

LOGO SEKOLAH

NAMA SEKOLAH

PEPERIKSAAN PERCUBAAN SPM 2026

KIMIA

Kertas 1

1 jam 15 minit



4541/1

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

Kertas peperiksaan ini mengandungi 26 halaman bercetak

- 1 Pasangan manakah yang dipadankan dengan betul?
Which pair is correctly matched?

	Isotop <i>Isotope</i>	Kegunaan <i>Uses</i>
A	Natrium-24 <i>Sodium-24</i>	Radioterapi bagi merawat kanser <i>Radiotherapy for the treatment of cancer</i>
B	Hidrogen-3 <i>Hydrogen-3</i>	Mengesan kebocoran paip bawah tanah <i>To detect the leakage of underground pipe</i>
C	Plumbum-210 <i>Lead-210</i>	Menentukan usia lapisan pasir dan tanah <i>To determine the age of sand and earth layers</i>
D	Kobalt-60 <i>Cobalt-60</i>	Pengesan untuk mengkaji kumbahan dan sisa buangan cecair <i>As a detector to study the sewage and liquid wastes</i>

- 2 Atom manakah digunakan sebagai rujukan piawai untuk menentukan jisim atom relatif unsur-unsur?
Which atom is used as the standard reference for determining the relative atomic mass of elements?

- A Hidrogen-1
Hydrogen-1

B Oksigen-16
Oxygen-16
- C Natrium-24
Sodium-24

D Karbon-12
Carbon-12

- 3 Rajah 1 menunjukkan satu kamera.
Diagram 1 shows a camera.

Diisi dengan gas X
Filled with gas X



Lampu denyar kilat
Flashlight

Rajah 1 / *Diagram 1*

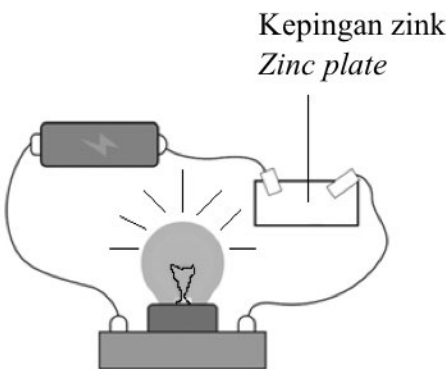
Apakah gas X?
What is gas X?

- A Argon
Argon

B Kripton
Krypton
- C Neon
Neon

D Xenon
Xenon

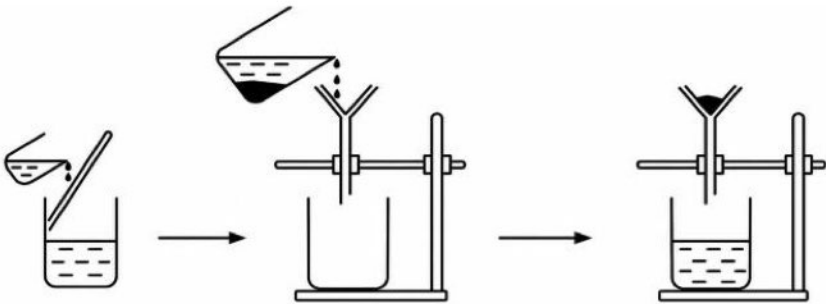
- 4 Rajah 2 menunjukkan pemerhatian mengkaji kekonduksian elektrik zink.
Diagram 2 shows the observation to study the electrical conductivity of zinc.



Rajah 2 / Diagram 2

Antara pernyataan berikut, yang manakah betul mengenai kekonduksian elektrik zink?
Which of the following statements is correct about electrical conductivity of zinc?

- A Mempunyai atom logam tersusun secara rapat dan teratur.
Has metal atoms are arranged closely packed and orderly
 - B Mempunyai ikatan hidrogen yang terbentuk antara molekul
Has hydrogen bond between the molecules
 - C Mempunyai lautan elektron yang bergerak bebas.
Has a sea of electrons that move freely.
 - D Mempunyai ion-ion bebas bergerak
Has freely moving ions
- 5 Rajah 3 menunjukkan susunan radas bagi penyediaan garam.
Diagram 3 shows the apparatus set-up for the preparation of salt.



Rajah 3 / Diagram 3

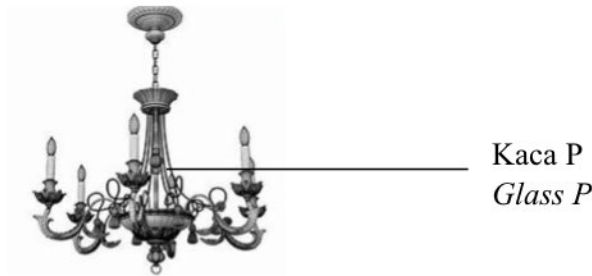
Garam manakah yang disediakan melalui kaedah ini?
Which salt is prepared through this method?

- | | |
|-------------------|----------------------------|
| A AgNO_3 | C CaCl_2 |
| B BaSO_4 | D Na_2CO_3 |

6 Antara berikut, pasangan yang manakah dipadankan dengan betul?
Which of the following pairs is correctly matched?

	Kadar tindak balas rendah <i>Low rate of reaction</i>	Kadar tindak balas tinggi <i>High rate of reaction</i>
A	Kakisan batu <i>Rock erosion</i>	Pembakaran bunga api <i>Burning of fireworks</i>
B	Nyalaan mancis <i>Ignition of matches</i>	Pembakaran bunga api <i>Burning of fireworks</i>
C	Kakisan batu <i>Rock erosion</i>	Penapaian <i>Fermentation</i>
D	Nyalaan mancis <i>Ignition of matches</i>	Penapaian <i>Fermentation</i>

7 Rajah 4 menunjukkan candelier yang diperbuat daripada kaca P.
Diagram 4 shows a chandelier which is made from glass P.



Rajah 4 / *Diagram 4*

Apakah sifat kaca P?
What is the property of glass P?

- A Indeks pembiasan yang tinggi
High refractive index

B Pekali pengembangan yang rendah
Low expansion coefficient
- C Tidak tahan terhadap haba
Cannot withstand high temperatures

D Sensitif terhadap keamatan cahaya
Sensitive to light intensity

- 8 Rajah 5 menunjukkan cakera brek berprestasi tinggi yang digunakan dalam motosikal. Cakera brek diperbuat daripada sejenis seramik.
Diagram 5 shows a high-performance brake disc used in a motorcycle. The brake disc is made of a type of ceramic.



Cakera brek
Brake disc

Rajah 5 / Diagram 5

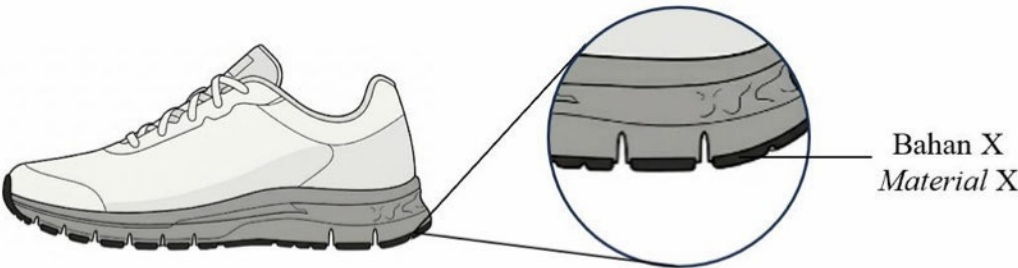
Antara berikut, yang manakah betul mengenai sifat-sifat seramik tersebut?
Which of the following is correct about the properties of the ceramic?

- | | |
|---|--|
| I Rintangan tinggi terhadap haba
<i>High resistance to heat</i> | |
| II Tahan kepada lelasan
<i>Resistant to abrasion</i> | |
| III Tahan kejutan terma
<i>Withstand thermal shocks</i> | |
| IV Keras dan kuat
<i>Hard and strong</i> | |
| A I dan II
<i>I and II</i> | C II dan III
<i>II and III</i> |
| B I dan III
<i>I and III</i> | D III dan IV
<i>III and IV</i> |

- 9 Seorang murid ingin membawa pulang lateks daripada estet getah dalam keadaan pepejal.
Antara yang berikut, bahan manakah boleh menggumpalkan lateks?
A student wants to bring back latex from a rubber estate in a solid form.
Which of the following substances can coagulates latex?
Apakah Q?
What is Q?

- | | |
|------------------------------------|--|
| A Etanol
<i>Ethanol</i> | C Asid metanoik
<i>Methanoic acid</i> |
| B Ammonia
<i>Ammonia</i> | D Natrium hidroksida
<i>Sodium hydroxide</i> |

- 10 Rajah 6 menunjukkan kasut seorang pelari maraton. Tapak kasut tersebut diperbuat daripada bahan X supaya lebih tahan lasak.
Diagram 6 shows the shoe for a marathon runner. The shoe sole is made of material X so that it is more durable.



Rajah 6 / Diagram 6

Antara berikut, padanan manakah yang betul tentang bahan X?
Which of the following is the correct match about material X?

	Getah sintetik <i>Synthetic rubber</i>	Ciri-ciri <i>Properties</i>
A	Stirena-butadiena <i>Styrene-butadiene</i>	Tahan pelepasan dan tahan haba yang tinggi <i>Abrasion resistance and high heat resistance</i>
B	Getah silikon <i>Silicone rubber</i>	Tahan pengoksidaan dan haba yang tinggi <i>Oxidation resistance and high heat resistance</i>
C	Neoprena <i>Neoprene</i>	Tahan suhu yang tinggi dan bersifat lengai <i>High heat resistance and inert</i>
D	Tiokol <i>Thiokol</i>	Tahan terhadap minyak dan pelarut <i>Oil and solvent resistance</i>

- 11 Rajah 7 menunjukkan seorang pesakit yang mengalami alahan hidung disebabkan oleh butir debunga dan mengalami demam.
Diagram 7 shows a patient suffering from nose allergy caused by pollen grains and also experiencing fever.

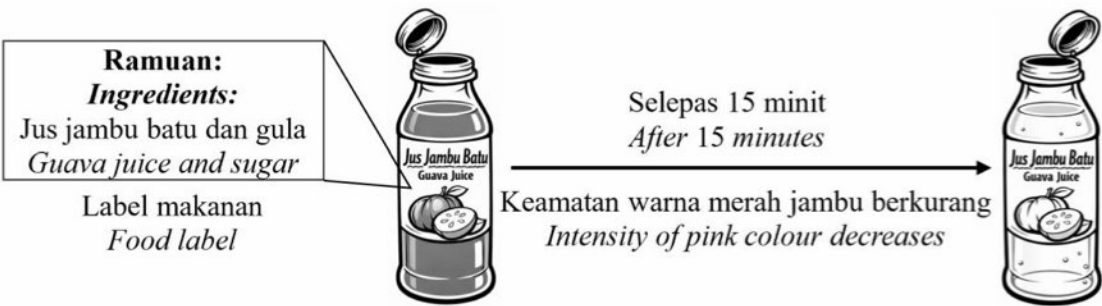


Rajah 7 / Diagram 7

Antara berikut, pasangan jenis ubat manakah yang dapat melegakan simptom pesakit tersebut?
Which of the following pairs of types of medicines can relieve the symptoms of the patient?

	Ubat 1 <i>Medicine 1</i>	Ubat 2 <i>Medicine 2</i>
A	Parasetamol <i>Paracetamol</i>	Antihistamin <i>Antihistamines</i>
B	Penisilin <i>Penicillin</i>	Antihistamin <i>Antihistamines</i>
C	Parasetamol <i>Paracetamol</i>	Prednisolone <i>Prednisolone</i>
D	Penisilin <i>Penicillin</i>	Prednisolone <i>Prednisolone</i>

- 12 Rajah 8 menunjukkan label makanan dan perubahan warna jus bagi sebotol jus jambu batu selepas 15 minit.
Diagram 8 shows the food label and colour change of juice for a bottle of guava juice after 15 minutes.



Rajah 8 / Diagram 8

Apakah bahan yang sesuai untuk ditambahkan ke dalam jus jambu batu untuk mengatasi masalah tersebut di samping mengekalkan kandungan nutrisinya?
What is the suitable substance that can be added into the guava juice to overcome the problem while retaining its nutritional content?

- A** Lesitin
Lecithin

B Aspartam
Aspartame

C Sebatian azo
Azo compound

D Asid askorbik
Ascorbic acid
- 13 Antara berikut, larutan garam manakah yang akan membentuk mendakan putih yang larut dalam larutan ammonia berlebihan?
Which of the following salt solutions will form a white precipitate that dissolves in excess ammonia solution?

- A** Aluminium sulfat
Aluminium sulphate

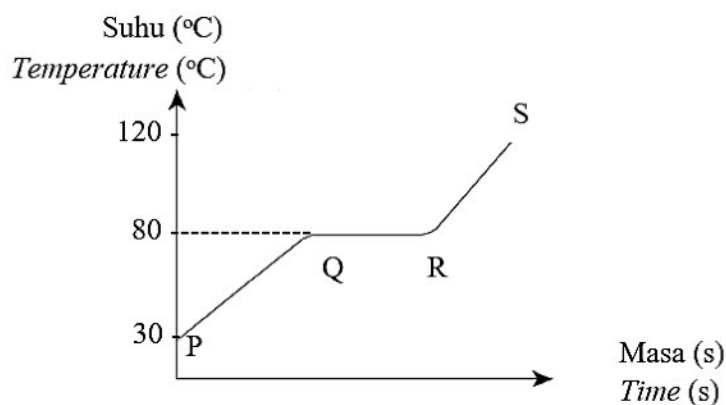
B Kalsium nitrat
Calcium nitrate

C Magnesium sulfat
Magnesium sulphate

D Zink nitrat
Zinc nitrate



- 14 Rajah 9 menunjukkan lengkung pemanasan pepejal asetamida, C_2H_5NO .
Diagram 9 shows the heating curve of solid acetamide, C_2H_5NO .

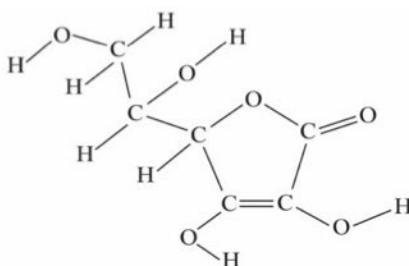


Rajah 9 / Diagram 9

Antara berikut, pernyataan manakah yang betul?

Which of the following statements is correct?

- A** Asetamida berada dalam keadaan cecair sepenuhnya pada R.
Acetamide is in liquid state completely at R.
- B** Tenaga kinetik molekul asetamida tidak berubah dari P ke Q.
Kinetic energy of acetamide molecules remains unchanged from P to Q.
- C** Suhu asetamida tidak meningkat melebihi 120°C jika pemanasan diteruskan.
The temperature of acetamide does not rise above 120°C if heating is continued.
- D** Daya tarikan antara molekul asetamida semasa P ke Q adalah lebih lemah daripada R ke S.
The attractive force between acetamide molecules during P to Q is weaker than during R to S.
- 15 Rajah 10 menunjukkan formula struktur asid askorbik.
Diagram 10 shows the structural formula of ascorbic acid.



Rajah 10 / Diagram 10

Apakah formula empirikal asid askorbik?

What is the empirical formula of ascorbic acid?

- | | |
|----------------------|----------------------|
| A $C_6H_8O_6$ | C $C_4H_8O_4$ |
| B $C_3H_4O_3$ | D $C_2H_4O_2$ |

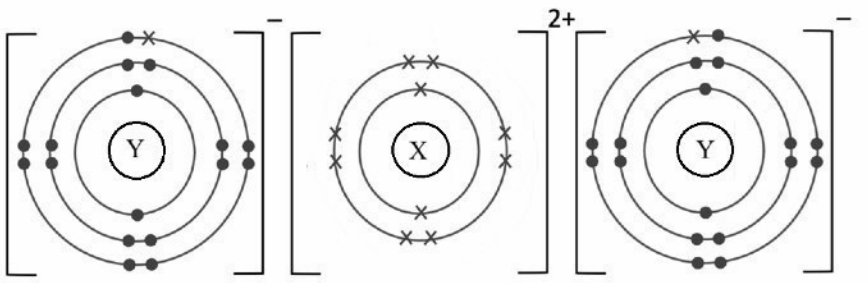
- 16 Rajah 11 menunjukkan unsur merentasi Kala 3 di dalam Jadual Berkala Unsur.
Diagram 11 shows the elements across Period 3 in the Periodic Table of Elements.

Na	Mg	Al	Si	P	S	Cl	Ar
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Rajah 11 / *Diagram 11*

Antara berikut, pernyataan manakah yang betul tentang unsur merentasi Kala 3?
Which of the following statements is correct about elements across Period 3?

- A Jejari atom semakin bertambah
The atomic radius increases
- B Keelektronegatifan semakin berkurang.
The electronegativity decreases.
- C Perubahan daripada unsur logam kepada separa logam dan akhirnya bukan logam.
Change from metal elements to semi-metal elements and non-metal elements.
- D Sifat oksida unsur berubah daripada oksida asid kepada oksida amfoterik dan kemudian kepada oksida bes.
The oxide properties of elements change from acidic oxide to amphoteric oxide and then to basic oxide.
- 17 Rajah 12 menunjukkan susunan elektron bagi sebatian yang terbentuk antara atom X dengan atom Y.
Diagram 12 shows the electron arrangement of a compound formed between atom X and atom Y.

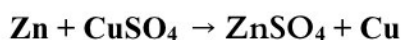


Rajah 12 / *Diagram 12*

Antara berikut, pernyataan manakah betul tentang sebatian itu?
Which of the following statements is correct about the compound?

- A Sebatian kovalen terhasil.
Covalent compound is formed.
- B Sebatian itu larut dalam air.
The compound is soluble in water.
- C Sebatian itu wujud dalam keadaan gas pada suhu bilik.
The compound exists as gas at room temperature.
- D Sebatian itu terbentuk melalui perkongsian elektron antara atom X dan atom Y.
The compound is formed by sharing of electrons between atom X and atom Y.

- 18 Seorang murid melarutkan gas hidrogen klorida ke dalam air.
Antara pernyataan berikut, yang manakah benar tentang larutan yang terhasil?
A student dissolved hydrogen chloride gas into water.
Which of the following statements is true of the solution obtained?
- A Tidak mengkonduksikan elektrik
Does not conduct electricity
 - B Menukarkan kertas litmus merah kering kepada biru
Turns dry red litmus paper to blue
 - C Hidrogen klorida kekal sebagai molekul bebas di dalam air.
Hydrogen chloride remains as molecules in water.
 - D Hidrogen klorida mengion dalam air untuk menghasilkan ion hidrogen, H^+ .
Hydrogen chloride ionises in water to produce hydrogen ions, H^+ .
- 19 Bagaimanakah nilai pH asid hidroklorik berubah apabila larutan kalium hidroksida ditambahkan secara perlahan-lahan sehingga berlebihan?
How does the pH value of hydrochloric acid change when potassium hydroxide solution is added slowly until excess?
- A Nilai pH berkurang daripada 14 kepada 7.
The pH value decreases from 14 to 7.
 - B Nilai pH berkurang daripada 14 kepada 1.
The pH value decreases from 14 to 1.
 - C Nilai pH meningkat daripada 1 kepada 7.
The pH value increases from 1 to 7.
 - D Nilai pH meningkat daripada 1 kepada 14.
The pH value increases from 1 to 14.
- 20 Persamaan kimia berikut mewakili satu tindak balas redoks.
The following chemical equation represents a redox reaction.

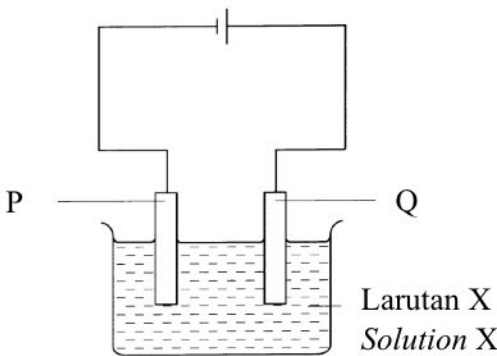


Bahan manakah yang dioksidakan?

Which substance is oxidised?

- | | |
|------|------------|
| A Cu | C $CuSO_4$ |
| B Zn | D $ZnSO_4$ |

- 21 Rajah 13 menunjukkan susunan alat radas untuk penulenan nikel.
Diagram 13 shows the apparatus set-up for purification of nickel.

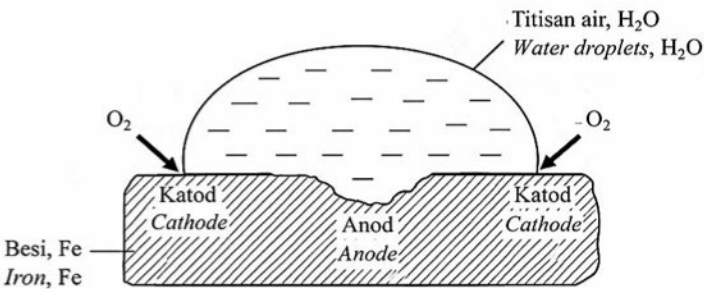


Rajah 13 / Diagram 13

Apakah P, Q dan X?
What is P, Q and X?

	P	Q	X
A	Nikel tak tulen <i>Impure nickel</i>	Nikel tulen <i>Pure nickel</i>	Nikel(II) nitrat <i>Nickel(II) nitrate</i>
B	Nikel tulen <i>Pure nickel</i>	Nikel tak tulen <i>Impure nickel</i>	Nikel(II) nitrat <i>Nickel(II) nitrate</i>
C	Nikel tak tulen <i>Impure nickel</i>	Nikel tulen <i>Pure nickel</i>	Nikel(II) karbonat <i>Nickel(II) carbonate</i>
D	Nikel tulen <i>Pure nickel</i>	Nikel tak tulen <i>Impure nickel</i>	Nikel(II) karbonat <i>Nickel(II) carbonate</i>

- 22 Rajah 14 menunjukkan mekanisme pengaratan besi.
Diagram 14 shows the mechanism of rusting of iron.



Rajah 14 / Diagram 14

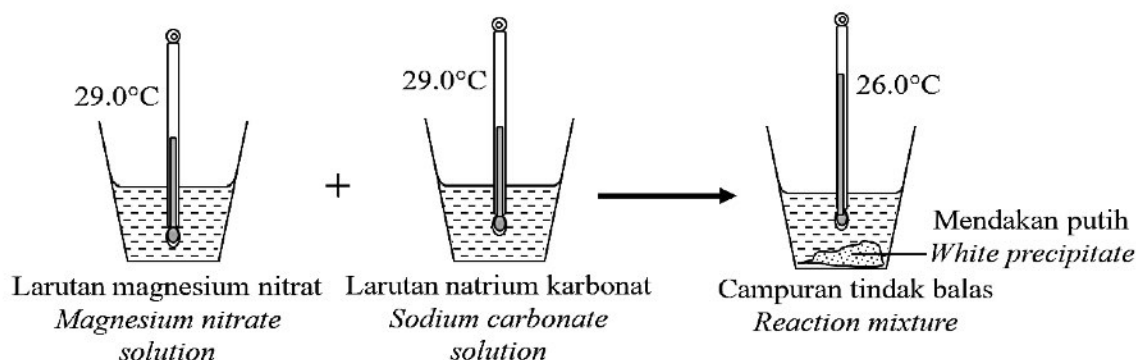
Setengah persamaan manakah yang mewakili tindak balas yang berlaku di anod?
Which of the following half equations represents the reaction that occurs at the anode?

- A $\text{Fe}^{2+} + 2\text{e}^- \rightarrow \text{Fe}$

B $\text{Fe} \rightarrow \text{Fe}^{2+} + 2\text{e}^-$
- C $4\text{OH}^- \rightarrow \text{O}_2 + 2\text{H}_2\text{O} + 4\text{e}^-$

D $\text{O}_2 + 2\text{H}_2\text{O} + 4\text{e}^- \rightarrow 4\text{OH}^-$

- 23 Rajah 15 menunjukkan susunan radas untuk menentukan haba tindak balas.
Diagram 15 shows the apparatus set-up to determine the heat of reaction.

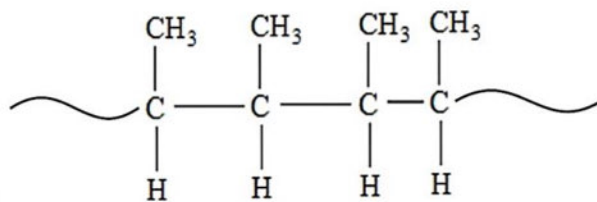


Rajah 15 / Diagram 15

Antara berikut, pernyataan manakah yang betul?
Which of the following statements is correct?

- A Tindak balas eksotermik.
Exothermic reaction.
- B Nilai ΔH dalam tindak balas ini adalah negatif.
The value of ΔH for the reaction is negative.
- C Tenaga haba diserap semasa tindak balas berlaku.
Heat energy is absorbed during the reaction.
- D Jumlah kandungan tenaga hasil tindak balas lebih rendah daripada jumlah kandungan tenaga bahan tindak balas.
The total energy content of the products is lower than the total energy content of the reactants.
- 24 Pasangan manakah yang menghasilkan haba peneutralan paling rendah?
Which pair produces the lowest heat of neutralisation?
- A Asid hidroklorik dan larutan ammonia
Hydrochloric acid and ammonia solution
- B Asid hidroklorik dan larutan natrium hidroksida
Hydrochloric acid and sodium hydroxide solution
- C Asid etanoik dan larutan ammonia
Ethanoic acid and ammonia solution
- D Asid etanoik dan larutan natrium hidroksida
Ethanoic acid and sodium hydroxide solution

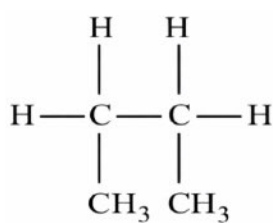
- 25 Rajah 16 menunjukkan struktur bagi sebahagian suatu polimer.
Diagram 16 shows part of the structure of a polymer.



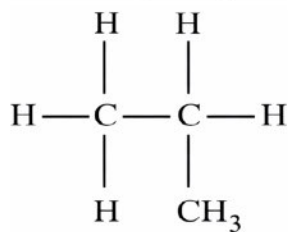
Rajah 16 / *Diagram 16*

Apakah monomer bagi polimer tersebut?
What is the monomer of the polymer?

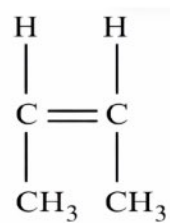
A



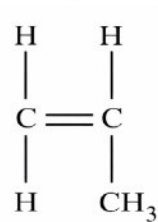
B



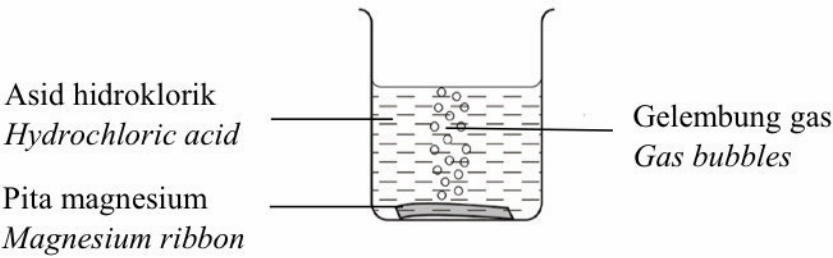
C



D



- 26 Rajah 17 menunjukkan susunan radas bagi menentukan kadar tindak balas antara pita magnesium dan asid hidroklorik.
Diagram 17 shows the apparatus set-up to determine the rate of reaction between magnesium ribbon and hydrochloric acid.

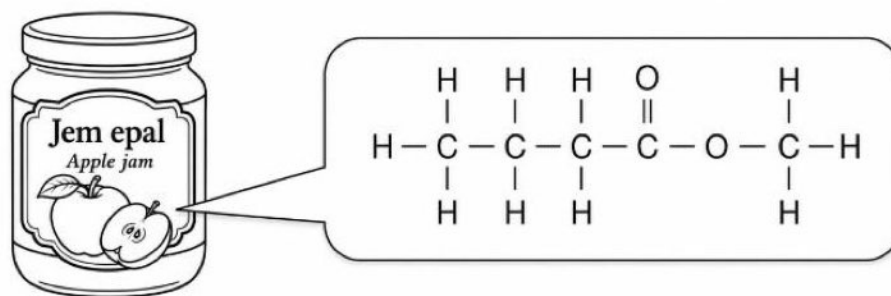


Rajah 17 / *Diagram 17*

Antara set eksperimen berikut, yang manakah mengambil masa paling panjang untuk pembuakan berhenti?
Which of the following experiments takes the longest time for the effervescence to stop?

	Bahan tindak balas <i>Reactants</i>	Suhu (°C) <i>Temperature (°C)</i>
A	Pita magnesium + 50 cm ³ asid hidroklorik 0.5 mol dm ⁻³ <i>Magnesium strip + 50 cm³ of 0.5 mol dm⁻³ hydrochloric acid</i>	25.0
B	Pita magnesium + 50 cm ³ asid hidroklorik 0.5 mol dm ⁻³ <i>Magnesium strip + 50 cm³ of 0.5 mol dm⁻³ hydrochloric acid</i>	40.0
C	Pita magnesium + 50 cm ³ asid hidroklorik 1.0 mol dm ⁻³ <i>Magnesium strip + 50 cm³ of 1.0 mol dm⁻³ hydrochloric acid</i>	25.0
D	Pita magnesium + 50 cm ³ asid hidroklorik 1.0 mol dm ⁻³ <i>Magnesium strip + 50 cm³ of 1.0 mol dm⁻³ hydrochloric acid</i>	40.0

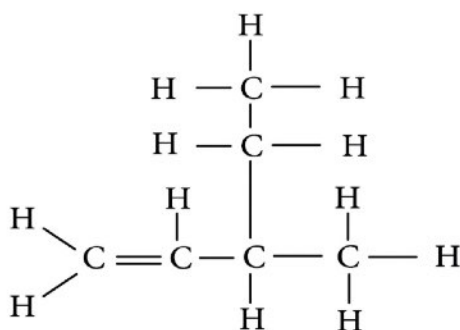
- 27 Rajah 18 menunjukkan formula struktur ester yang terkandung dalam jem epal.
 Diagram 18 shows the structural formula of ester contained in apple jam.



Rajah 18 / Diagram 18

Antara berikut, sebatian manakah yang boleh menghasilkan ester tersebut?
 Which of the following substances can produce the ester?

- | | |
|---|---|
| A CH_3OH dan $\text{C}_3\text{H}_7\text{COOH}$
CH_3OH and $\text{C}_3\text{H}_7\text{COOH}$ | C $\text{C}_3\text{H}_7\text{OH}$ dan HCOOCH_3
$\text{C}_3\text{H}_7\text{OH}$ and HCOOCH_3 |
| B $\text{C}_4\text{H}_9\text{OH}$ dan HCOOCH_3
$\text{C}_4\text{H}_9\text{OH}$ and HCOOCH_3 | D $\text{C}_2\text{H}_5\text{OH}$ dan $\text{C}_3\text{H}_7\text{COOH}$
$\text{C}_2\text{H}_5\text{OH}$ and $\text{C}_3\text{H}_7\text{COOH}$ |
- 28 Rajah 19 menunjukkan formula struktur satu sebatian.
 Diagram 19 shows the structural formula of a compound.



Rajah 19 / Diagram 19

Apakah nama IUPAC sebatian tersebut?
 What is the IUPAC name of the compound?

- | | |
|--|--|
| A 2-etilbut-1-ena
2-ethylbut-1-ene | C 3-metilpent-4-ena
3-methylpent-4-ene |
| B 3-etilbut-1-ena
3-ethylbut-1-ene | D 3-metilpent-1-ena
3-methylpent-1-ene |

- 29 Apakah nombor pengoksidaan bagi sulfur di dalam SO_2 ?

What is the oxidation number of sulphur in SO_2 ?

- | | |
|-------------|-------------|
| A -2 | C +4 |
| B +2 | D +6 |

- 30 Seorang murid perlu menyediakan larutan piawai kalium hidroksida, KOH 0.50 mol dm^{-3} sebanyak 500 cm^3 . Berapakah jisim pepejal kalium hidroksida, KOH yang diperlukan?
[Jisim atom relatif: $\text{H} = 1$, $\text{O} = 16$, $\text{K} = 39$]

A student needs to prepare a standard solution of 0.50 mol dm^{-3} potassium hydroxide, KOH solution of 500 cm^3 . What is the mass of potassium hydroxide, KOH solid needed?

[Relative atomic mass: $\text{H} = 1$, $\text{O} = 16$, $\text{K} = 39$]

- | | |
|----------------|-----------------|
| A 3.5 g | C 10.5 g |
| B 7.0 g | D 14.0 g |

- 31 Antara berikut, bahan manakah yang mempunyai bilangan ion yang sama dengan 4.05 g kuprum(II) klorida, CuCl_2 ?

[Jisim atom relatif: $\text{O} = 16$, $\text{Na} = 23$, $\text{Mg} = 24$, $\text{Al} = 27$, $\text{Cl} = 35.5$, $\text{Cu} = 64$, $\text{Zn} = 65$]

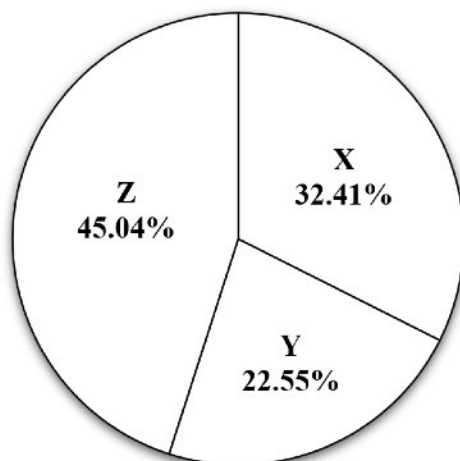
Which of the following substances has the same number of ions as 4.05 g copper(II) chloride, CuCl_2 ?

[Relative atomic mass: $\text{O} = 16$, $\text{Na} = 23$, $\text{Mg} = 24$, $\text{Al} = 27$, $\text{Cl} = 35.5$, $\text{Cu} = 64$, $\text{Zn} = 65$]

- | | |
|---|--|
| A 1.20 g magnesium oksida, MgO
1.20 g <i>magnesium oxide</i> , MgO | C 3.20 g aluminium oksida, Al_2O_3
3.20 g <i>aluminium oxide</i> , Al_2O_3 |
| B 1.55 g natrium oksida, Na_2O
1.55 g <i>sodium oxide</i> , Na_2O | D 4.08 g zink klorida, ZnCl_2
4.08 g <i>zinc chloride</i> , ZnCl_2 |

- 32 Rajah 20 menunjukkan satu carta pai yang memaparkan peratus jisim unsur X, unsur Y dan unsur Z dalam sebatian P.

Diagram 20 shows a pie chart that displays the mass percentage of elements X, Y and Z in compound P.



Rajah 20 / Diagram 20

Apakah formula empirik bagi sebatian P?

[Jisim atom relatif: X = 23, Y = 32, Z = 16]

What is the empirical formula of compound P?

[Relative atomic mass: X = 23, Y = 32, Z = 16]

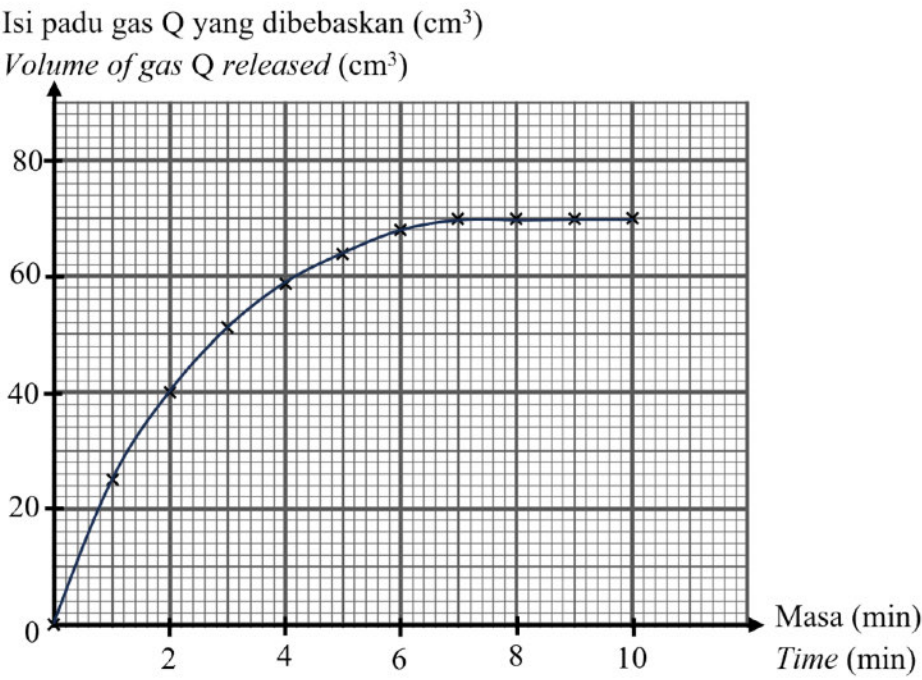
A XYZ₄

B X₂YZ₄

C X₃Y₂Z₆

D X₄YZ₉

- 33 Rajah 21 menunjukkan graf isi padu gas Q melawan masa bagi tindak balas antara kalsium karbonat dengan asid hidroklorik cair.
Diagram 21 shows a graph of the volume of gas Q against time for the reaction between calcium carbonate and dilute hydrochloric acid.



Rajah 21/ Diagram 21

Berdasarkan Rajah 21, tentukan kadar tindak balas purata dalam dua minit pertama.
Based on Diagram 21, determine the average rate of reaction in the first two minutes.

- A** 10.00 cm³ min⁻¹

B 12.67 cm³ min⁻¹
- C** 15.00 cm³ min⁻¹

D 20.00 cm³ min⁻¹

34 Jadual 1 menunjukkan senarai nilai bahan api.
Table 1 shows a list of fuel values.

Bahan Api <i>Fuel</i>	Nilai bahan api (kJ g ⁻¹) <i>Fuel value (kJ g⁻¹)</i>
Arang <i>Charcoal</i>	30
Hidrogen <i>Hydrogen</i>	143
Metana <i>Methane</i>	27
Petrol <i>Petrol</i>	34

Jadual 1 / *Table 1*

Apabila 10.5 g bahan api X terbakar dengan lengkap dalam udara, haba yang terhasil cukup untuk mendidihkan 1 000 cm³ air suling dari suhu bilik.

Apakah X?

[Muatan haba tentu air = 4.2 J g⁻¹ °C⁻¹; Ketumpatan air = 1 g cm⁻³; Suhu bilik = 25°C]

When 10.5 g of fuel X burns completely in air, the heat produced is enough to boil 1 000 cm³ of distilled water from room temperature.

What is X?

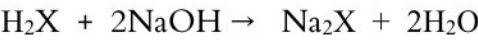
[Specific heat capacity of water = 4.2 J g⁻¹ °C⁻¹; Density of water = 1 g cm⁻³; Room temperature = 25°C]

- A** Arang
Charcoal

B Hidrogen
Hydrogen
- C** Metana
Methane

D Petrol
Petrol

- 35 Persamaan kimia berikut menunjukkan tindak balas di antara suatu asid dan suatu alkali.
The following chemical equation shows a reaction between an acid and an alkali.



25 cm³ asid diprotik, H₂X 0.1 mol dm⁻³ dititratkan dengan larutan natrium hidroksida, NaOH yang tidak diketahui kepekataannya.
25 cm³ of 0.1 mol dm⁻³ *diprotic acid*, H₂X is titrated with sodium hydroxide, NaOH solution of unknown concentration.

Jadual 2 menunjukkan data yang diperolehi.
Table 2 shows the data obtained.

Bilangan titratan <i>Number of titration</i>	Bacaan awal buret <i>Initial burette reading (cm³)</i>	Bacaan akhir buret <i>Final burette reading (cm³)</i>
1	0.10	25.40
2	1.10	27.20
3	0.80	26.80

Jadual 2 / *Table 2*

Apakah kepekatan larutan natrium hidroksida, NaOH?
What is the concentration of sodium hydroxide, NaOH solution?

- A** 0.097 mol dm⁻³
- B** 0.194 mol dm⁻³
- C** 0.197 mol dm⁻³
- D** 0.200 mol dm⁻³



- 36 Jadual 3 menunjukkan maklumat bagi beberapa unsur yang berada dalam kumpulan yang sama dalam Jadual Berkala Unsur.
Table 3 shows the information for several elements which are located in the same group in the Periodic Table of Elements.

Unsur <i>Element</i>	Bilangan proton <i>Number of protons</i>	Kereaktifan unsur <i>Reactivity of elements</i>
X	3	Kurang reaktif <i>Less reactive</i>
Y	11	Reaktif <i>Reactive</i>
Z	19	Lebih reaktif <i>More reactive</i>

Jadual 3 / *Table 3*

Antara berikut, pernyataan manakah yang menerangkan perubahan kereaktifan bagi unsur X, Y dan Z?
Which of the following statements explains the changes of reactivity of elements X, Y and Z?

- I Kecenderungan atom untuk menerima elektron bagi mengisi petala valens semakin berkurang.
The tendency of atom to accept electrons to fill the valence shell decreases.

II Daya tarikan nukleus terhadap elektron valens semakin berkurang.
The nuclear attraction force towards valence electrons decreases.

III Bilangan elektron valens semakin bertambah.
The number of valence electrons increases.

IV Jejari atom semakin bertambah.
The atomic radius increases.
- 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

37 Rajah 22 menunjukkan formula molekul bagi sebatian T dan sebatian U.
Diagram 22 shows the molecular formula of compound T and compound U.

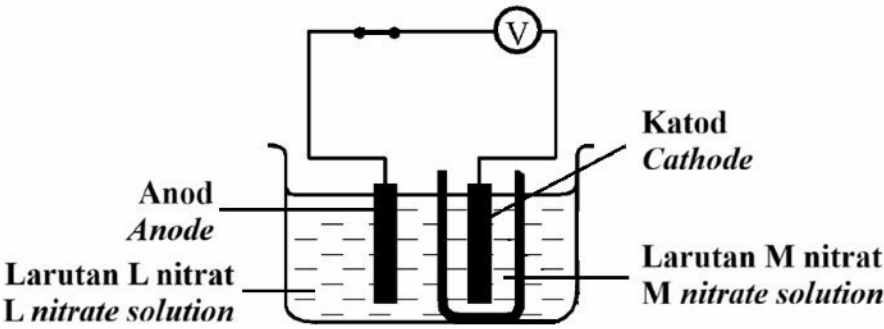
C₄H₁₀ Sebatian T / <i>Compound T</i>	C₄H₈ Sebatian U / <i>Compound U</i>
--	---

Rajah 22 / *Diagram 22*

Antara berikut, yang manakah menunjukkan perbandingan yang betul antara sebatian T dan sebatian U?
Which of the following shows the correct comparison between compound T and compound U?

	Sebatian T <i>Compound T</i>	Sebatian U <i>Compound U</i>
A	Bertindak balas dengan air bromin <i>Reacts with bromine water</i>	Tidak bertindak balas dengan air bromin <i>Does not react with bromine water</i>
B	Terbakar dengan nyalaan kuning yang lebih berjelaga <i>Burns with more yellow sooty flame</i>	Terbakar dengan nyalaan kuning yang kurang berjelaga <i>Burns with less yellow sooty flame</i>
C	Mempunyai peratusan jisim karbon per molekul yang lebih tinggi <i>Has higher percentage of carbon by mass per molecule</i>	Mempunyai peratusan jisim karbon yang lebih rendah <i>Has lower percentage of carbon by mass per molecule</i>
D	Tidak bertindak balas dengan larutan kalium manganat(VII) berasid <i>Does not react with acidified potassium manganate(VII) solution</i>	Bertindak balas dengan larutan kalium manganat(VII) berasid <i>Reacts with acidified potassium manganate(VII) solution</i>

- 38 Rajah 23 menunjukkan susunan radas bagi satu sel kimia dan sebahagian daripada Siri Keupayaan Elektrod Piawai.
Diagram 23 shows an apparatus set-up of a chemical cell and part of Standard Electrode Potential series.



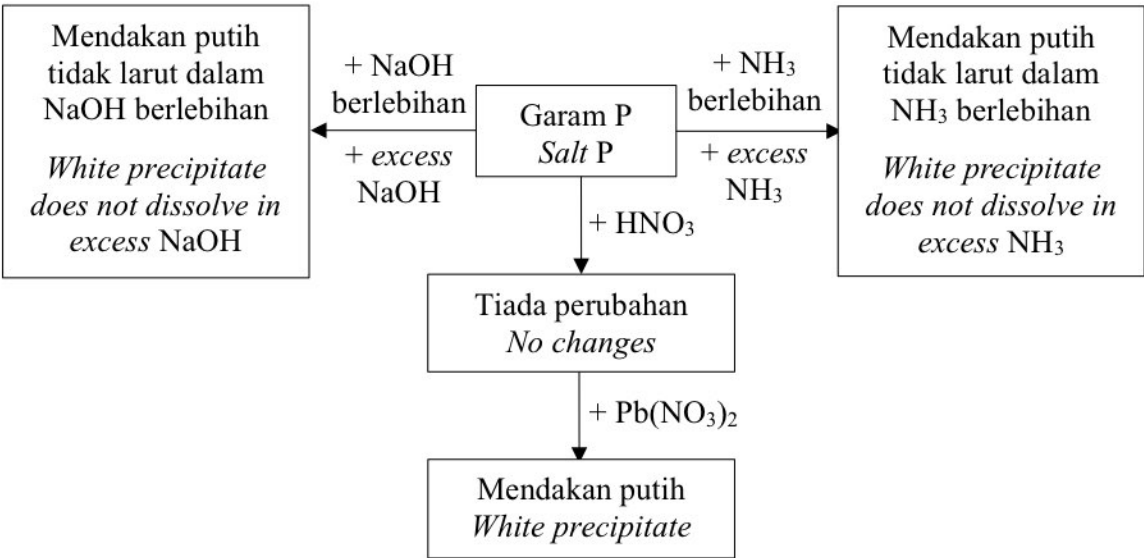
Rajah 23/ Diagram 23

Persamaan setengah sel <i>Half-cell equations</i>	E° (V) (298 K)
$Q^{+} + e^{-} \rightleftharpoons Q$	+0.80
$X^{2+} + 2e^{-} \rightleftharpoons X$	+0.34
$Y^{2+} + 2e^{-} \rightleftharpoons Y$	-0.76
$Z^{2+} + 2e^{-} \rightleftharpoons Z$	-0.13

Antara berikut, pasangan elektrod yang manakah menghasilkan nilai voltan yang tertinggi?
Which of the following pairs of electrodes produce the highest voltage value?

	Katod <i>Cathode</i>	Anod <i>Anode</i>
A	Q	Y
B	Z	X
C	Q	X
D	Z	Y

39 Rajah 24 menunjukkan carta alir bagi satu siri tindak balas ke atas garam P.
Diagram 24 shows the flow chart for a series of reaction on salt P.



Rajah 24 / *Diagram 24*

Berdasarkan keputusan eksperimen, apakah garam P?
Based on the results of the experiment, what is salt P?

- A** Zink klorida
Zinc chloride

B Kalsium klorida
Calcium chloride
- C** Magnesium sulfat
Magnesium sulphate

D Ammonium sulfat
Ammonium sulphate

40 Jadual 4 menunjukkan keadaan eksperimen yang dijalankan untuk mengkaji faktor-faktor yang mempengaruhi kadar tindak balas.

Table 4 shows the conditions of experiments that were carried out to investigate the factors that affect the rate of reaction.

Eksperimen Experiment	Saiz Size	Asid Acid
I	Serbuk zink Zinc powder	Asid hidroklorik 0.1 mol dm ⁻³ 0.1 mol dm ⁻³ of hydrochloric acid
II	Serbuk zink Zinc powder	Asid sulfurik 0.1 mol dm ⁻³ 0.1 mol dm ⁻³ of sulphuric acid
III	Ketulanan zink Zinc granule	Asid hidroklorik 0.1 mol dm ⁻³ 0.1 mol dm ⁻³ of hydrochloric acid

Jadual 4 / Table 4

Antara berikut, graf manakah yang mewakili ketiga-tiga eksperimen tersebut?

Which of the following graphs represent the three experiments?

