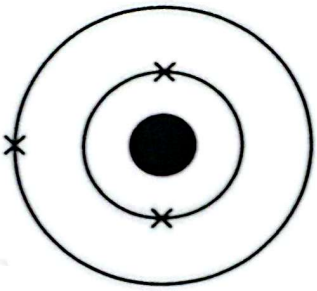
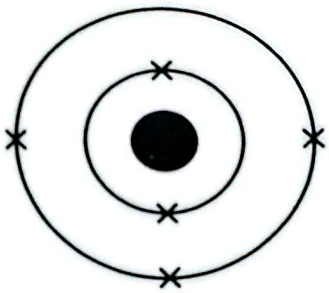
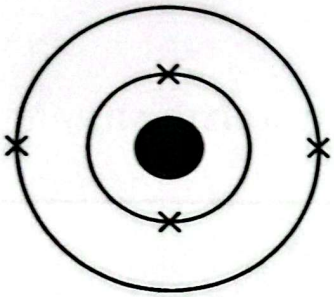
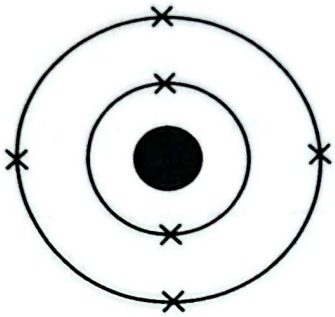
1 Antara berikut, atom yang manakah mempunyai tiga elektron valens?
Which of the following atoms has three valence electrons?

A


C


B


D


2 Pernyataan berikut merujuk kepada sumbangan seorang ahli sains dalam perkembangan idea tentang struktur atom.
The following statement refers to the contribution of a scientist in the development of ideas about atomic structure.

- Menemui proton
  Discovered the proton
- Nukleus sebagai pusat atom
  Nucleus as the centre of an atom
- Elektron bergerak di luar nukleus
  Electrons move outside the nucleus

Siapakah ahli sains itu?
Who is the scientist?

A Niels Bohr
B John Dalton
C James Chadwick
D Ernest Rutherford

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3 Unsur X dan unsur Y masing-masing terletak dalam Kumpulan 1 dan Kumpulan 16 dalam Jadual Berkala Unsur. Unsur X bertindak balas dengan unsur Y untuk membentuk suatu sebatian.

Apakah formula kimia bagi sebatian itu?

Element X and element Y are located in Group 1 and Group 16 respectively in the Periodic Table of Elements. Element X reacts with element Y to form a compound.

What is the chemical formula of the compound?

A XY

B XY_2

C X_2Y

D X_2Y_3

4 Antara berikut, sifat fizik yang manakah sama bagi unsur-unsur dalam Kumpulan 17 dalam Jadual Berkala Unsur?

Which of the following physical properties are the same for the elements in Group 17 of the Periodic Table of Elements?

A Warna
Colour

B Saiz atom
Atomic size

C Takat lebur
Melting point

D Tidak mengkonduksi arus elektrik
Does not conduct electricity

5 Antara berikut, pernyataan manakah yang **benar** tentang peranan air dalam menunjukkan sifat keasidan?

*Which of the following statements is **true** about the role of water in showing acidic properties?*

A Molekul asid akan larut dalam air menghasilkan ion hidroksida
Acid molecules will dissolve in water to produce hydroxide ions

B Kehadiran air akan menyebabkan kertas litmus merah bertukar biru
The presence of water will cause red litmus paper to turn blue

C Peneutralan asid akan berlaku dalam air untuk menghasilkan ion hidrogen
Neutralisation of acid will occur in water to produce hydrogen ions

D Molekul asid akan mengion di dalam air untuk menghasilkan ion hidrogen
Acid molecules will ionise in water to produce hydrogen ions

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6 Berikut adalah ciri-ciri bagi unsur L dan unsur M.
The following are the characteristics of elements L *and* M.

- Membentuk ion kompleks
  Forms complex ions
- Membentuk sebatian berwarna
  Forms coloured compounds

Apakah L dan M?
What are L *and* M*?*

I Ferum
Iron

II Barium
Barium

III Kromium
Chromium

IV Magnesium
Magnesium

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

7 Antara berikut, pernyataan yang manakah menerangkan tentang ikatan datif?
Which of the following statements explains about dative bond?

A Ikatan kovalen yang terbentuk apabila hanya satu atom berkongsi elektron
Covalent bond that formed when only one atom shares electrons

B Ikatan kovalen yang terbentuk apabila elektron dipindahkan daripada satu atom sahaja
Covalent bond that formed when electron is transferred from one atom only

C Ikatan kovalen yang terbentuk apabila pasangan elektron dikongsi oleh dua atom bukan logam
Covalent bond that formed when a pair of electrons is shared by two non-metal atoms

D Ikatan kovalen yang terbentuk apabila pasangan elektron dikongsi berasal daripada satu atom sahaja
Covalent bond that formed when a pair of electrons that is shared comes from one atom only

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8 Antara berikut, tindak balas yang manakah merupakan tindak balas perlahan?
Which of the following reactions is a slow reaction?

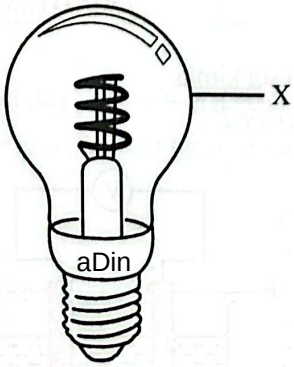
A Penapaian glukosa
Fermentation of glucose

B Percikan bunga api
Sparks of fireworks

C Pembakaran metanol
Combustion of methanol

D Pemendakan argentum klorida
Precipitation of silver chloride

9 Rajah 1 menunjukkan sebuah mentol LED.
Diagram 1 *shows a* LED *bulb.*



Rajah / *Diagram* 1

Antara berikut, kaca yang manakah sesuai untuk menghasilkan bahagian X?
Which of the following glass is suitable for producing part X?

A Kaca plumbum
Lead crystal glass

B Kaca borosilikat
Borosilicate glass

C Kaca soda kapur
Soda-lime glass

D Kaca silika terlakur
Fused silica glass

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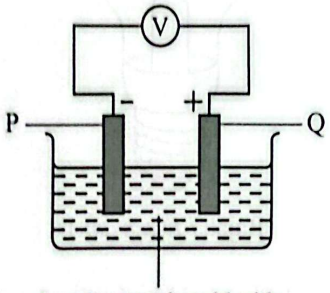
10 Antara berikut, padanan yang manakah **betul**?
Which of the following is matched correctly?

	Bahan komposit *Composite materials*	**Bahan matriks** *Matrix substance*	**Bahan pengukuhan** *Strengthening substance*
A	Gentian kaca *Glass fibre*	Plastik *Plastic*	Kaca gentian *Fibre glass*
B	Gentian optik *Optical fibre*	Plastik *Plastic*	Gentian kaca silika *Silica glass fibre*
C	Konkrit diperkukuhkan *Reinforced concrete*	Jejaring dawai *Wire mesh*	Konkrit *Concrete*
D	Kaca fotokromik *Photochromic glass*	Argentum klorida dan kuprum(I) klorida *Silver chloride and copper(I) chloride*	Kaca *Glass*

11 Rajah 2 menunjukkan suatu sel kimia.
Diagram 2 shows a chemical cell.



Larutan natrium klorida
Sodium chloride solution

Rajah / *Diagram* 2

Apakah yang berlaku di P dan Q?
What happen at P *and* Q?

	P	**Q**
A	Kehilangan oksigen *Loss of oxygen*	Menerima oksigen *Gain of oxygen*
B	Menerima hidrogen *Gains of hydrogen*	Kehilangan hidrogen *Loss of hydrogen*
C	Menerima elektron *Gains of electrons*	Kehilangan elektron *Loss of electrons*
D	Pertambahan nombor pengoksidaan *Increase in oxidation number*	Pengurangan nombor pengoksidaan *Decrease in oxidation number*

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12 Jadual 1 menunjukkan nilai keupayaan elektrod piawai bagi sel setengah dalam suatu sel kimia.
Table 1 shows the standard electrode potential value of half-cells in a chemical cell.

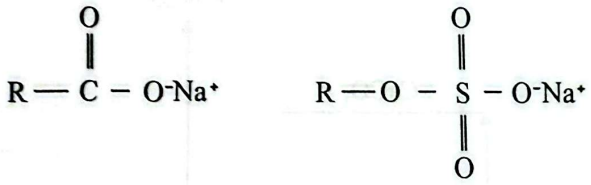
Persamaan sel setengah ***Half-cell equation***	**E⁰ (V)**
Cu^{2+} (ak/*aq*) + $2e^-$ ⇌ Cu (p/*s*)	+ 0.34
Ag^+ (ak/*aq*) + e^- ⇌ Ag (p/*s*)	+ 0.80

Jadual / *Table* 1

Antara berikut, agen penurunan yang manakah paling kuat?
Which of the following reducing agents is the strongest?

A Cu^{2+}
B Ag^+
C Cu
D Ag

13 Rajah 3 menunjukkan formula bagi dua jenis bahan pencuci X dan bahan pencuci Y.
Diagram 3 shows the formulae for two different types of cleaning agent X and Y.



Bahan pencuci X
Cleaning agent X

Bahan pencuci Y
Cleaning agent Y

Rajah / *Diagram* 3

Antara berikut, pernyataan yang manakah **betul** tentang bahan pencuci X dan bahan pencuci Y?
Which of the following statements is ***correct*** *about cleaning agent X and Y?*

	Bahan pencuci X ***Cleaning agent* X**	**Bahan pencuci Y** ***Cleaning agent* Y**
A	Terbiodegradasi *Biodegradable*	Kebanyakannya tidak terbiodegradasi *Most are not biodegradable*
B	Berkesan dalam air liat sahaja *Effective in hard water only*	Berkesan dalam air liat dan air lembut *Effective in hard water and soft water*
C	Tidak membentuk kekat dalam air liat *Does not form scum in hard water*	Membentuk kekat dalam air liat *Forms scum in hard water*
D	Dihasilkan daripada pecahan petroleum *Produced from fraction of petroleum*	Dihasilkan daripada minyak atau lemak *Produced from oil or fat*

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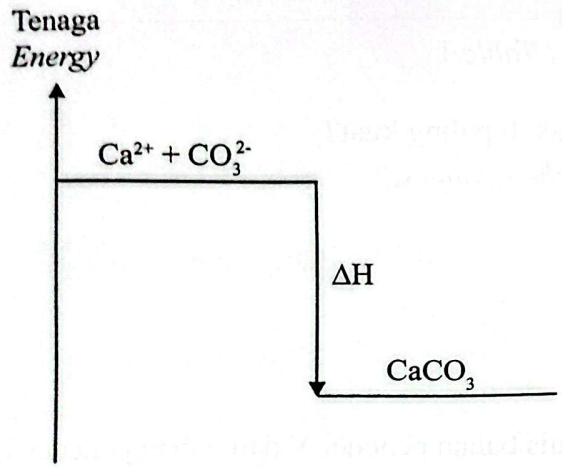
14 Tindak balas antara larutan kalsium nitrat dengan larutan natrium karbonat adalah tindak balas endotermik.

Antara berikut, gambar rajah aras tenaga manakah yang mewakili tindak balas itu?

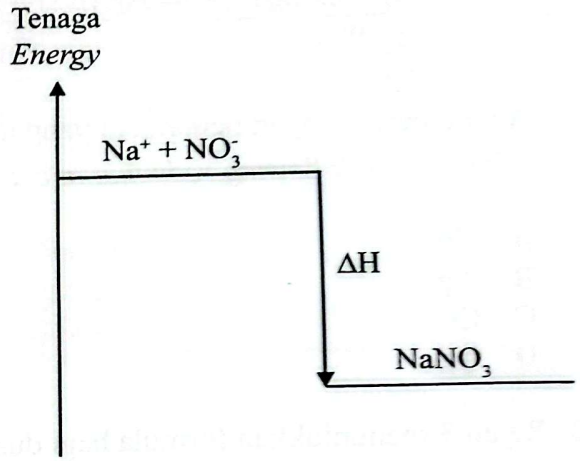
The reaction between calcium nitrate solution and sodium carbonate solution is an endothermic reaction.

Which of the following energy level diagrams represents the reaction?

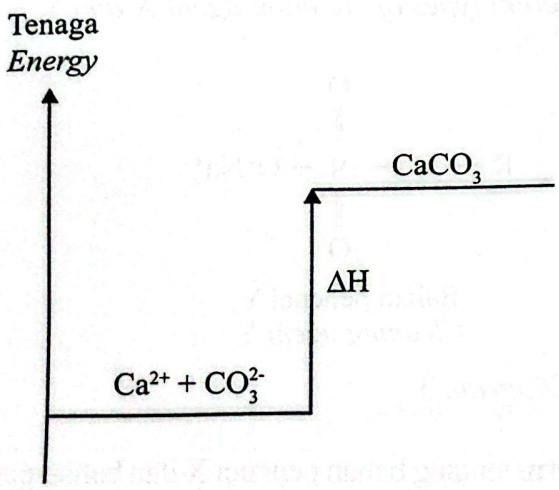
A



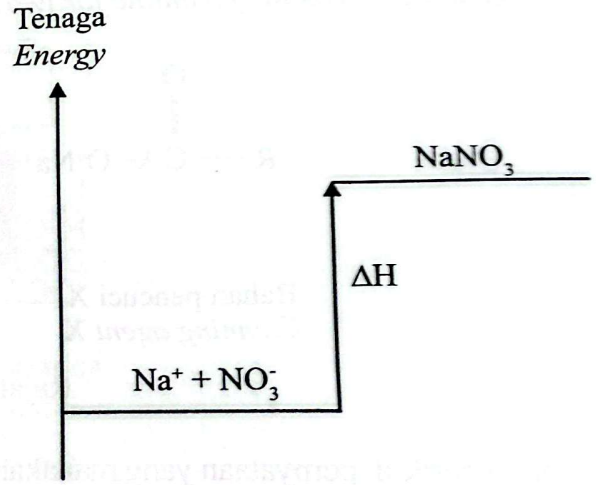
C



B



D



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15 Penemuan grafen membuka lembaran baharu dalam bidang nanoteknologi. Pelbagai aplikasi sedia ada dapat ditambah baik atau digantikan dengan grafen yang mempunyai ciri-ciri unggul dan istimewa.

Antara berikut, yang manakah sifat fizik grafen?

The discovery of graphene has opened a new chapter in the field of nanotechnology. Various existing applications can be improved or replaced with graphene that has superior and distinctive characteristics.

Which of the following is a physical property of graphene?

A Penebat haba
Heat insulator

B Penebat elektrik
Electrical insulator

C Keras tetapi rapuh
Hard but brittle

D Bersifat tidak telap
Impermeable

16 Antara berikut, bahan yang manakah boleh larut dalam air?

Which of the following substances can dissolve in water?

A Benzena, C_6H_6
Benzene, C_6H_6

B Heksana, C_6H_{14}
Hexane, C_6H_{14}

C Glukosa, $C_6H_{12}O_6$
Glucose, $C_6H_{12}O_6$

17 Rajah 4 menunjukkan formula ion bagi unsur X dan unsur Y.

Diagram 4 *shows the ionic formulae of elements* X *and elements* Y.

X^{3+}	Y^{2-}

Rajah / *Diagram* 4

Antara berikut, persamaan ion yang manakah mewakili tindak balas antara ion-ion itu?

Which of the following ionic equations represents the reaction between the ions?

A $X^{3+} + Y^{2-} \rightarrow X_2Y_3$

B $X^{3+} + 3Y^{2-} \rightarrow XY_3$

C $2X^{3+} + 3Y^{2-} \rightarrow X_2Y_3$

D $3X^{3+} + 2Y^{2-} \rightarrow X_2Y_3$

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18 Apakah jenis ikatan yang terdapat antara atom karbon dalam molekul propuna, C_3H_4?
What type of bond present between carbon atoms in a propyne, C_3H_4 molecule?

A Ikatan tunggal sahaja
Only single bonds

B Ikatan ganda tiga sahaja
Only triple bonds

C Satu ikatan tunggal dan satu ikatan ganda dua
One single bond and one double bond

D Satu ikatan tunggal dan satu ikatan ganda tiga
One single bond and one triple bond

19 Jadual 2 menunjukkan pemerhatian apabila tiga jenis logam alkali diletakkan di dalam satu bikar yang mengandungi air.
Table 2 shows observations when three types of alkali metals are placed into a beaker containing water.

Logam alkali ***Alkali metal***	**Pemerhatian** ***Observation***
Litium *Lithium*	Bergerak perlahan di atas permukaan air *Moves slowly on the surface of water*
Natrium *Sodium*	Bergerak laju di atas permukaan air dengan nyalaan kuning *Moves quickly on the surface of water with yellow flame*
Kalium *Potassium*	Bergerak sangat laju di atas permukaan air dengan nyalaan ungu *Moves very fast on the surface of water with a lilac flame*

Jadual / *Table* 2

Antara berikut, pernyataan yang manakah paling sesuai menerangkan pemerhatian tersebut?
Which of the following statements best explains the observation?

A Kereaktifan logam alkali berkurangan apabila menuruni kumpulan
Reactivity of alkali metals decreases when going down the group

B Kecenderungan atom logam alkali untuk menerima elektron berkurang apabila menuruni kumpulan
The tendency of alkali metal atoms to accept electrons decreases when going down the group

C Atom logam alkali membentuk ikatan ion dengan air dengan mudah apabila menuruni kumpulan
Alkali metal atoms form ionic bond with water easily when going down the group

D Saiz atom logam alkali bertambah dan menjadikannya lebih mudah untuk kehilangan elektron valensnya
The atomic size of alkali metals increase and making them easier to lose their valence electrons

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20 Antara berikut, yang manakah **benar** tentang asid lemah?
*Which of the following is **true** about weak acid?*

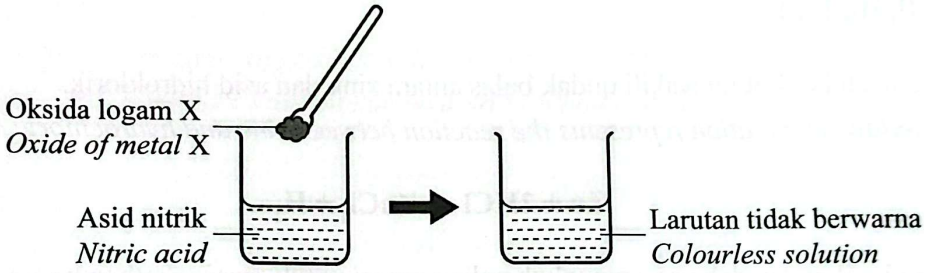
A Tidak boleh meneutralkan alkali
Unable to neutralise alkali

B Nilai pH lebih tinggi daripada 7
pH *value is higher than* 7

C Mengion separa dalam air untuk menghasilkan ion hidrogen
Ionises partially in water to produce hydrogen ions

D Boleh menukarkan warna kertas litmus merah kepada biru
Able to change red litmus paper to blue

21 Rajah 5 menunjukkan pemerhatian apabila oksida logam X ditambahkan ke dalam sebuah bikar.
Diagram 5 *shows the observation when oxide of metal* X is added into a beaker.



Rajah / *Diagram* 5

Antara berikut, bahan yang manakah akan menunjukkan pemerhatian yang sama apabila ditambahkan ke dalam asid nitrik?
Which of the following substances will show the same observation when added to nitric acid?

I Kalsium oksida
Calcium oxide

II Natrium oksida
Sodium oxide

III Silikon dioksida
Silicon dioxide

IV Kuprum(II) oksida
Copper(II) *oxide*

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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22 Antara berikut, urutan yang manakah **betul** dalam penyediaan satu larutan melalui kaedah pencairan?
*Which of the following is the **correct** sequence in preparation of solution by dilution method?*

I Pindahkan larutan ke dalam kelalang volumetrik
Transfer the solution into a volumetric flask

II Hitung isi padu larutan stok yang hendak dicairkan
Calculate the volume of stock solution to be diluted

III Gunakan pipet untuk menyukat isi padu larutan yang diperlukan
Use a pipette to measure the volume of solution needed

IV Tambah air suling sehingga mencapai tanda senggatan
Add distilled water until the calibration mark

A II, I, III, IV
B II, I, IV, III
C II, III, I, IV
D II, III, IV, I

23 Persamaan berikut mewakili tindak balas antara zink dan asid hidroklorik.
The following equation represents the reaction between zinc and hydrochloric acid.

$$Zn + 2HCl \rightarrow ZnCl_2 + H_2$$

Antara berikut, kaedah yang manakah paling sesuai untuk meningkatkan kadar tindak balas?
Which of the following methods is the most suitable to increase the rate of reaction?

A Mengecilkan saiz zink
Decrease the size of zinc

B Menurunkan suhu asid hidroklorik
Reduce the temperature of hydrochloric acid

C Mengurangkan isi padu asid hidroklorik
Reduce the volume of hydrochloric acid

D Mengurangkan kepekatan asid hidroklorik
Decrease the concentration of hydrochloric acid

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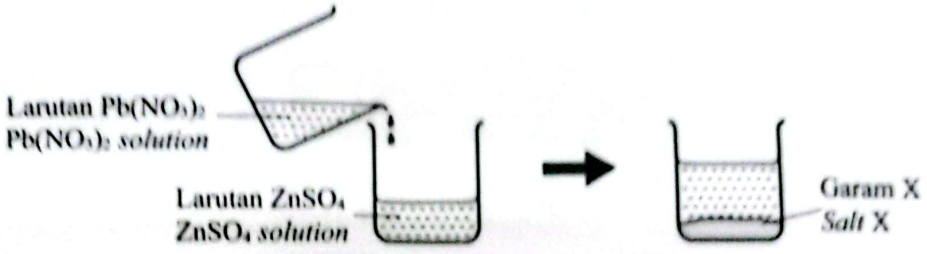
24 Rajah 6 menunjukkan suatu eksperimen untuk menghasilkan garam X.
Diagram 6 shows an experiment to produce salt X.



Rajah / *Diagram* 6

Eksperimen ini diulang untuk menghasilkan garam Y yang mempunyai keterlarutan sama seperti garam X.
Antara berikut, larutan garam yang manakah boleh digunakan untuk mengantikan larutan $Pb(NO_3)_2$?
The experiment is repeated to produce salt Y *which has the same solubility as salt* X.
Which of the following salt solution can be used to replace the $Pb(NO_3)_2$ *solution?*

A $Ca(NO_3)_2$
B $Cu(NO_3)_2$
C $Fe(NO_3)_2$
D $Mg(NO_3)_2$

25 Antara berikut, kaedah yang manakah dapat digunakan untuk memasak 100 biji kentang dalam masa yang paling singkat?
Which of the following methods can use to cook 100 *potatoes within the shortest time?*

A Merebus kentang dalam periuk tekanan
Boil the potatoes in pressure cooker
B Mengukus kentang dalam pengukus
Steam the potatoes in steamer
C Merebus kentang dalam kuali leper
Boil the potatoes in a pan
D Menggoreng kentang dalam kuali
Fry the potatoes in a wok

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26 Rajah 7 menunjukkan enjin sebuah jet.
Diagram 7 shows the engine of a jet.

Rajah / *Diagram* 7

Mengapakah seramik digunakan dalam pembuatan turbin?
Why is ceramic used in manufacturing the turbine?

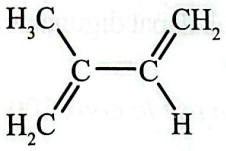
A Fleksibel
Flexible

B Penebat elektrik
Electrical insulator

C Lengai secara kimia
Chemically inert

D Rintangan haba tinggi
High heat resistance

27 Rajah 8 menunjukkan monomer bagi lateks.
Diagram 8 shows the monomer of latex.



Rajah / *Diagram* 8

Apakah nama monomer itu?
What is the name of the monomer?

A Etena
Ethene

B Stirena
Styrene

C Propena
Propene

D Isoprena
Isoprene

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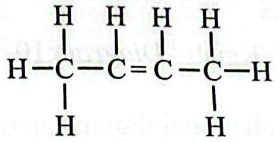
28 Antara berikut, bahan yang manakah terlarut campur dalam air pada semua kadar?
Which of the following substances is miscible in water in all proportions?

A C_2H_2
B C_2H_4
C C_2H_6
D C_2H_5OH

29 Rajah 9 menunjukkan formula struktur bagi satu alkena.
Diagram 9 shows the structural formula of an alkene.

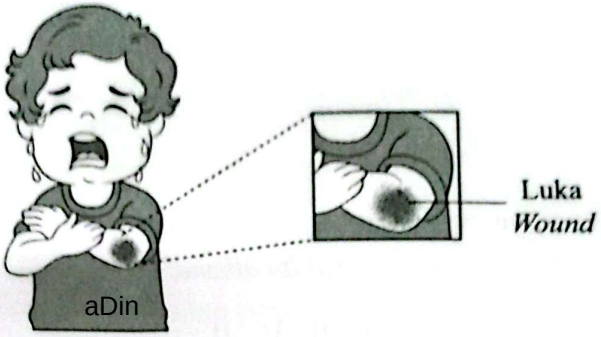


Rajah / *Diagram* 9

Apakah yang terbentuk apabila alkena itu bertindak balas dengan stim?
What is the product formed when the alkene reacts with steam?

A Butana
Butane
B But-1-una
But-1-yne
C Butan-2-ol
Butan-2-ol
D Asid butanoik
Butanoic acid

30 Rajah 10 menunjukkan seorang kanak-kanak yang cedera.
Diagram 10 *shows an injured child.*



Rajah / *Diagram* 10

Antara berikut, ubat yang manakah sesuai digunakan untuk merawat kecederaannya?
Which of the following medicines is used to treat his injury?

A Iodin
Iodine

B Kodeina
Codeine

C Antihistamin
Antihistamine

D Formaldehid
Formaldehyde

31 Persamaan berikut mewakili penurunan ferum(III) oksida oleh magnesium.
The following equation represents the reduction of iron(III) *oxide by magnesium.*

$$3Mg + Fe_2O_3 \rightarrow 3MgO + 2Fe$$

Apakah jisim ferum(III) oksida yang diturunkan jika 7.2 g magnesium digunakan?
[Jisim atom relatif: Fe = 56, Mg = 24, O = 16]
What is the mass of iron(III) *oxide that is reduced if* 7.2 g *magnesium is used?*
[*Relative atomic mass:* Fe = 56, Mg = 24, O = 16]

A 8.0 g
B 16.0 g
C 32.0 g
D 48.0 g

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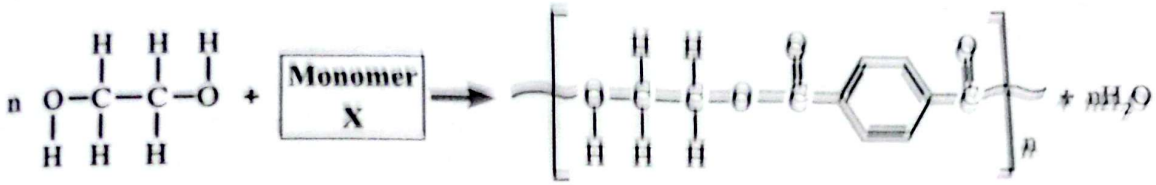
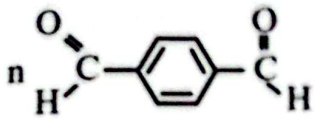
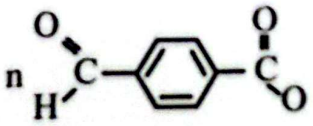
32 Rajah 11 menunjukkan pembentukan terilena.
Diagram 11 shows the formation of terylene.

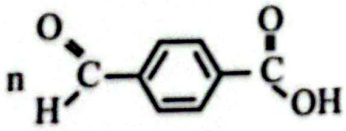


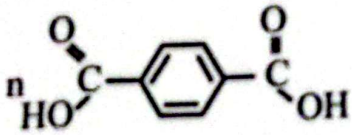
Rajah / *Diagram* 11

Apakah monomer X?
What is monomer X?

A


B


C


D


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33 Maklumat berikut menunjukkan pemerhatian apabila satu larutan yang mengandungi kation R diuji dengan larutan alkali.

The following information shows the observation when a solution containing cation R *is tested with alkali solutions.*

- Mendakan putih tidak larut di dalam larutan natrium hidroksida, NaOH berlebihan.
  White precipitate is insoluble in excess sodium hydroxide, NaOH *solution.*
- Mendakan putih tidak larut di dalam larutan ammonia, NH_3 berlebihan.
  White precipitate is insoluble in excess ammonia, NH_3 *solution.*

Apakah kation R?

What is cation R?

A Al^{3+}
B Ca^{2+}
C Mg^{2+}
D Pb^{2+}

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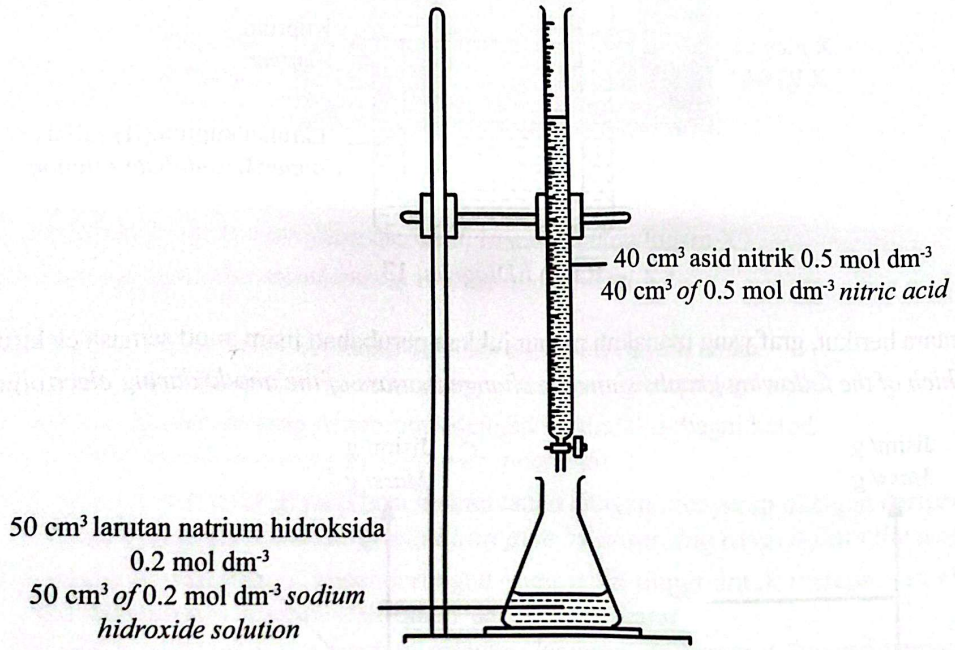
34 Rajah 12 menunjukkan susunan radas bagi pentitratan larutan natrium hidroksida, NaOH dengan asid nitrik, HNO_3.

Diagram 12 shows the apparatus set-up for the titration of sodium hydroxide, NaOH *with nitric acid,* HNO_3.



Rajah / *Diagram* 12

Berapakah jisim maksimum garam yang terhasil daripada tindak balas ini?
[Jisim atom relatif: Na = 23, O = 16, N = 14]
What is the maximum mass of the salt formed in this reaction?
[*Relative atomic mass*: Na = 23, O = 16, N = 14]

A 0.85 g
B 1.12 g
C 1.70 g
D 2.55 g

$HNO_3 + NaOH \rightarrow NaNO_3 + H_2O$

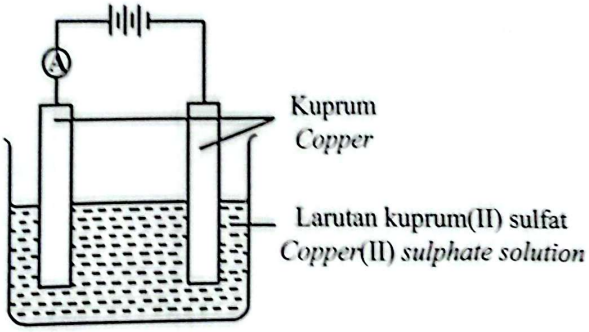
0.02 0.01 mol

$\frac{40 \times 0.5}{1000} = 0.02$

NaOH : 1 mol of NaNO3
1 : 1
0.02 0.02

0.01 x 85 = 0.85 g

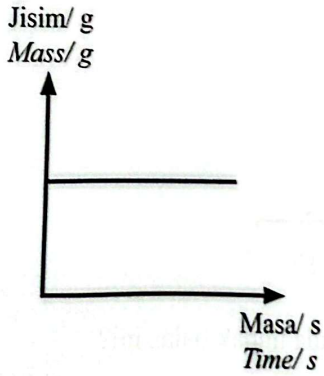
35 Rajah 13 menunjukkan susunan radas bagi satu sel elektrolisis.
Diagram 13 shows the setup of apparatus for an electrolytic cell.



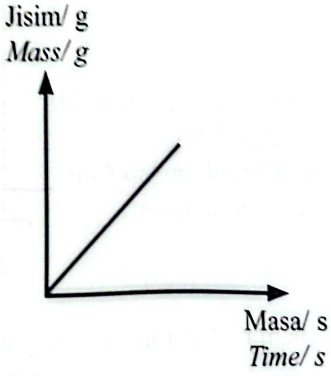
Rajah / *Diagram* 13

Antara berikut, graf yang manakah menunjukkan perubahan jisim anod semasa elektrolisis?
Which of the following graphs show the change in mass of the anode during electrolysis?

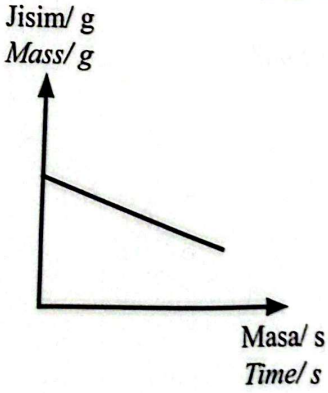
A



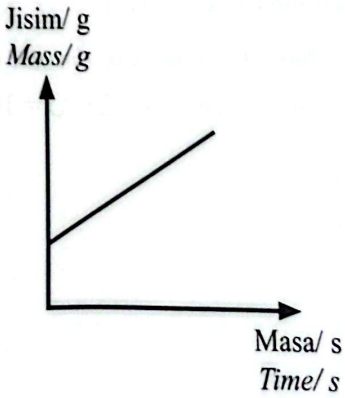
C



B



D



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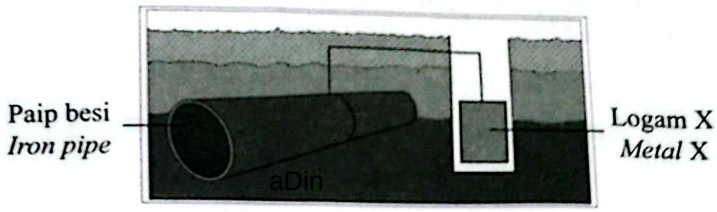
36 Rajah 14 menunjukkan logam korban yang digunakan pada paip besi bawah tanah.
Diagram 14 shows the sacrificial metal used in underground iron pipes.



Rajah / *Diagram* 14

Antara berikut, pernyataan yang manakah **benar** tentang logam X?
*Which of the following statements is **correct** about metal X?*

A Logam X meningkatkan kadar kakisan paip besi bawah tanah
Metal X increases the corrosion rate of the underground iron pipe

B Logam X menghalang pengaratan dengan bertindak sebagai katod
Metal X prevents rusting by acting as a cathode

C Logam X melindungi paip besi bawah tanah dengan menyerap oksigen daripada air
Metal X protects the underground iron pipe by absorbing oxygen from the water

D Logam X mempunyai kecenderungan yang lebih tinggi untuk melepaskan elektron dan melindungi paip bawah tanah daripada berkarat
Metal X has higher tendency to release electrons, and protect the underground iron pipe from rusting

37 Antara berikut, yang manakah ialah isomer $C_5H_{11}OH$?
Which of the following are the isomer for $C_5H_{11}OH$?

I Pentan-2-ol
Pentan-2-ol

II 2-etilpropanol
2-ethylpropanol

III 2,2-dimetilpropan-1-ol
2,2-dimethylpropan-1-ol

IV 2,3-dimetilpropan-2-ol
2,3-dimethylpropan-2-ol

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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38 Jadual 3 menunjukkan isipadu gas hidrogen yang dikumpul dalam tindak balas antara serbuk zink dengan asid hidroklorik cair.

Table 3 shows the volume of hydrogen gas collected in the reaction between zinc powder and diluted hydrochloric acid.

Masa *Time* (min)	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5
Isi padu gas *Volume of gas* (cm^3)	0.0	4.0	7.0	10.5	12.0	14.0	16.5	16.5

Jadual / *Table* 3

Apakah kadar tindak balas purata dalam minit kedua?

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

A 4.7 cm^3 min^{-1}
B 5.0 cm^3 min^{-1}
C 5.5 cm^3 min^{-1}
D 6.0 cm^3 min^{-1}

39 Seorang murid menyediakan 100 cm^3 larutan natrium hidroksida, NaOH dengan melarutkan 4.0 g natrium hidroksida dalam air suling. Selepas itu, 150 cm^3 air suling ditambahkan ke dalam larutan itu untuk mencairkannya.

Apakah nilai pH bagi larutan cair itu?

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

A student prepared 100 cm^3 *of sodium hydroxide solution,* NaOH *by dissolving* 4.0 g *of sodium hydroxide in distilled water. After that,* 150 cm^3 *of distilled water was added to the solution to dilute it.*

What is the pH *value of the dilute solution?*

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

A 10.6
B 13.6
C 13.8
D 14.0

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40 Persamaan termokimia berikut menunjukkan pembakaran gas butana.
The following thermochemical equation shows the combustion of butane gas.

$$C_4H_{10} + \frac{13}{2}O_2 \rightarrow 4CO_2 + 5H_2O \quad \Delta H = -2880 \text{ kJ mol}^{-1}$$

2400 cm^3 oksigen gas, O_2 terbakar lengkap dengan gas butana.
Berapakah perubahan haba bagi tindak balas itu?
[1 mol bagi sebarang gas menempati 24 dm^3 pada keadaan bilik]
2400 cm^3 *oxygen gas,* O_2 *is burnt completely in butane gas.*
What is the heat change of the reaction?
[1 *mol of any gas occupies* 24 dm^3 *at room conditions*]

A 44.3 kJ
B 288.0 kJ
C 1152.0 kJ
D 1872.0 kJ

SOALAN MODUL TAMAT
END OF MODULE QUESTION

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