

Kimia
Kertas 1
November
2022
1 $\frac{1}{4}$ jam



MAKTAB RENDAH SAINS MARA

PEPERIKSAAN AKHIR SIJIL PENDIDIKAN MRSM 2022

KIMIA

Kertas 1

Satu jam lima belas minit

JANGAN BUKA KERTAS PEPERIKSAAN INI SEHINGGA DIBERITAHU

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

Kertas peperiksaan ini mengandungi 36 halaman bercetak

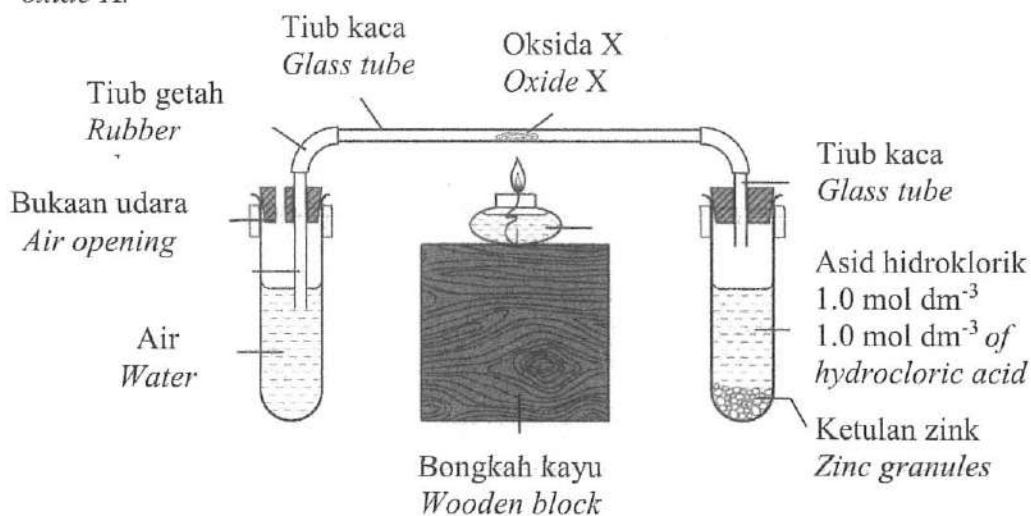
**MAKLUMAT UNTUK CALON
INFORMATION FOR CANDIDATES**

1. Kertas soalan ini mengandungi **40** soalan.
*This question paper consists of **40** questions.*
2. Jawab **semua** soalan.
*Answer **all** questions.*
3. Jawab setiap soalan dengan menghitamkan ruangan yang betul pada kertas jawapan.
Answer each question by blackening the correct space on the answer sheet.
4. Hitamkan **satu** ruangan sahaja pada setiap soalan.
*Blacken only **one** space for each question.*
5. Sekiranya anda hendak menukar jawapan, padamkan tanda yang telah dibuat. Kemudian hitamkan jawapan yang baru.
If you wish to change your answer, erase the blackened mark that you have made. Then blacken the new answer.
6. Rajah yang mengiringi soalan tidak dilukiskan mengikut skala kecuali dinyatakan.
The diagrams in the questions provided are not drawn to scale unless stated.
7. Anda dibenarkan menggunakan kalkulator saintifik.
You may use a scientific calculator.

- 1 Protium, deuterium dan tritium adalah isotop bagi unsur hidrogen. Antara berikut, apakah persamaan bagi ketiga-tiga isotop?

Protium, deuterium and tritium are the isotopes of hydrogen. Which of the following is the similarity of the isotopes?

- A Sifat kimia
Chemical property
- B Sifat fizikal
Physical property
- C Nombor nukleon
Nucleon number
- D Jisim atom relatif
Relative atomic mass
- 2 Rajah 1 menunjukkan susunan radas bagi menentukan formula empirik bagi oksida X.
Diagram 1 shows the apparatus set-up to determine the empirical formula of oxide X.



Rajah 1
Diagram 1

Antara berikut, yang manakah logam X?
Which of the following is metal X?

- A Zink
Zinc
- B Kuprum
Copper
- C Magnesium
Magnesium

- 3 Unsur Z terletak dalam kumpulan yang sama dengan neon, Ne dan kripton, Kr dalam Jadual Berkala Unsur.
Antara berikut, yang manakah merupakan sifat Z?

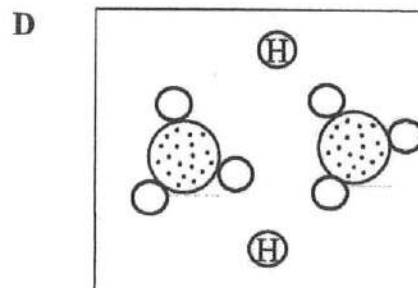
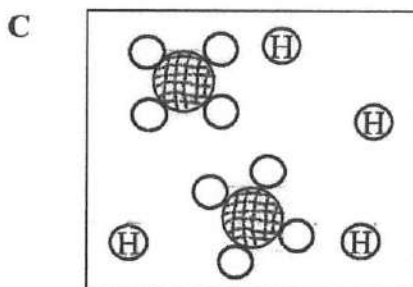
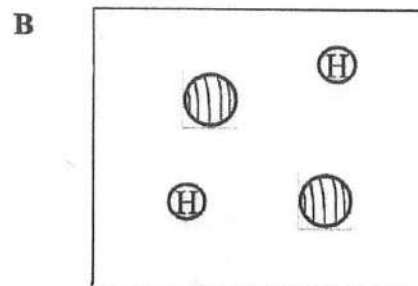
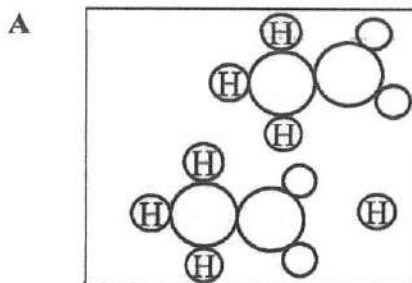
Element Z is located in the same group as neon, Ne and krypton, Kr in the Periodic Table of Elements.

Which of the following is the property of Z?

- A Lengai secara kimia
Chemically inert
- B Wujud sebagai molekul dwiatom
Exists as diatomic molecules
- C Wujud sebagai cecair pada suhu bilik
Exists as liquid at room temperature
- D Mengkonduksikan elektrik dalam keadaan leburan dan larutan akueus
Conducts electricity in molten and aqueous solution
- 4 Pengionan asid dalam air akan mempengaruhi nilai pH.
Antara yang berikut, manakah memberikan nilai pH tertinggi?

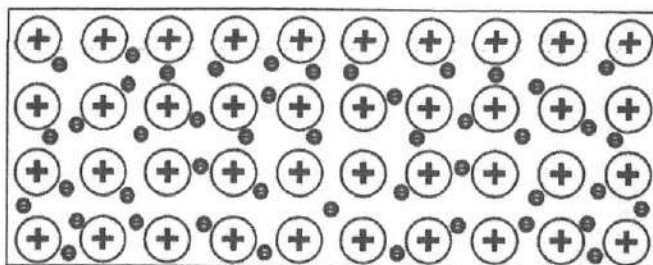
Ionisation of acid in water affects the pH value.

Which of the following gives the highest pH value?



- 5 Rajah 2 menunjukkan sejenis ikatan.

Diagram 2 shows a type of bond.



Rajah 2
Diagram 2

Antara berikut, yang manakah betul tentang ikatan tersebut?

Which of the following is correct about the bond?

- A** Wujud daya tarikan elektrostatik antara lautan elektron dan ion-ion logam bercas positif
There is an electrostatic attraction force between the sea of electrons and the positively-charged metal ions
- B** Sejenis ikatan di mana pasangan elektron yang dikongsi berasal daripada satu atom sahaja
A type of bond where the electron pairs shared come from one atom only
- C** Ikatan yang terbentuk melalui pemindahan elektron antara atom logam dengan atom bukan logam
A bond that is formed through the transfer of electrons between metal atoms and non-metal atoms
- D** Daya tarikan antara atom hidrogen yang terikat dengan satu atom yang lebih elektronegatif dalam molekul lain
The forces of attraction between hydrogen atoms that have bonded with an atom of high electronegativity in another molecule
- 6 Bagaimanakah suhu meningkatkan kadar tindak balas?
How does temperature increase the rate of reaction?
- A** Meningkatkan jumlah bilangan zarah-zarah bahan tindak balas
Increase the total number of reactant particles
- B** Meningkatkan tenaga kinetik zarah-zarah bahan tindak balas
Increase the kinetic energy of reactant particles
- C** Meningkatkan tenaga pengaktifan tindak balas
Increase the activation energy of the reaction
- D** Meningkatkan bilangan perlanggaran berkesan
Increase the number of effective collisions

- 7 Kaca dihasilkan dari silikon dioksida dan kalsium karbonat.
Rajah 3 menunjukkan alatan memasak yang diperbuat daripada kaca.

*Glass is made up of silicon dioxide and calcium carbonate.
Diagram 3 shows a cookware made from glass.*



Rajah 3
Diagram 3

Apakah bahan yang ditambah dan ciri baharu kaca tersebut?
What is the substance added and the new property of the glass?

	Bahan tambah <i>Substance added</i>	Ciri baharu <i>New property</i>
A	Natrium karbonat dan plumbum(II) oksida <i>Sodium carbonate and lead(II) oxide</i>	Pekali pengembangan yang rendah <i>Low expansion coefficient</i>
B	Natrium karbonat dan plumbum(II) oksida <i>Sodium carbonate and lead(II) oxide</i>	Pekali pengembangan yang tinggi <i>High expansion coefficient</i>
C	Boron oksida dan aluminium oksida <i>Boron oxide and aluminium oxide</i>	Pekali pengembangan yang rendah <i>Low expansion coefficient</i>
D	Boron oksida dan aluminium oksida <i>Boron oxide and aluminium oxide</i>	Pekali pengembangan yang tinggi <i>High expansion coefficient</i>

- 8 Persamaan di bawah mewakili tindak balas antara ferum dan gas klorin.
The following equation represents the reaction between iron and chlorine gas.



Apakah perubahan nombor pengoksidaan bagi klorin?

What is the change in oxidation number of chlorine?

- A +2 → +3
B -2 → -3
C -1 → 0
D 0 → -1
- 9 Bahan W mempunyai ciri-ciri berikut

Substance W has the following properties

- Membebaskan gas karbon dioksida dan air apabila terbakar dalam oksigen
Gives off carbon dioxide gas and water when burnt in oxygen
- Larut dalam air
Dissolves in water

Apakah bahan W?

What is substance W?

- A Propanol
Propanol
B Pentana
Pentane
C Pentena
Pentene
D Asid pentanoik
Pentanoic acid

- 10 Rajah 4 menunjukkan relau bagas yang digunakan untuk mengekstrak ferum dari bijihnya.

Diagram 4 shows the blast furnace used to extract iron from its ore.



Rajah 4
Diagram 4

Manakah antara persamaan kimia berikut mewakili tindak balas di Zon 2?

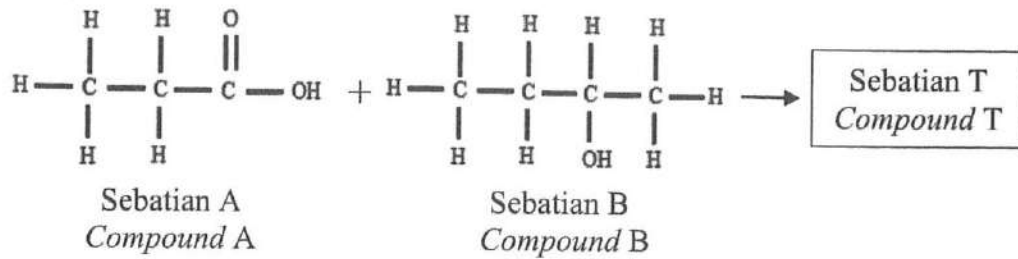
Which of the following chemical equation represents the reaction in Zone 2?

- A $C + O_2 \rightarrow CO_2$
- B $C + CO_2 \rightarrow 2CO$
- C $Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$
- D $CaO + SiO_2 \rightarrow CaSiO_3$

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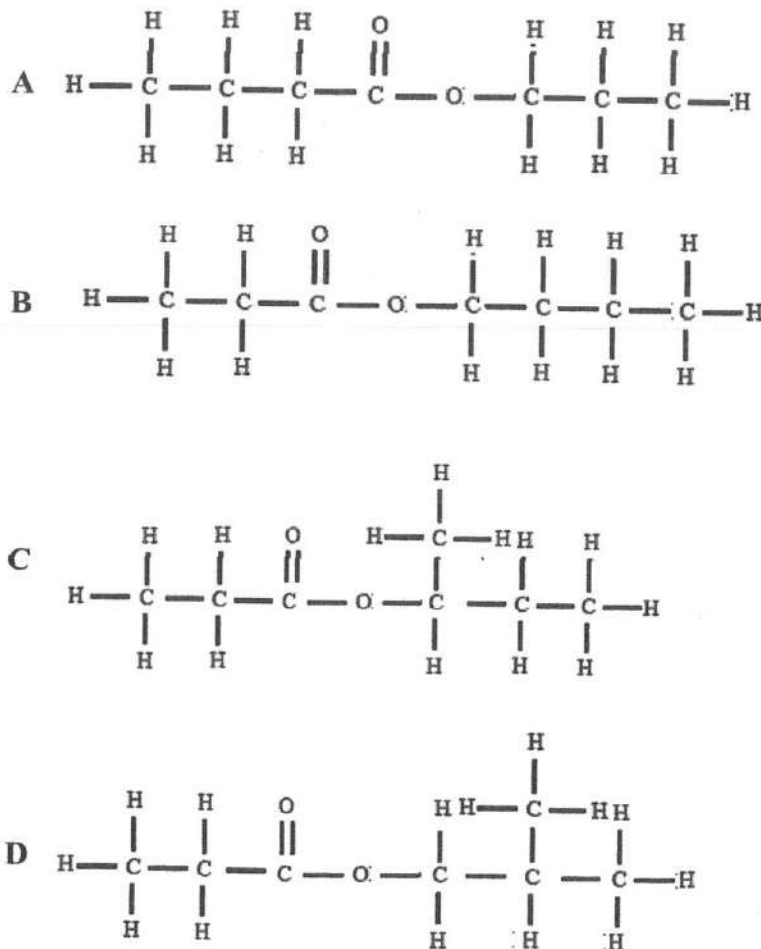
- 11 Rajah 5 menunjukkan tindak balas penghasilan sebatian T dengan kehadiran asid sulfurik pekat sebagai mangkin.

Diagram 5 shows a reaction to produce compound T with the presence of concentrated sulphuric acid as a catalyst.



Rajah 5
Diagram 5

Antara yang berikut, manakah formula struktur bagi sebatian T?
Which of the following is the structural formula of compound T?

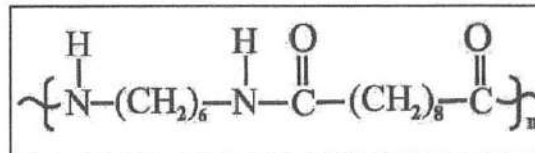


- 12 Manakah antara tindak balas peneutralan berikut membebaskan kuantiti haba yang rendah ?

Which of the following neutralisation reactions release a lower amount of heat?

- A Asid hidroklorik dan kalium hidroksida
Hydrochloric acid and potassium hydroxide
- B Asid nitrik dan natrium hidroksida
Nitric acid and sodium hydroxide
- C Asid sulfurik dan natrium hidroksida
Sulphuric acid and sodium hydroxide
- D Asid propanoik dan kalium hidroksida
Propanoic acid and potassium hydroxide
- 13 Rajah 6 menunjukkan polimer W yang digunakan secara meluas dalam industri tekstil.

Diagram 6 shows polymer W that is widely used in the textile industry.



Rajah 6
Diagram 6

Apakah contoh bagi W?

What is the example of W?

- A Poliester
Polyester
- B Polisterin
Polystyrene
- C Nilon
Nylon
- D Polivinil klorida, (PVC)
Polyvinyl chloride, (PVC)

- 14 Jadual 1 menunjukkan jenis dan fungsi bahan tambah makanan.

Table 1 shows the types and functions of food additives.

	Jenis Type	Fungsi Functions
I	Antioksidan <i>Antioxidant</i>	Mencegah ketengikan makanan yang berminyak atau berlemak <i>Prevent oily or greasy food from becoming rancid</i>
II	Perisa <i>Flavouring</i>	Meningkatkan rasa makanan <i>Enhances the flavour of foods</i>
III	Pengemulsi <i>Emulsifier</i>	Memberikan tekstur yang sekata dan licin <i>Gives uniformed and smooth texture</i>
IV	Pengawet <i>Preservative</i>	Menghalang tindakbalas pengoksidaan makanan bergaram oleh oksigen <i>Prevents oxidation of the salty food by oxygen</i>

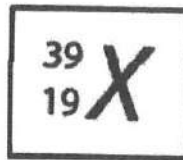
Jadual 1

Table 1

Antara pilihan jawapan di bawah yang manakah dipadankan dengan betul?
Which of the following are correctly matched?

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

- 15 Rajah 7 menunjukkan simbol atom bagi unsur X.
Diagram 7 shows the atomic symbol of element X.

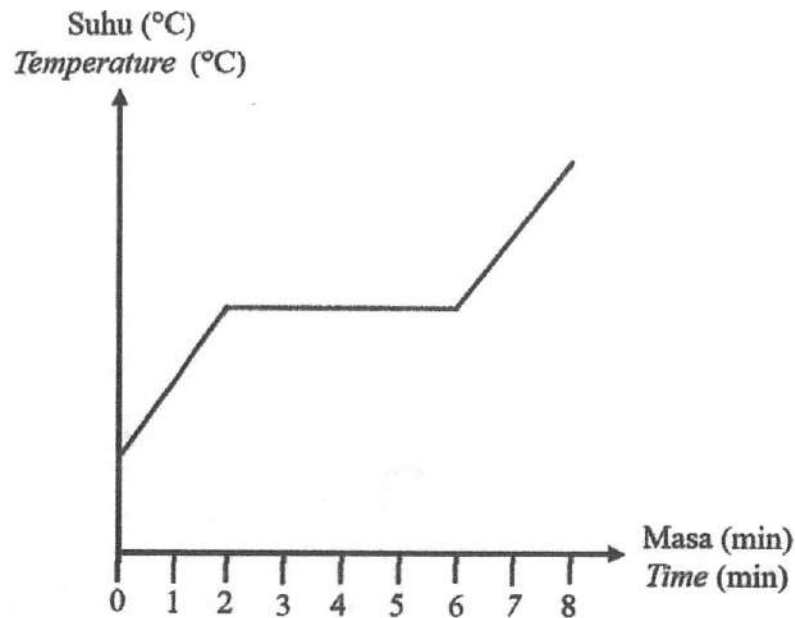


Rajah 7
Diagram 7

Antara yang berikut, yang manakah benar tentang atom bagi unsur X?
Which of the following is true about the atom of element X?

	Bilangan neutron <i>Number of neutrons</i>	Susunan elektron <i>Electron arrangement</i>
A	39	2.8.8.1
B	20	2.8.8.1
C	20	2.8.8.2
D	19	2.8.8.2

- 16 Rajah 8 menunjukkan lengkung pemanasan bagi pepejal asid asetik.
Diagram 8 shows the heating curve of solid acetic acid.



Rajah 8
Diagram 8

Penyataan manakah yang boleh dideduksikan daripada Rajah 8?
Which statement can be deduced from Diagram 8?

- A Tiada haba diserap dalam 2 minit pertama
No heat is absorbed in the first 2 minutes
- B Asid asetik memerlukan 8 minit untuk melebur selengkapnya
Acetic acid needs 8 minutes to melt completely
- C Asid asetik mengalami perubahan fizikal di antara minit kedua hingga minit keenam
Acetic acid undergoes physical changes between second minute to sixth minute
- D Daya tarikan antara zarah-zarah asid asetik menjadi semakin kuat selepas 6 minit
The attractive forces between particles of acetic acid become stronger after 6 minutes

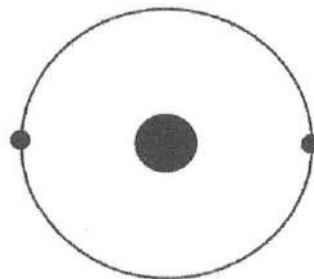
- 17 Formula kimia kalsium nitrat dan kalium fosfat adalah masing-masing $\text{Ca}(\text{NO}_3)_2$ and K_3PO_4 .
Apakah formula kimia bagi kalsium fosfat?

The chemical formulae of calcium nitrate and potassium phosphate are $\text{Ca}(\text{NO}_3)_2$ and K_3PO_4 respectively.

What is the chemical formula of calcium phosphate?

- A $\text{Ca}(\text{PO}_4)_3$
B $\text{Ca}(\text{PO}_4)_2$
C Ca_3PO_4
D $\text{Ca}_3(\text{PO}_4)_2$
- 18 Rajah 9 menunjukkan susunan elektron bagi suatu atom dalam Jadual Berkala Unsur.

Diagram 9 shows the electron arrangement for an atom in the Periodic Table of Elements.

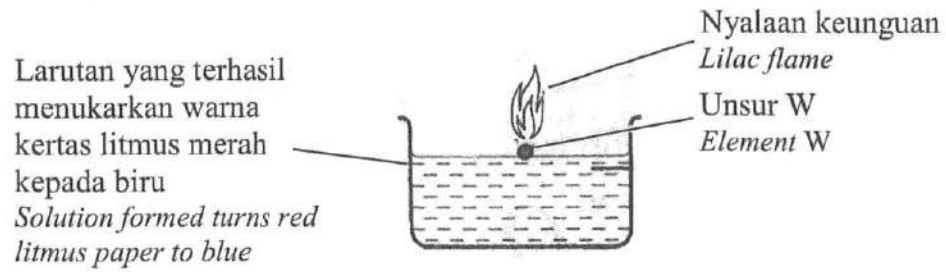


Rajah 9
Diagram 9

Antara pernyataan berikut, yang manakah betul tentang atom tersebut?
Which of the following statements is correct about the atom?

- A Berada dalam Kumpulan 2
Located in Group 2
- B Bertindak balas dengan oksigen untuk membentuk sebatian oksida
Reacts with oxygen to form an oxide
- C Digunakan untuk mengisi belon udara
Used to fill the weather balloons
- D Bertindak balas antara satu sama lain untuk membentuk molekul dwiatom
Reacts with each other to form diatomic molecule

- 19 Rajah 10 menunjukkan tindakbalas antara unsur W dengan air, H_2O .
Diagram 10 shows the reaction of an element W and water, H_2O .

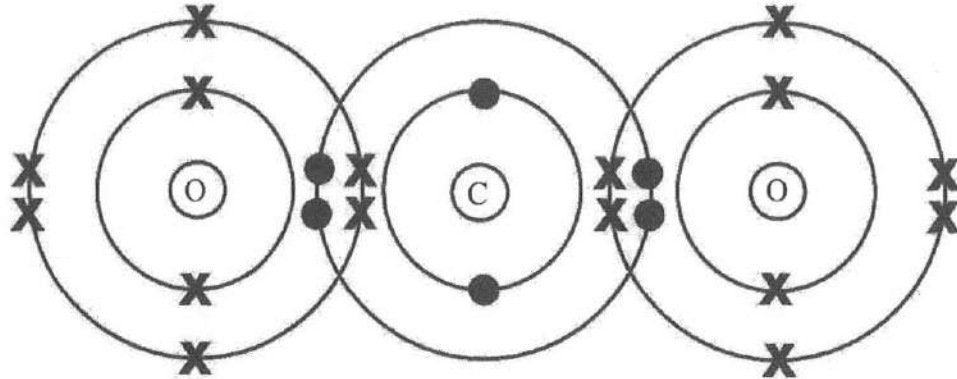


Rajah 10
Diagram 10

Apakah unsur W?
What is element W?

- A Magnesium
Magnesium
- B Kalsium
Calcium
- C Kalium
Potassium
- D Litium
Lithium

- 20 Rajah 11 menunjukkan susunan elektron bagi molekul karbon dioksida.
Diagram 11 shows the electron arrangement of a carbon dioxide molecule.



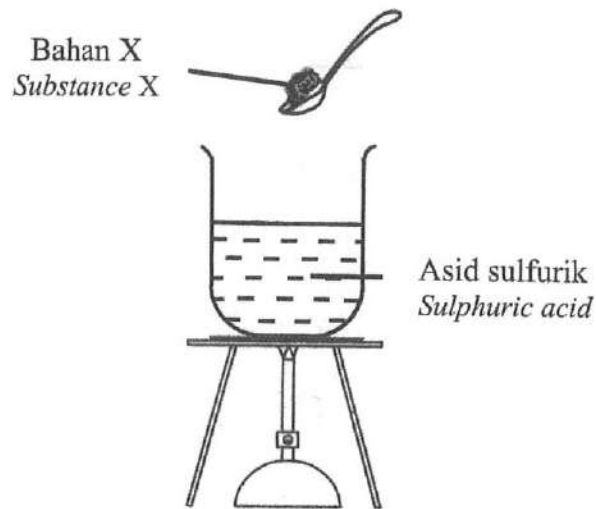
Rajah 11
 Diagram 11

Manakah antara berikut adalah benar?
Which of the following is true?

- A Setiap atom oksigen menyumbang satu elektron untuk dikongsi
Each oxygen atom contributes one electron for sharing
- B Satu atom karbon menyumbang empat elektron untuk dikongsi dengan dua atom oksigen
One carbon atom contributes four electrons to be shared by two oxygen atoms
- C Empat ikatan kovalen ganda dua terbentuk dalam molekul karbon dioksida
Four double covalent bonds are formed in a carbon dioxide molecule
- D Satu atom karbon memerlukan dua elektron untuk mencapai susunan elektron oktet
One carbon atom requires two electrons to achieve the octet electron arrangement

- 21 Rajah 12 menunjukkan satu langkah dalam penyediaan garam sulfat terlarutkan.

Diagram 12 shows a step in the preparation of a soluble sulphate salt.



Rajah 12
Diagram 12

Apakah bahan X?

What is substance X?

- A Plumbum(II) oksida
Lead(II) oxide
- B Zink oksida
Zinc oxide
- C Barium hidroksida
Barium hydroxide
- D Kalsium hidroksida
Calcium hydroxide

- 22 Persamaan berikut menunjukkan tindak balas antara serbuk magnesium, Mg dengan 50.0 cm^3 asid hidroklorik, HCl 1.0 mol dm^{-3} .

The following equation shows the reaction between magnesium powder and 50.0 cm^3 of 1.0 mol dm^{-3} of hydrochloric acid, HCl.



Bagaimanakah kadar penghasilan gas hidrogen boleh ditingkatkan?

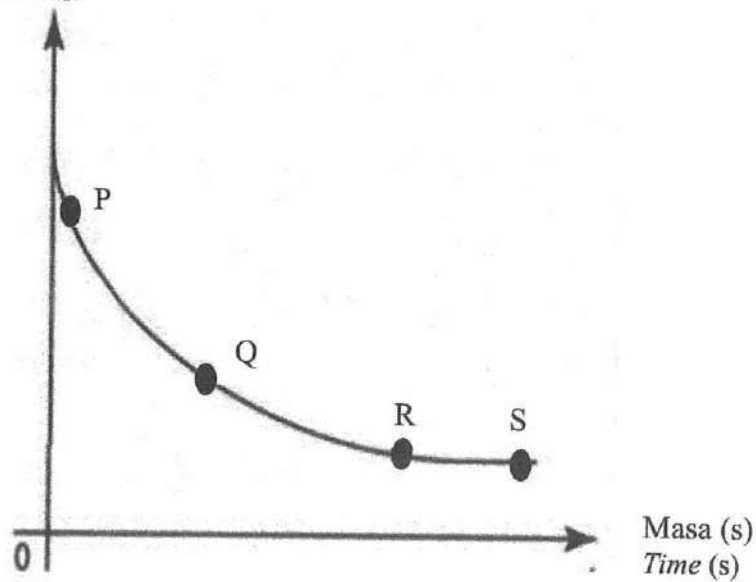
How can the rate of production of hydrogen gas be increased?

- A Menggantikan serbuk magnesium dengan ketulan magnesium
Replace magnesium powder with magnesium granules
- B Mengurangkan isipadu asid hidroklorik
Decrease the volume of hydrochloric acid
- C Menambahkan air suling
Add distilled water
- D Menambahkan larutan kuprum(II) sulfat
Add copper(II) sulphate solution

- 23 Rajah 13 menunjukkan satu graf jisim campuran tindak balas melawan masa bagi tindakbalas antara zink karbonat dan asid nitrik.

Diagram 13 shows a graph of mass of a reaction mixture against time for the reaction between zinc carbonate and nitric acid.

Jisim campuran tindak balas (g)
Mass of mixture (g)



Rajah 13
Diagram 13

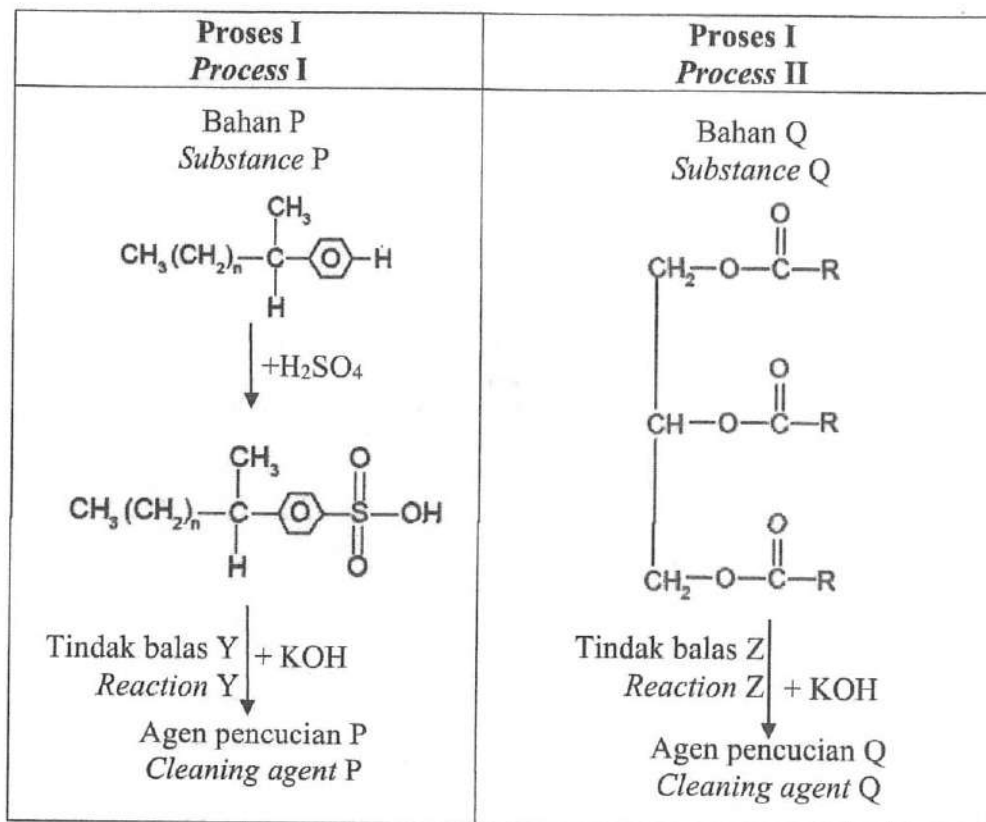
Titik manakah yang menunjukkan kadar tindak balas paling tinggi?

Which point shows the highest rate of reaction?

- A P
- B Q
- C R
- D S

- 24 Rajah 14 menunjukkan proses dalam penyediaan dua jenis bahan pencuci berbeza.

Diagram 14 shows processes in the preparation of two different types of cleaning agents.



Rajah 14
Diagram 14

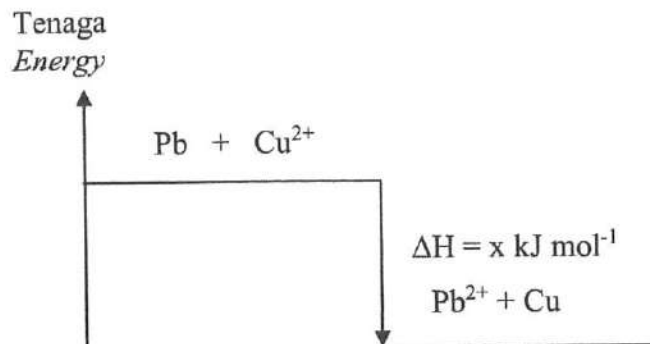
Apakah bahan P, bahan Q, tindak balas Y dan tindak balas Z?
What are substance P, substance Q, reaction Y and reaction Z?

	Bahan P Substance P	Bahan Q Substance Q	Tindak balas Y Reaction Y	Tindak balas Z Reaction Z
A	Minyak sawit Palm oil	Alkil benzena Alkyl benzene	Pensulfonan Sulphonation	Peneutralan Neutralisation
B	Minyak sawit Palm oil	Alkil benzena Alkyl benzene	Pensulfonan Sulphonation	Saponifikasi Saponification
C	Alkil benzena Alkyl benzene	Minyak sawit Palm oil	Saponifikasi Saponification	Peneutralan Neutralisation
D	Alkil benzena Alkyl benzene	Minyak sawit Palm oil	Peneutralan Neutralisation	Saponifikasi Saponification

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25 Rajah 15 menunjukkan gambarajah aras tenaga bagi satu tindak balas.

Diagram 15 shows the energy level diagram for a reaction.



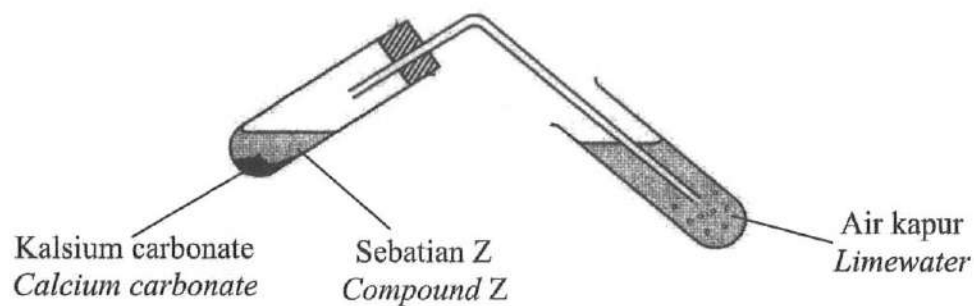
Rajah 15
Diagram 15

Antara berikut, yang manakah benar?

Which of the following is correct?

	Penerangan <i>Explanation</i>	Perubahan haba <i>Heat change</i>
A	Ion kuprum(II) dioksidakan <i>Copper(II) ion is oxidized</i>	Haba dibebaskan <i>Heat is released</i>
B	Atom plumbum mengalami pengoksidaan <i>Lead atom undergoes oxidation</i>	Haba dibebaskan <i>Heat is released</i>
C	Ion kuprum(II) adalah satu agen penurunan <i>Copper(II) ion is a reducing agent</i>	Haba diserap <i>Heat is absorbed</i>
D	Atom plumbum menerima electron <i>Lead atom receives electrons</i>	Haba diserap <i>Heat is absorbed</i>

- 26 Rajah 16 menunjukkan susunan radas bagi sesuatu tindak balas antara sebatian Z dan kalsium karbonat.
Diagram 16 shows the apparatus set-up for the reaction between compound Z and calcium carbonate.



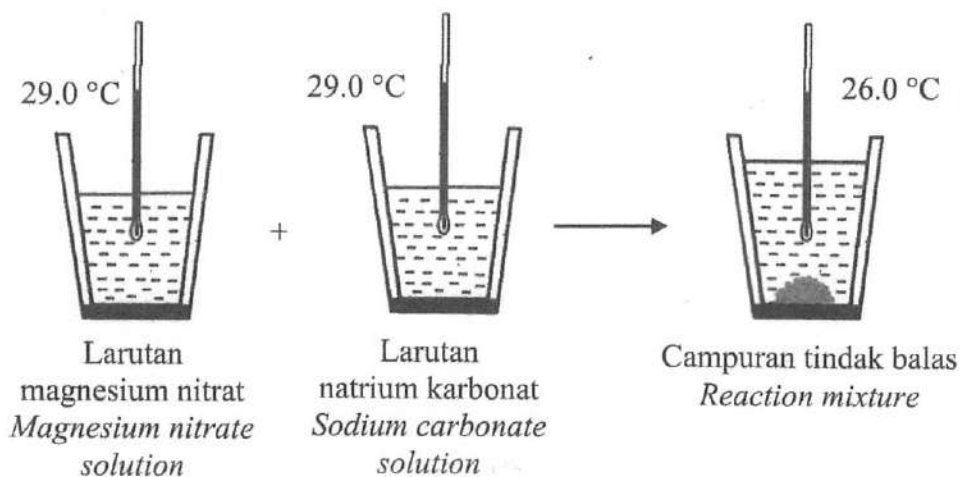
Rajah 16
Diagram 16

Di akhir eksperimen, air kapur bertukar menjadi keruh.
Apakah formula kimia bagi sebatian Z?

*At the end of the experiment, limewater turns cloudy.
What is the chemical formula for compound Z?*

- A C_3H_8
- B C_3H_7OH
- C CH_3COOCH_3
- D C_2H_5COOH

- 27 Rajah 17 menunjukkan susunan radas untuk menentukan haba tindak balas.
Diagram 17 shows the apparatus set-up to determine the heat of reaction



Rajah 17
Diagram 17

Manakah antara pernyataan berikut adalah benar?
Which of the following statement is true?

- I Pembentukan ikatan berlaku.
Bond formation occurs.
- II Suhu menurun semasa tindak balas berlaku.
The temperature decreases during the reaction.
- III Nilai ΔH dalam tindak balas ini adalah negatif.
The value of ΔH for the reaction is negative.
- IV Jumlah kandungan tenaga hasil tindak balas lebih tinggi daripada jumlah kandungan tenaga bahan tindak balas.
The total energy content of the products is higher than the total energy content of the reactants.

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

- 28 Diagram 18 menunjukkan jenis polimer yang digunakan sebagai bahan pembungkusan.
Diagram 18 shows the types of polymers that is used as a packaging material.



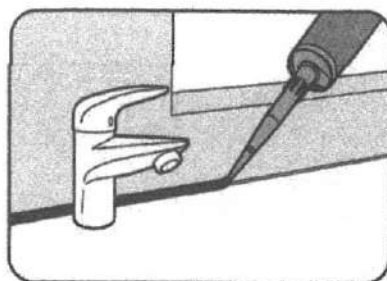
Rajah 18
Diagram 18

Manakah yang berikut menerangkan mengapa bahan pembungkus tersebut mencemarkan alam sekitar?

Which of the following explains why the packaging material pollutes the environment?

- I Terbiodegradasi
Biodegradable
 - II Menyebabkan pembentukan alga
Cause the formation of algae
 - III Membebaskan gas-gas toksik bila terbakar
Emitted toxic gases when burnt
 - IV Menyebabkan sistem saliran terhalang dan banjir kilat
Cause blockage of drainage systems and flash flood
- A I dan II
I and II
 - B I dan III
I and III
 - C II dan IV
II and IV
 - D III dan IV
III and IV

- 29 Rajah 19 menunjukkan salah satu kegunaan getah sintetik.
Diagram 19 shows one of the uses of synthetic rubber.



Rajah 19
Diagram 19

Manakah antara berikut adalah benar bagi getah sintetik tersebut?
Which of the following is true about the synthetic rubber?

	Getah sintetik <i>Synthetic rubber</i>	Ciri-ciri <i>Characteristics</i>
A	Getah nitril <i>Nitrile rubber</i>	Tahan terhadap minyak dan pelarut <i>Oil and solvent resistance</i>
B	Getah stirena- butadiene <i>Styrene-butadiene rubber</i>	Tahan pelepasan dan tahan haba yang tinggi <i>Abrasion resistance and high heat resistance</i>
C	Getah silikone <i>Silicone rubber</i>	Tahan suhu yang tinggi dan bersifat lengai <i>High temperature resistance and inert</i>
D	Tiokol <i>Thiokol</i>	Tahan terhadap minyak dan pelarut <i>Oil and solvent resistance</i>

- 30 Antara berikut yang manakah mempunyai isipadu gas terbesar pada keadaan bilik?

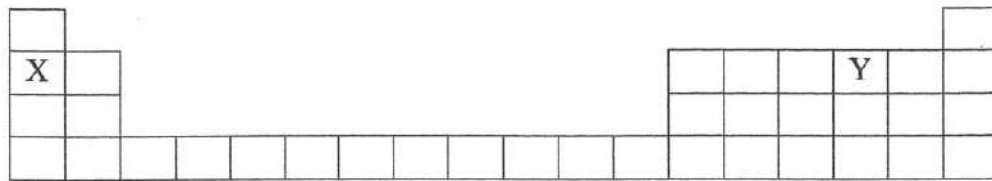
[Jisim atom relatif: H=1, C=12, N=14, O=16, 1 mol sebarang gas menempati 24 dm³ pada keadaan bilik]

Which of the following has the largest volume of gas at room condition?

[Relative atomic mass: H=1, C=12, N=14, O=16, 1 mol of any gas occupied 24 dm³ at room condition]

- A 12 g wap air, H₂O
12 g of steam, H₂O
- B 17 g ammonia, NH₃
17 g of ammonia, NH₃
- C 23 g nitrogen dioksida, NO₂
23 g of nitrogen dioxide, NO₂
- D 42 g karbon monoksida, CO
42 g of carbon monoxide, CO

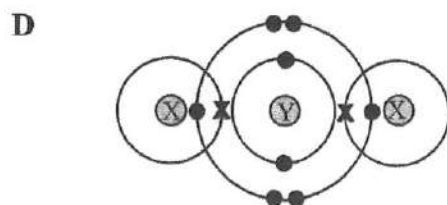
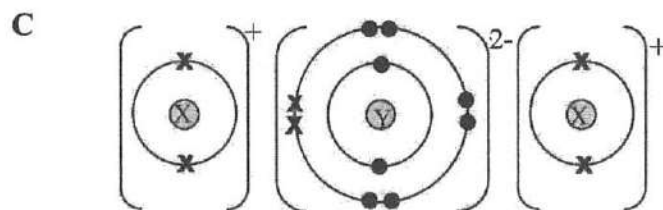
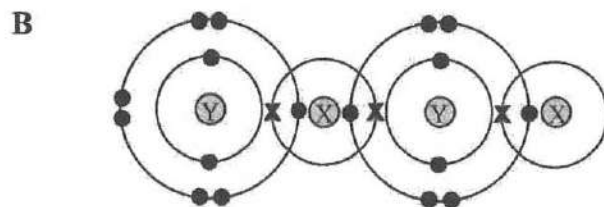
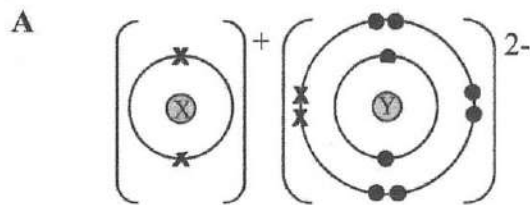
- 31 Rajah 20 menunjukkan kedudukan atom X dan Y dalam Jadual Berkala Unsur.
 Diagram 20 shows the position of X and Y atoms in the Periodic Table of Elements.



Rajah 20
 Diagram 20

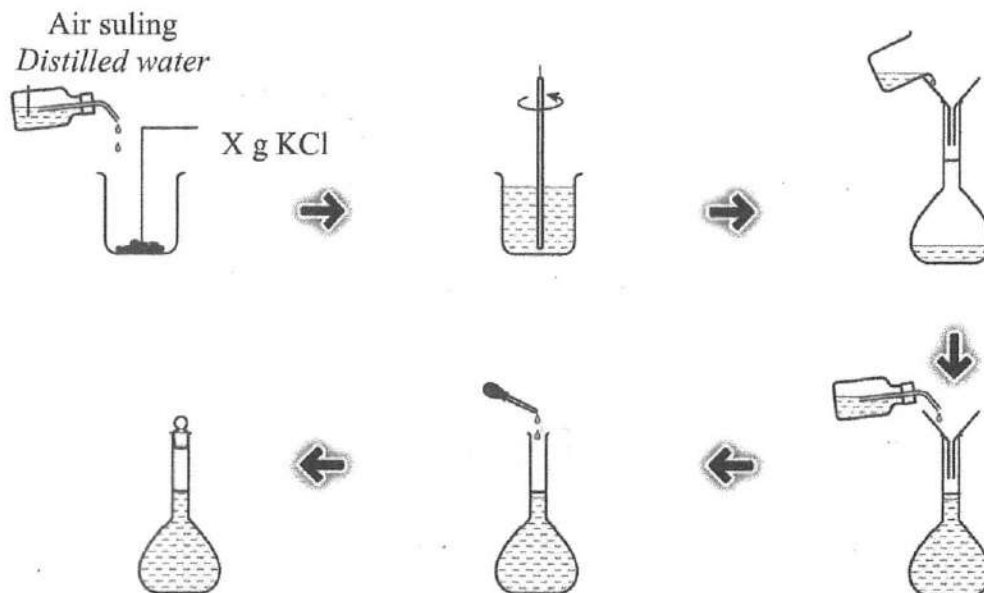
Manakah antara rajah berikut mewakili sebatian yang terbentuk apabila X bertindak balas dengan Y?

Which of the following diagrams represent the compound formed when X reacts with Y?



[Lihat halaman sebelah

- 32 Rajah 21 menunjukkan langkah-langkah penyediaan larutan kalium klorida.
Diagram 21 shows the preparation of potassium chloride solution.



500 cm³ larutan KCl
0.4 mol dm⁻³
500 cm³ of 0.4 mol dm⁻³
of KCl solution

Rajah 21
Diagram 21

Apakah nilai X?

[Jisim atom relatif: K=39, Cl=35.5]

What is the value of X?

[Relative atomic mass: K=39, Cl=35.5]

- A 59.6 g
B 37.3 g
C 29.4 g
D 14.9 g

- 33 Jadual 2 menunjukkan isipadu gas hidrogen terkumpul dalam satu eksperimen apabila serbuk magnesium bertindak balas dengan asid nitrik cair berlebihan. *Table 2 shows the volume of hydrogen gas collected in an experiment when magnesium powder reacts with excess dilute nitric acid.*

Masa (min) Time (min)	1.0	2.0	3.0	4.0	5.0
Isipadu gas hidrogen (cm ³) Volume of hydrogen gas (cm ³)	0.00	30.00	36.00	45.00	45.00

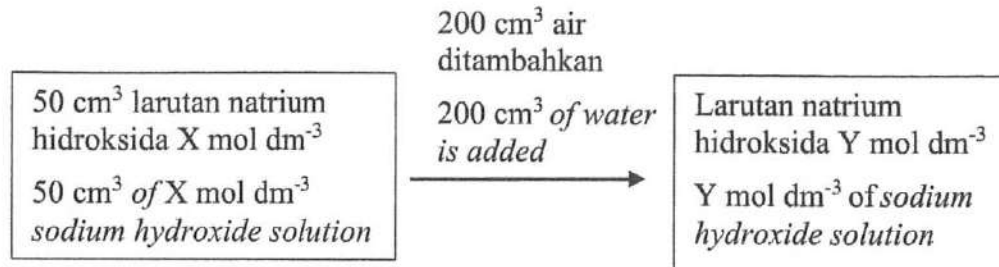
Jadual 2
Table 2

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

- A 0.089 cm³ s⁻¹
- B 0.188 cm³ s⁻¹
- C 9.000 cm³ s⁻¹
- D 11.250 cm³ s⁻¹

- 34 Rajah 22 menunjukkan penyediaan larutan natrium hidroksida Y mol dm⁻³ dengan nilai pH 13.

Diagram 22 shows a preparation of Y mol dm⁻³ of sodium hydroxide solution with a pH value of 13.



Rajah 22
Diagram 22

Apakah nilai X?

What is the value of X?

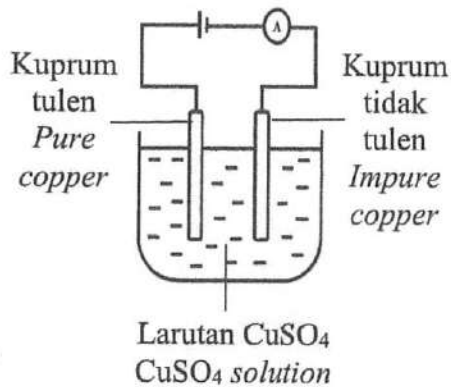
- A 0.02 mol dm⁻³
- B 0.1 mol dm⁻³
- C 0.4 mol dm⁻³
- D 0.5 mol dm⁻³

- 35 Kuprum yang diekstrak dari kuprum pirit mempunyai darjah ketulenan yang rendah dan perlu ditulenan melalui elektrolisis. Manakah antara berikut merupakan susunan alat radas yang boleh digunakan untuk menulenan kuprum tersebut?

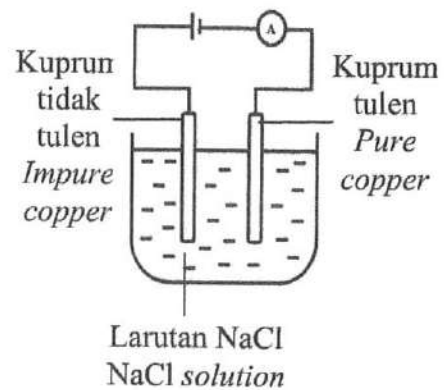
The extracted copper from copper pyrite has low degree of purity and needs to be purified through electrolysis.

Which of the following apparatus set-up can be used to purify the copper?

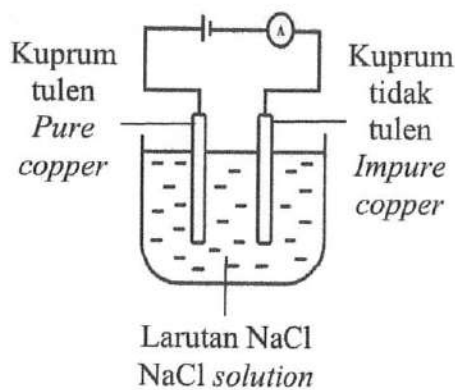
A



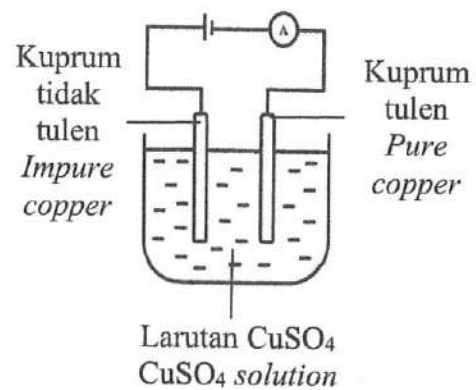
B



C



D



- 36 Nilai bahan api arang kayu ialah 34 kJ g^{-1} .
Hitung jisim arang kayu yang diperlukan untuk mendidihkan 2.0 dm^3 air.

[Muatan haba tentu air = $4.2 \text{ J g}^{-1} \text{ }^\circ\text{C}^{-1}$, Ketumpatan air = 1 g cm^{-3}
Suhu air pada keadaan bilik = $27.0 \text{ }^\circ\text{C}$]

The fuel value of charcoal is 34 kJ g^{-1} .

Calculate the mass of charcoal needed to boil 2.0 dm^3 of water.

[*Heat capacity of water = $4.2 \text{ J g}^{-1} \text{ }^\circ\text{C}^{-1}$, Density of water = 1 g cm^{-3}
Temperature of water at room temperature = $27.0 \text{ }^\circ\text{C}$]*

- A 18 g
- B 16 g
- C 12 g
- D 7 g

- 37 Manakah antara berikut merupakan formula struktur dan nama yang benar bagi isomer C_5H_{10} ?

Which of the following is the correct structural formulae and its name for the isomer of C_5H_{10} ?

	Formula struktur <i>Structural formula</i>	Nama <i>Name</i>
I	$ \begin{array}{c} \text{H} \\ \\ \text{H}-\text{C}-\text{H} \\ \quad \quad \\ \text{H}-\text{C}=\text{C}-\text{C}-\text{C}-\text{H} \\ \quad \quad \\ \text{H} \quad \text{H} \quad \text{H} \end{array} $	2-metilbut-1-ena <i>2-methylbut-1-ene</i>
II	$ \begin{array}{c} \text{H} \\ \\ \text{H}-\text{C}-\text{H} \\ \quad \\ \text{H}-\text{C}=\text{C}-\text{C}-\text{C}-\text{H} \\ \quad \quad \\ \text{H} \quad \text{H} \quad \text{H} \end{array} $	3-metilbut-2-ena <i>3-methylbut-2-ene</i>
III	$ \begin{array}{c} \text{H} \quad \quad \quad \text{H} \quad \text{H} \\ \quad \quad \quad \quad \\ \text{H}-\text{C}-\text{C}=\text{C}-\text{C}-\text{C}-\text{H} \\ \quad \quad \quad \quad \\ \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \end{array} $	Pent-2-ena <i>Pent-2-ene</i>
IV	$ \begin{array}{c} \text{H} \quad \quad \quad \text{H} \quad \text{H} \quad \text{H} \\ \quad \quad \quad \quad \quad \\ \text{H}-\text{C}=\text{C}-\text{C}-\text{C}-\text{C}-\text{H} \\ \quad \quad \quad \\ \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \end{array} $	Pent-3-ena <i>Pent-3-ene</i>

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

- 38 Jadual 3 menunjukkan pemerhatian yang direkodkan apabila satu siri ujian dijalankan untuk mengesahkan kehadiran kation dan anion sebatian T.

Table 3 shows the observations recorded when a series of tests were conducted to verify the cation and anion of compound T.

Ujian Test	Pemerhatian Observation
Tambah beberapa titis larutan natrium hidroksida sehingga berlebihan kepada larutan T. <i>Add a few drops of sodium hydroxide solution until excess to solution of T.</i>	Mendakan putih terbentuk dan larut dalam larutan natrium hidroksida berlebihan. <i>White precipitate is formed and dissolves in excess sodium hydroxide solution.</i>
Tambah beberapa titis larutan ammonia sehingga berlebihan kepada larutan T. <i>Add a few drops of ammonia solution until excess to solution of T.</i>	Mendakan putih terbentuk dan larut dalam larutan ammonia berlebihan. <i>White precipitate is formed and dissolves in excess ammonia solution.</i>
Tambah larutan T kepada larutan barium nitrat. <i>Add solution of T to barium nitrate solution.</i>	Mendakan putih terbentuk. <i>White precipitate is formed.</i>

Jadual 3
Table 3

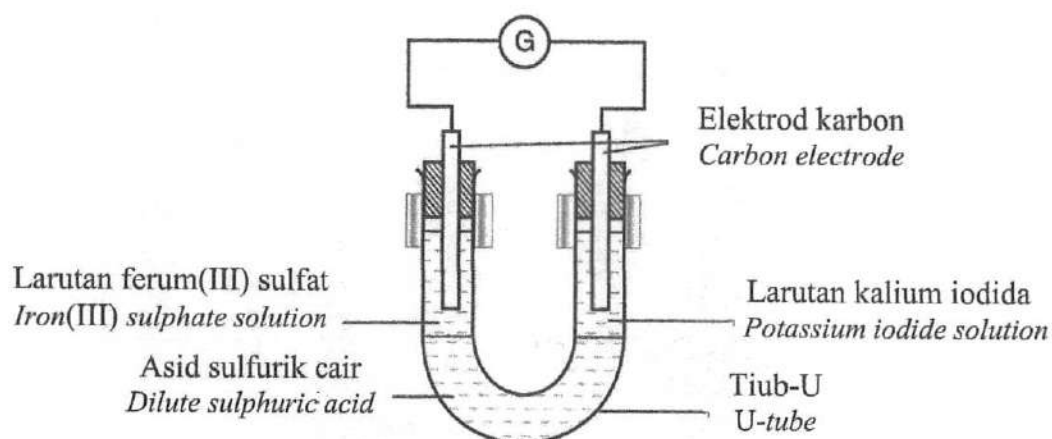
Apakah kation dan anion yang hadir dalam sebatian T?

What are the cation and anion present in compound T?

	Kation Cation	Anion Anion
A	Pb^{2+}	Cl^-
B	Zn^{2+}	SO_4^{2-}
C	Pb^{2+}	SO_4^{2-}
D	Zn^{2+}	Cl^-

- 39 Diagram 23 menunjukkan susunan radas untuk mengkaji tindak balas antara larutan ferum(III) sulfat dengan larutan kalium iodida.

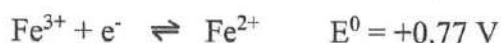
Diagram 23 shows the apparatus set-up to investigate the reaction between iron(III) sulphate solution with potassium iodide solution.



Rajah 23
Diagram 23

Diberi nilai keupayaan elektrod piawai berikut.

Given the following standard electrode potential value.

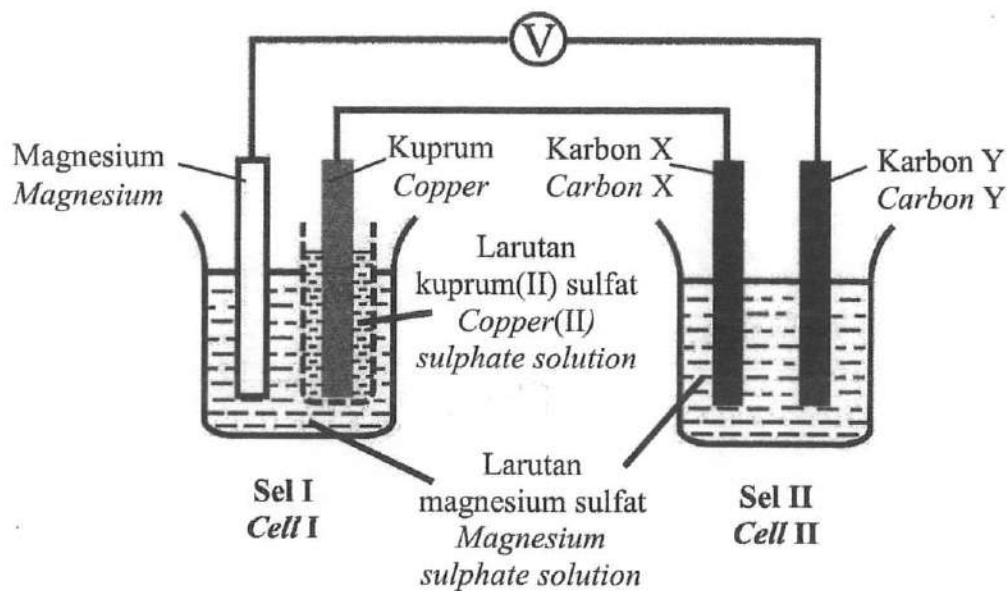


Antara yang berikut, yang manakah perubahan warna bagi kedua-dua larutan itu?

Which of the following is the colour change of the two solutions?

	Larutan ferum(III) sulfat <i>Iron(III) sulphate solution</i>	Larutan kalium iodida <i>Potassium iodide solution</i>
A	Perang kepada hijau <i>Brown to green</i>	Tak berwarna kepada perang <i>Colourless to brown</i>
B	Hijau kepada perang <i>Green to brown</i>	Ungu kepada tak berwarna <i>Purple to colourless</i>
C	Perang kepada hijau <i>Brown to green</i>	Jingga kepada hijau <i>Orange to green</i>
D	Hijau kepada perang <i>Green to brown</i>	Jingga kepada hijau <i>Orange to green</i>

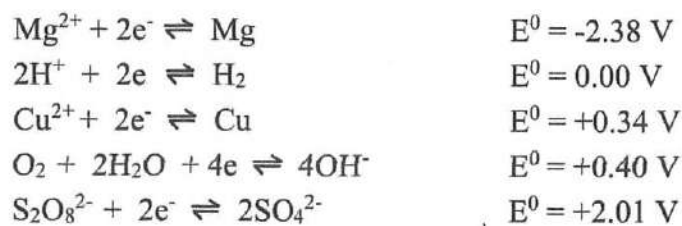
- 40 Rajah 24 menunjukkan dua jenis sel.
Diagram 24 shows two type of cells.



Rajah 24
Diagram 24

Diberi nilai keupayaan elektrod piawai berikut.

Given the following standard electrode potential value.



Antara berikut, yang manakah benar?

Which of the following is correct?

	Mg	Cu	Karbon X <i>Carbon X</i>	Karbon Y <i>Carbon Y</i>
A	Elektrod magnesium menebal <i>Magnesium electrode becomes thicker</i>	Elektrod kuprum menipis <i>Copper electrode becomes thinner</i>	Tiada perubahan <i>No changes</i>	Gelembung gas tidak berwarna terhasil <i>Bubbles of colourless gas is produced</i>
B	Elektrod magnesium menipis <i>Magnesium electrode becomes thinner</i>	Elektrod kuprum menebal <i>Copper electrode becomes thicker</i>	Gelembung gas tidak berwarna terhasil <i>Bubbles of colourless gas is produced</i>	Tiada perubahan <i>No changes</i>
C	Ion magnesium menerima elektron <i>Magnesium ion receives electron</i>	Atom kuprum menyingkirkan elektron <i>Copper atom releases electron</i>	Ion hidrogen mengalami penurunan <i>Hydrogen ion undergoes reduction</i>	Ion hidoksida mengalami pengoksidaan <i>Hydroxide ion undergoes oxidation</i>
D	Atom magnesium menyingkirkan elektron <i>Magnesium atom releases electron</i>	Ion kuprum(II) menerima elektron <i>Copper(II) ion receives electron</i>	Ion hidoksida mengalami pengoksidaan <i>Hydroxide ion undergoes oxidation</i>	Ion hidrogen mengalami penurunan <i>Hydrogen ion undergoes reduction</i>

**KERTAS PEPERIKSAAN TAMAT
END OF QUESTION PAPER**

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