vertical axis and horizontal axis 2. Straight line	1
	No response given / wrong answer	0



QUESTION	RUBRIC	SCORE
2(d)	*Able to state the relationship between temperature and rate of reaction correctly* Sample answer: When the temperature of sodium thiosulphate solution is higher, the rate of reaction is higher// When the temperature of sodium thiosulphate solution is lower, the rate of reaction is lower	3
	Able to state the relationship between temperature and rate of reaction incorrectly Sample answer: Different temperature of sodium thiosulphate solution, different the rate of reaction//	2
	Able to give an idea of the relationship between temperature and rate of reaction Sample answer: Temperature affect the rate of reaction// When temperature is higher, rate of reaction is faster// Rate of reaction is directly proportional with temperature	1
	No response given / wrong answer	0

QUESTION	RUBRIC	SCORE
2(e)	*Able to give the operational definition accurately* Sample answer: What should be observed : One per time taken for mark 'X' to disappear from sight What should be done : sulphuric acid is added into sodium thiosulphate solution with different temperature. One per time taken for mark 'X' to disappear from sight when sulphuric acid is added into sodium thiosulphate solution with different temperature.	3
	Able to state the meaning of the rate of reaction less accurately Sample answer: Time taken for mark 'X' to disappear from sight when sulphuric acid is added into sodium thiosulphate solution with different temperature.	2

[Lihat Sebelah

	Able to give an idea for the meaning of the rate of reaction Sample answer: Time taken for mark 'X' to disappear from sight// Sulphuric acid is added into sodium thiosulphate solution with different temperature.	1
	No response given / wrong answer	0

QUESTION	RUBRIC	SCORE
3(a)	*Able to give the problem statement correctly* Sample answer: How does the reactivity of (alkali metals)/(Group 1 elements) towards oxygen gas changes when going down Group 1?// How does the reactivity of lithium, sodium and potassium towards oxygen gas changes when going down Group 1?	3
	Able to give the problem statement less accurately Sample answer: How does the reactivity of (alkali metals)/(Group 1 elements) changes when going down Group 1?// How does the reactivity of lithium, sodium and potassium changes when going down Group 1?	2
	Able to give an idea of the problem statement Sample answer: How the reactivity of alkali metals is different?	1
	No response given / wrong answer	0

QUESTION	RUBRIC	SCORE
3(b)	*Able to state all variables correctly* Sample answer : Manipulated variable : Alkali metals// Group 1 elements// Lithium, sodium and potassium. Responding variable : Reactivity of alkali metals // Brightness of flame Constant variables : Size of alkali metals// Oxygen gas.	3
	Able to state **any two** variables correctly	2

[Lihat Sebelah

	Able to state **any one** variables correctly	1
	No response given / wrong answer	0

QUESTION	RUBRIC	SCORE
3(c)	*Able to write the relationship between manipulated variables and responding variable with direction correctly.* Sample answer : When going down Group 1 from lithium to potassium, the reactivity of alkali metals towards oxygen gas increases.// When going down Group 1, the reactivity of alkali metals towards oxygen gas increases.	3
	Able to write the relationship between manipulated variables and responding variable inaccurately. Sample answer : When going down Group 1, the reactivity of alkali metals increases// The reactivity of alkali metals towards oxygen gas increases when going down Group 1.	2
	Able to state an idea of the hypothesis. Sample answer : Different alkali metals have different reactivity towards oxygen gas// The reactivity of alkali metals is depends on the position of alkali metals in Group 1	1
	No response given / wrong answer	0

QUESTION	RUBRIC	SCORE
3(d)	*Able to state all materials and apparatus correctly.* Sample answer : List of materials : Lithium, sodium and potassium, oxygen gas, filter paper List of apparatus : Gas jar, gas jar spoon with cover, knife and forceps.	3
	Able to state all materials and 3 apparatus inaccurately. Sample answer : List of materials : Lithium, sodium, potassium, oxygen gas	2

[Lihat Sebelah

	List of apparatus : Gas jar, gas jar spoon and forceps.	
	Able to state any (1) metal, oxygen gas and 2 apparatus inaccurately. <u>Sample answer :</u> List of materials : Lithium/ sodium/ potassium, oxygen gas, List of apparatus : Gas jar, gas jar spoon.	1
	No response given / wrong answer	0

QUESTION	RUBRIC	SCORE
3(e)	*Able to write all steps correctly.* <u>Sample answer :</u> 1. Cut a small piece of lithium. 2. Dry the lithium metal by using a filter paper 3. Put lithium on a gas jar spoon. 4. Heat the lithium until it burns. 5. Put the lithium in the gas jar containing oxygen gas and cover it. 6. Observe and record the changes. 7. Repeat steps 1 to 7 by using sodium and potassium respectively to replace lithium.	3
	Able to write steps 1, 2, 5, 6, 7 and 8 inaccurately. <u>Sample answer :</u> 1. Cut a small piece of lithium. 2. Dry the outer surface of lithium metal by using a filter paper 5. Heat the lithium. 6. Put the lithium in the gas jar filled with oxygen gas and cover it. 7. Observe and record the changes. 8. Repeat steps 1 to 7 by using sodium and potassium respectively to replace lithium.	2
	Students are able to write steps 5, 6, 7 inaccurately. <u>Sample answer :</u> 5. Heat the lithium/ sodium/ potassium.	1

[Lihat Sebelah

	6. Put the lithium/ sodium/ potassium in the gas jar and cover it. 7. Observe and record the changes.	
	No response given / wrong answer	0

QUESTION	RUBRIC	SCORE
3(f)	*Able to draw a complete table of data with all three manipulated variables and observation for the responding variable correctly.* **Alkali metals// Group 1 elements** / **Observation** Lithium/ Li Sodium/ Na Potassium/ K	2
	Able to draw a complete table of data with all three manipulated variables correctly but the responding variable inaccurately. **Type of metals// elements// Set** / **Reactivity** Lithium/ Li Sodium/ Na Potassium/ K	1
	No response given / wrong answer	0