

Chemistry
Kertas 1
November
2021
 $1\frac{1}{4}$ jam



MAKTAB RENDAH SAINS MARA

PEPERIKSAAN AKHIR SIJIL PENDIDIKAN MRSM 2021

CHEMISTRY

Kertas 1

Satu jam lima belas minit

JANGAN BUKA KERTAS PEPERIKSAAN INI SEHINGGA DIBERITAHU

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

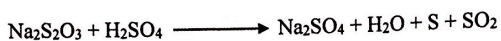
Kertas peperiksaan ini mengandungi 31 halaman bercetak dan 1 halaman tidak bercetak

SULIT

- 1 Antara bahan berikut, yang manakah terdiri daripada ion?
Which of the following substances is made up of ions?

- A Air
Water
- B Argon
Argon
- C Gas oksigen
Oxygen gas
- D Natrium klorida
Sodium chloride

- 2 Persamaan berikut mewakili satu tindak balas.
The following equation represents a reaction.



Apakah bahan tindak balas dalam persamaan ini?
What are the reactants in this equation?

- A Natrium sulfat, air, sulfur dan sulfur dioksida
Sodium sulphate, water, sulphur and sulphur dioxide
- B Natrium sulfat dan asid sulfurik
Sodium sulphate and sulphuric acid
- C Natrium tiosulfat dan asid sulfurik
Sodium thiosulphate and sulphuric acid
- D Natrium tiosulfat dan natrium sulfat
Sodium thiosulphate and sodium sulphate

- 3 Pernyataan berikut merujuk kepada sumbangan seorang ahli sains dalam membangunkan Jadual Berkala Unsur.

The following statements refer to the contributions of a scientist in the development of the Periodic Table of Elements.

- Unsur yang mempunyai sifat kimia yang sama terletak pada lajur menegak yang sama yang dikenali sebagai kumpulan.
Elements with similar chemical properties were placed in the same vertical column called a group.
- Ruang ditinggalkan dalam Jadual Berkala Unsur ini untuk unsur yang belum ditemui.
Gaps were left in the Periodic Table of Elements for undiscovered elements.

Siapakah ahli sains tersebut?

Who was the scientist?

- A Lothar Meyer
- B John Newlands
- C Dmitri Mendeleev
- D Johann W. Dobereiner

- 4 Bagaimanakah ikatan datif boleh terbentuk?

How a dative bond can be formed?

- A Pasangan elektron bebas daripada atom bukan logam dikongsi dengan atom lain
Lone pair of electrons from a non-metal atom are shared with another atom
- B Pasangan elektron bebas didermakan kepada atom lain untuk membentuk daya elektrostatik
Lone pair of electrons are donated to another atom to form electrostatic force
- C Pasangan elektron bebas didermakan untuk memastikan hanya 6 elektron di petala terluar
Lone pair of electrons are donated to ensure only 6 electrons in the outermost shell

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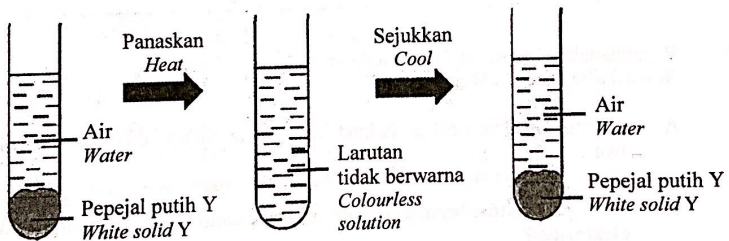
SULIT

- 5 Seorang pelajar menambahkan 2 cm^3 asid nitrik 0.1 mol dm^{-3} ke dalam sebuah tabung uji yang mengandungi 2 cm^3 larutan kalium hidroksida 0.1 mol dm^{-3} .
Kenalpasti garam yang terhasil dan keterlarutannya dalam air.

*A student added 2 cm^3 of 0.1 mol dm^{-3} nitric acid into a test tube containing 2 cm^3 of 0.1 mol dm^{-3} potassium hydroxide solution.
Identify the salt produced and its solubility in water.*

	Formula kimia bagi hasil tindak balas <i>Chemical formula of product formed</i>	Keterlarutan dalam air <i>Solubility in water</i>
A	KNO_2	Tak larut <i>Insoluble</i>
B	KNO_3	Tak larut <i>Insoluble</i>
C	KNO_2	Larut <i>Soluble</i>
D	KNO_3	Larut <i>Soluble</i>

- 6 Rajah 1 menunjukkan salah satu daripada sifat fizik garam Y.
Diagram 1 shows one of the physical properties of salt Y.



Rajah 1
Diagram 1

Apakah garam Y?
What is salt Y?

- A Plumbum(II) iodida
Lead(II) iodide
- B Plumbum(II) klorida
Lead(II) chloride
- C Barium kromat(VI)
Barium chromate(VI)
- D Kalium iodida
Potassium iodide

- 7 Antara berikut, pasangan manakah betul tentang kadar tindak balas?
Which of the following pair is correct about the rate of reaction?

	Kadar tindak balas rendah <i>Low rate of reaction</i>	Kadar tindak balas tinggi <i>High rate of reaction</i>
A	Peneutralan antara asid dan alkali <i>Neutralisation between acid and alkali</i>	Kakisan logam <i>Corrosion of metals</i>
B	Penguraian ganda dua antara larutan plumbum(II) nitrat dan larutan natrium iodida <i>Double decomposition between lead(II) nitrate solution and sodium iodide solution</i>	Peneutralan antara asid dan alkali <i>Neutralisation between acid and alkali</i>
C	Kakisan logam <i>Corrosion of metals</i>	Penapaian larutan glukosa <i>Fermentation of glucose solution</i>
D	Penapaian larutan glukosa <i>Fermentation of glucose solution</i>	Penguraian ganda dua antara larutan plumbum(II) nitrat dan larutan natrium iodida <i>Double decomposition between lead(II) nitrate solution and sodium iodide solution</i>

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- 8 Aloi Z mempunyai komposisi seperti berikut:
Alloy Z has the following composition:

74% Ferum 74% Iron
18% Kromium 18% Chromium
8% Nikel 8% Nickel

Apakah aloi Z?
What is alloy Z?

- A Keluli nirkarat
Stainless steel
- B Duralumin
Duralumin
- C Loyang
Brass
- D Piuter
Pewter
- 9 Apakah keupayaan elektrod piawai?
What is a standard electrode potential?
- A Beza keupayaan yang terhasil apabila wujud keseimbangan antara logam dan larutan akueus ionnya dalam sel setengah
The potential difference produced when an equilibrium is established between metal and its ions aqueous solution in a half-cell
- B Beza keupayaan yang terhasil apabila wujud keseimbangan antara dua larutan akueus dalam sel setengah
The potential difference produced when an equilibrium is established between two aqueous solutions in a half-cell
- C Beza keupayaan di mana pengoksidaan berlaku di elektrod
The potential difference as oxidation occurs at the electrode
- D Beza keupayaan di mana penurunan berlaku di elektrod
The potential difference as reduction occurs at the electrode

- 10 Dalam tindak balas redoks, pengoksidaan dan penurunan berlaku secara serentak. Antara berikut yang manakah melibatkan penurunan?
In a redox reaction, oxidation and reduction occur simultaneously. Which of the following involves a reduction?

- A Atom aluminium menerima oksigen
Aluminium atom gains oxygen
- B Atom barium kehilangan elektron
Barium atom loses electron
- C Hidrogen sulfida kehilangan hidrogen
Hydrogen sulphide loses hydrogen
- D Atom klorin menerima elektron
Chlorine atom gains electron

- 11 Persamaan berikut mewakili tindak balas penambahan bagi suatu alkena.
The following equation represents addition reaction of an alkene.



Apakah mangkin yang digunakan dalam tindak balas ini?
What is the catalyst used in the reaction?

- A Ferum
Iron
- B Nikel
Nickel
- C Kuprum(II) sulfat
Copper(II) sulphate
- D Mangan(IV) oksida
Manganese(IV) oxide
- 12 Antara pasangan sebatian berikut, manakah yang dikelaskan dalam siri homolog yang sama?
Which of the following pair of compounds is classified in the same homologous series?

	Sebatian I <i>Compound I</i>	Sebatian II <i>Compound II</i>
A	C_2H_4	C_3H_6
B	C_2H_6	C_3H_6
C	$\text{C}_2\text{H}_5\text{OH}$	CH_3COOH
D	$\text{CH}_3\text{COOCH}_3$	$\text{C}_2\text{H}_5\text{COOH}$

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 SULIT

- 13 Antara bahan kimia berikut, yang manakah akan merendahkan suhu apabila dilarutkan dalam air?
Which of the following chemicals will lower the temperature when dissolved in water?

- A Natrium oksida
Sodium oxide
- B Kalium hidroksida
Potassium hydroxide
- C Kuprum(II) sulfat
Copper(II) sulphate
- D Ammonium nitrat
Ammonium nitrate

- 14 Berikut adalah ciri-ciri neoprena.
The following are the characteristics of neoprene.

- Tidak mengalirkan elektrik
Does not conduct electricity
- Tahan terhadap pelarut dan minyak
Resistant to solvents and oils
- Tahan haba
Heat-resistance

- Antara produk berikut, yang manakah sesuai dihasilkan dengan menggunakan neoprena?
Which of the following product is suitable to be made by using neoprene?

- A Sarung tangan
Gloves
- B Implan perubatan
Medical implant
- C Tapak kasut
Soles of shoes
- D Tayar
Tyres

- 15 Grafen mempunyai potensi yang sangat besar dalam industri bioperubatan, antaranya sebagai sensor dalam peranti untuk mengukur aras glukosa darah dengan kuantiti sampel yang kecil.
Pernyataan manakah yang paling baik menerangkan penggunaan grafen dalam pembuatan biosensor?

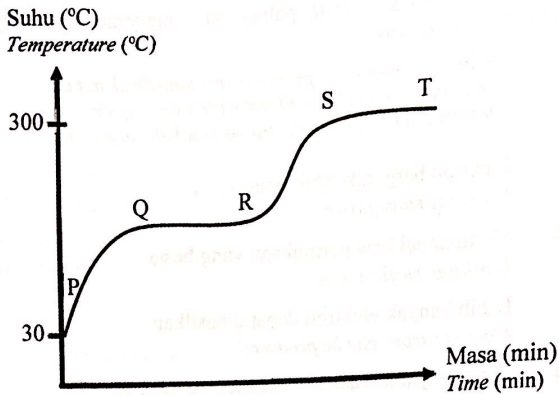
*Graphene has an enormous potential in biomedical industries, especially as sensor in a device to measure blood glucose level with a small quantity of sample.
Which statement best explains the use of graphene in making biosensor?*

- A Elektron bergerak lebih pantas
Electrons move faster
 - B Mempunyai luas permukaan yang besar
Has large surface area
 - C Lebih banyak elektron dapat dihasilkan
More electrons can be produced
 - D Mempunyai kekuatan mekanikal yang tinggi
Has high mechanical strength
- 16 Unsur manakah mempunyai isotop yang boleh mengesan kebocoran paip bawah tanah?
Which element has an isotope that can detects the leakage in underground pipe?

- A Fosforus
Phosphorus
- B Karbon
Carbon
- C Natrium
Sodium
- D Kobalt
Cobalt

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- 17 Rajah 2 menunjukkan lengkung pemanasan bahan M.
Diagram 2 shows the heating curve of substance M.



Rajah 2
Diagram 2

Berdasarkan Rajah 2, pada bahagian manakah bahan M wujud sebagai campuran pepejal dan cecair?
Based on Diagram 2, at which section does substance M exist as a mixture of solid and liquid?

- A P hingga Q
P to Q
- B Q hingga R
Q to R
- C R hingga S
R to S
- D S hingga T
S to T

- 18 Klorin-35 dan klorin-37 adalah isotop bagi klorin.
Antara yang berikut, pernyataan manakah yang betul?
[Nombor proton klorin = 17]

*Chlorine-35 and chlorine-37 are isotopes of chlorine.
Which of the following statement is correct?
[Proton number of chlorine = 17]*

- A Klorin-37 mempunyai 17 proton dan 20 neutron
Chlorine-37 has 17 protons and 20 neutrons
- B Klorin-35 mempunyai 17 proton dan 18 elektron
Chlorine-35 has 17 protons and 18 electrons
- C Klorin-35 mempunyai bilangan elektron kurang daripada klorin-37
Chlorine-35 has less number of electrons than chlorine-37
- D Klorin-35 mempunyai bilangan neutron yang sama dengan klorin-37
Chlorine-35 has same number of neutrons as chlorine-37

- 19 Unsur X berada di bawah bromin dalam kumpulan yang sama dalam Jadual Berkala Unsur.

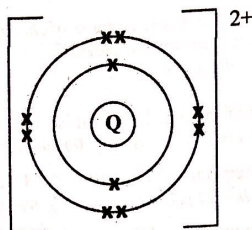
Jika unsur X bertindak balas dengan ferum, bagaimanakah kereaktifan unsur X berbanding bromin dan apakah formula kimia hasil tindak balas yang terbentuk?

*Element X is located below bromine in the same group in the Periodic Table of Elements.
If element X reacts with iron, how does the reactivity of X compared to bromine and what is the chemical formula of the product formed?*

	Kereaktifan dengan ferum <i>Reactivity with iron</i>	Formula hasil tindak balas <i>Formula of the product</i>
A	Kurang reaktif <i>Less reactive</i>	FeX_3
B	Lebih reaktif <i>More reactive</i>	FeX_3
C	Kurang reaktif <i>Less reactive</i>	Fe_2X_3
D	Lebih reaktif <i>More reactive</i>	Fe_2X_3

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- 20 Rajah 3 menunjukkan susunan elektron bagi ion Q.
Diagram 3 shows the electron arrangement of Q ion.

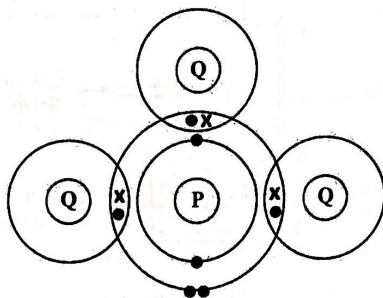


Rajah 3
Diagram 3

Manakah antara pernyataan berikut benar mengenai atom Q?
Which of the following statements is true about Q atom?

- A Susunan elektron bagi atom Q ialah 2.8
The electron arrangement of Q atom is 2.8
- B Terdapat 12 elektron di dalam atom Q
There are 12 electrons in Q atom
- C Q terletak dalam Kumpulan 18
Q is in Group 18
- D Q terletak dalam Kala 2
Q is in Period 2

- 21 Rajah 4 menunjukkan susunan elektron bagi sebatian yang terbentuk antara atom P dan atom Q.
 Diagram 4 shows the electron arrangement of a compound formed between atom P and atom Q.



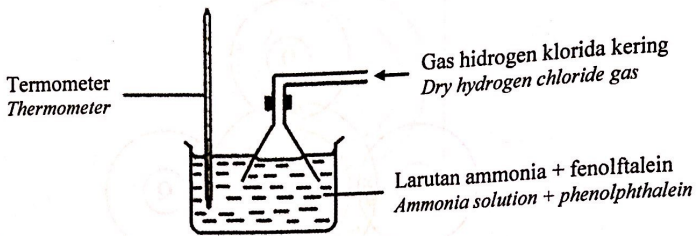
Rajah 4
 Diagram 4

Penyataan manakah yang benar mengenai sebatian tersebut?
 Which of the following statements is true about the compound?

- A Sebatian tersebut tidak stabil
 The compound is not stable
- B Semua atom telah mencapai susunan elektron oktet
 All atoms have achieved octet electron arrangement
- C Atom Q berkongsi elektron valens dengan atom P
 Q atoms share their valence electrons with P atom
- D Sebatian terbentuk melalui perpindahan elektron
 The compound is formed by electron transfer

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- 22 Rajah 5 menunjukkan gas hidrogen klorida kering dialirkan melalui larutan ammonia yang telah ditambah dengan beberapa titis fenolftalein.
Diagram 5 shows dry hydrogen chloride gas is passed through an ammonia solution which was added with a few drops of phenolphthalein.



Rajah 5
Diagram 5

Antara berikut yang manakah benar?

Which of the following is true?

- A Larutan merah jambu menjadi tidak berwarna
The pink solution turns colourless
- B Mendakan putih terbentuk
White precipitate formed
- C Suhu larutan berkurang
Temperature of solution decreases
- D pH larutan bertambah
pH of solution increases

- 23 Jadual 1 menunjukkan eksperimen untuk mengkaji kadar tindak balas antara marmar dan asid hidroklorik.

Table 1 shows an experiment to study the rate of reaction between marble and hydrochloric acid.

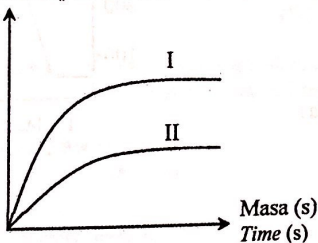
Set Set	Bahan Substance
I	Marmar berlebihan dan 50.0 cm ³ asid hidroklorik 2.0 mol dm ⁻³ Excess marble and 50.0 cm ³ of 2.0 mol dm ⁻³ hydrochloric acid
II	Marmar berlebihan dan 50.0 cm ³ asid hidroklorik 1.0 mol dm ⁻³ Excess marble and 50.0 cm ³ of 1.0 mol dm ⁻³ hydrochloric acid

Jadual 1

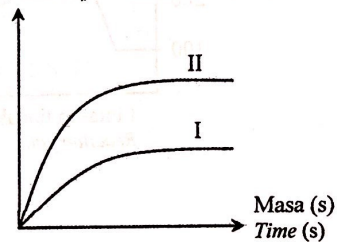
Table 1

Antara berikut, graf yang manakah mewakili eksperimen tersebut?
Which of the following graph represents the experiments?

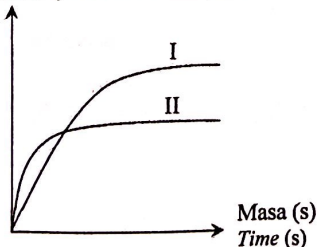
A Isipadu karbon dioksida (cm³)
Volume of carbon dioxide (cm³)



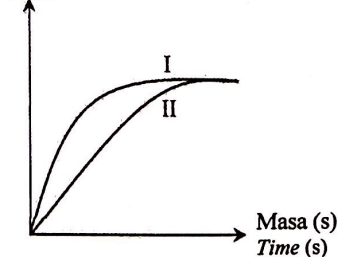
B Isipadu karbon dioksida (cm³)
Volume of carbon dioxide (cm³)



C Isipadu karbon dioksida (cm³)
Volume of carbon dioxide (cm³)

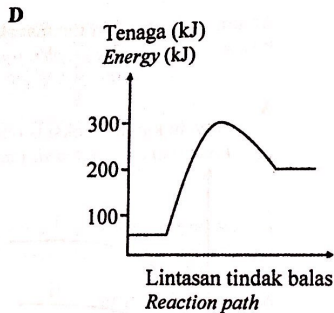
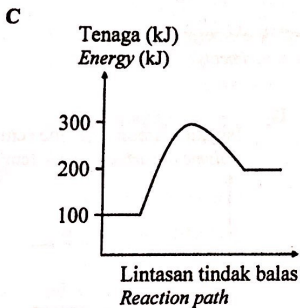
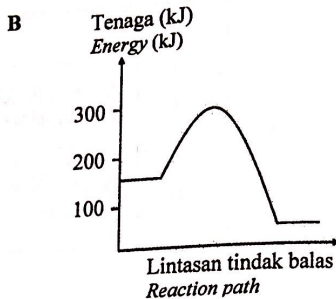
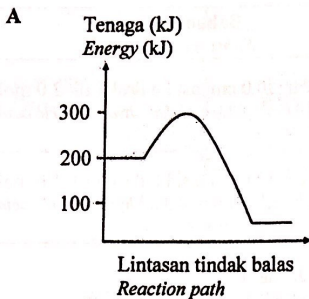


D Isipadu karbon dioksida (cm³)
Volume of carbon dioxide (cm³)

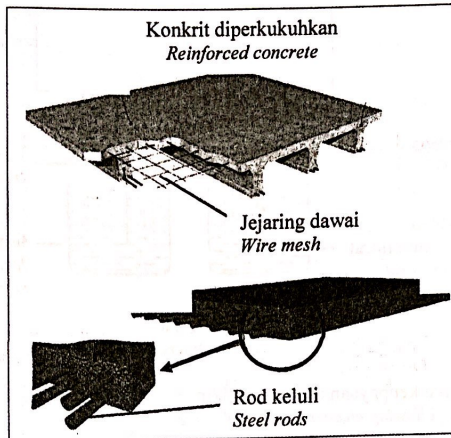


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- 24 Antara berikut, gambar rajah profil tenaga yang manakah menunjukkan tenaga pengaktifan paling tinggi?
Which of the following energy profile diagram shows the highest activation energy?



- 25 Rajah 6 menunjukkan konkrit yang diperkukuhkan. Penambahan rod keluli atau jejaring dawai akan menambah baik sifat konkrit tersebut.
Diagram 6 shows reinforced concrete. Adding steel rods or wire mesh will improve the properties of the concrete.



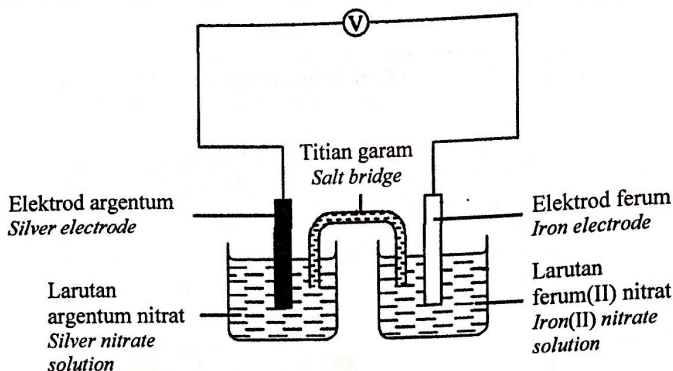
Rajah 6
Diagram 6

Antara berikut, sifat manakah yang akan ditambah baik?
Which of the following properties will be improved?

- A Tahan kakisan
Resistant to corrosion
- B Kekuatan regangan
Stretching strength
- C Kekuatan mampatan
Compression strength
- D Kekonduksian haba dan elektrik
Heat and electrical conductivity

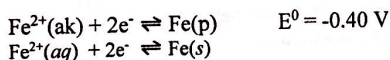
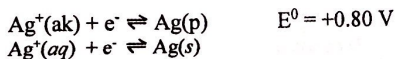
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SULIT

- 26 Rajah 7 menunjukkan susunan radas bagi satu sel kimia.
Diagram 7 shows the apparatus set-up for a voltaic cell.



Rajah 7
Diagram 7

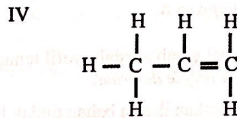
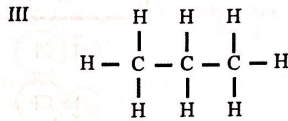
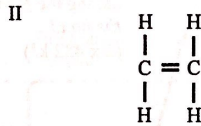
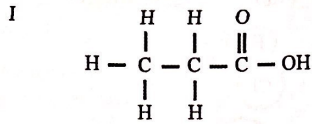
Diberi nilai keupayaan elektrod berikut.
Given the following electrode potential values.



Apakah notasi sel untuk sel kimia tersebut?
What is the cell notation of the voltaic cell?

- A $\text{Ag}(\text{p}) \mid \text{Ag}^+(\text{ak}) \parallel \text{Fe}^{2+}(\text{ak}) \mid \text{Fe}(\text{p})$
 $\text{Ag}(\text{s}) \mid \text{Ag}^+(\text{aq}) \parallel \text{Fe}^{2+}(\text{aq}) \mid \text{Fe}(\text{s})$
- B $\text{Fe}(\text{p}) \mid \text{Fe}^{2+}(\text{ak}) \parallel \text{Ag}(\text{p}) \mid \text{Ag}^+(\text{ak})$
 $\text{Fe}(\text{s}) \mid \text{Fe}^{2+}(\text{aq}) \parallel \text{Ag}(\text{s}) \mid \text{Ag}^+(\text{aq})$
- C $\text{Ag}^+(\text{ak}) \mid \text{Ag}(\text{p}) \parallel \text{Fe}(\text{p}) \mid \text{Fe}^{2+}(\text{ak})$
 $\text{Ag}^+(\text{aq}) \mid \text{Ag}(\text{s}) \parallel \text{Fe}(\text{s}) \mid \text{Fe}^{2+}(\text{aq})$
- D $\text{Fe}(\text{p}) \mid \text{Fe}^{2+}(\text{ak}) \parallel \text{Ag}^+(\text{ak}) \mid \text{Ag}(\text{p})$
 $\text{Fe}(\text{s}) \mid \text{Fe}^{2+}(\text{aq}) \parallel \text{Ag}^+(\text{aq}) \mid \text{Ag}(\text{s})$

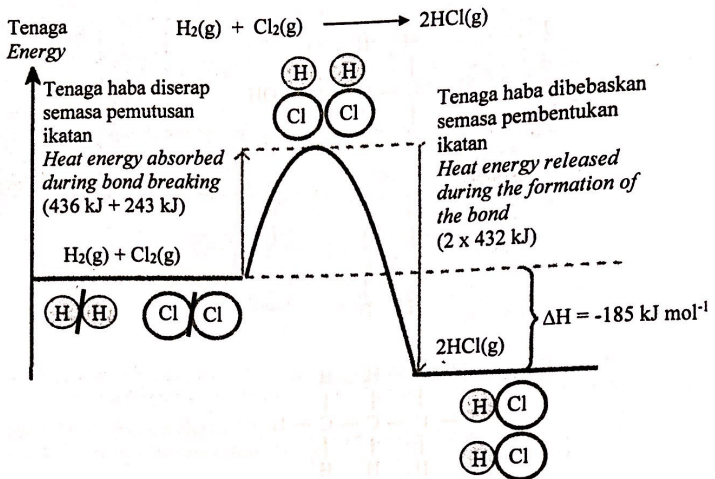
- 27 Antara sebatian berikut, yang manakah akan menyahwarnakan air bromin?
Which of the following compounds will decolourise bromine water?



- 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

[Lihat halaman sebelah
SULIT

- 28 Rajah 8 menunjukkan gambar rajah profil tenaga bagi suatu tindak balas.
Diagram 8 shows the energy profile diagram of a reaction.



Rajah 8
Diagram 8

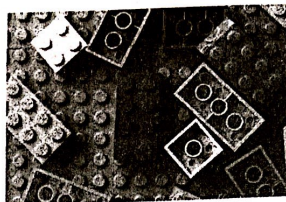
Pernyataan manakah yang betul mengenai gambar rajah profil tenaga itu?
Which statement is correct about the energy profile diagram?

- A Tenaga haba diserap untuk memutuskan ikatan bahan tindak balas adalah lebih tinggi
Heat energy absorbed to break the bonds in the reactants is greater
- B Tenaga haba yang dibebaskan semasa pembentukan ikatan adalah lebih rendah
Heat energy released during the formation of bonds is lower
- C Tenaga haba diserap untuk pemutusan ikatan bahan tindak balas adalah 679 kJ
Heat energy absorbed to break the bonds in the reactants is 679 kJ
- D Tenaga haba yang dibebaskan semasa pembentukan ikatan ialah 432 kJ
Heat energy released during the formation of bonds is 432 kJ

- 29 Rajah 9 menunjukkan dua produk polimer dengan ciri yang berbeza.
 Diagram 9 shows two products of polymers with different characteristics.



Pinggan melamin
 Melamine plate



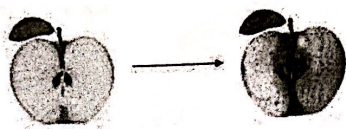
Permainan blok binaan
 Building block toys

Rajah 9
 Diagram 9

Antara berikut, yang manakah paling baik menerangkan ciri kedua-dua polimer?
 Which of the following best explains the characteristic of both polymers?

- A Termoplastik lebih keras dari termoset
 Thermoplastic is harder than thermoset
- B Termoplastik tidak melebur bila dipanaskan tetapi termoset melebur bila dipanaskan dan mengeras bila disejukkan
 Thermoplastic does not melt when heated but thermoset melts when heated and solidify when cooled
- C Termoplastik mempunyai rangkai silang antara rantai polimer tetapi termoset tiada
 Thermoplastic has cross-links between polymer chain but thermoset does not
- D Termoplastik boleh diacu berulang kali tetapi termoset hanya boleh diacu sekali sahaja
 Thermoplastic can be moulded repeatedly, but thermoset can only be moulded once

- 30 Rajah 10 menunjukkan potongan epal yang bertukar perang selepas 20 minit.
Diagram 10 shows a cut of apple that turns brown after 20 minutes.



Rajah 10
Diagram 10

Mengapakah epal bertukar perang dan apakah jenis bahan tambah makanan yang sesuai digunakan untuk mengelakkannya?
Why the apple turns brown and what is the suitable type of food additives can be used to prevent it?

	Sebab Reason	Bahan tambah makanan Food additives
A	Pertumbuhan bakteria The growth of bacteria	Pengawet Preservatives
B	Pengoksidaan berlaku Oxidation occurs	Antioksida Antioxidants
C	Kepekatan garam yang tinggi High concentration of salt	Perisa Flavourings
D	Sebatian azo wujud dalam epal Azo compound presents in the apple	Pewarna Dyes

- 31 Persamaan kimia berikut mewakili tindak balas untuk mengekstrak aluminium daripada aluminium oksida.
The following chemical equation represents the reaction to extract aluminium from aluminium oxide.



Hitungkan jisim maksimum aluminium yang dapat diekstrak daripada 10.20 g aluminium oksida?
[Jisim atom relatif: O = 16, Al = 27]

Calculate the maximum mass of aluminium that can be extracted from 10.20 g of aluminium oxide?
[Relative atomic mass: O = 16, Al = 27]

- A 2.70 g
B 5.40 g
C 10.80 g
D 2160 g

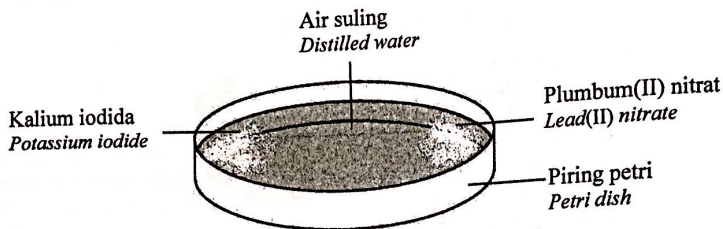
- 32 Rajah 11 menunjukkan penggunaan span basah untuk mengatasi masalah kepingan kertas yang melekat bersama.
Diagram 11 shows the uses of wet sponge to overcome the problem of turning the pieces of papers sticking together.



Rajah 11
Diagram 11

- Antara berikut, yang manakah paling baik menjelaskan keadaan ini?
Which of the following is best explained this situation?
- A Molekul air membentuk ikatan kovalen dengan selulosa dalam kertas
Water molecules formed covalent bond with the cellulose in paper
 - B Molekul air mempunyai daya Van der Waals yang lemah
Water molecules has weak Van der Waals force
 - C Molekul air membentuk ikatan hidrogen dengan selulosa dalam kertas
Water molecules formed hydrogen bond with the cellulose in paper
 - D Molekul air mengandungi ion H^+ dan OH^-
Water molecules contain H^+ and OH^- ions
- 33 Satu larutan natrium hidroksida mempunyai kepekatan 4 g dm^{-3} .
Apakah pH larutan itu?
[Jisim molar $\text{NaOH} = 40 \text{ g mol}^{-1}$]
*A solution of sodium hydroxide has a concentration of 4 g dm^{-3} .
What is the pH of the solution?
[Molar mass of $\text{NaOH} = 40 \text{ g mol}^{-1}$]*
- A 0.6
 - B 1.0
 - C 13.0
 - D 13.4

- 34 Rajah 12 menunjukkan tindak balas antara 5 g serbuk kalium iodida dengan 5 g serbuk plumbum(II) nitrat menghasilkan mendakan kuning. Masa untuk tindak balas lengkap berlaku ialah 1 minit.
 Diagram 12 shows the reaction between 5 g of potassium iodide powder and 5 g of lead(II) nitrate powder to form a yellow precipitate. Time for the reaction to complete is 1 minute.



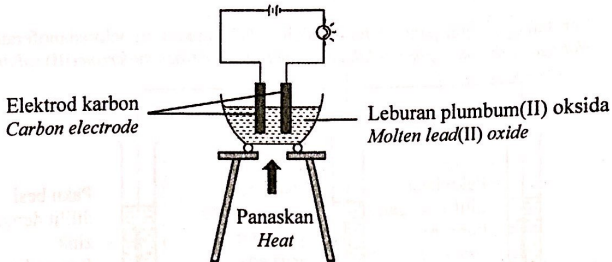
Rajah 12
 Diagram 12

Apakah kadar pembentukan mendakan kuning tersebut?
 [Jisim formula relatif: KI = 166, $\text{Pb}(\text{NO}_3)_2 = 331$, $\text{PbI}_2 = 461$]

What is the rate of formation of the yellow precipitate?
 [Relative formula mass: KI = 166, $\text{Pb}(\text{NO}_3)_2 = 331$, $\text{PbI}_2 = 461$]

- A 3.458 g min^{-1}
 B 6.915 g min^{-1}
 C 13.830 g min^{-1}

- 35 Rajah 13 menunjukkan susunan radas bagi elektrolisis leburan plumbum(II) oksida, PbO.
Diagram 13 shows the apparatus set-up for electrolysis of molten lead(II) oxide, PbO.



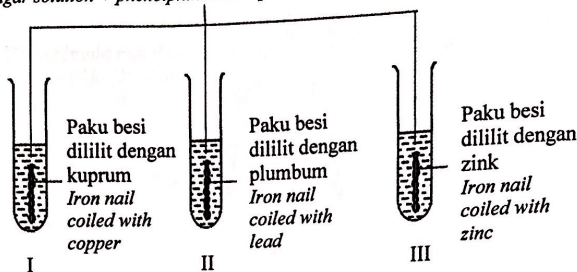
Rajah 13
Diagram 13

Antara setengah persamaan berikut, yang manakah berlaku di anod dan katod?
Which of the following half equations take place at anode and cathode?

	Anod Anode	Katod Cathode
A	$\text{Pb}^{2+} + 2\text{e}^- \rightarrow \text{Pb}$	$2\text{O}^{2-} \rightarrow \text{O}_2 + 4\text{e}^-$
B	$2\text{O}^{2-} \rightarrow \text{O}_2 + 4\text{e}^-$	$2\text{H}^+ + 2\text{e}^- \rightarrow \text{H}_2$
C	$\text{Pb}^{2+} + 2\text{e}^- \rightarrow \text{Pb}$	$2\text{H}^+ + 2\text{e}^- \rightarrow \text{H}_2$
D	$2\text{O}^{2-} \rightarrow \text{O}_2 + 4\text{e}^-$	$\text{Pb}^{2+} + 2\text{e}^- \rightarrow \text{Pb}$

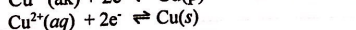
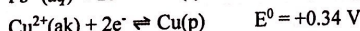
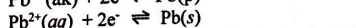
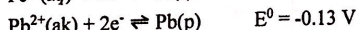
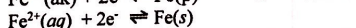
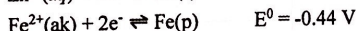
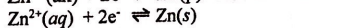
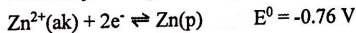
- 36 Rajah 14 menunjukkan susunan radas untuk mengkaji kesan logam lain terhadap pengurangan besi.
Diagram 14 shows the apparatus set-up to study the effect of other metals on the rusting of iron.

Larutan agar-agar panas + fenolftalein + larutan kalium heksasianoferrat(III)
Hot agar solution + phenolphthalein + potassium hexacyanoferrate(III) solution



Rajah 14
Diagram 14

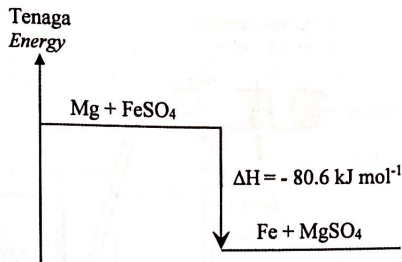
Diberi nilai keupayaan elektrod berikut.
Given the following electrode potential value.



Dalam tabung uji manakah tompok biru dapat diperhatikan?
In which test tubes the blue spots can be observed?

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

- 37 Rajah 15 menunjukkan gambar rajah aras tenaga bagi tindak balas penyesaran antara serbuk magnesium dan larutan ferum(II) sulfat.
Diagram 15 shows the energy level diagram of the displacement reaction between magnesium powder and iron(II) sulphate solution.



Rajah 15
Diagram 15

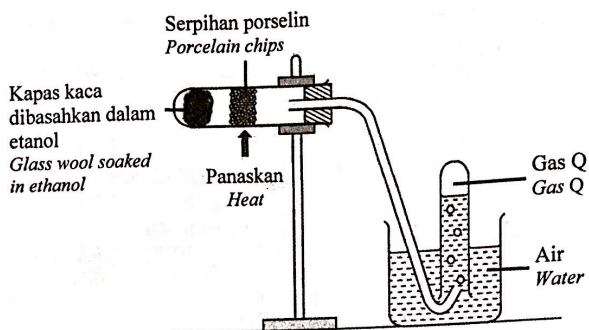
Berapakah kenaikan suhu, jika 50 cm³ larutan ferum(II) sulfat 0.25 mol dm⁻³ ditindak balaskan dengan magnesium berlebihan?
[Muatan haba tentu larutan = 4.2 J g⁻¹ °C⁻¹]

What is the increase in temperature if 50 cm³ of 0.25 mol dm⁻³ iron(II) sulphate solution is reacted with excess magnesium?
[Specific heat capacity of the solution = 4.2 J g⁻¹ °C⁻¹]

- A 0.048 °C
- B 0.48 °C
- C 4.8 °C
- D 48.0 °C

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- 38 Rajah 16 menunjukkan susunan radas bagi tindak balas untuk menghasilkan gas Q. Gas Q boleh terbakar dengan lengkap dalam kehadiran oksigen berlebihan. Diagram 16 shows the apparatus set-up for the reaction to produce gas Q. Gas Q can be burnt completely in excess oxygen.

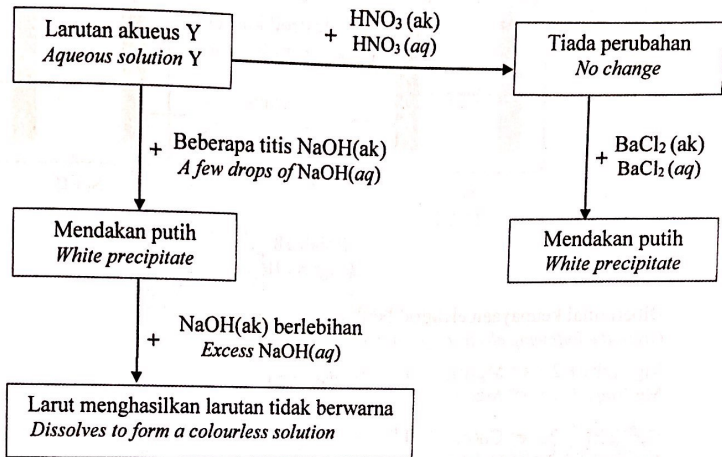


Rajah 16
Diagram 16

Apakah gas Q dan persamaan kimia bagi pembakaran lengkap tersebut?
What is gas Q and the chemical equation for the complete combustion?

	Gas Q Gas Q	Chemical equation for complete combustion Persamaan kimia bagi pembakaran lengkap
A	Etanol Ethanol	$C_2H_5OH + 3O_2 \longrightarrow 2CO_2 + 3H_2O$
B	Etena Ethene	$C_2H_4 + 3O_2 \longrightarrow 2CO_2 + 2H_2O$
C	Etanol Ethanol	$C_2H_5OH + 2O_2 \longrightarrow 2CO + 3H_2O$
D	Etena Ethene	$C_2H_4 + 2O_2 \longrightarrow 2CO + 2H_2O$

- 39 Rajah 17 menunjukkan pemerhatian yang diperoleh apabila larutan akueus Y bertindak balas dengan beberapa reagen. Diagram 17 shows the observations obtained when aqueous solution Y reacts with a few reagents.



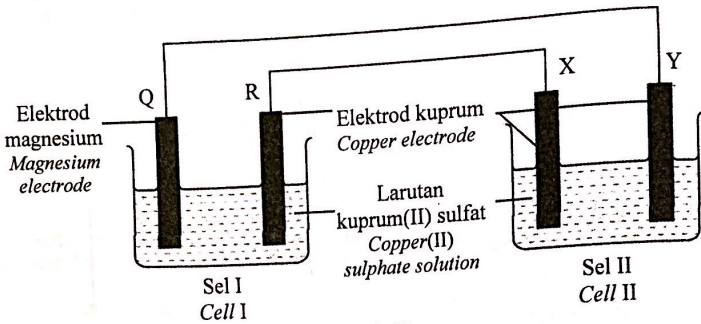
Rajah 17
Diagram 17

Apakah garam Y?
What is salt Y?

- A Zink karbonat
Zinc carbonate
- B Kalsium klorida
Calcium chloride
- C Aluminium sulfat
Aluminium sulphate
- D Magnesium sulfat
Magnesium sulphate

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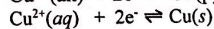
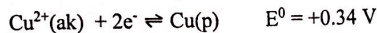
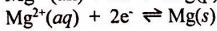
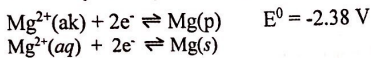
- 40 Rajah 18 menunjukkan susunan radas bagi gabungan dua sel.
Diagram 18 shows the apparatus set-up for a combination of two cells.



Rajah 18
Diagram 18

Diberi nilai keupayaan elektrod berikut.

Given the following electrode potential value.



Antara berikut, pernyataan manakah yang betul?
Which of the following statements are true?

- I Gelembung gas tidak berwarna dihasilkan di elektrod X
Bubbles of colourless gas is produced at electrode X
- II Elektrod R dan elektrod Y menipis
Electrode R and electrode Y become thinner
- III Elektrod X dan elektrod Q ialah anod
Electrode X and electrode Q are anode
- IV Warna biru larutan kuprum(II) sulfat di dalam Sel II tidak berubah
Blue colour of copper(II) sulphate solution in Cell II remains unchanged

- 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

KERTAS PEPERIKSAAN TAMAT
END OF QUESTION PAPER