

Nama: Kelas:

4541/1
Kimia
Kertas 1
November 2023
1 ¼ jam



**JAWATANKUASA PEMUAFAKATAN KURIKULUM DAERAH (KIMIA)
PEJABAT PENDIDIKAN DAERAH MUAR**

**PEPERIKSAAN PERCUBAAN SPM
2023**

KIMIA
Kertas 1

Satu jam lima belas minit

UNTUK CALON

1. Kertas soalan ini mengandungi 40 soalan.
2. Jawab semua soalan.
3. Jawab dengan menghitamkan ruangan yang betul pada kertas jawapan.
4. Hitamkan satu ruangan sahaja bagi setiap soalan.
5. Sekiranya anda hendak menukar jawapan, padamkan tanda yang telah dibuat. Kemudian hitamkan jawapan yang baru.
6. Rajah yang mengiringi soalan tidak dilukis mengikut skala kecuali dinyatakan.
7. Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogram.

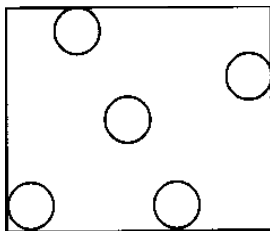
INFORMATION FOR CANDIDATES

1. *This question paper consists of 40 questions.*
2. *Answer all questions.*
3. *Answer each question by blackening the correct space on the answer sheet.*
4. *Blacken only one space for each question.*
5. *If you wish to change your answer, erase the blackened mark that you have made. Then blacken the space for the new answer.*
6. *The diagrams in the questions provided are not drawn to scale unless stated.*
7. *You may use a non-programmable scientific calculator.*

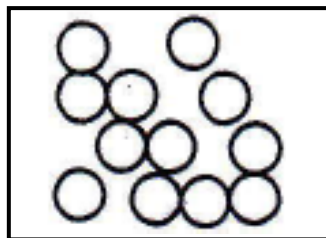
- 1 Antara berikut, yang manakah betul?
Which of the following is correct?

A	Ernest Rutherford	neutron <i>neutron</i>
B	J. J. Thompson	elektron <i>electron</i>
C	James Chadwick	proton <i>proton</i>
D	John Dalton	proton <i>proton</i>

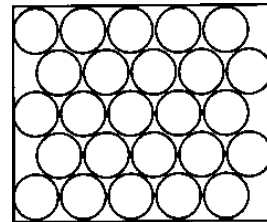
- 2 Rajah 1 menunjukkan susunan zarah dalam tiga keadaan jirim pada suhu bilik.
Diagram 1 shows the arrangement of particles in three states of matter at room temperature.



P



Q



R

Rajah 1
Diagram 1

Apakah bahan P, Q dan R pada suhu bilik?
What is substances P, Q and R at room temperature?

	P	Q	R
A	Air <i>Water</i>	Glukosa <i>Glucose</i>	Hidrogen <i>Hydrogen</i>
B	Air <i>Water</i>	Hidrogen <i>Hydrogen</i>	Glukosa <i>Glucose</i>
C	Glukosa <i>Glucose</i>	Hidrogen <i>Hydrogen</i>	Air <i>Water</i>
D	Hidrogen <i>Hydrogen</i>	Air <i>Water</i>	Glukosa <i>Glucose</i>

7. Antara berikut bahan manakah merupakan unsur?
Which of the following is an element?
- A Ammonia
Ammonia
 - B Metana
Methane
 - C Naftalena
Naphthalene
 - D Oksigen
Oxygen
8. Antara berikut yang manakah kegunaan kobalt-60?
Which of the following is a use of cobalt-60?
- A Menganggar umur bahan fosil.
Estimate the age of fossils.
 - B Mengkaji metabolisma tumbuhan
Investigate the metabolism in plants
 - C Mensterilkan alat pembedahan
Sterilize surgical instruments
 - D Merawat penyakit tiroid
Treating thyroid disease
9. Antara berikut yang manakah kegunaan unsur kumpulan 18?
Which of the following is uses of group 18 elements?
- A Helium digunakan dalam lampu rumah api.
Helium used in lighthouse lamps.
 - B Neon digunakan di dalam lampu papan iklan.
Neon used in advertising board lights.
 - C Kripton digunakan dalam peluntur pakaian.
Krypton used in clothes bleach
 - D Xenon digunakan di dalam belon kaji cuaca
Xenon used in weather balloons.

10. Antara berikut, yang manakah **benar** tentang sifat oksida unsur apabila merentasi kala 3.
Which of the following is true about the properties of oxide when going across period 3.

- A Na_2O merupakan oksida bes
 Na_2O are basic oxide
- B Al_2O_3 merupakan oksida asid.
 Al_2O_3 is an acidic oxide
- C SiO_2 merupakan oksida bes
 SiO_2 is a basic oxide
- D MgO merupakan oksida asid
 MgO is an acidic oxide

11. Sebatian Z mempunyai sifat-sifat berikut
Compound Z has the following properties.
- Takat lebur dan takat didih yang tinggi
High melting and boiling point
 - Larut dalam air tetapi tak larut dalam pelarut organik
Soluble in water in water but insoluble in organic solvents.

Apakah Z?
What is Z?

- A Asetamida
Acetamide
- B Naftalena
Naphthalene
- C Natrium klorida
Sodium Chloride
- D Karbon dioksida
Carbon dioxide

12. Ion kalium dan atom kalium mempunyai bilangan zarah subatom yang berbeza. Antara berikut, yang manakah betul mengenai ion kalium berbanding atom kalium?
Potassium ion and potassium atom have different number of subatomic particles. Which of the following is correct about potassium ion compare to potassium atom?

- A Bilangan neutron yang lebih
More number of neutron
- B Bilangan elektron yang kurang
Less number of electrons
- C Nombor proton yang lebih besar
Bigger proton number
- D Nombor nukleon yang lebih kecil
Smaller nucleon number

13. Antara bahan-bahan berikut yang manakah mengion separa lengkap dalam air?
Which of the following substances ionise partially in water?

- A Asid nitrik
Nitric acid
- B Asid etanoik
Ethanoic acid
- C Hidrogen klorida
Hydrogen chloride
- D Natrium hidroksida
Sodium hydroxide

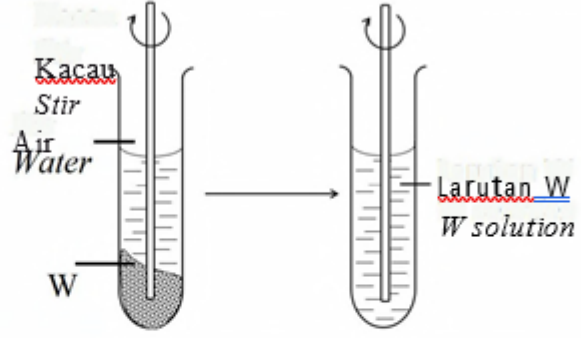
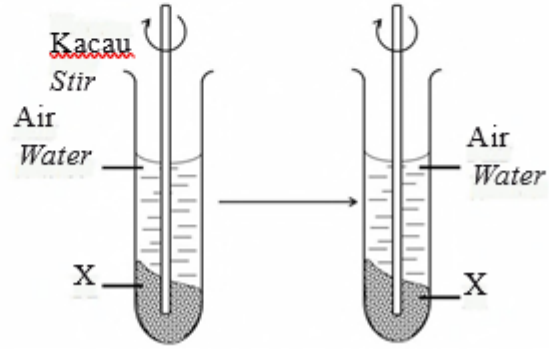
14. Antara berikut, manakah garam yang larut dalam air?
Which of the following salt is soluble in water?

- A Kalium nitrat
Potassium nitrate
- B Barium sulfat
Barium sulphate
- C Argentum karbonat
Silver carbonate
- D Plumbum(II) klorida
Lead(II) chloride

15. Antara berikut yang manakah tindak balas cepat?
Which of the following is fast reaction?

- I Pereputan buah
Fruit decay
 - II Pembakaran gas
Combustion of gases
 - III Nyalaan mancis
Ignition of matches
 - IV Penapaian
Fermentation
- A I dan II
I and II
 - B II dan III
II and III
 - C III dan IV
III and IV
 - D I dan IV
I and IV

16. Apakah maksud kadar tindak balas pada masa tertentu?
What is the meaning of instantaneous rate of reaction?
- A Kadar tindak balas yang berlaku pada satu ketika sahaja
Rate of reaction at a particular point of time
 - B Perubahan kuantiti bahan tindak balas per unit masa
Changes in the quantity of the reactant per unit time.
 - C Perubahan kuantiti hasil tindak balas per unit masa
Changes in the quantity of the product per unit time.
 - D Kadar tindak balas yang berlaku pada satu ketika dalam tindak balas
Rate of reaction that occur at particular point in the reaction.
17. Namakan getah sintetik yang dapat digunakan untuk menghasilkan tapak kasut
Name a synthetic rubber that can be used to manufacture shoe soles
- A Neoprena
Neoprene
 - B Getah nitril
Nitrile rubber
 - C Getah stirena-butadiena
Styrene-butadiene rubber
18. Jadual 1 menunjukkan pemerhatian bagi ujian ketelaruhan sebatian W dan X dalam air.
Table 1 shows the observations for the solubility test of compound W and X in water

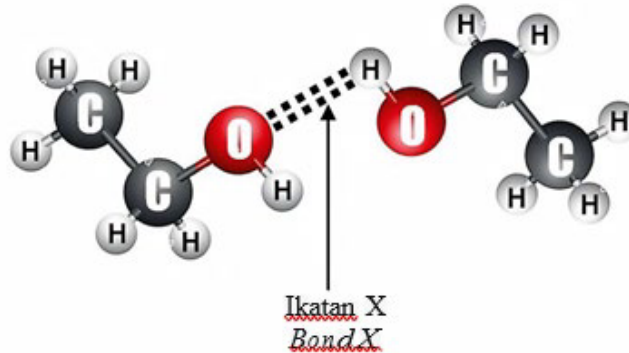
Set Set	Pemerhatian Observation
I	
II	

Jadual 1

Apakah sebatian W dan X?
What is compound W and X?

	Sebatian W Compound W	Sebatian X Compound X
A	Natrium karbonat, Na_2CO_3 Sodium carbonate Na_2CO_3	Asetamida, $\text{C}_2\text{H}_5\text{NO}$ Acetamide $\text{C}_2\text{H}_5\text{NO}$
B	Kalium oksida, K_2O Potassium oxide, K_2O	Kalium karbonat, K_2CO_3 Potassium carbonate, K_2CO_3
C	Naftalena, C_{10}H_8 Naphthalene, C_{10}H_8	Kuprum(II)sulfat, CuSO_4 Copper(II)sulphate, CuSO_4

19. Rajah 2 menunjukkan daya tarikan yang terbentuk dalam satu molekul sebatian karbon
Diagram 2 shows the attractive force formed in one molecule of a carbon compound



Rajah 2

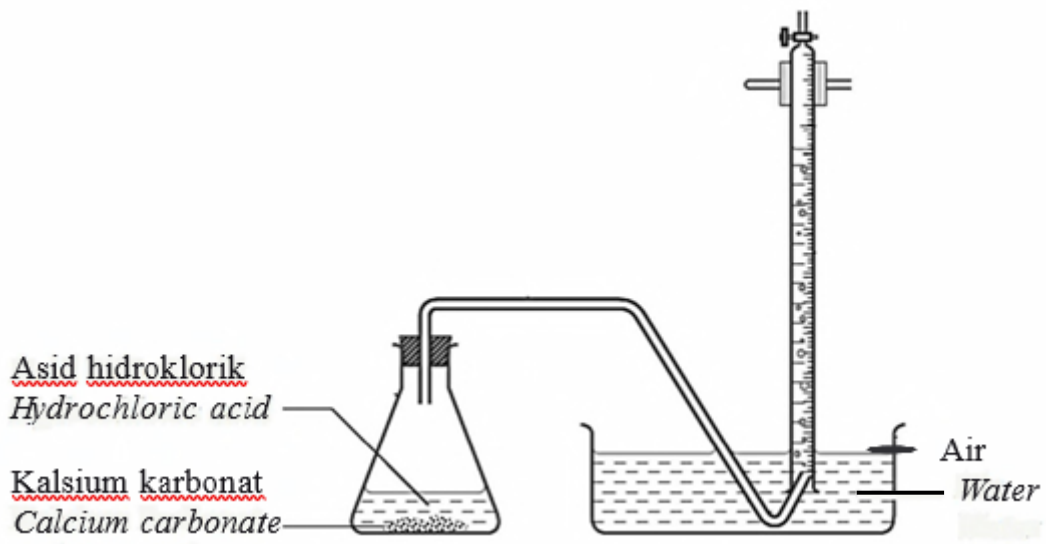
Apakah ikatan X?
What is bond X?

- A Ikatan ion
Ionic bond
- B Ikatan datif
Dative bond
- C Ikatan logam
Metallic bond
- D Ikatan hidrogen
Hydrogen bond
20. Tindak balas penurunan adalah sebahagian daripada tindak balasa redoks.
Reduction reaction is a part of redox reaction. Which of the following involves a reduction reaction?
- A Atom aluminium menerima oksigen
Aluminium atom accepts oxygen
- B Atom klorin menerima electron
Chlorine atom accepts electrons
- C Hidrogen sulfida kehilangan hydrogen
Hydrogen sulfide loses hydrogen atoms
- D Atom barium kehilangan elektron
Barium atom loses electrons

21. Antara berikut, yang manakah siri homolog bagi hidrokarbon?
Which of the following is a homologous series of hydrocarbons?

- A Ester
Ester
- B Alkuna
Alkynes
- C Alkohol
Alcohol
- D Asid karboksilik
Carboxylic acid

22. Rajah 3 menunjukkan susunan radas suatu eksperimen bagi mengkaji kesan saiz bahan tindak balas terhadap kadar tindak balas.
Diagram 3 shows the apparatus set up of an experiment to study the effect of size of reactant on the rate of reaction.

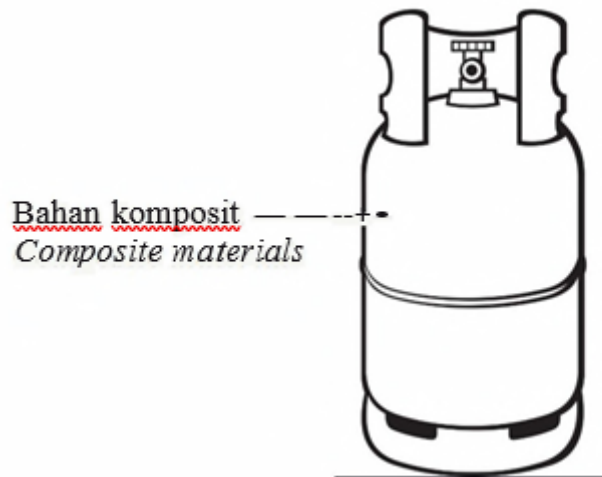


Rajah 3/Diagram 3

Nyatakan perubahan yang boleh dilihat dan diukur dalam eksperimen ini
State the observable and measurable changes in this experiment.

- A Isipadu kalsium karbonat
Volume of calcium carbonate
- B Peningkatan jisim kalsium karbonat
Increase in mass of calcium carbonate
- C Pengurangan isi padu asid hidroklorik
Decrease in volume of hydrochloric acid
- D Peningkatan isi padu gas karbon dioksida
Increase in volume of carbon dioxide

23. Rajah 4 menunjukkan silinder gas yang diperbuat daripada bahan komposit
Diagram 4 shows a cylinder gas that made off from composite material



Rajah 4/Diagram 4

Antara berikut, yang manakah benar mengenai bahan komposit?
Which of the following is true about composite materials?

- A** Terdiri daripada silika dan alumina
Consists of silica and alumina
- B** Terdiri daripada bahan matriks dan bahan pengukuhan
Consists of matrix material and reinforcement material
- C** Bahan yang terdiri daripada gabungan dua atau lebih bahan yang homogen
A substance consisting of a combination of two or more homogeneous substances
- D** Merupakan campuran dua atau lebih unsur yang mana unsur utama adalah logam
Is a mixture of two or more elements where the main element is a metal
24. Sebatian karbon yang manakah larut dalam air?
Which carbon compounds are soluble in water?
- A** C_2H_2
- B** C_2H_4
- C** C_2H_5OH
- D** $CH_3COOC_2H_5$

- 25** Air yang mengandungi ion kalsium, Ca^{2+} dan ion X^{2+} , disebut air liat. Anion sabun bergabung dengan kation-kation tersebut untuk membentuk garam yang tidak larut di dalam air, iaitu kekat.

Water containing calcium ions, Ca^{2+} and X^{2+} ions, is called hard water.

Soap anions combine with the cations to form insoluble salts called scum.

Antara formula kimia berikut, manakah yang menunjukkan formula kimia bagi kekat untuk ion X^{2+} selepas bertindak balas dengan natrium laurat?

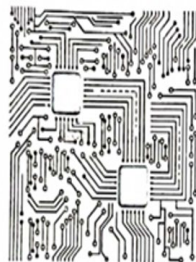
Which of the chemical formulae of the scum for ion X^{2+} after reacted with sodium laurate?

- A** $(\text{CH}_3(\text{CH}_2)_{10} \text{COO})_2\text{Ba}$
B $(\text{CH}_3(\text{CH}_2)_{16} \text{COO})_2\text{Pb}$
C $(\text{CH}_3(\text{CH}_2)_{16} \text{COO})_2\text{Zn}$
D $(\text{CH}_3(\text{CH}_2)_{10} \text{COO})_2\text{Mg}$
- 26** Superkonduktor seperti seramik itrium barium kuprum oksida, YBCO merupakan bahan komposit yang memiliki sifat superkonduktiviti. Magnet superkonduktor ringan dan mempunyai daya magnet yang sangat kuat. Antara berikut, yang manakah merupakan contoh kegunaan magnet superkonduktor?
Superconductors such as ceramic itrium barium copper oxide, YBCO is a composite material that possesses superconductivity properties. Superconductor magnets are lightweight and have a very strong magnetic force. Which of the following is an example of the use of superconductor magnets?

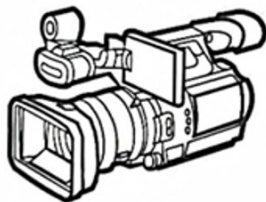
A

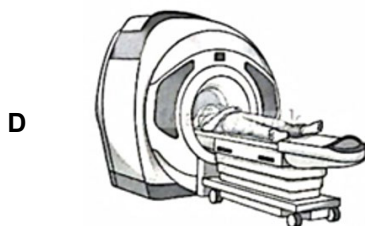


B



C





- 27 Antara sebatian berikut yang manakah mengandungi 2.4 dm³ isipadu gas pada suhu dan tekanan bilik.

Which of the following compounds contains 2.4 dm³ volume of gas at room temperature and pressure.

[Jisim atom relatif: H=1, C=12, O=16, N=14 dan 1 mol gas menempati isipadu sebanyak 24 dm³ pada suhu dan tekanan bilik]

[Relative atomic masses: H=1, C=12, O=16, N=14 and 1 mole of gas occupies a volume of 24 dm³ at room temperature and pressure]

- I 0.8 g CH₄
- II 1.7 g NH₃
- III 2.2 g CO₂
- IV 4.6 g NO₂

A I dan II
I and II

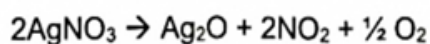
B I dan III
I and III

C II dan IV
II and IV

D III dan IV
III and IV

- 28 Persamaan kimia berikut menunjukkan tindak balas penguraian argentum nitrat apabila dipanaskan pada suhu dan tekanan bilik

The following chemical equation shows the decomposition reaction of argentum nitrate when heated at room temperature and pressure



Antara berikut yang manakah benar apabila 1 mol argentum nitrat terurai?

Which of the following is true when 1 mole of silver nitrate decomposes?

[Jisim atom relatif: O=16, Ag=207, pemalar Avogadro = 6.02 x 10²³ mol dan 1 mol gas menempati isipadu sebanyak 24 dm³ pada suhu dan tekanan bilik]

[Relative atomic masses: O=16, Ag=207, Avogadro constant = 6.02 x 10²³ mol and 1 mole of gas occupies a volume of 24 dm³ at room temperature and pressure]

- A 1 mol argentum oksida terhasil
1 mole of silver oxide is produced
- B 12 dm³ gas oksigen terbebas
12 dm³ of oxygen gas is released
- C 6.02×10^{23} molekul gas nitrogen dioksida terbebas
 6.02×10^{23} molecules of nitrogen dioxide gas are released
- D 430 g argentum nitrat terhasil
430 g of silver nitrate is produced

- 29 Jadual 2 menunjukkan nombor proton dan bilangan neutron bagi atom A
Table 2 shows the proton number and number of neutrons for atom A

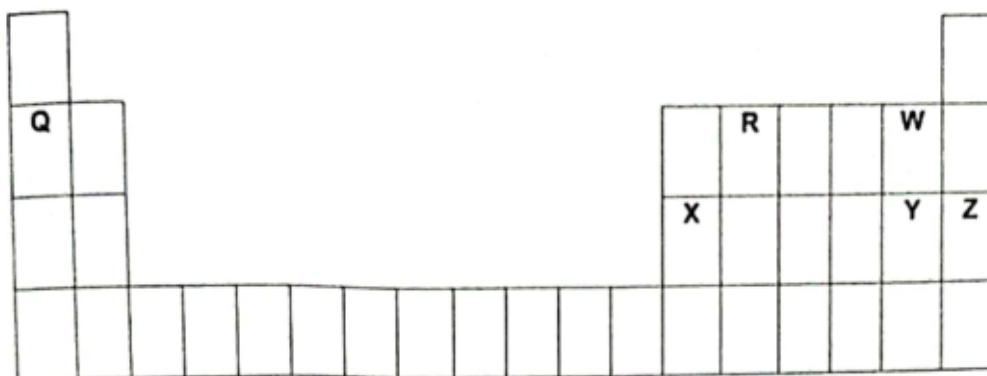
Atom <i>Atom</i>	Nombor proton <i>Proton number</i>	Bilangan neutron <i>Number of neutron</i>
A	17	18

Jadual 2/ Table 2

Antara berikut yang manakah betul bagi perwakilan piawai bagi atom A?
Which of the following is correct for the standard representation of atom A?

- A ${}_{35}^{17}\text{A}$ B ${}_{35}^{18}\text{A}$ C ${}_{17}^{35}\text{A}$ D ${}_{18}^{35}\text{A}$

30



Rajah 5/ Diagram 5

Rajah 5 menunjukkan beberapa unsur dalam Jadual Berkala Unsur. Susun semua unsur mengikut pertambahan saiz atom.

Diagram 5 shows several elements in Periodic Table. Arrange all the elements in ascending order of atomic size.

- A Z,Y,X,W,R, Q
- B Q,R,W,X,Y,Z
- C X,Y,Z,Q,R,W
- D W,R,Q,Z,Y,X

- 31 Antara bahan-bahan berikut, yang manakah boleh bertindak balas dengan asid etanoik glasial?
Which of the following substances can react with glacial ethanoic acid?

- A Serbuk zink
Zinc powder
- B Larutan natrium karbonat
Sodium carbonate solution
- C Serpihan kalsium karbonat
Calcium carbonate chips
- D Magnesium oksida
Magnesium oxide

- 32 Apakah perubahan yang dapat diperhatikan dan diukur untuk menentukan kadar tindak balas bagi persamaan kimia berikut?
What is the observable and measurable changes to determine the rate of reaction for the chemical equation?

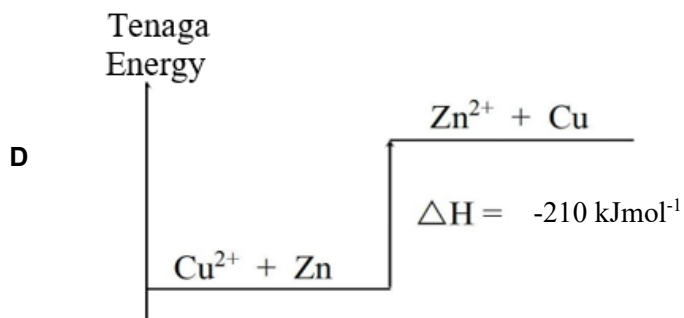
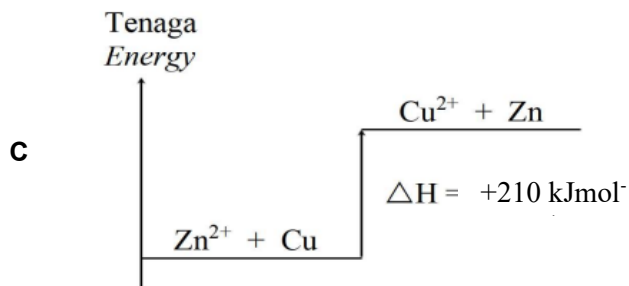
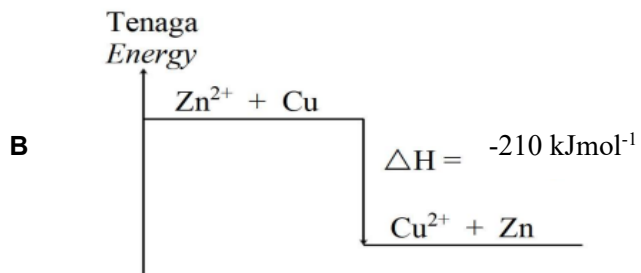
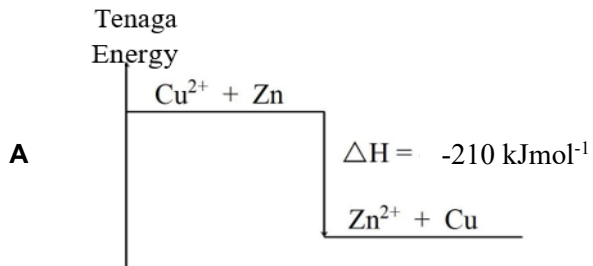


- A Pertambahan isi padu air, H₂O terhasil per unit masa.
The increase in the volume of water, H₂O per unit time.
- B Pengurangan isi padu asid hidroklorik, HCl per unit masa.
The decrease in the volume of hydrochloric acid, HCl per unit time.
- C Pertambahan isi padu gas karbon dioksida, CO₂ terhasil per unit masa.
The increase in the volume of carbon dioxide gas, CO₂ per unit time.
- D Pertambahan isi padu kalsium klorida, CaCl₂ terhasil per unit masa.
The increase in the volume of calcium chloride, CaCl₂ per unit time.
- 33 Bahan yang manakah perlu ditambahkan kepada lateks agar kekal dalam keadaan cecair?

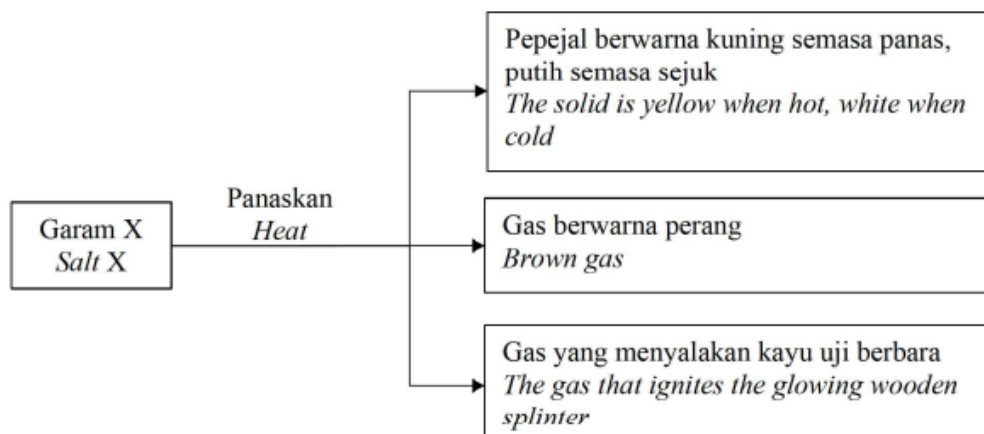
Which substances should be added to latex to keep it in a liquid state?

- A Air
Water
- B Etanol
Ethanol
- C Asid metanoik
Methanoic acid
- D Larutan ammonia
Ammonia solution

- 34 Antara berikut, rajah aras tenaga yang manakah mewakili tindak balas antara larutan kuprum (II) sulfat dengan zink?
Which of the following energy level diagrams represents the reaction between copper (II) sulphate solution and zinc?



- 35 Carta alir dalam Rajah 6 menunjukkan kesan haba ke atas garam X
The flow chart in Figure 6 shows the effect of heat on salt X

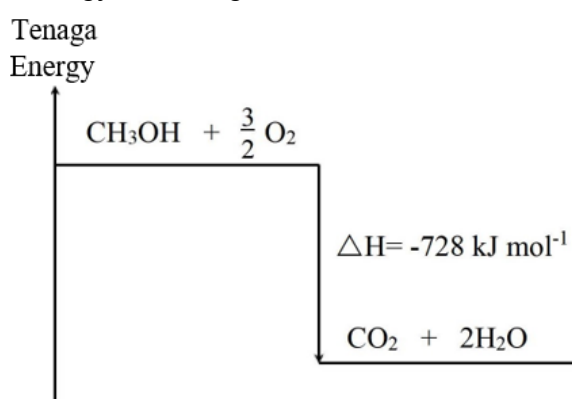


Rajah 6
Diagram 6

Apakah kation dan anion yang mungkin hadir dalam garam X?
What cations and anions may be present in salt X?

	Kation Cations	Anion Anions
A	Pb ²⁺	CO ₃ ²⁻
B	Pb ²⁺	NO ₃ ⁻
C	Zn ²⁺	CO ₃ ²⁻
D	Zn ²⁺	NO ₃ ⁻

- 36 Rajah 7 menunjukkan gambarajah aras tenaga bagi pembakaran metanol, CH₃OH.
Diagram 7 shows the energy level diagram for the combustion of methanol, CH₃OH.



Rajah 7/Diagram 7

Berapakah jisim metanol yang diperlukan untuk menaikkan suhu 200 cm³ air sebanyak 30.5 °C

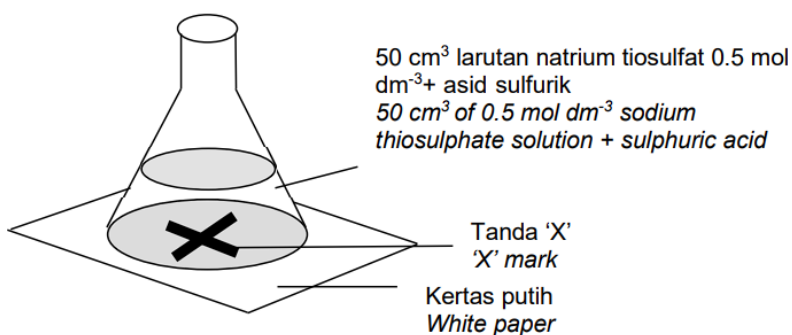
[Jisim molar metanol, CH₃OH = 32, muatan haba tentu air = 4.2 Jg⁻¹°C⁻¹
ketumpatan air = 1 gcm⁻³]

What is the mass of methanol needed to raise the temperature of 200 cm^3 of water by $30.5 \text{ }^\circ\text{C}$

[Molar mass of methanol, $\text{CH}_3\text{OH} = 32$, specific heat capacity of water $4.2 \text{ Jg}^{-1}\text{C}^{-1}$
density of water = 1 gcm^{-3}]

- A 1.12 g
- B 2.24 g
- C 2.84 g
- D 3.52 g

- 37 Rajah 8 di bawah menunjukkan susunan radas eksperimen untuk menentukan kadar tindak balas antara natrium tiosulfat dan asid sulfurik.
Diagram 8 below shows the set-up of the apparatus for an experiment to determine the rate of the reaction between sodium thiosulphate and sulphuric acid.



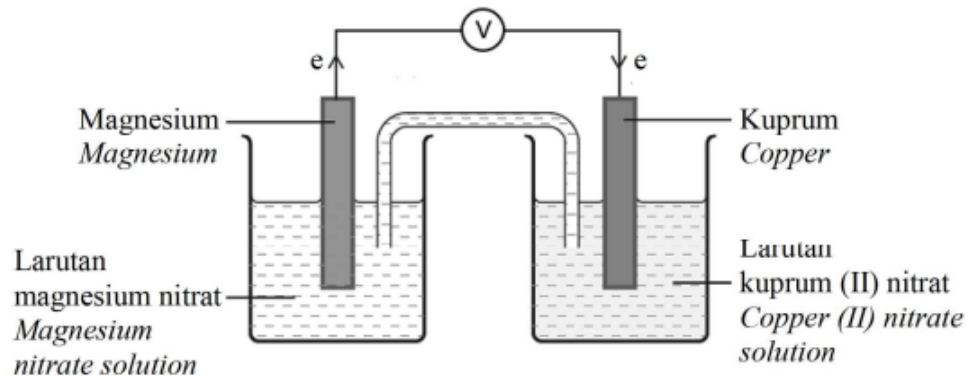
Rajah 8/Diagram 8

Antara keadaan berikut yang manakah menyebabkan masa yang paling singkat diambil bagi tanda 'X' hilang dari pandangan?

Which of the following conditions will cause the shortest time taken for the mark 'X' disappear from sight?

	Asid sulfurik Sulphuric acid		Suhu/ $^\circ\text{C}$ Temperature/ $^\circ\text{C}$
	Isipadu/ cm^3 Volume/ cm^3	Kepekatan/ mol dm^{-3} Concentration/ mol dm^{-3}	
A	10	1.0	40
B	10	1.0	30
C	10	0.5	40
D	10	0.5	30

- 38 Rajah 9 menunjukkan satu sel kimia dan notasi sel.
Diagram 9 shows a chemical cell and cell notation.



Notasi Sel
Cell Notation



Rajah 9/Diagram 9

Antara berikut, manakah benar
Which of the following is true?

- A Atom magnesium bertindak sebagai agen pengoksidaan
Magnesium atom acts as the oxidising agent
- B Jisim elektrod magnesium semakin bertambah
The mass of magnesium electrode increases
- C Ion kuprum(II) diturunkan kepada atom kuprum
Copper(II) ions are reduced to copper atom
- D Jisim elektrod kuprum semakin berkurang
The mass of copper electrode decreases
- 39 Jadual 3 menunjukkan jenis ubat dan fungsinya.
Table 3 shows the types of medicine and their function

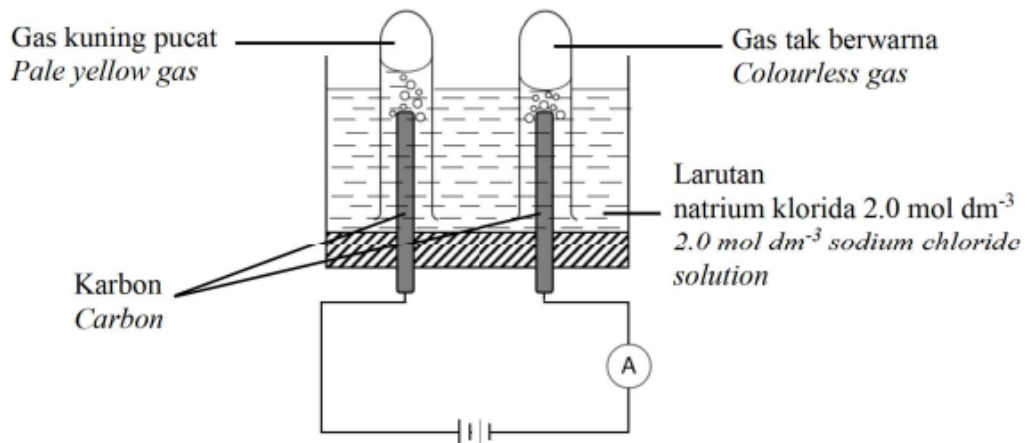
Jenis Ubat <i>Type of medicine</i>	Fungsi <i>Function</i>
X	Melegakan kesakitan dalam keadaan sedar. <i>Relieves pain in a conscious state.</i>
Y	Merencatkan pertumbuhan bakteria . <i>Inhibits the growth of bacteria.</i>

Jadual 3
Table 3

Apakah X dan Y?
What are X and Y?

	X	Y
A	Analgesik Analgesic	Antimikrob Antimicrobe
B	Analgesik Analgesic	Antialergi Antiallergic
C	Kortikosteroid Corticosteroids	Antialergi Antiallergic
D	Kortikosteroid Corticosteroids	Antimikrob Antimicrobe

- 40 Seorang pelajar menjalankan elektrolisis ke atas larutan natrium klorida. Susunan radas yang digunakan dan pemerhatian ditunjukkan dalam Rajah 10
A student performs electrolysis on sodium chloride solution. The arrangement of the apparatus used and observation is shown in Diagram 10.



Rajah 10/Diagram 10

Apakah faktor yang terlibat dalam menentukan hasil yang terbentuk di anod dan katod?

What factors are involved in determining the results formed at anode and cathode?

	Anod <i>Anode</i>	Katod <i>Cathode</i>
A	Jenis elektrod <i>Type of electrodes</i>	Kepekatan elektrolit <i>Concentration of electrolyte</i>
B	Nilai E° <i>E^o value</i>	Kepekatan elektrolit <i>Concentration of electrolyte</i>
C	Kepekatan elektrolit <i>Concentration of electrolyte</i>	Nilai E° <i>E^o value</i>
D	Jenis elektrod <i>Type of electrodes</i>	Nilai E° <i>E^o value</i>