

4541/1
Kimia
Kertas 1
Ogos 2026
1 ¼ jam



MAKTAB RENDAH SAINS MARA

PEPERIKSAAN AKHIR SIJIL PENDIDIKAN MRSM 2026

Kimia

Kertas 1

Satu jam lima belas minit

JANGAN BUKA KERTAS PEPERIKSAAN INI SEHINGGA DIBERITAHU

1. *Kertas soalan 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 peperiksaan ini adalah dalam dwibahasa.*
5. *Kertas jawapan objektif hendaklah diserahkan kepada pengawas peperiksaan pada akhir peperiksaan.*

Kertas peperiksaan ini mengandungi 31 halaman bercetak dan 1 halaman tidak bercetak

- 1 Antara berikut, saintis manakah yang menemui neutron?
Which of the following scientist discovered neutron?
- A John Dalton
 B J. J Thomson
 C James Chadwick
 D Ernest Rutherford
- 2 Antara berikut, manakah definisi jisim atom relatif yang betul?
Which of the following is the correct definition of relative atomic mass?
- A
$$\frac{\text{Purata jisim satu atom unsur}}{\text{Jisim satu atom karbon-12}}$$

Average mass of one atom of the element
The mass of one carbon-12 atom
- B
$$\frac{\text{Purata jisim satu atom unsur}}{12 \times \text{jisim satu atom karbon-12}}$$

Average mass of one atom of the element
12 × the mass of one carbon-12 atom
- C
$$\frac{\text{Purata jisim satu atom unsur}}{\frac{1}{12} \times \text{jisim satu atom karbon-12}}$$

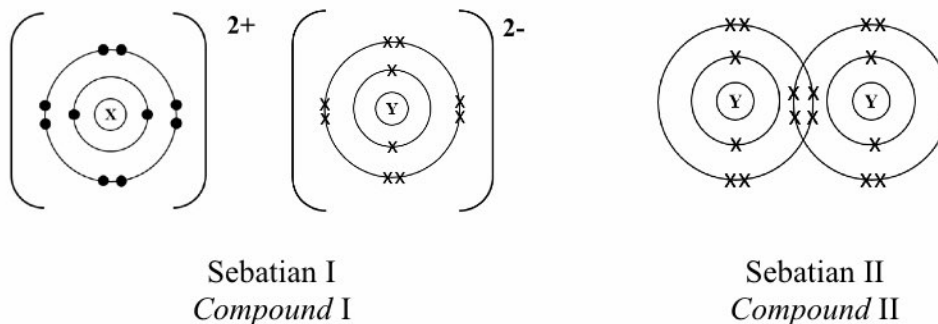
Average mass of one atom of an element

$$\frac{1}{12} \times \text{mass of one carbon-12 atom}$$
- D
$$\frac{\text{Jisim satu atom karbon-12}}{\frac{1}{12} \times \text{purata jisim satu atom karbon-12}}$$

Mass of one carbon-12 atom

$$\frac{1}{12} \times \text{average mass of one carbon-12 atom}$$

- 3 Bagaimanakah unsur-unsur disusun dalam Jadual Berkala Unsur?
How does the elements are arranged in the Periodic Table of Elements?
- A Susunan menurun saiz atom
Descending order of atomic size
- B Susunan menaik nombor nukleon
Ascending order of nucleon number
- C Susunan menurun bilangan neutron
Descending order of number of neutron
- D Susunan menaik nombor proton
Ascending order of proton number
- 4 Rajah 1 menunjukkan susunan elektron bagi dua jenis sebatian.
Diagram 1 shows the electron arrangement of two compounds.



Rajah 1
Diagram 1

Antara pernyataan berikut, yang manakah betul tentang pembentukan ikatan kimia bagi kedua-dua sebatian?

Which of the following statement is true about the formation of chemical bond for both compounds?

- A Atom-atom unsur membentuk ikatan kimia melalui perkongsian atau pemindahan elektron
Atoms of the elements form chemical bond through sharing or transfer of electrons
- B Semua atom unsur dapat mencapai susunan elektron duplet dan oktet yang stabil
All atoms of elements can achieve stable duplet and octet electron arrangement
- C Atom-atom unsur dapat membentuk ikatan ion melalui perkongsian elektron
Atoms of the elements can form ionic bond through sharing of electrons
- D Atom-atom unsur dapat membentuk molekul neutral sahaja
Atoms of the elements can form neutral molecules only

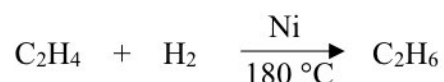
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- 5 Antara berikut, yang manakah larutan dengan isi padu dan kepekatan yang sama mempunyai bilangan ion hidroksida per unit isi padu paling rendah?

Which of the following solutions with the same volume and concentration has the lowest number of hydroxide ions per unit volume?

- A Ammonia
Ammonia
 - B Natrium hidroksida
Sodium hydroxide
 - C Barium hidroksida
Barium hydroxide
 - D Kalsium hidroksida
Calcium hydroxide
- 6 Persamaan kimia berikut menunjukkan satu tindak balas bagi etena.
The following chemical equation shows a reaction of ethene.

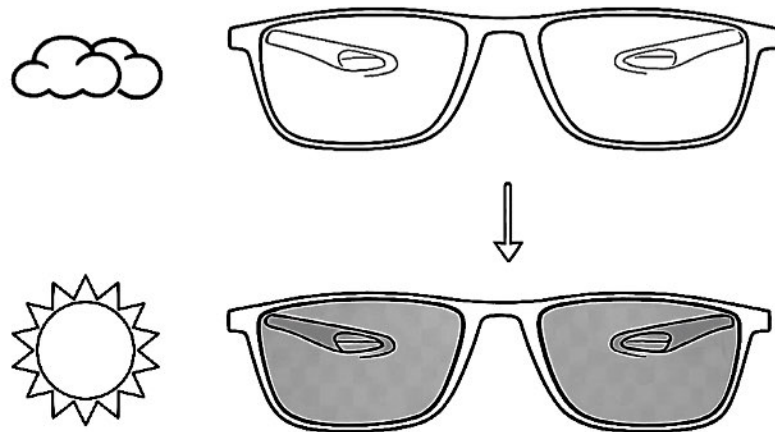


Antara berikut, yang manakah betul tentang nikel, Ni?

Which of the following is true about nickel, Ni?

- A Mengubah kadar tindak balas dan kuantiti hasil tindak balas
Change the rate of reaction and the quantity of the product
- B Mengubah kadar tindak balas dan kuantiti bahan tindak balas
Change the rate of reaction and the quantity of reactants
- C Mengubah kadar tindak balas tanpa mengalami perubahan fizik
Change the rate of reaction without undergoes physical changes
- D Mengubah kadar tindak balas tanpa mengalami perubahan kimia
Change the rate of reaction without undergoes chemical changes

- 7 Rajah 2 menunjukkan perubahan kepada cermin mata dalam dua situasi berbeza.
Diagram 2 shows changes to the spectacles in two different situations.



Rajah 2
Diagram 2

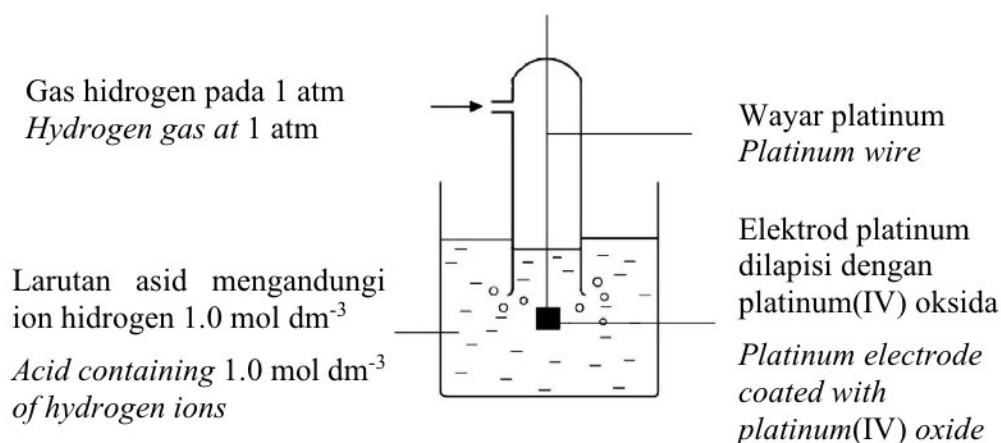
Antara berikut, bahan manakah digunakan untuk membuat kaca cermin mata tersebut?
Which of the following substances are used to make the glass of the spectacles?

- I Argentum klorida
 Silver chloride
 - II Argentum nitrat
 Silver nitrate
 - III Kuprum(I) klorida
 Copper(I) chloride
 - IV Kuprum(II) karbonat
 Copper(II) carbonate
-
- 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

- 8 Antara bahan dan sifat berikut, yang manakah dipadankan dengan betul?
Which of the following materials and characteristics are correctly matched?

	Bahan <i>Material</i>	Sifat <i>Characteristic</i>
A	Aloi <i>Alloy</i>	Keras dan tahan kakisan <i>Hard and resistance to corrosion</i>
B	Gentian kaca <i>Fibre glass</i>	Boleh menghantar data <i>Can transmit data</i>
C	Superkonduktor <i>Superconductor</i>	Tiada rintangan elektrik pada suhu yang tinggi <i>No electrical resistance at high temperature</i>
D	Konkrit yang diperkukuh <i>Reinforced concrete</i>	Kuat dan tahan tekanan tinggi <i>Strong and can withstand high pressure</i>

- 9 Rajah 3 menunjukkan satu sel setengah.
Diagram 3 shows a half-cell.



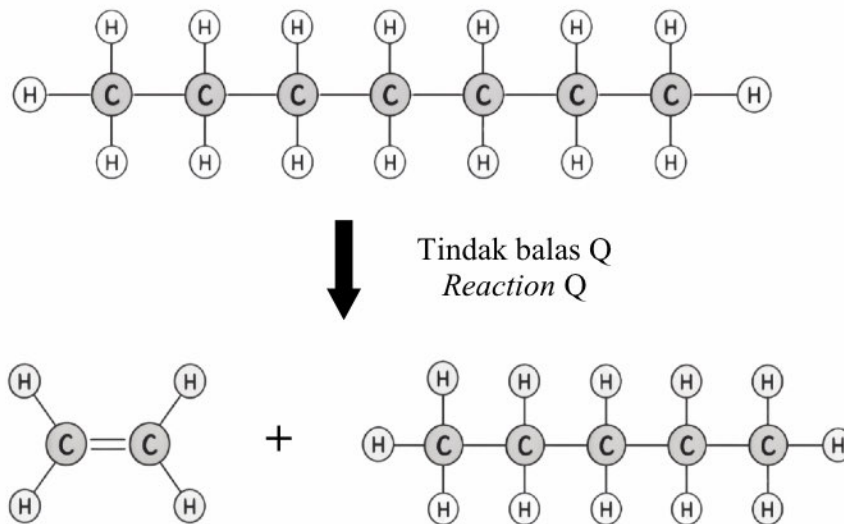
Rajah 3
Diagram 3

Apakah fungsi platinum(IV) oksida dalam sel tersebut?
What is the function of platinum(IV) oxide in the cell?

- A** Menjerap gas oksigen
Adsorbs oxygen gas
- B** Bertindak sebagai elektrod lengai
Acts as an inert electrode
- C** Meningkatkan luas permukaan platinum
Increases the surface area of platinum
- D** Menentukan nilai elektrod hidrogen piawai
Determine the standard hydrogen electrode value

- 10 Rajah 4 menunjukkan satu tindak balas kimia melibatkan hidrokarbon berantai panjang.

Diagram 4 shows a chemical reaction involving long-chain hydrocarbon.

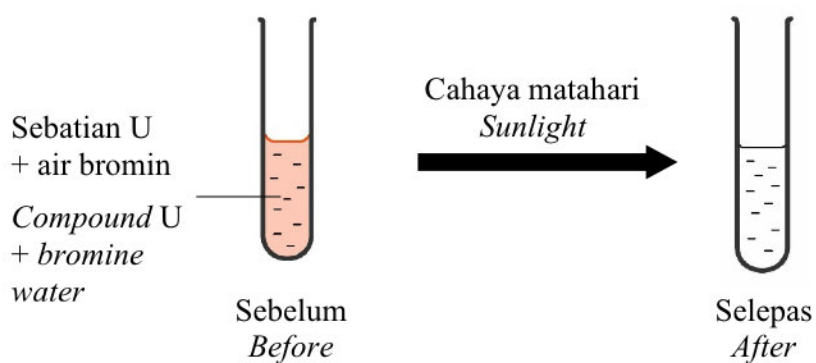


Rajah 4
Diagram 4

Apakah tindak balas Q?
What is reaction Q?

- A Penyulingan berperingkat
Fractional distillation
- B Pempolimeran
Polymerisation
- C Pengoksidaan
Oxidation
- D Peretakan
Cracking

- 11 Rajah 5 menunjukkan aktiviti makmal bagi satu tindak balas kimia.
Diagram 5 shows a laboratory activity for a chemical reaction.

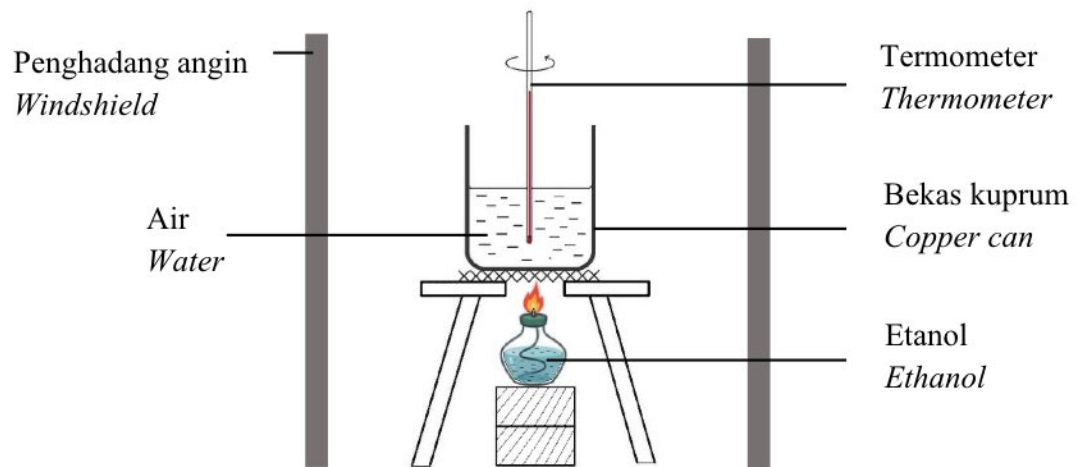


Rajah 5
Diagram 5

Apakah formula am bagi sebatian U?
What is the general formula for compound U?

- A $C_nH_{2n+1}COOC_mH_{2m+1}$
B $C_nH_{2n+1}COOH$
C $C_nH_{2n+1}OH$
D C_nH_{2n+2}

- 12 Rajah 6 menunjukkan susunan radas bagi menentukan haba pembakaran etanol.
Diagram 6 shows the apparatus set-up to determine the heat of combustion of ethanol.



Rajah 6
Diagram 6

Haba pembakaran yang ditentukan oleh pelajar lebih rendah dari nilai teori.
Antara berikut, manakah menerangkan perbezaan nilai haba pembakaran tersebut?

*Heat of combustion determined by the students is lower than theoretical value.
Which of the following explains the difference in the heat of combustion?*

- A Termometer tidak menyentuh dasar bekas kuprum
Thermometer does not touch the base of the copper can
- B Sebahagian haba diserap oleh kasa dawai
Some of heat is absorbed by the wire gauze
- C Bekas kuprum tidak ditutup
Copper can is not covered
- D Tidak menggunakan bikar
Beaker is not used

- 13 Persamaan termokimia berikut mewakili suatu tindak balas.
The following thermochemical equation represents a reaction.



Berdasarkan persamaan termokimia tersebut, apakah maksud haba penyesaran?
Based on the thermochemical equation, what is the meaning of the heat of displacement?

- A Haba diserap apabila 1 mol kuprum disesarkan daripada larutan kuprum(II) sulfat oleh zink
Heat absorbed when 1 mol of copper is displaced from copper(II) sulphate solution by zinc
- B Haba diserap apabila 1 mol zink menyesarkan kuprum daripada larutan kuprum(II) sulfat
Heat absorbed when 1 mol of zinc displaces copper from copper(II) sulphate solution
- C Haba dibebaskan apabila 1 mol kuprum disesarkan daripada larutan kuprum(II) sulfat oleh zink
Heat released when 1 mol of copper is displaced from copper(II) sulphate solution by zinc
- D Haba dibebaskan apabila 1 mol zink menyesarkan kuprum daripada larutan kuprum(II) sulfat
Heat released when 1 mol of zinc displaces copper from copper(II) sulphate solution
- 14 Antara berikut, yang manakah polimer semula jadi?
Which of the following is a natural polymer?
- A Poliisoprena
Polyisoprene
- B Polipropena
Polypropene
- C Polikloroetena
Polychloroethene
- D Polivinil klorida
Polyvinyl chloride

- 15 Rajah 7 menunjukkan perbualan antara ibu dan anaknya.
Diagram 7 shows a conversation between a mother and her daughter.



Rajah 7
Diagram 7

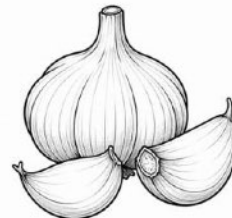
Berdasarkan Rajah 7, bahan manakah yang boleh digunakan untuk menggantikan krim X?

Based on Diagram 7, which substance can be used to replace cream X?

A



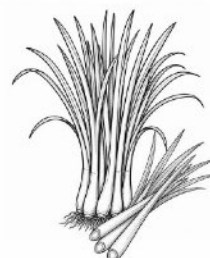
B



C



D



SERTAI TELEGRAM @exercise_students

- 16 Antara berikut, yang manakah mengandungi 6.02×10^{23} atom?
Which of the following contains 6.02×10^{23} atoms?

- A 1 mol gas neon
1 mol of neon gas
- B 1 mol gas ammonia
1 mol of ammonia gas
- C 1 mol gas oksigen
1 mol of oxygen gas
- D 1 mol gas karbon monoksida
1 mol of carbon monoxide

- 17 Pernyataan berikut menunjukkan maklumat tentang sebatian Z.
The following statement shows information about compound Z.

- Sebatian Z merupakan ahli kedua suatu siri homolog yang menukarkan kertas litmus biru kepada merah
Compound Z is the second members of a homologous series that change blue litmus paper to red
- Sebatian Z menghasilkan gas yang mengeruhkan air kapur apabila bertindak balas dengan ketulan marmar
Compound Z produces gas that change the limewater to cloudy when reacts with marble chips

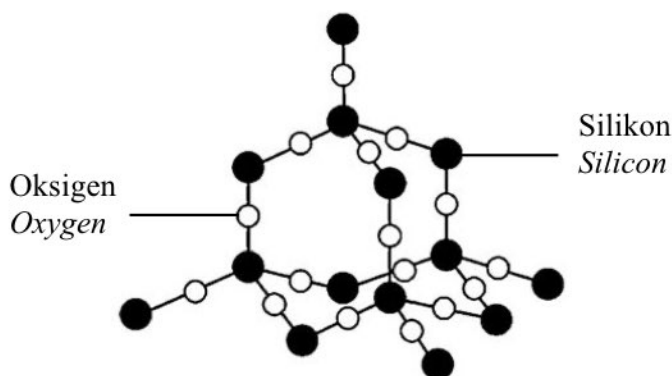
Antara pasangan berikut, yang manakah mewakili sebatian Z?
Which of the following represents compound Z?

	Kumpulan berfungsi Functional group	Formula empirik Empirical formula
A	$\begin{array}{c} \text{O} \\ \\ -\text{C}-\text{O}- \end{array}$	CH_2O
B	$\begin{array}{c} \text{O} \\ \\ -\text{C}-\text{O}- \end{array}$	$\text{C}_2\text{H}_4\text{O}_2$
C	$\begin{array}{c} \text{O} \\ \\ -\text{C}-\text{O}-\text{H} \end{array}$	CH_2O
D	$\begin{array}{c} \text{O} \\ \\ -\text{C}-\text{O}-\text{H} \end{array}$	$\text{C}_2\text{H}_4\text{O}_2$

- 18 Antara berikut, manakah padanan yang betul bagi zarah T?
Which of the following is the correct match for particle T?

	Zarah Particle	Bilangan elektron Number of electrons	Kala Period
A	T^-	11	3
B	T^{2+}	10	3
C	T	11	2
D	T^+	10	2

- 19 Rajah 8 menunjukkan struktur molekul bagi suatu sebatian kimia.
Diagram 8 shows the molecular structure of a chemical compound.



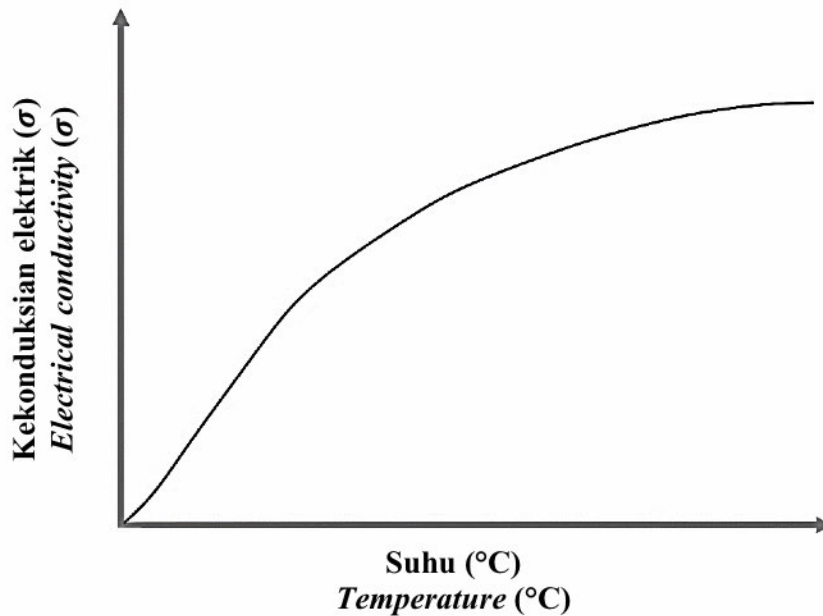
Rajah 8
Diagram 8

- Antara berikut, yang manakah betul mengenai sebatian ini?
Which of the following is correct about the compound?

- A Terdapat daya tarikan Van der Waals yang lemah antara molekul
Has weak Van der Waals forces between molecules
- B Boleh mengkonduksikan elektrik dalam keadaan leburan
Can conduct electricity in molten state
- C Larut dalam air tetapi tidak larut dalam propanon
Soluble in water but insoluble in propanone
- D Mempunyai takat lebur yang tinggi
Has high melting point

- 20 Rajah 9 menunjukkan graf hubungan antara kekonduksian elektrik melawan suhu bagi unsur X.

Diagram 9 shows a graph of the relationship between electrical conductivity against temperature for element X.



Rajah 9
Diagram 9

Antara berikut, unsur manakah yang menerangkan sifat fizik seperti yang ditunjukkan dalam graf di atas?

Which of the following element explains about the physical characteristic as shown in above graph?

- A Iodin
Iodine
- B Sulfur
Sulphur
- C Karbon
Carbon
- D Silikon
Silicon



- 21 Encik Rahim menghadapi masalah tanaman yang kurang subur di kebunnya. Rajah 10 menunjukkan nilai pH bagi larutan sampel tanah dari kebunnya.

Mr. Rahim is facing problems in his garden due to poor crop fertility.

Diagram 10 shows the pH value of the soil sample solution from his garden.



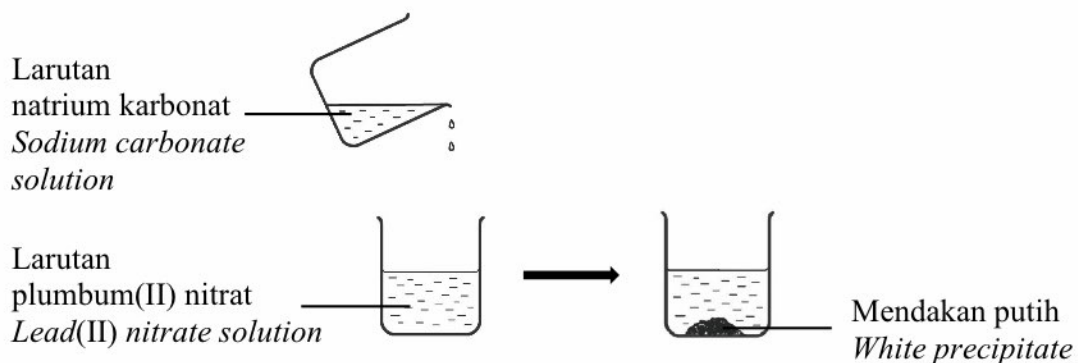
Rajah 10
Diagram 10

Antara berikut, bahan manakah yang sesuai digunakan untuk merawat tanah tersebut?
Which of the following substances is suitable to treat the soil?

- A Asid fosforik
Phosphoric acid
- B Tanah kompos
Compost soil
- C Kalsium oksida
Calcium oxide
- D Natrium hidroksida
Sodium hydroxide

- 22 Rajah 11 menunjukkan aktiviti makmal bagi menyediakan garam plumbum(II) karbonat.

Diagram 11 shows a laboratory activity to prepare lead(II) carbonate salt.



Rajah 11
Diagram 11

Antara berikut, larutan manakah yang boleh menggantikan larutan plumbum(II) nitrat untuk membentuk mendakan hijau?

Which of the following solution can be used to replace lead(II) nitrate solution to form green precipitate?

- A Larutan kalsium klorida
Calcium chloride solution
- B Larutan ferum(III) sulfat
Iron(III) sulphate solution
- C Larutan kuprum(II) nitrat
Copper(II) nitrate solution
- D Larutan zink nitrat
Zinc nitrate solution

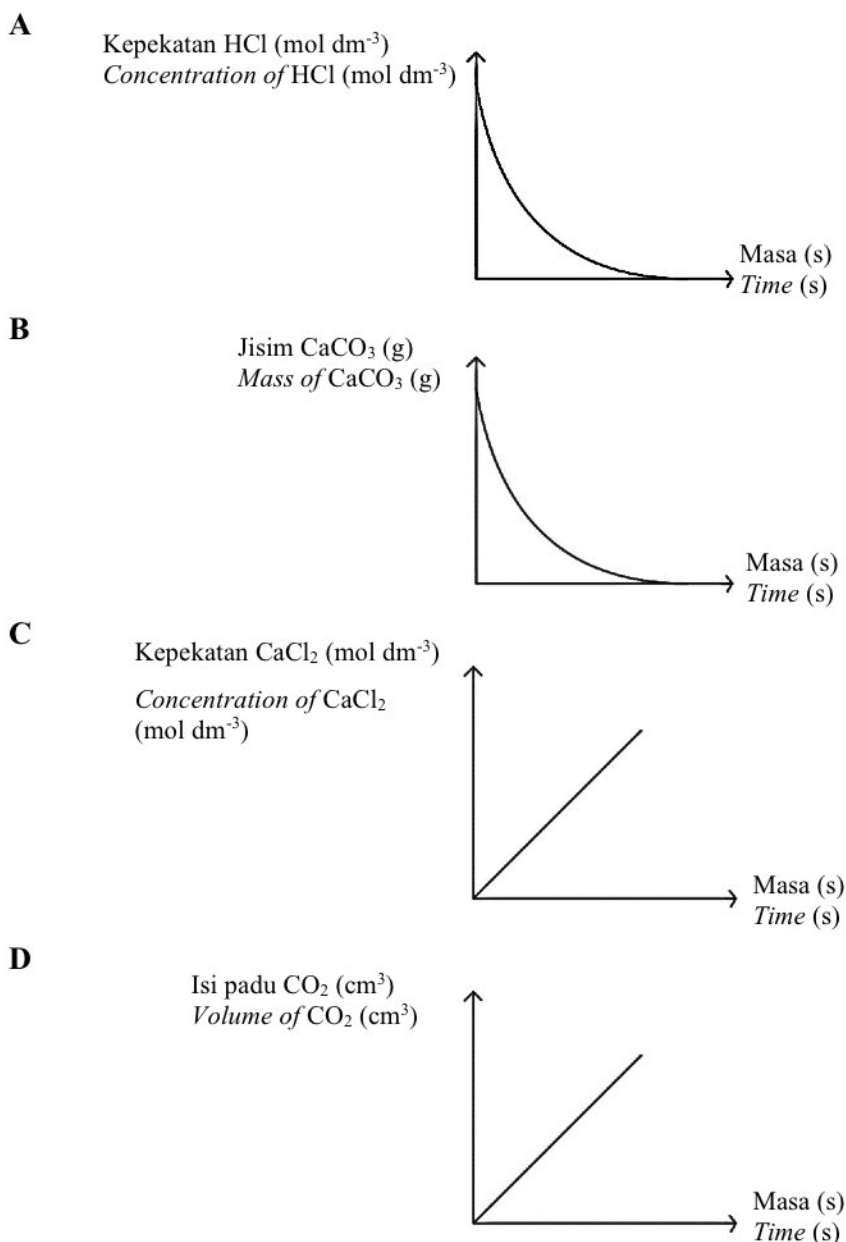


- 23 Persamaan kimia berikut menunjukkan tindak balas antara asid hidroklorik dan kalsium karbonat berlebihan.

The following chemical equation shows the reaction between hydrochloric acid and excess calcium carbonate.



Antara berikut, graf manakah yang menunjukkan lengkung bagi tindak balas di atas?
Which of the following graph shows the curve for the reaction above?



- 24 Persamaan kimia berikut mewakili satu tindak balas yang menukarkan propena kepada sebatian X.

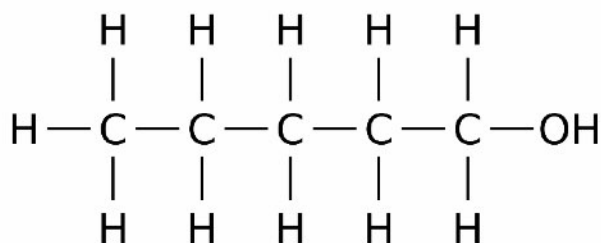
The following chemical equation represents a reaction that converts propene to compound X.



Apakah sebatian X?

What is compound X?

- A Propana
Propane
 - B Propanol
Propanol
 - C Asid propanoik
Propanoic acid
 - D Propan-1,2-diol
Propane-1,2-diol
- 25 Rajah 12 menunjukkan formula struktur bagi sebatian M.
Diagram 12 shows the structural formula for compound M.



Rajah 12
Diagram 12

Antara berikut, yang manakah merupakan satu isomer bagi sebatian M?
Which of the following is the isomer of compound M?

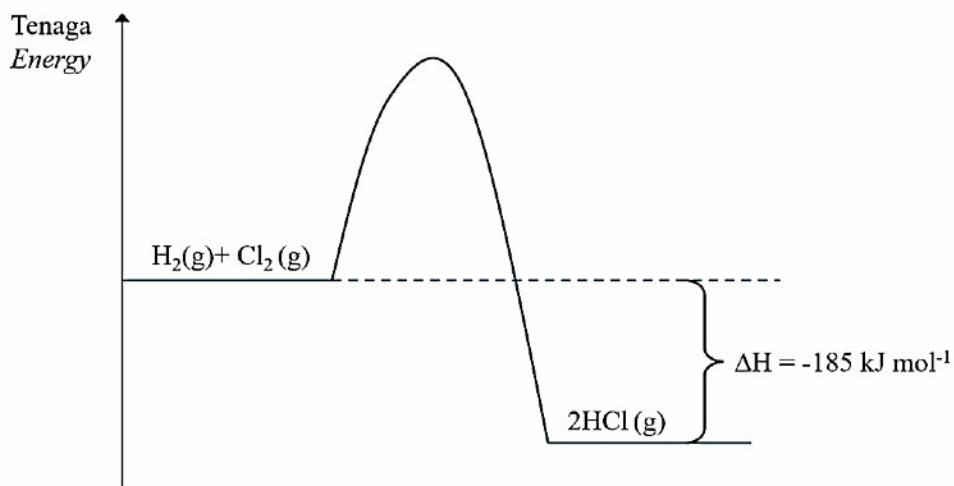
- A 2,2-dimetilpropan-1-ol
2,2-dimethylpropan-1-ol
- B 2-metilbutan-3-ol
2-methylbutan-3-ol
- C 2-etilpropan-2-ol
2-ethylpropan-2-ol
- D Pentan-4-ol
Pentan-4-ol



SERTAI TELEGRAM @exercise_students

- 26 Rajah 13 menunjukkan gambarajah profil tenaga bagi tindak balas antara gas hidrogen dan gas klorin.

Diagram 13 shows the energy profile diagram for the reaction between hydrogen gas and chlorine gas.

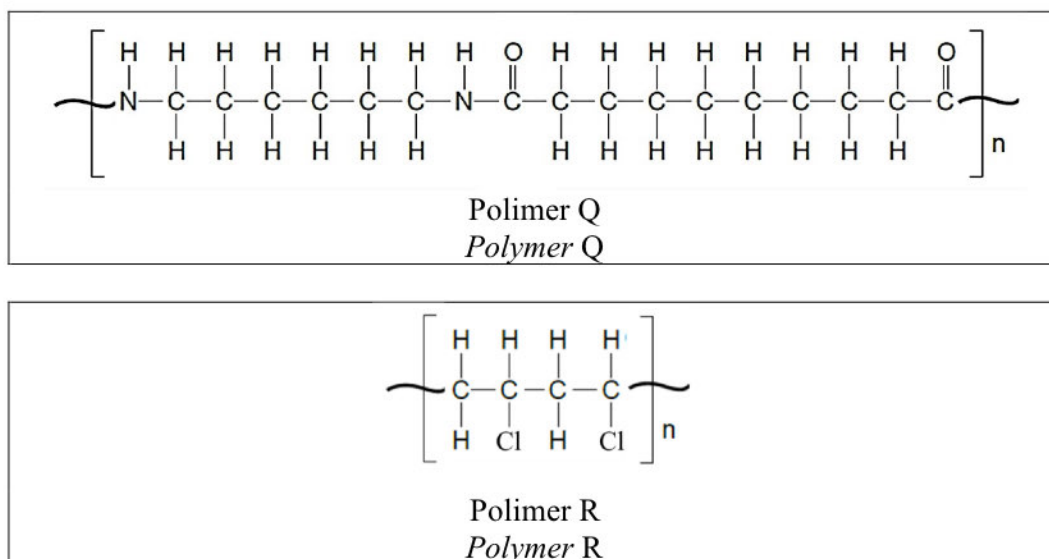


Rajah 13
Diagram 13

Antara berikut, pernyataan manakah betul tentang gambarajah profil tenaga ini?
Which of the following statements is correct about the energy profile diagram?

- A Tindak balas endotermik
Endothermic reaction
- B Haba dibebaskan ke persekitaran
Heat is released to the surroundings
- C Suhu persekitaran berkurang semasa tindak balas
The temperature of the surroundings decreases during the reaction
- D 185 kJ haba diserap apabila 2 mol gas hidrogen klorida dihasilkan
185 kJ of heat is absorbed when 2 mole of hydrogen chloride gas is produced

- 27 Rajah 14 menunjukkan polimer Q dan R.
Diagram 14 shows polymer Q and R.

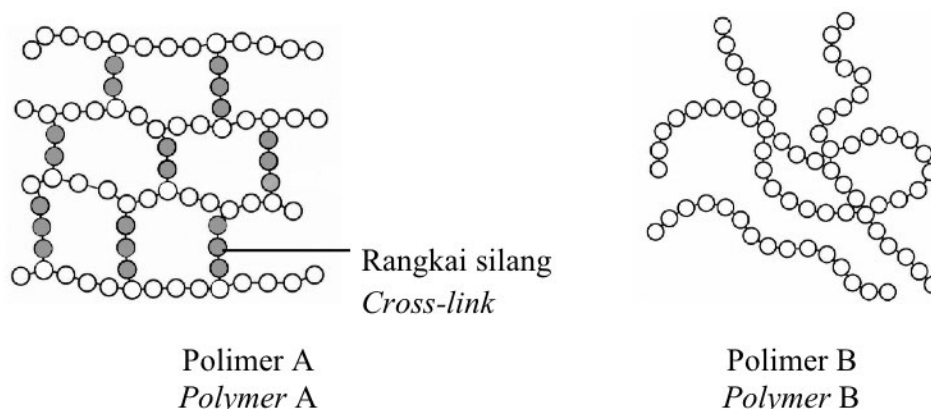


Rajah 14
Diagram 14

Antara padanan berikut, yang manakah betul mengenai polimer Q dan R?
Which of the following pairs is correct about polymer Q and R?

	Polimer Polymer	Penerangan Explanation
A	Q	Salah satu hasil tindak balas dalam penghasilan polimer ini ialah air <i>One of the products in the production of the polymer is water</i>
B	Q, R	Pempolimeran melibatkan sekurang-kurangnya dua jenis monomer yang berbeza <i>Polymerisation involves at least two different types of monomers</i>
C	R	Digunakan dalam pembuatan alat mainan <i>Used in making toys</i>
D	Q, R	Kedua-duanya adalah polimer sintetik <i>Both are synthetic polymers</i>

- 28 Rajah 15 menunjukkan struktur bagi dua polimer.
Diagram 15 shows a structure of two polymers.



Rajah 15
Diagram 15

Antara berikut, pernyataan manakah yang betul bagi menunjukkan perbezaan antara Polimer A dan Polimer B?

Which of the following statements is correct to show the difference between Polymer A and Polymer B?

	Polimer A <i>Polymer A</i>	Polimer B <i>Polymer B</i>
A	Dapat diacu berulang kali selepas dipanaskan <i>Can be repeatedly remoulded upon heating</i>	Tidak dapat diacu semula selepas dipanaskan <i>Cannot be remoulded after heating</i>
B	Terurai atau hangus apabila dipanaskan <i>Disintegrate or burn upon heating</i>	Melebur apabila dipanaskan dan mengeras apabila disejukkan <i>Melts when heated and hardens when cooled</i>
C	Boleh digunakan untuk menghasilkan nilon <i>Can be used to produce nylon</i>	Boleh digunakan untuk menghasilkan melamina <i>Can be used to produce melamine</i>
D	Dapat dikitar semula <i>Can be recycled</i>	Tidak dapat dikitar semula <i>Cannot be recycled</i>

- 29 Jadual 1 menunjukkan kuantiti bahan pencuci untuk membasuh sehelai baju dengan menggunakan air sungai.

Table 1 shows the quantity of cleaning agent used to wash a shirt by using river water.

Bahan pencuci <i>Cleaning agent</i>	Detergen <i>Detergent</i>	Sabun <i>Soap</i>
Jisim (g) <i>Mass (g)</i>	20	45

Jadual 1

Table 1

Antara pernyataan berikut, yang manakah menerangkan perbezaan jisim bahan pencuci yang digunakan?

Which of the following statement explains the different of mass of cleaning agent used?

- A Detergen tidak terbiodegradasi tetapi sabun terbiodegradasi
Detergent is non-biodegradable but soap is biodegradable
- B Detergen dan sabun ialah bahan pencuci yang efektif
Detergent and soap is an effective cleaning agent
- C Pembentukan kekat menyebabkan lebih banyak sabun digunakan berbanding detergen dalam air sungai
The formation of scum caused more soap is used to wash the shirt compared to detergent in river water
- D Detergen dapat membasuh baju dengan bersih berbanding sabun
Detergent can wash the shirt cleaner than soap

- 30 Persamaan kimia berikut menunjukkan tindak balas antara ferum dan klorin.
The following chemical equation shows the reaction between iron and chlorine.

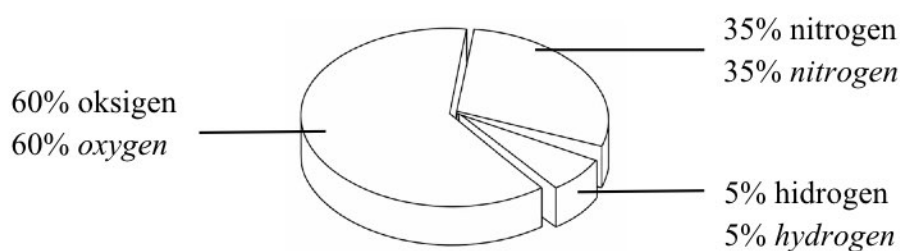


1.12 g ferum terbakar dengan lengkap dalam klorin.
Berapakah jisim hasil tindak balas itu?

*1.12 g of iron burns completely in chlorine.
What is the mass of the product formed?*

[Jisim atom relatif: Cl = 35.5, Fe = 56]
[Relative atomic mass: Cl = 35.5, Fe = 56]

- A 1.63 g
B 1.83 g
C 3.25 g
D 6.50 g
- 31 Rajah 16 menunjukkan komposisi baja X.
Diagram 16 shows the composition of fertilizer X.



Rajah 16
Diagram 16

Tentukan formula empirik baja X.
Determine the empirical formula of fertiliser X.

[Jisim atom relatif: H = 1, N = 14, O = 16]
[Relative atomic mass: H = 1, N = 14, O = 16]

- A NH_2O_2
B $\text{N}_2\text{H}_4\text{O}_3$
C $\text{N}_2\text{H}_4\text{O}_6$
D $\text{N}_2\text{H}_6\text{O}_3$

- 32 50 cm³ asid hidroklorik 1.0 mol dm⁻³ bertindak balas dengan zink berlebihan. Berapakah isi padu gas hidrogen yang dihasilkan pada keadaan bilik?

50 cm³ of 1.0 mol dm⁻³ of hydrochloric acid reacts with excess zinc.
What is the volume of hydrogen gas produced at room conditions?

[Isi padu molar gas pada keadaan bilik = 24 dm³ mol⁻¹]

[Molar volume of gas at room conditions = 24 dm³ mol⁻¹]

- A 0.6 dm³
B 1.2 dm³
C 2.4 dm³
D 4.8 dm³
- 33 Jadual 2 menunjukkan jumlah isi padu gas hidrogen yang terkumpul dalam tindak balas antara magnesium dengan asid nitrik.

Table 2 shows the total volume of hydrogen gas collected in the reaction between magnesium and nitric acid.

Masa (s) Time (s)	0	30	60	90	120	150	180	210	240
Isi padu gas (cm ³) Volume of gas (cm ³)	0.00	5.20	9.40	12.80	15.00	16.20	17.00	17.00	17.00

Jadual 2

Table 2

Apakah kadar tindak balas purata dalam minit ketiga?

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

- A 0.013 cm³ s⁻¹
B 0.033 cm³ s⁻¹
C 0.094 cm³ s⁻¹
D 0.108 cm³ s⁻¹



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- 34 Rajah 17 menunjukkan tindakan yang diambil oleh seorang juruwang di pasar raya untuk membuka beg plastik dengan lebih mudah.

Diagram 17 shows an action of a cashier at a supermarket to open the plastic bag easily.



Rajah 17
Diagram 17

Antara pernyataan berikut, yang manakah paling baik menerangkan tindakan juruwang tersebut?

Which of the following best explains the action of the cashier?

- A Menjadikan air mudah meruap dan memudahkan plastik dibuka
Causes water to evaporate and makes plastic easier to open
- B Mengurangkan geseran antara jari dengan plastik dan memudahkan plastik dibuka
Reduce friction between the fingers and plastic and makes it easier to open
- C Membolehkan molekul air melekat antara satu sama lain dan memudahkan plastik dibuka
Enable water molecules stick to each other and makes plastic easier to open
- D Membolehkan molekul air melekat pada permukaan kulit dan plastik dan memudahkan plastik dibuka
Allow water molecules to adhere to the surface of skin and plastic and makes it easier to open

- 35 Rajah 18 menunjukkan perbualan di antara dua orang pelajar.
Diagram 18 shows a conversation between two students.



Rajah 18
Diagram 18

Apakah nilai pH bagi larutan natrium hidroksida yang telah disediakan?
What is the pH value of the sodium hydroxide solution prepared?

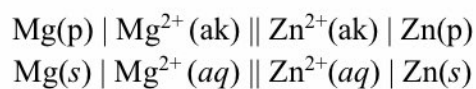
[Jisim atom relatif: H = 1, O = 16, Na = 23]

[Relative atomic mass: H = 1, O = 16, Na = 23]

- A 0.6
- B 0.7
- C 13.3
- D 14.0

- 36 Notasi sel bagi suatu sel kimia adalah seperti berikut:

Cell notation for a chemical cell are as follows:



Diberi sebahagian daripada nilai keupayaan elektrod piawai:

Given part of the standard electrode potential value:

Tindak balas sel setengah <i>Half-cell equation</i>	E^0 / V (298 K)
$\text{Zn}^{2+} + 2\text{e}^- \rightleftharpoons \text{Zn}$	- 0.76
$\text{Mg}^{2+} + 2\text{e}^- \rightleftharpoons \text{Mg}$	- 2.38

Apakah nilai voltan sel tersebut?

What is the voltage of the cell?

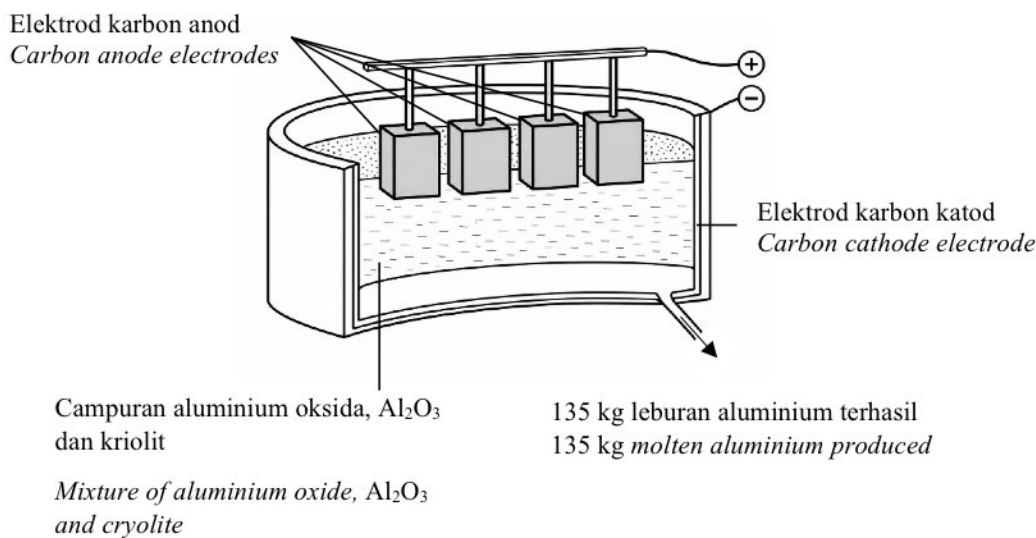
- A + 1.62 V
- B - 1.62 V
- C + 3.14 V
- D - 3.14 V



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- 37 Rajah 19 menunjukkan proses pengekstrakan aluminium daripada bijihnya.
Diagram 19 shows the extraction process of aluminium from its ore.



Rajah 19
 Diagram 19

Persamaan kimia berikut menunjukkan tindak balas yang berlaku:
The following chemical equation shows reaction that occurs:



Oksigen yang terhasil bertindak balas dengan elektrod karbon dan menghasilkan gas karbon dioksida. Berapakah isi padu gas karbon dioksida yang dibebaskan pada keadaan bilik?

Oxygen formed reacts with carbon electrodes and produces carbon dioxide gas. What is the volume of carbon dioxide gas released at room condition?

[Jisim atom relatif: C = 12, O = 16, Al = 27]

[Isi padu molar gas pada keadaan bilik = $24 \text{ dm}^3 \text{ mol}^{-1}$]

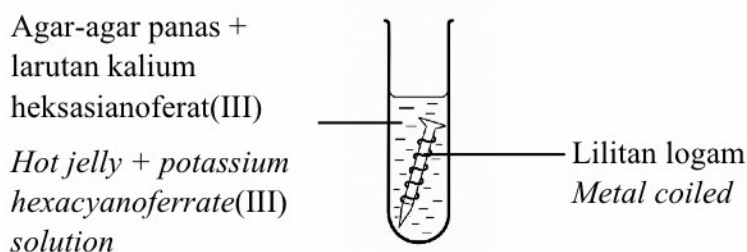
[Relative atomic mass: C = 12, O = 16, Al = 27]

[Molar volume of gas at room conditions = $24 \text{ dm}^3 \text{ mol}^{-1}$]

- A 90 000 cm^3
- B 90 000 dm^3
- C 120 000 cm^3
- D 120 000 dm^3

- 38 Rajah 20 menunjukkan susunan radas untuk mengkaji kesan logam T, U dan V yang dililit pada paku besi ke atas pengaratan besi.

Diagram 20 shows the apparatus set-up to study the effects of metal T, U and V that is coiled on iron nail towards the rusting of iron.



Rajah 20
Diagram 20

Jadual 3 menunjukkan pemerhatian eksperimen tersebut.

Table 3 shows observations for the experiment.

Lilitan logam <i>Metal coiled</i>	Pemerhatian <i>Observation</i>
T	Banyak tompok biru tua terbentuk <i>Dark blue spot formed</i>
U	Tiada perubahan <i>No change</i>
V	Sedikit tompok biru tua terbentuk <i>A little dark blue spot formed</i>

Jadual 3
Table 3

Antara pasangan berikut, yang manakah betul bagi sel kimia yang dibina menggunakan logam T, U dan V?

Which of the following pairs is correct for the chemical cells builds using metal T, U and V?

	Pasangan logam <i>Pair of metals</i>	Logam bertindak sebagai katod <i>Metal acts as cathode</i>	Bacaan voltmeter <i>Voltmeter reading</i>
A	U dan V <i>U and V</i>	V	Paling rendah <i>Lowest</i>
B	T dan V <i>T and V</i>	V	Paling tinggi <i>Highest</i>
C	T dan U <i>T and U</i>	U	Paling rendah <i>Lowest</i>
D	T dan U <i>T and U</i>	T	Paling tinggi <i>Highest</i>

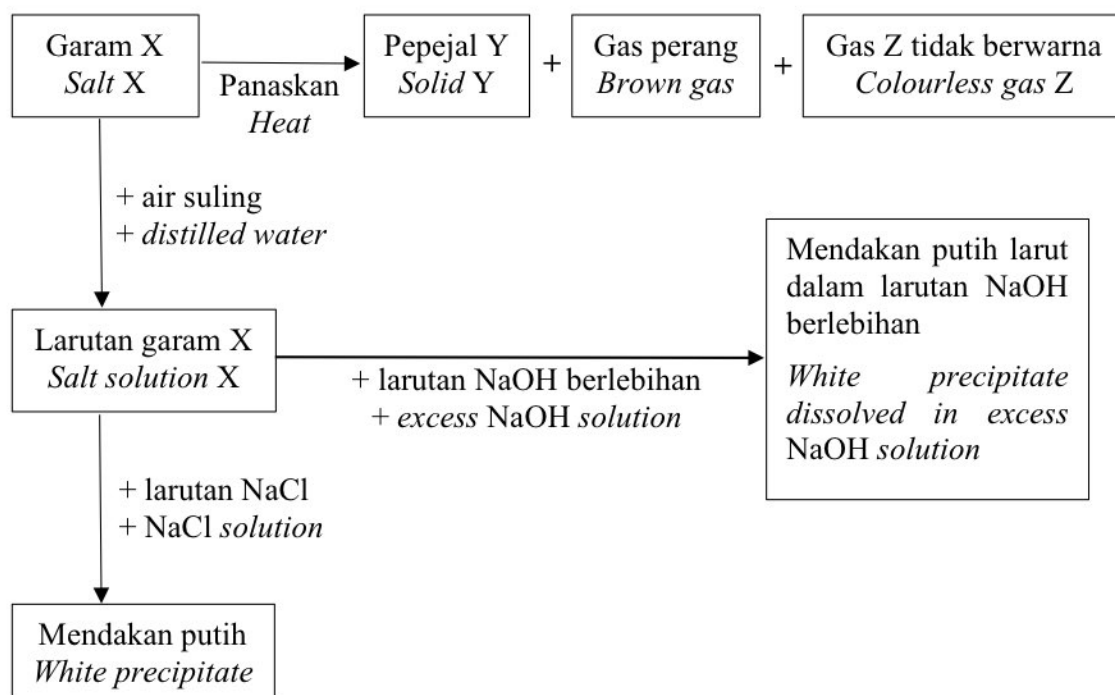


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- 39 Rajah 21 menunjukkan carta alir bagi beberapa tindak balas yang dijalankan ke atas garam X.

Diagram 21 shows a flow chart for a series of reaction on salt X.



Rajah 21
Diagram 21

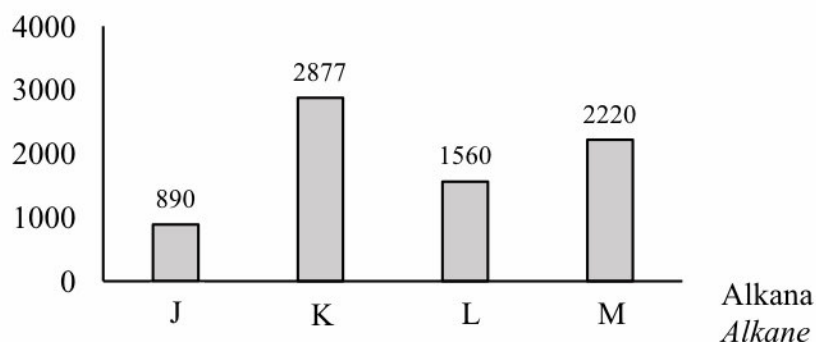
Antara pernyataan berikut, yang manakah betul tentang X, Y dan Z?

Which of the following statements is correct about X, Y and Z?

	X	Y	Z
A	$\text{Zn}(\text{NO}_3)_2$	Pepejal kuning semasa panas, putih semasa sejuk <i>Yellow solid when hot, white when cold</i>	Gas hidrogen <i>Hydrogen gas</i>
B	$\text{Zn}(\text{NO}_3)_2$	Pepejal perang semasa panas, kuning semasa sejuk <i>Brown solid when hot, yellow when cold</i>	Gas oksigen <i>Oxygen gas</i>
C	$\text{Pb}(\text{NO}_3)_2$	Pepejal kuning semasa panas, putih semasa sejuk <i>Yellow solid when hot, white when cold</i>	Gas hidrogen <i>Hydrogen gas</i>
D	$\text{Pb}(\text{NO}_3)_2$	Pepejal perang semasa panas, kuning semasa sejuk <i>Brown solid when hot, yellow when cold</i>	Gas oksigen <i>Oxygen gas</i>

- 40 Rajah 22 menunjukkan haba pembakaran bagi empat alkana yang berbeza.
Diagram 22 shows the heat of combustion for four different alkanes.

Haba pembakaran (kJ mol^{-1})
Heat of combustion (kJ mol^{-1})



Rajah 22
Diagram 22

- Jadual 4 menunjukkan jisim molar untuk empat alkana berbeza.
Table 4 shows the molar mass for four different alkanes.

Alkana <i>Alkane</i>	Jisim molar (g mol^{-1}) <i>Molar mass (g mol^{-1})</i>
J	16
K	58
L	30
M	44

Jadual 4
Table 4

Antara susunan berikut, yang manakah betul bagi nilai bahan api dalam tertib menaik?
Which of the following arrangement is correct for the fuel value in an ascending order?

- A K, M, L, J
B J, L, M, K
C J, K, L, M
D M, L, K, J

KERTAS PEPERIKSAAN TAMAT



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