

Kimia
Kertas 1
November
2023
1 ¼ jam



MAKTAB RENDAH SAINS MARA

PEPERIKSAAN AKHIR SIJIL PENDIDIKAN MRSM 2023

KIMIA

Kertas 1

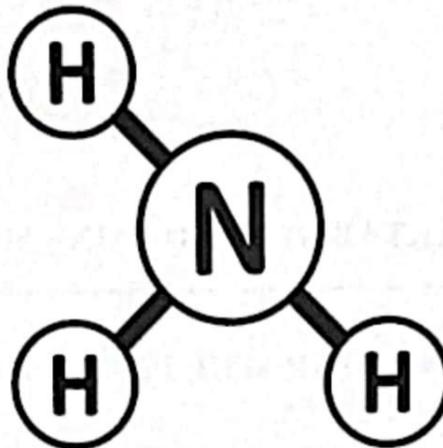
Satu jam lima belas minit

JANGAN BUKA KERTAS PEPERIKSAAN INI SEHINGGA DIBERITAHU

1. *Kertas peperiksaan ini mengandungi 40 soalan.*
2. *Jawab semua soalan.*
3. *Bagi setiap soalan, pilih satu jawapan sahaja. **Hitamkan** jawapan anda pada kertas jawapan objektif yang disediakan.*
4. *Kertas soalan ini adalah dalam dwibahasa.*
5. **Kertas jawapan objektif** *hendaklah diserahkan kepada pengawas peperiksaan pada akhir peperiksaan.*

Kertas peperiksaan ini mengandungi 30 halaman bercetak dan 2 halaman tidak bercetak

- 1 Rajah 1 menunjukkan formula struktur bagi bahan X.
Diagram 1 shows structural formula of substance X.



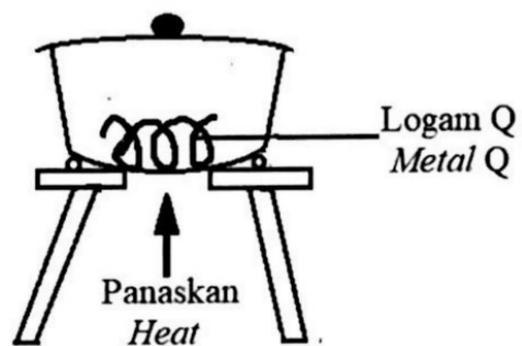
Rajah 1
Diagram 1

Apakah jenis zarah bagi bahan X?
What is the type of particle of substance X?

- A Ion
Ion
- B Atom
Atom
- C Molekul
Molecule

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- 2 Rajah 2 menunjukkan susunan radas untuk menentukan formula empirik bagi oksida logam Q.
Diagram 2 shows the apparatus set-up to determine the empirical formula of metal oxide Q.



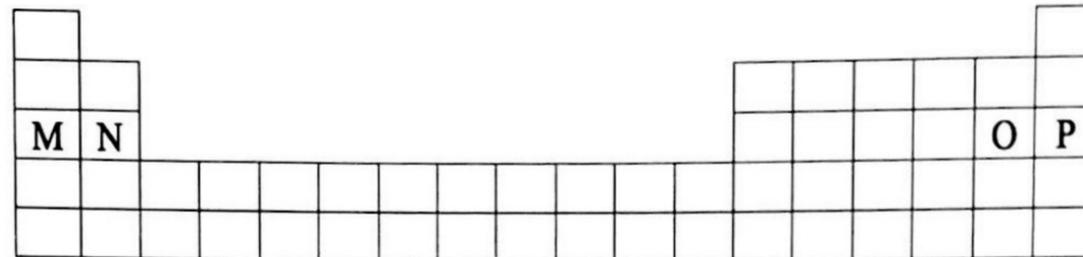
Rajah 2
Diagram 2

Apakah logam Q?
What is metal Q?

- A Plumbum
Lead
- B Argentum
Silver
- C Kuprum
Copper
- D Magnesium
Magnesium

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- 3 Rajah 3 menunjukkan sebahagian daripada Jadual Berkala Unsur. M, N, O dan P tidak mewakili simbol sebenar unsur.
Diagram 3 shows part of Periodic Table of Elements. M, N, O and P do not represent the actual symbols of the elements.



Rajah 3
 Diagram 3

Antara yang berikut, manakah yang betul menunjukkan kumpulan bagi M, N, O dan P?

Which of the following shows correctly the groups for M, N, O and P?

| | Gas adi <i>Noble gas</i> | Logam alkali bumi <i>Alkaline earth metal</i> | Halogen <i>Halogen</i> | Logam alkali <i>Alkali metal</i> |
|----------|-----------------------------|--|---------------------------|-------------------------------------|
| A | M | O | N | P |
| B | N | P | O | M |
| C | P | N | M | O |
| D | P | N | O | M |

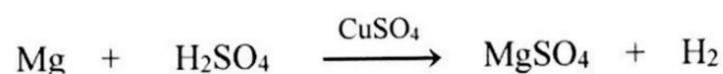
- 4 Antara sebatian berikut, yang manakah boleh membentuk ikatan hidrogen?
Which of the following compound can form hydrogen bond?

- A** Hidrogen klorida, HCl
Hydrogen chloride, HCl
- B** Hidrogen fluorida, HF
Hydrogen fluoride, HF
- C** Gas hidrogen, H₂
Hydrogen gas, H₂
- D** Metana, CH₄
Methane, CH₄

5 Antara yang berikut, manakah asid lemah?
Which of the following is a weak acid?

- A Asid hidroklorik
Hydrochloric acid
- B Asid sulfurik
Sulphuric acid
- C Asid etanoik
Ethanoic acid
- D Asid nitrik
Nitric acid

6 Persamaan kimia berikut menunjukkan tindak balas antara magnesium dan asid sulfurik.
The following chemical equation shows a reaction between magnesium and sulphuric acid.



Antara pernyataan berikut, yang manakah benar tentang CuSO_4 dalam tindak balas ini?

Which of the following statement is true about CuSO_4 in the reaction?

- A Mengubah kadar tindak balas
Alter the rate of reaction
- B Meningkatkan kuantiti hasil tindak balas
Increase the quantity of product
- C Sifat kimianya berubah
Its chemical properties change
- D Jisim CuSO_4 berkurang pada akhir tindak balas
Mass of CuSO_4 decreases at the end of the reaction

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- 7 Seramik termaju diperbuat daripada sebatian tak organik seperti oksida, karbida dan nitrida. Antara bahan berikut yang manakah diperbuat daripada seramik termaju?

Advanced ceramics are made from inorganic compounds such as oxides, carbides and nitrides. Which of the following is made from advanced ceramics?

A



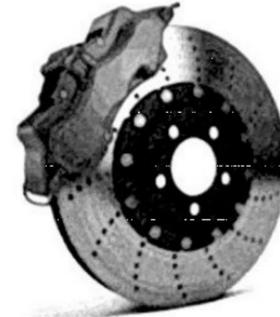
B



C



D



- 8 Antara berikut, yang manakah menunjukkan tindak balas penurunan?
Which of the following shows a reduction reaction?

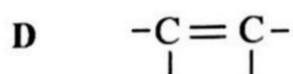
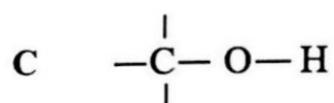
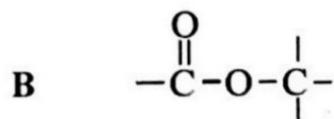
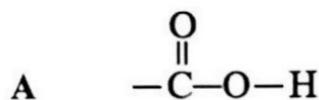
- A Atom magnesium menderma elektron membentuk ion magnesium
Magnesium atom donates electron to form magnesium ion
- B Plumbum(II) oksida kehilangan oksigen apabila bertindak balas dengan gas hidrogen
Lead(II) oxide loses oxygen when react with hydrogen gas
- C Ammonia kehilangan hidrogen membentuk nitrogen apabila bertindak balas dengan kuprum(II) oksida
Ammonia loses hydrogen to form nitrogen when react with copper(II) oxide
- D Nombor pengoksidaan zink meningkat daripada 0 kepada +2
Oxidation number of zinc increases from 0 to +2

- 9 Antara yang berikut, bahan manakah akan mengalami perubahan kimia apabila arus elektrik dialirkan melaluinya?

Which of the following substance will undergo chemical changes when electricity is passed through it?

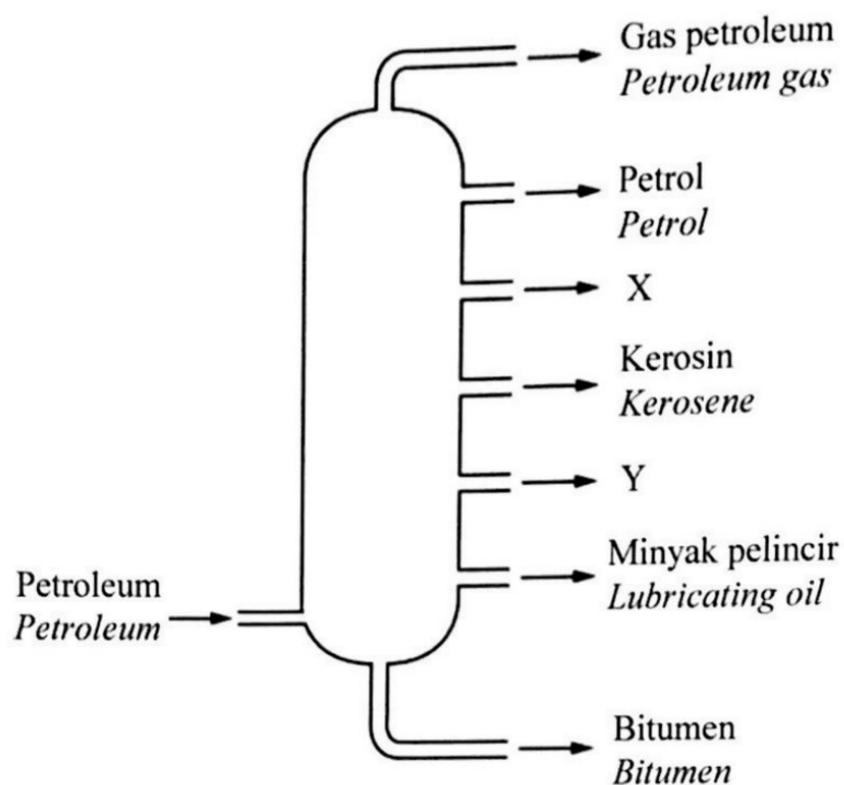
- A Leburan naftalena
Molten naphthalene
- B Larutan glukosa
Glucose solution
- C Pepejal plumbum(II) bromida
Solid lead(II) bromide
- D Larutan kalium nitrat
Potassium nitrate solution

- 10 Apakah kumpulan berfungsi bagi 2,3-dimetilbutan-2-ol?
What is the functional group for 2,3-dimethylbutan-2-ol?



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- 11 Rajah 4 menunjukkan pecahan petroleum dari proses penyulingan berperingkat.
Diagram 4 shows petroleum fraction from fractional distillation process.



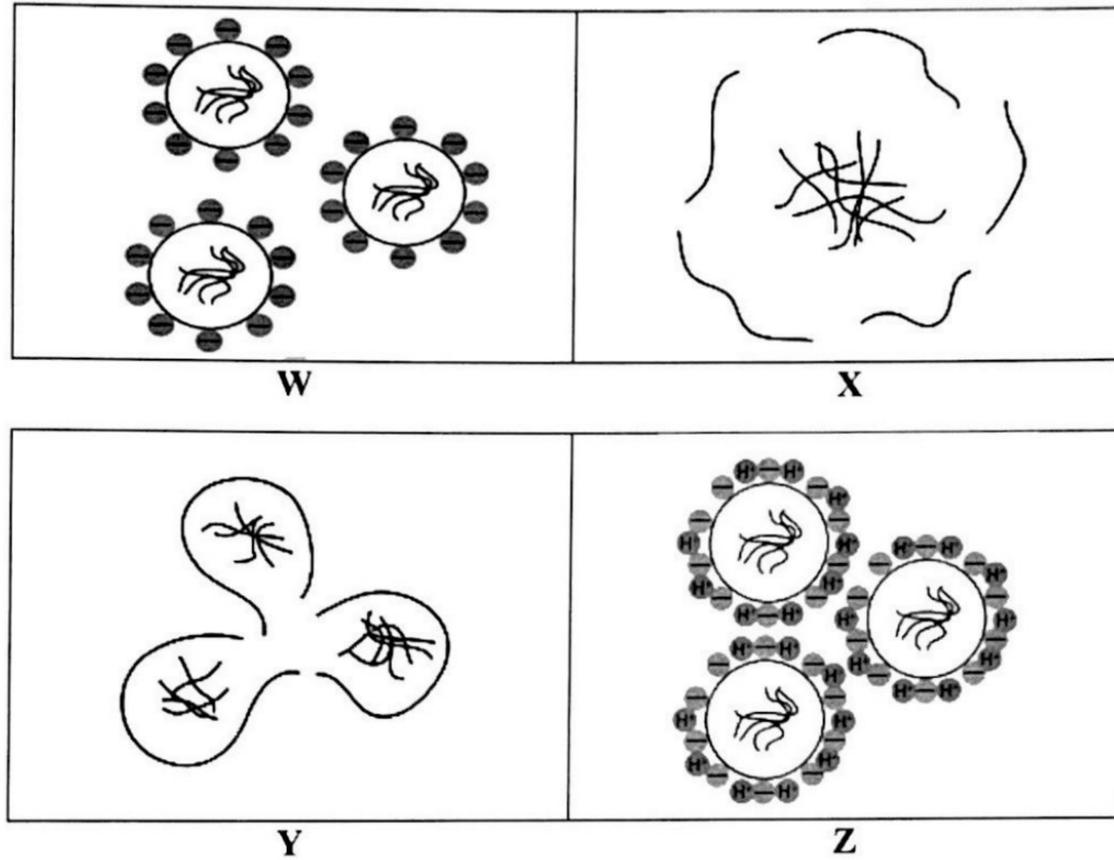
Rajah 4
Diagram 4

Antara yang berikut, pasangan pecahan petroleum manakah yang sepadan dengan kegunaannya?

Which of the following pairs of petroleum fraction is correctly matched to its use?

| | X | Y |
|---|---|---|
| A | Gas memasak <i>Cooking gas</i> | Minyak pelincir <i>Lubricating oil</i> |
| B | Bahan mentah industri petrokimia <i>Raw materials for petrochemical industry</i> | Bahan api kenderaan berat <i>Fuel for heavy vehicles</i> |
| C | Bahan api kapal terbang <i>Fuel for aircraft</i> | Menurap jalan raya <i>Road pavement</i> |
| D | Bahan api kenderaan <i>Fuel for motor vehicles</i> | Bahan api kapal terbang <i>Fuel for aircraft</i> |

- 12 Rajah 5 menunjukkan proses yang berlaku semasa penggumpalan lateks.
Diagram 5 shows the process that occurs during latex coagulation.



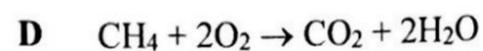
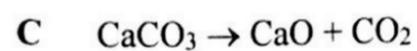
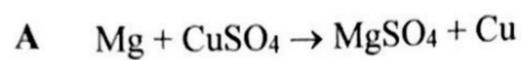
Rajah 5
Diagram 5

Susun proses penggumpalan lateks dalam urutan yang betul.
Arrange the process of latex coagulation in the correct order.

- A $W \rightarrow Z \rightarrow Y \rightarrow X$
 B $Z \rightarrow W \rightarrow Y \rightarrow X$
 C $W \rightarrow Z \rightarrow X \rightarrow Y$
 D $Z \rightarrow X \rightarrow Y \rightarrow W$

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13 Antara yang berikut, yang manakah menyerap haba daripada persekitaran?
Which of the following reactions absorbs heat from the surroundings?



14 Rajah 6 menunjukkan seorang budak lelaki mengalami kegatalan kulit akibat alahan.

Diagram 6 shows a boy suffering skin rashes due to allergic reaction.



Rajah 6
Diagram 6

Antara ubat berikut, manakah yang sesuai untuk merawat alahan tersebut?
Which of the following medicine is suitable to treat the allergic reaction?

A Kodeina
Codeine

B Haloperidol
Haloperidol

C Antihistamin
Antihistamine

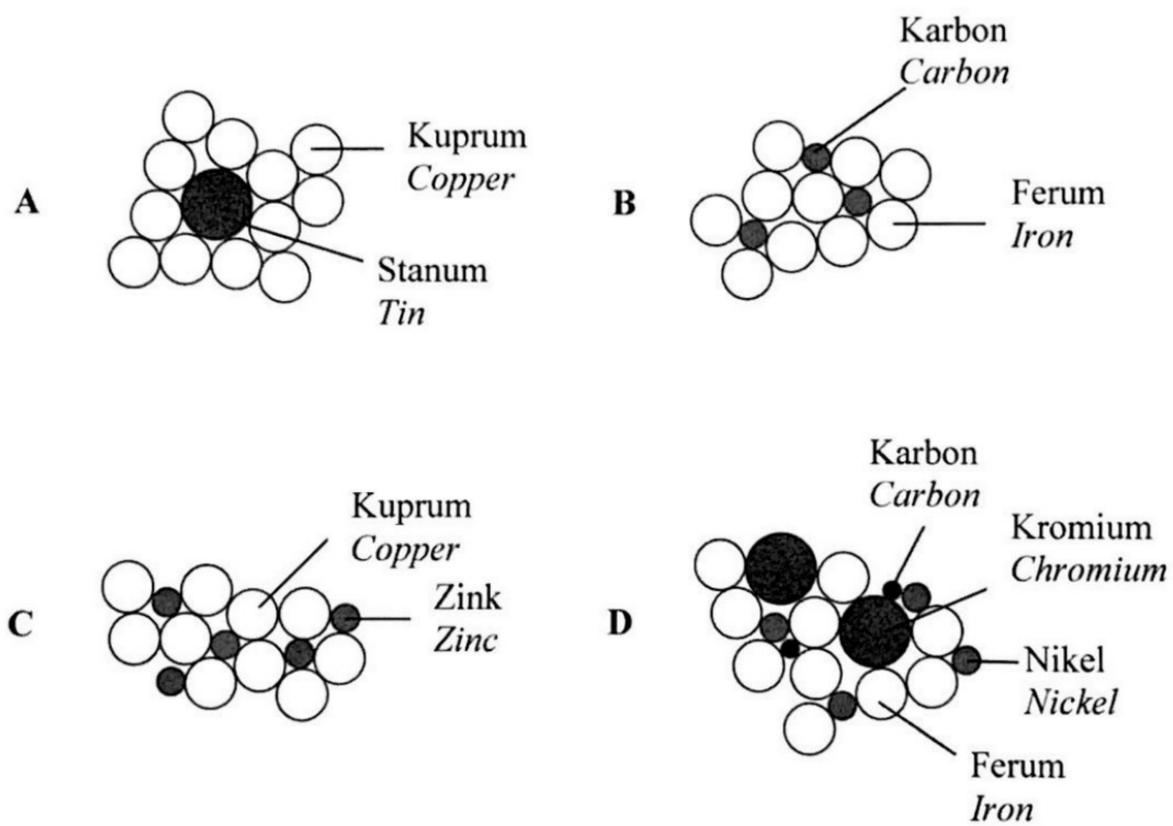
D Parasetamol
Paracetamol

- 15 Rajah 7 menunjukkan sebuah jambatan keluli.
Diagram 7 shows a steel bridge.



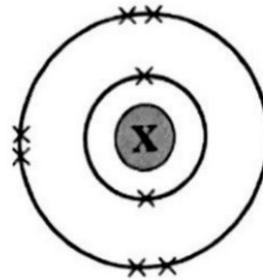
Rajah 7
Diagram 7

Yang manakah antara berikut merupakan susunan atom bagi keluli?
Which of the following, is the arrangement of the atoms in steel?



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- 16 Rajah 8 menunjukkan susunan elektron bagi atom X yang mempunyai jisim atom relatif 17.
Diagram 8 shows the electron arrangement of atom X with the relative atomic mass of 17.



Rajah 8
Diagram 8

Berapakah bilangan neutron yang terdapat dalam nukleus atom X?
How many neutrons are there in the nucleus of atom X?

- A 6
B 8
C 9
D 17
- 17 Antara yang berikut, yang manakah mempunyai formula empirik yang sama seperti etena, C_2H_4 ?
Which of the following has the same empirical formula as ethene, C_2H_4 ?
- A C_2H_6
B C_3H_8
C C_4H_{10}
D C_6H_{12}

- 18 Unsur T dan xenon terletak dalam kumpulan yang sama dalam Jadual Berkala Unsur.

Antara yang berikut, manakah ciri-ciri bagi unsur T?

Element T and xenon are located in the same group as in the Periodic Table of Elements.

Which of the following are the characteristics of element T?

- I Cecair pada suhu bilik
Liquid at room temperature
 - II Terdiri daripada zarah monoatom
Consists of monoatomic particle
 - III Mengkonduksi elektrik
Conduct electricity
 - IV Lengai secara kimia
Chemically inert
-
- 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

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- 19 Jadual 1 menunjukkan keputusan apabila tiga oksida unsur dalam Kala 3 dalam Jadual Berkala Unsur ditambah kepada larutan natrium hidroksida, NaOH dan asid nitrik, HNO₃.

Table 1 shows the results when three oxides of elements in Period 3 in the Periodic Table of Elements are added to sodium hydroxide, NaOH solution and nitric acid, HNO₃.

| Oksida bagi unsur dalam Kala 3 <i>Oxide of elements in Period 3</i> | Ditambah NaOH <i>Added to NaOH</i> | Ditambah HNO ₃ <i>Added to HNO₃</i> |
|--|---------------------------------------|--|
| Oksida Q <i>Oxide of Q</i> | ✓ | ✓ |
| Oksida R <i>Oxide of R</i> | ✓ | ✗ |
| Oksida T <i>Oxide of T</i> | ✗ | ✓ |

✓ = Tindak balas berlaku
Reaction occurs

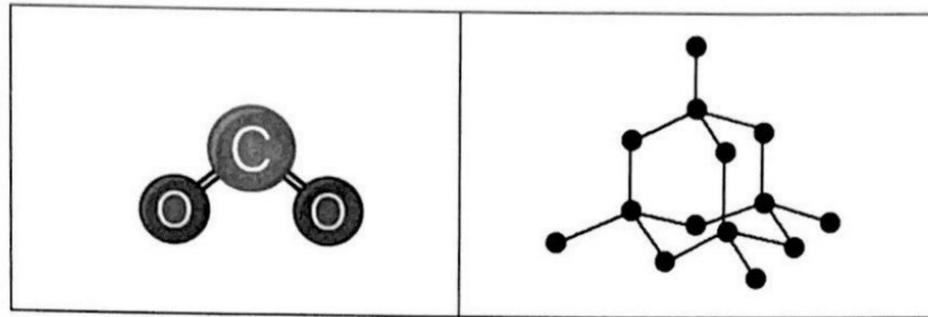
✗ = Tindak balas tidak berlaku
Reaction does not occur

Jadual 1
Table 1

Susun unsur Q, R dan T mengikut urutan menurun saiz atom.
Arrange element Q, R and T according to the descending order of the atomic size.

- A Q, R, T
B T, Q, R
C Q, T, R
D R, T, Q

- 20 Rajah 9 menunjukkan struktur dua sebatian kovalen.
Diagram 9 shows the structure of two covalent compounds.



Karbon dioksida
Carbon dioxide

Berlian
Diamond

Rajah 9
Diagram 9

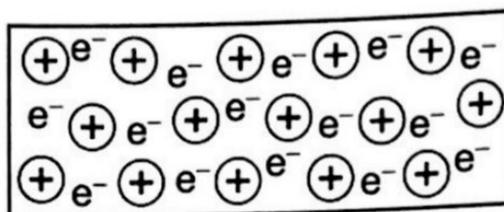
Antara pernyataan berikut, yang manakah benar tentang sebatian tersebut?
Which of the following statement is true about the compounds?

| | Karbon dioksida <i>Carbon dioxide</i> | Berlian <i>Diamond</i> |
|----------|--|---|
| A | Mempunyai ikatan kovalen yang lemah <i>Has weak covalent bond</i> | Mempunyai ikatan kovalen yang kuat <i>Has strong covalent bond</i> |
| B | Tidak mengkonduksikan elektrik <i>Cannot conduct electricity</i> | Boleh mengkonduksikan elektrik <i>Can conduct electricity</i> |
| C | Mempunyai takat lebur yang rendah <i>Has low melting point</i> | Mempunyai takat lebur yang rendah <i>Has low melting point</i> |
| D | Mempunyai daya tarikan Van der Waals yang lemah antara molekul <i>Has weak Van der Waals attraction force between molecules</i> | Tidak mempunyai daya tarikan Van der Waals antara molekul <i>No Van der Waals attraction force between molecules</i> |

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- 21 Rajah 10 menunjukkan struktur kekisi bagi unsur X
 Diagram 10 shows a lattice structure of element X.



Rajah 10
 Diagram 10

Antara pernyataan berikut, manakah yang benar tentang unsur X?
 Which of the following statements are true about element X?

- I Wujud sebagai gas pada keadaan bilik
 Exist as a gas at room conditions
 - II Mempunyai takat lebur yang tinggi
 Has high melting point
 - III Larut dalam air
 Dissolves in water
 - IV Mengalirkan arus elektrik dalam keadaan pepejal
 Conducts electricity in solid state
- A I dan II
 I and II
 - B II dan IV
 II and IV
 - C I dan III
 I and III
 - D III dan IV
 III and IV

- 22 Asid nitrik cair bertindak balas lebih cepat dengan serbuk zink berbanding kepingan zink.

Antara berikut yang manakah menerangkan pernyataan tersebut?

*Dilute nitric acid reacts faster with zinc powder compared to zinc strip.
Which of the following explains this statement?*

- A Terdapat lapisan zink oksida yang terbentuk pada kepingan zink
There is a layer of zinc oxide on the zinc strip
- B Zarah-zarah dalam kepingan zink tersusun sangat rapat
The particles in the zinc strip are packed closely
- C Serbuk zink mempunyai jumlah luas permukaan yang lebih besar
The zinc powder has a larger total surface area
- D Zarah-zarah dalam serbuk zink mempunyai tenaga kinetik yang lebih tinggi
The particles of zinc powder have higher kinetic energy

- 23 Larutan XOH dan YOH dengan kepekatan yang sama mempunyai nilai pH 10.0 dan 13.0 masing-masing.

Antara berikut, yang manakah paling tepat menerangkan tentang larutan XOH dan YOH?

Solution XOH and YOH with same concentration have pH value of 10.0 and 13.0 respectively.

Which of the following best explain about solutions XOH and YOH?

| Jenis alkali <i>Type of alkali</i> | | Darjah penceraian <i>Degree of dissociation</i> | |
|--|-------------------------------------|--|-----------------------|
| XOH | YOH | XOH | YOH |
| A Strong alkali <i>Alkali kuat</i> | Weak alkali <i>Alkali lemah</i> | Tinggi <i>High</i> | Rendah <i>Low</i> |
| B Weak alkali <i>Alkali lemah</i> | Strong alkali <i>Alkali kuat</i> | Tinggi <i>High</i> | Rendah <i>Low</i> |
| C Strong alkali <i>Alkali kuat</i> | Weak alkali <i>Alkali lemah</i> | Rendah <i>Low</i> | Tinggi <i>High</i> |
| D Weak alkali <i>Alkali lemah</i> | Strong alkali <i>Alkali kuat</i> | Rendah <i>Low</i> | Tinggi <i>High</i> |

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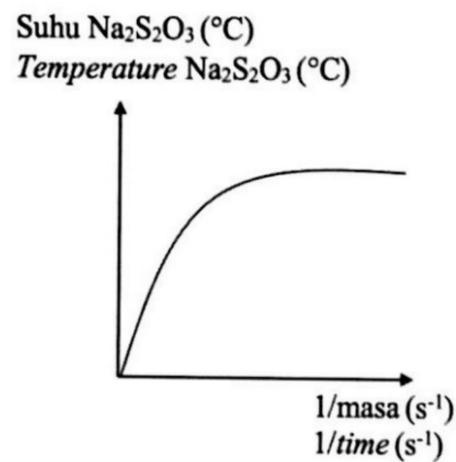
- 24 Seorang murid menjalankan eksperimen untuk mengkaji kesan suhu terhadap kadar tindak balas antara natrium tiosulfat, $\text{Na}_2\text{S}_2\text{O}_3$ dan asid sulfurik, H_2SO_4 . Eksperimen dijalankan pada suhu yang berbeza tanpa mengubah kepekatan atau isipadu kedua-dua bahan tindak balas.

A student carries out an experiment to investigate how the temperature affects the rate of the reaction between sodium thiosulfate, $\text{Na}_2\text{S}_2\text{O}_3$ and sulphuric acid, H_2SO_4 . The experiment is carried at different temperatures without changing the concentration or volume of both reactants.

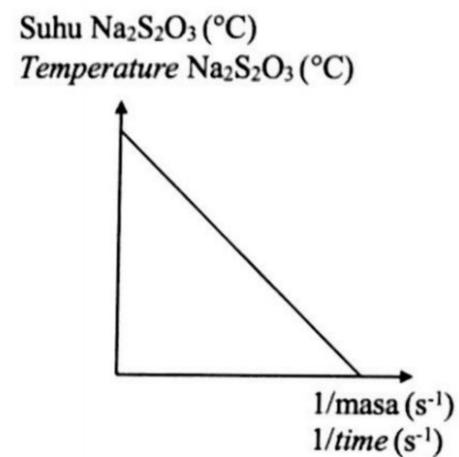
Antara yang berikut, manakah graf yang menunjukkan keputusan eksperimen tersebut?

Which of the following shows the graph for the experiment?

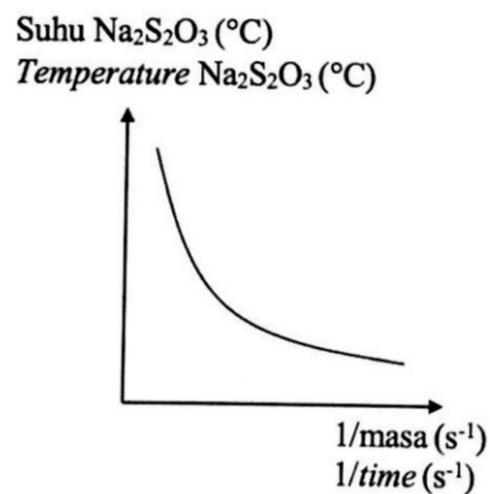
A



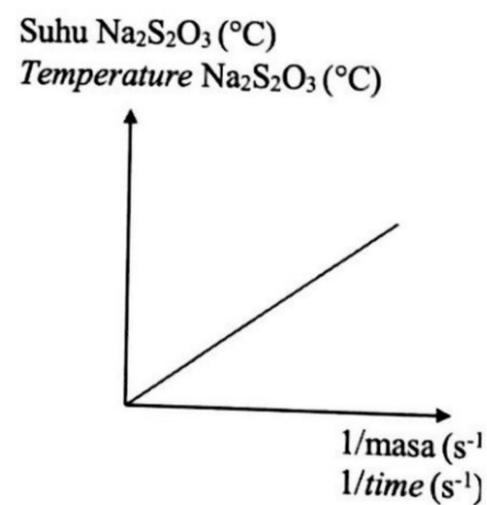
B



C



D



- 25 Pernyataan berikut menunjukkan pemerhatian untuk dua tindak balas berbeza bagi gas X dan gas Y.

The following statements show the observations of two different reactions for gas X and gas Y.

- Gas X menukarkan warna ungu larutan kalium manganat(VII) berasid kepada tanpa warna.
Gas X turns purple acidified potassium manganate(VII) solution to colourless.
- Gas Y menukarkan larutan tanpa warna kalium iodida kepada perang.
Gas Y turns colourless potassium iodide solution to brown.

Apakah kesimpulan yang boleh dibuat daripada pemerhatian tersebut?

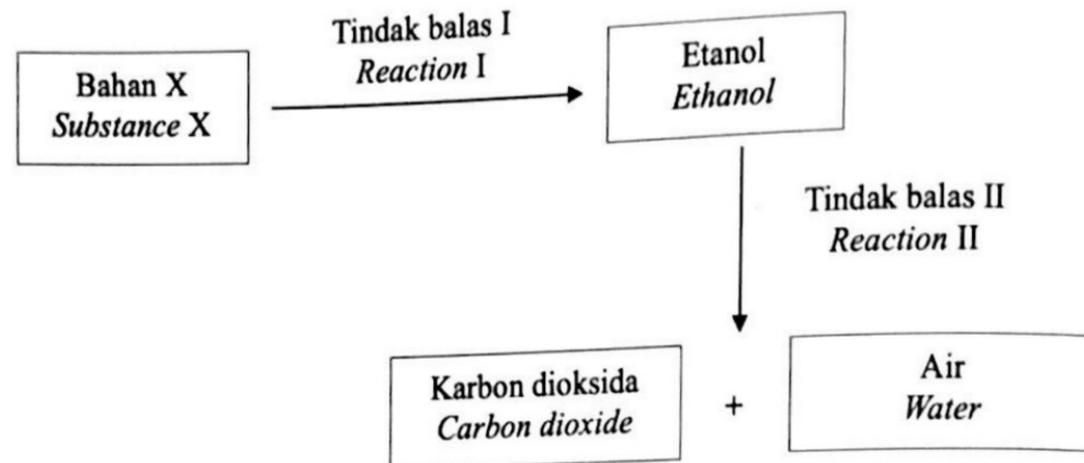
What conclusion can be made from the observations?

| | Gas X | Gas Y |
|---|---|---|
| A | Agen pengoksidaan <i>Oxidising agent</i> | Agen pengoksidaan <i>Oxidising agent</i> |
| B | Agen penurunan <i>Reducing agent</i> | Agen pengoksidaan <i>Oxidising agent</i> |
| C | Agen pengoksidaan <i>Oxidising agent</i> | Agen penurunan <i>Reducing agent</i> |
| D | Agen penurunan <i>Reducing agent</i> | Agen penurunan <i>Reducing agent</i> |

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- 26 Rajah 11 adalah satu siri tindak balas kimia bagi bahan X.
Diagram 11 shows a series of chemical reactions for substance X.

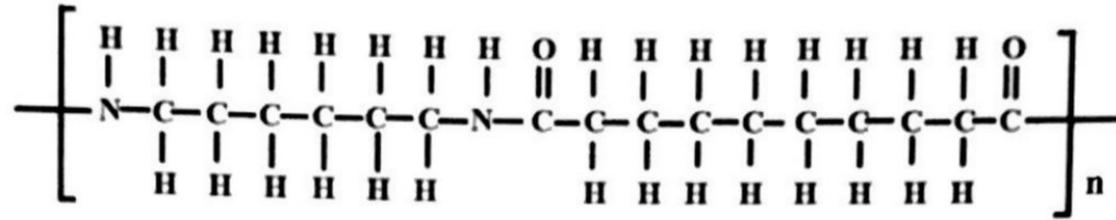


Rajah 11
Diagram 11

Apakah bahan X, tindak balas I dan tindak balas II?
What is substance X, reaction I and reaction II?

| | Bahan X Substance X | Tindak balas I Reaction I | Tindak balas II Reaction II |
|---|------------------------|------------------------------|--------------------------------|
| A | Glukosa Glucose | Penghidratan Hydration | Pembakaran Combustion |
| B | Etena Ethene | Penghidratan Hydration | Pembakaran Combustion |
| C | Etena Ethene | Pengoksidaan Oxidation | Pengesteran Esterification |
| D | Glukosa Glucose | Pengoksidaan Oxidation | Penapaian Fermentation |

- 27 Rajah 12 menunjukkan formula struktur bagi polimer Y.
Diagram 12 shows the structural formula for polymer Y.



Rajah 12
Diagram 12

Antara yang berikut, manakah dihasilkan menggunakan polimer Y?
Which of the following is made from polymer Y?

A



B



C



D



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- 28 Aida telah mencuci baju dengan menggunakan sabun dan air telaga namun kesan kotoran masih kekal.
Antara pernyataan berikut, yang manakah menerangkan dengan tepat situasi itu?

Aida has washed her clothes by using soap and water from a well, but the dirt remains.

Which of the following statements best described the situation?

- A Terdapat ion Ca^{2+} dan ion Mg^{2+} dalam air telaga
There are Ca^{2+} ions and Mg^{2+} ions in the well water
- B Terdapat ion Na^+ dan ion K^+ dalam sabun
There are Na^+ ions and K^+ ions in the soap
- C Pembentukan garam yang terlarutkan
The formation of soluble salts
- D Kepekatan anion sabun kekal tidak berubah
The concentration of soap anions remain unchanged

- 29 100 cm^3 larutan plumbum(II) nitrat 1.0 mol dm^{-3} ditambahkan kepada 100 cm^3 larutan kalium sulfat 1.0 mol dm^{-3} di dalam sebuah cawan plastik. Perubahan suhu ialah $5.0 \text{ }^\circ\text{C}$.
Eksperimen diulang dengan menggunakan 100 cm^3 larutan plumbum(II) nitrat 1.0 mol dm^{-3} dan 100 cm^3 larutan natrium sulfat 1.0 mol dm^{-3} .
Berapakah perubahan suhu untuk tindak balas ini?

100 cm^3 of 1.0 mol dm^{-3} lead(II) nitrate solution was added to 100 cm^3 of 1.0 mol dm^{-3} potassium sulphate solution in a plastic cup. The temperature change is $5.0 \text{ }^\circ\text{C}$.

The experiment is repeated by using 100 cm^3 of 1.0 mol dm^{-3} lead(II) nitrate solution and 100 cm^3 of 1.0 mol dm^{-3} sodium sulphate solution.

What is the change in temperature of the reaction?

- A $2.5 \text{ }^\circ\text{C}$
- B $5.0 \text{ }^\circ\text{C}$
- C $7.5 \text{ }^\circ\text{C}$
- D $10.0 \text{ }^\circ\text{C}$

- 30 Berapakah jumlah bilangan atom hidrogen yang terdapat dalam 6.0 g propanol, C_3H_7OH ?
[Jisim atom relatif: H = 1, C = 12, O = 16;
Pemalar Avogadro = $6.02 \times 10^{23} \text{ mol}^{-1}$]

*What is the total number of hydrogen atoms in 6.0 g of propanol, C_3H_7OH ?
[Relative atomic mass: H = 1, C = 12, O = 16;
Avogadro constant = $6.02 \times 10^{23} \text{ mol}^{-1}$]*

- A 4.816×10^{23}
B 4.214×10^{23}
C 2.408×10^{23}
D 6.020×10^{22}
- 31 Jadual 2 menunjukkan nombor proton bagi lima unsur V, W, X, Y dan Z yang merupakan bukan simbol unsur yang sebenar.
Table 2 shows the proton number for five elements V, W, X, Y and Z which are not the actual symbol of elements.

| Unsur <i>Element</i> | V | W | X | Y | Z |
|---------------------------------------|---|---|---|----|----|
| Nombor proton <i>Proton number</i> | 2 | 6 | 9 | 11 | 16 |

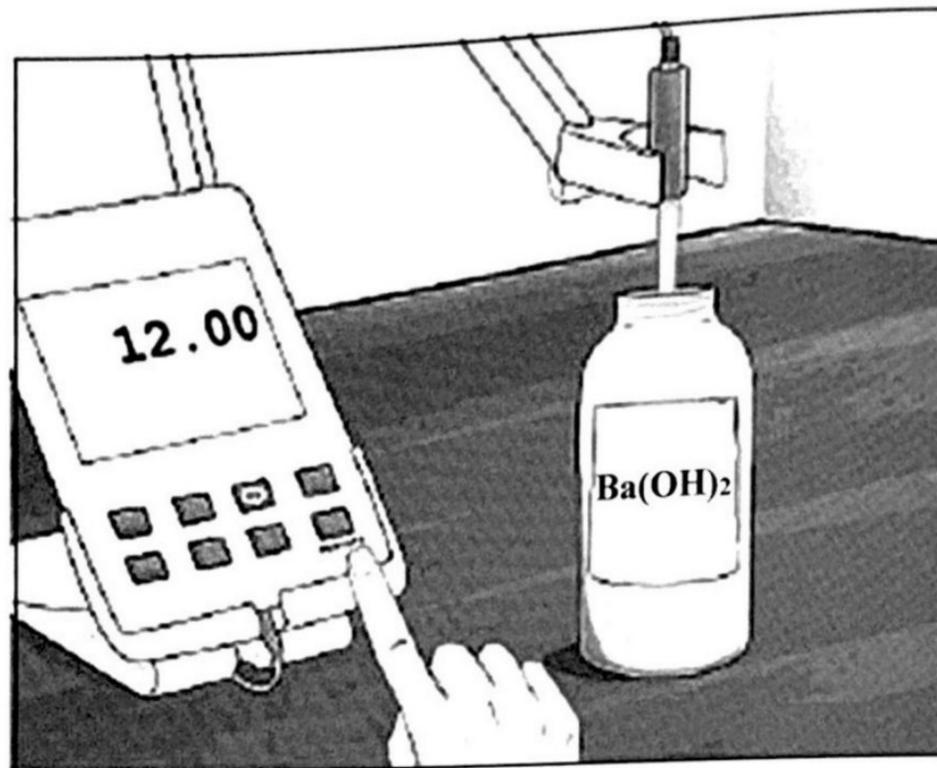
Jadual 2
Table 2

Antara pasangan unsur berikut, yang manakah membentuk sebatian yang boleh mengkonduksi elektrik dalam larutan akueus?
Which of the following pairs of elements forms a compound that can conduct electricity in aqueous solution?

- A V dan W
V and W
B X dan Z
X and Z
C X dan Y
X and Y
D W dan Z
W and Z

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- 32 Rajah 13 menunjukkan nilai pH satu larutan.
Diagram 13 shows the pH value of a solution.



Rajah 13
Diagram 13

Apakah kemolaran larutan itu?
What is the molarity of the solution?

- A $0.005 \text{ mol dm}^{-3}$
- B $0.010 \text{ mol dm}^{-3}$
- C $0.020 \text{ mol dm}^{-3}$
- D $0.200 \text{ mol dm}^{-3}$

- 33 Jadual 3 menunjukkan jumlah isipadu gas yang terkumpul pada sela masa yang tetap dalam suatu tindak balas.

Table 3 shows the total volume of gas collected at regular intervals in a reaction.

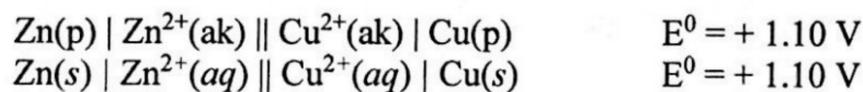
| | | | | | | | | |
|---|---|-----|-----|-----|-----|-----|-----|-----|
| Time/s Masa/s | 0 | 30 | 60 | 90 | 120 | 150 | 180 | 210 |
| Volume of gas /cm ³ Isipadu gas / cm ³ | 0 | 2.0 | 3.7 | 5.2 | 6.4 | 7.3 | 8.6 | 8.6 |

Table 3
Jadual 3

Berapakah purata kadar tindak balas dalam minit kedua?

What is the average rate of reaction in the second minute?

- A 0.040 cm³ s⁻¹
- B 0.045 cm³ s⁻¹
- C 0.053 cm³ s⁻¹
- D 0.062 cm³ s⁻¹
- 34 Notasi sel bagi satu sel kimia ditunjukkan di bawah
Cell notation for a voltaic cell is shown below.



Antara setengah persamaan berikut, yang manakah mewakili tindak balas di terminal negatif?

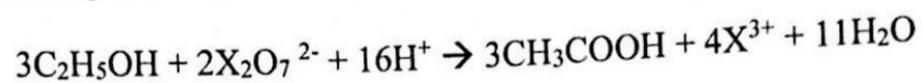
Which of the following half equation represents the reaction at the negative terminal?

- A $\text{Zn}^{2+}(\text{ak}) + 2\text{e}^- \rightarrow \text{Zn(p)}$
 $\text{Zn}^{2+}(\text{aq}) + 2\text{e}^- \rightarrow \text{Zn(s)}$
- B $\text{Zn(p)} \rightarrow \text{Zn}^{2+}(\text{ak}) + 2\text{e}^-$
 $\text{Zn(s)} \rightarrow \text{Zn}^{2+}(\text{aq}) + 2\text{e}^-$
- C $\text{Cu}^{2+}(\text{ak}) + 2\text{e}^- \rightarrow \text{Cu(p)}$
 $\text{Cu}^{2+}(\text{aq}) + 2\text{e}^- \rightarrow \text{Cu(s)}$
- D $\text{Cu(p)} \rightarrow \text{Cu}^{2+}(\text{ak}) + 2\text{e}^-$
 $\text{Cu(s)} \rightarrow \text{Cu}^{2+}(\text{aq}) + 2\text{e}^-$

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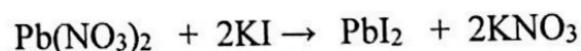
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- 35 Persamaan ion berikut mewakili satu tindak balas redoks.
The following ionic equation represents a redox reaction.



Apakah perubahan nombor pengoksidaan X?
What is the change in the oxidation number of X?

- A +6 ke +12
+6 to +12
- B +6 ke +3
+6 to +3
- C +7 ke +3
+7 to +3
- D +7 ke +12
+7 to +12
- 36 Persamaan kimia berikut menunjukkan tindak balas antara larutan kalium iodida dan larutan plumbum(II) nitrat:
The following chemical equation shows the reaction between potassium iodide solution and lead(II) nitrate solution:



Hitungkan jisim maksimum mendakan yang terbentuk apabila larutan plumbum(II) nitrat berlebihan ditambah ke dalam 50 cm³ larutan kalium iodida 0.2 mol dm⁻³.

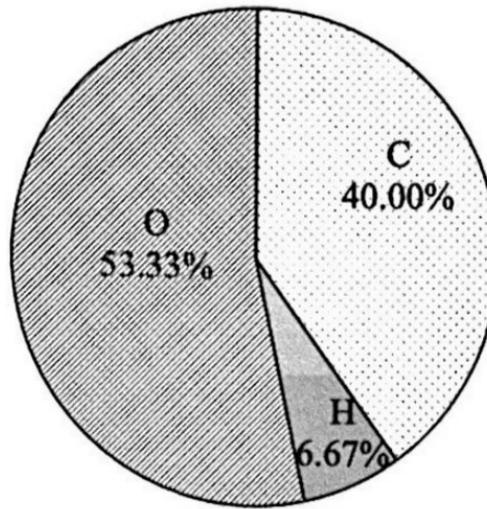
[Jisim atom relatif: N = 14, O = 16, K = 39, I = 127, Pb = 207]

Calculate the maximum mass of precipitate formed when excess lead(II) nitrate solution is added to 50 cm³ of 0.2 mol dm⁻³ potassium iodide solution.
[Relative atomic mass: N = 14, O = 16, K = 39, I = 127, Pb = 207]

- A 1.010 g
- B 2.020 g
- C 2.305 g
- D 4.610 g

- 37 Rajah 14 menunjukkan komposisi unsur bagi bahan W. Jisim molekul relatif bagi bahan W ialah 90.

Diagram 14 shows the composition of the elements in substance W. The relative molecular mass of substance W is 90.



Rajah 14
Diagram 14

Antara yang berikut, manakah pasangan formula empirik dan formula molekul yang betul bagi bahan W?

Which of the following is the correct pair of empirical formula and molecular formula of substance W?

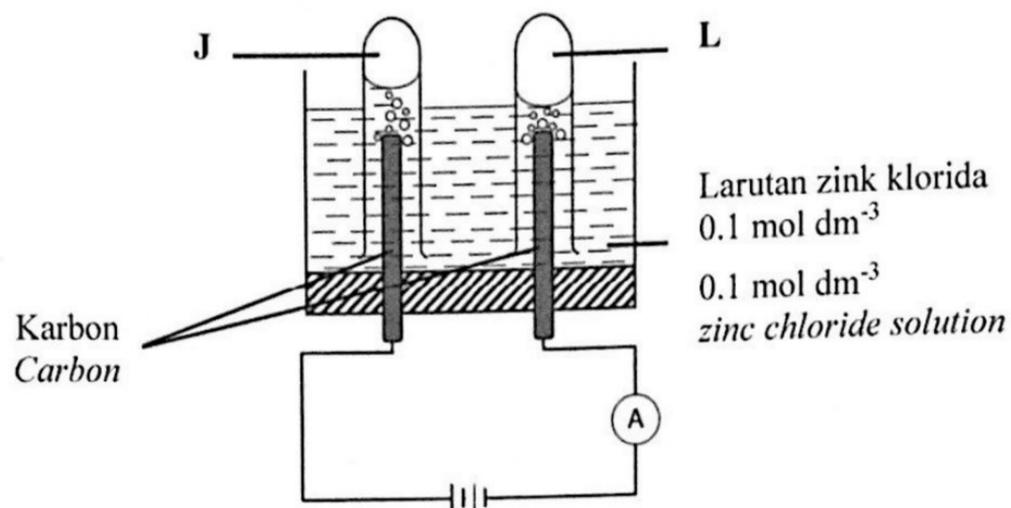
| | Formula empirik <i>Empirical formula</i> | Formula molekul <i>Molecular formula</i> |
|---|--|--|
| A | CH ₂ O | CH ₂ O |
| B | CH ₂ O | C ₃ H ₆ O ₃ |
| C | C ₃ H ₆ O ₃ | C ₃ H ₆ O ₃ |
| D | CH ₃ O | C ₂ H ₆ O ₂ |

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- 38 Rajah 15 menunjukkan susunan radas bagi elektrolisis larutan zink klorida 0.1 mol dm^{-3} .

Diagram 15 shows the apparatus set-up for the electrolysis of 0.1 mol dm^{-3} zinc chloride solution.



Rajah 15
Diagram 15

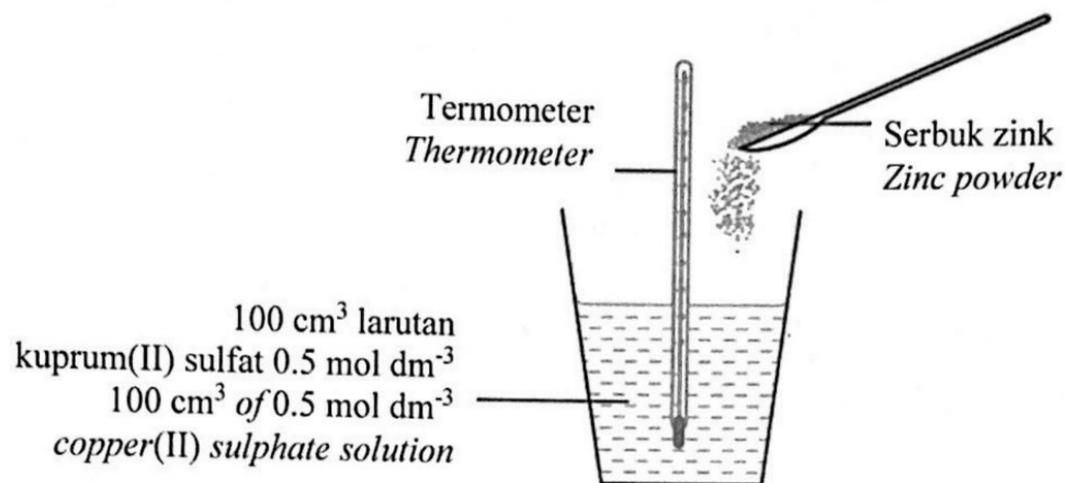
Diberi,
Given,

| Persamaan sel setengah <i>Half-cell equation</i> | $E^0 / \text{V (298K)}$ |
|--|-------------------------|
| $\text{Zn}^{2+} + 2\text{e}^- \rightleftharpoons \text{Zn}$ | - 0.76 |
| $2\text{H}^+ + 2\text{e}^- \rightleftharpoons \text{H}_2$ | 0.00 |
| $\text{O}_2 + 2\text{H}_2\text{O} + 4\text{e}^- \rightleftharpoons 4\text{OH}^-$ | + 0.40 |
| $\text{Cl}_2 + 2\text{e}^- \rightleftharpoons 2\text{Cl}^-$ | + 1.36 |

Apakah gas J dan L?
What is gas J and L?

| | J | L |
|---|-----------------------------|-----------------------------|
| A | Hidrogen <i>Hydrogen</i> | Klorin <i>Chlorine</i> |
| B | Oksigen <i>Oxygen</i> | Hidrogen <i>Hydrogen</i> |
| C | Klorin <i>Chlorine</i> | Hidrogen <i>Hydrogen</i> |
| D | Hidrogen <i>Hydrogen</i> | Oksigen <i>Oxygen</i> |

- 39 Rajah 16 menunjukkan susunan radas dan pemerhatian bagi satu aktiviti yang dilakukan oleh seorang murid.
 Diagram 16 shows the apparatus set up and observation for an activity carried out by a student.



| | |
|---|----------------------------|
| Perubahan suhu Temperature change | T °C |
| Haba tindak balas, ΔH Heat of reaction, ΔH | - 210 kJ mol ⁻¹ |

Rajah 16
Diagram 16

Aktiviti tersebut diulang dengan mengubah isipadu dan kepekatan larutan kuprum(II) sulfat bagi mendapatkan perubahan suhu sebanyak dua kali ganda, 2T °C dari aktiviti pertama.

The activity is repeated by changing the volume and concentration of copper(II) sulphate solution to obtain two times of temperature change, 2T °C from the first activity.

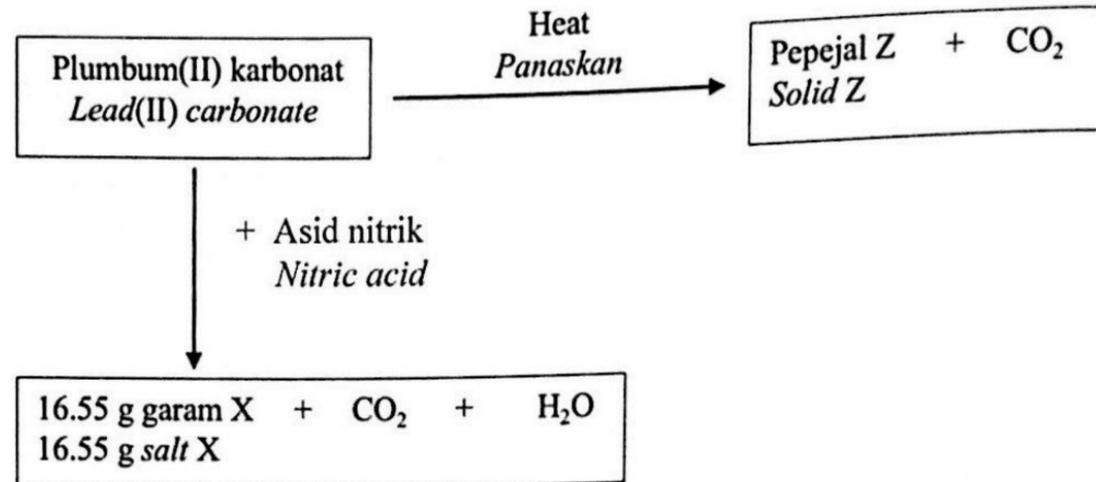
Manakah antara berikut merupakan isipadu dan kepekatan yang digunakan dalam aktiviti kedua?

Which of the following is the correct volume and concentration used for the second activity?

| | Isipadu (cm ³) Volume (cm ³) | Kepekatan (mol dm ⁻³) Concentration (mol dm ⁻³) |
|---|---|--|
| A | 100 | 2.0 |
| B | 50 | 1.0 |
| C | 100 | 0.5 |
| D | 50 | 0.25 |

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- 40 Rajah 17 menunjukkan dua tindak balas berbeza bagi plumbum(II) karbonat.
Diagram 17 shows two different reactions of lead(II) carbonate.



Rajah 17
Diagram 17

Berapakah jisim pepejal Z yang terbentuk apabila jisim plumbum(II) karbonat yang sama digunakan?
[Jisim atom relatif: N = 14, O = 16, Pb = 207]

What is the mass of solid Z formed when the same mass of lead(II) carbonate is used?
[Relative atomic mass: N = 14, O = 16, Pb = 207]

- A 14.34 g
- B 13.38 g
- C 11.95 g
- D 11.15 g

**KERTAS PEPERIKSAAN TAMAT
END OF QUESTION PAPER**

Selamat mengulangkaji dari telegram@soalanpercubaanspm
Kimia K1 Trial MRSM 2023