

# ChemQuest 2022

disusun mengikut bab KSSM  
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**Bab 1 – 8 Tingkatan 4**

Kompilasi Soalan  
Kertas 1

Percubaan SPM **2021**

[SBP | Perlis | Kedah 2 set | Selangor 2 set ]  
[Melaka | Johor | Kelantan | Terengganu]

## Bab 1 Pengenalan Kepada Kimia

### 1.2 Penyiasatan Saintifik Dalam Kimia

#### [Selangor2021-Set01-01]

1. Seorang murid menjalankan eksperimen untuk menentukan kadar keterlarutan garam untuk saiz yang berbeza.

Antara radas berikut, yang manakah penting untuk eksperimen tersebut?

A student carries out an experiment to determine the rate of dissolving salt at different sizes. Which of the following apparatus is essential for the experiment?

A Kelalang kon/ Conical flask

C Mangkuk penyejat/ Evaporating dish

B Jam randik/ Stopwatch

D Penunu Bunsen/ Bunsen burner

#### [SBP2021-02]

2. Antara berikut yang manakah merupakan urutan kaedah saintifik yang betul dalam kimia?

Which of the following is the correct sequence of scientific method in chemistry?

A Membuat pemerhatian → membuat hipotesis → merancang eksperimen → mengawal pemboleh ubah

Making observations → making a hypothesis → planning an experiment → controlling the variables

B Merancang eksperimen → membuat inferens → membuat hipotesis → mengumpul data

Planning an experiment → making an inference → making a hypothesis → collecting data

C Membuat pemerhatian → membuat hipotesis → merancang eksperimen → mengumpul data

Making observations → making a hypothesis → planning an experiment → collecting data

D Merancang eksperimen → mengenal pasti masalah → membuat hipotesis → mengumpul data

Planning an experiment → identifying the problem → making a hypothesis → collecting data

### 1.3 Penggunaan, Pengurusan Dan Pengendalian Radas Serta Bahan Kimia

#### [Selangor2021-Set02-01]

1. Di manakah logam reaktif seperti litium, natrium dan kalium perlu disimpan?

Where reactive metals such as lithium, sodium and potassium should be stored?

A Tempat yang teduh/ Shady area

C Botol kaca/ Glass bottles

B Minyak parafin/ Paraffin oil

D Bilik yang berkunci/ Locked room

**[Negeri Sembilan 2021-02]**

2. Rajah 1 menunjukkan satu contoh alat perlindungan diri.  
Diagram 1 shows an example of personal protective equipment.



Apakah fungsi bagi alat perlindungan diri ini?  
What is the function of this personal protective equipment?

A Untuk mengelakkan habuk atau percikan bahan kimia masuk ke mata  
To prevent dust or splashes of chemicals from getting into the eyes

B Untuk melindungi organ pernafasan daripada bahan kimia dalam bentuk serbuk atau wasap  
To protect the respiratory organs from chemicals in the form of powder or fumes

C Untuk melindungi tangan daripada kecederaan, bahan kimia atau jangkitan semasa mengendalikan bahan kimia  
To protect hands from injuries, chemicals or infections when handling chemicals

D Untuk melindungi badan dan pakaian daripada tumpahan bahan kimia seperti asid, alkali dan pelarut organik  
To protect body and clothing against chemical spills such as acids, alkalis and organic solvents

**[SBP 2021-01]**

1. Sisa bahan kimia di dalam makmal mempunyai cara pelupusan yang tertentu mengikut jenis bahan.

Antara kaedah berikut, yang manakah betul untuk melupuskan sisa bahan itu?  
Chemical wastes in the laboratory have a specific method of disposal according to the type of material.

Which of the following methods is correct to dispose the chemical waste

A Sisa hidrogen peroksida pada kepekatan rendah boleh dituang secara terus ke dalam singki makmal.  
Hydrogen peroxide waste with a low concentration can be poured directly into laboratory's sink.

B Larutan yang mengandungi logam berat mesti diletakkan dalam botol reagen yang gelap  
Solutions containing heavy metals must be kept in a dark reagent bottle

C Sisa pepejal seperti kaca dan getah mesti dibuangkan ke dalam tong sampah  
Solid wastes like glass and rubber must be disposed into the dustbin

D Sisa bahan mudah meruap perlu disimpan di dalam bekas  
Volatile waste should be stored in the container

**[Negeri Sembilan 2021-01]**

1. Bahan kimia yang berlainan jenis perlu disimpan dan dilupuskan mengikut cara yang berbeza.

Antara yang berikut, yang manakah cara melupuskan bahan yang mempunyai nilai pH kurang daripada 5 dan lebih daripada 9?

Different types of chemicals should be stored and disposed by using different methods.

Which of the following is the way to dispose substances with pH value less than 5 and more than 9?

A Disimpan di dalam bekas yang bertutup dan dijauhkan daripada sumber cahaya dan haba

Stored in closed containers and kept away from light and heat

B Disimpan di dalam beg plastik dan larutannya dibiarkan menyejat di dalam kebuk wasap

Stored in plastic bags and the solutions be left to evaporate in fume chamber

C Dituang secara terus ke dalam singki makmal

Poured directly into the laboratory's sink

D Disimpan di dalam bekas tertutup berlabel

Stored in closed labelled containers

**[Melaka 2021-01]**

1. Rajah manakah menunjukkan kaedah penyimpanan yang betul bagi larutan hidrogen peroksida?

Which diagram shows the correct storage method for hydrogen peroxide solution?

A



C



B



D



## 2.0 Jirim Dan Struktur Atom

### 2.1 konsep asas jirim

[SBP2021-03]

3. Antara berikut, bahan yang manakah merupakan suatu unsur?  
Which of the following substances is an element?

A Air/ Water  
B Neon/ Neon

C Etanol/ Ethanol  
D Naftalena/ Naphthalene

[Terengganu2021-01]

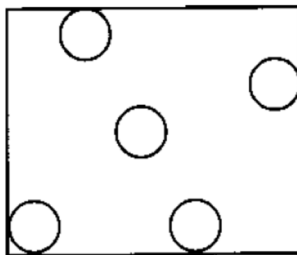
1. Apakah jenis zarah dan keadaan jirim asetamida pada keadaan bilik?  
What is the types of particles and the state of matter of acetamide at room conditions?

	Zarah / Particle	Keadaan jirim / State of matter
A	Atom / Atom	Cecair / Liquid
B	Ion / Ion	Gas
C	Molekul / Molecule	Pepejal / Solid

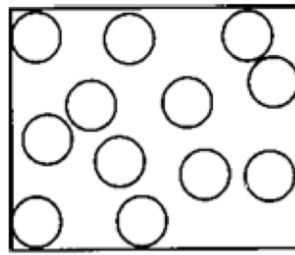
[Perlis2021-02]

2. Rajah 1 menunjukkan susunan zarah dalam tiga keadaan jirim pada suhu bilik.

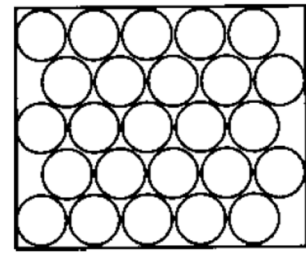
Diagram 1 shows the arrangement of particles in three states of matter at room temperature.



P



Q



R

Apakah bahan P, Q dan R pada suhu bilik?

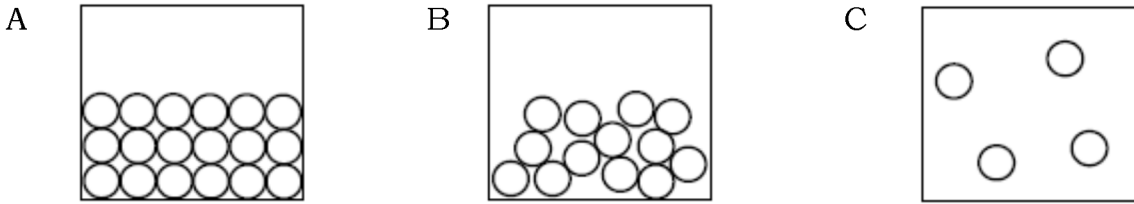
What are substances P, Q and R at room temperature?

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

**[Kelantan2021-02]**

2. Manakah rajah yang menunjukkan molekul gas hidrogen.

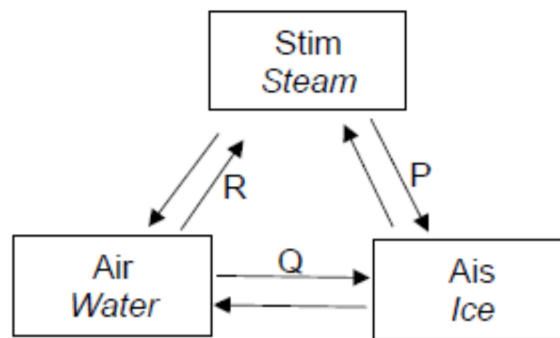
Which diagram represent the molecules of hydrogen gas



**[Kelantan2021-08]**

8. Rajah 2 menunjukkan perubahan keadaan jirim bagi suatu bahan.

Diagram 2 shows the inter-conversion of the states of matter of a substance.



Proses manakah yang melibatkan penyerapan tenaga haba?

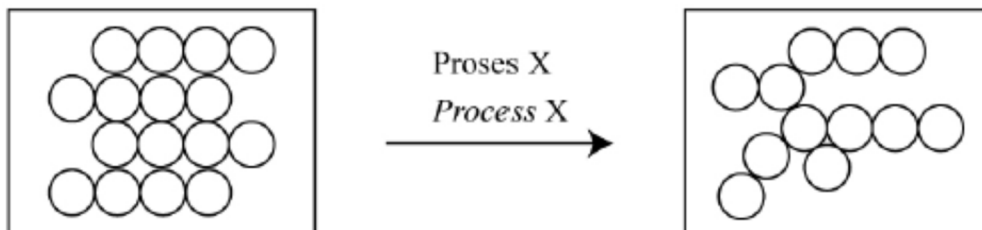
Which process involves the absorption of heat energy?

- A P
- B Q
- C R

**[Selangor2021-Set02-14]**

14. Rajah 3 menunjukkan susunan zarah bagi pertukaran keadaan jirim.

Diagram 3 shows the particles arrangement for the change of state of matter.



Antara berikut yang manakah adalah proses X?

Which of the following is process X?

- A Pemejalwapan/ Sublimation
- B Kondensasi/ Condensation
- C Penyejatan/ Evaporation
- D Peleburan/ Melting

**[Negeri Sembilan 2021-16]**

16. Bahan R wujud sebagai cecair pada suhu 100°C.

Antara yang berikut, yang manakah merupakan takat didih dan takat lebur bagi sebatian R?

Substance R exists as liquid at 100°C.

Which of the following is the boiling point and melting point of substance R?

	Takat didih/ Boiling point (°C)	Takat lebur/ Melting point (°C)
A	267	196
B	128	76
C	171	148
D	19	10

**[SBP 2021-17]**

17 Jadual 17 menunjukkan takat lebur dan takat didih bagi bahan P.

Table 17 shows the melting point and boiling point of substance P.

Takat lebur/ Melting point (°C)	78
Takat didih/ Boiling point (°C)	245

Apakah keadaan fizik bahan P pada suhu 100°C?

What is the physical state of substance P at 100°C?

A Pepejal/ Solid

B Cecair/ Liquid

C Pepejal dan cecair/ Solid and liquid

D Cecair dan gas/ Liquid and gas

**[Kelantan 2021-20]**

20. Jadual 3 menunjukkan takat lebur dan takat didih bagi empat bahan.

Table 3 shows the melting point and boiling point of four substances.

Bahan/ Substance	Takat lebur/Melting point (°C)	Takat didih/ Boiling point (°C)
P	-17	58
Q	85	192
R	-120	-10
S	258	302

Bahan manakah ialah cecair pada suhu bilik?

Which substance is a liquid at room temperature?

A P

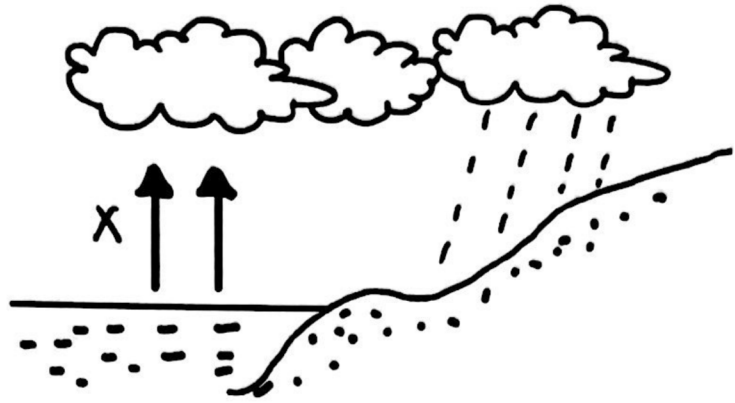
B Q

C R

D S

**[Johor2021-16]**

16. Rajah 8 menunjukkan kitaran air secara semula jadi. Diagram 8 shows a natural water cycle.

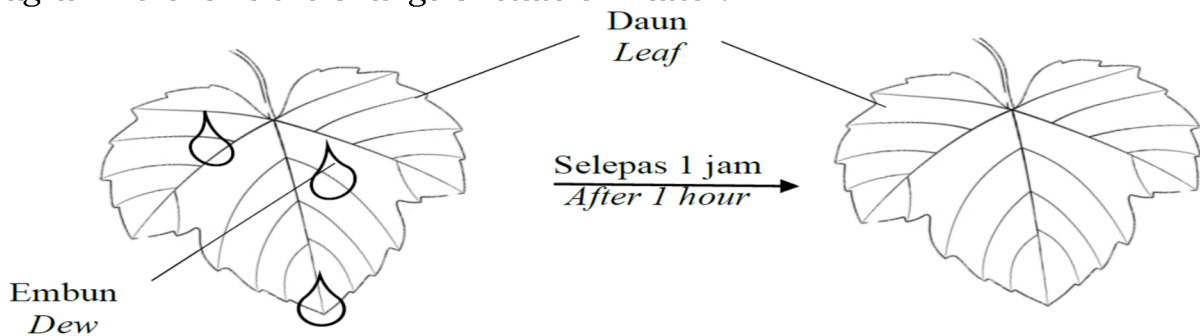


Apakah proses X dan perubahan tenaga yang terlibat?  
What is process X and the energy change involved?

	Proses X/ Process X	Perubahan Tenaga/ Energy Change
A	Penyejatan/ Evaporation	Diserap/ Absorbed
B	Pembekuan/ Freezing	Dibebaskan/ Released
C	Kondensasi/ Condensation	Diserap/ Absorbed
D	Pendidihan/ Boiling	Dibebaskan/ Released

**[Melaka2021-34]**

34. Rajah 10 menunjukkan perubahan keadaan fizik jirim. Diagram 10 shows the change of state of matter.



Antara yang berikut, yang manakah menerangkan teori kinetik jirim yang ditunjukkan dalam Rajah 10?

Which of the following statement explain the kinetic theory of matter shown on Diagram 10?

A Zarah-zarah hanya bergetar dan berputar di kedudukan yang tetap  
The particles can only vibrate and rotate at fixed positions

B Zarah bergerak lebih laju jika lebih banyak tenaga dibebaskan  
Particles move faster if more energy is released

C Zarah-zarah menyerap tenaga haba untuk mengatasi daya tarikan antara zarah-zarah  
The particles absorb heat energy to overcome attraction force between particles

D Pergerakan zarah-zarah dalam cecair utamanya ialah bergetar  
The movement of particles in liquid is mainly vibration



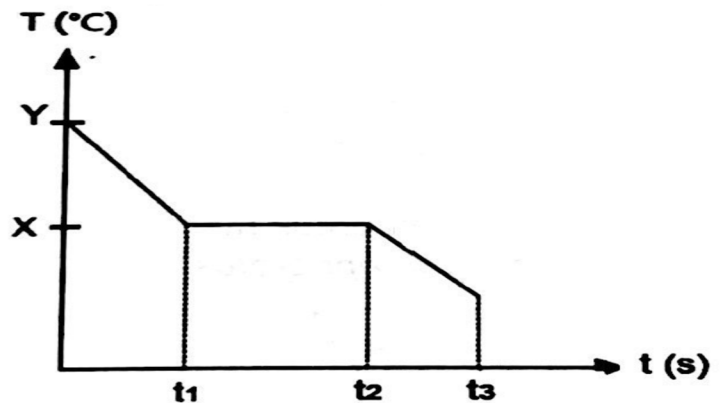
**[Kedah2021-Set01-25]**

25. Anas membuka peti beku di kedai untuk membeli sebatang aiskrim. Dia melihat ais kering di dalam peti beku itu bertukar menjadi asap. Apakah proses dan perubahan tenaga yang terjadi kepada ais kering itu? Anas opened a freezer in a shop to buy an ice-cream. He can see the dry iced in the freezer changed into smoke. What is the process and energy change occurs to the dry iced?

	Proses/ Process	Perubahan tenaga/ Energy changed
A	Pembekuan/ Freezing	Tenaga dibebaskan/ Energy is released
B	Kondensasi/ Condensation	Tenaga dibebaskan/ Energy is released
C	Penyejatan/ Evaporation	Tenaga diserap/ Energy is absorbed
D	Pemejalwapan/ Sublimation	Tenaga diserap/ Energy is absorbed

**[Johor2021-13]**

13. Rajah 6 menunjukkan lengkung penyejukan cecair X. Diagram 6 shows the cooling curve of liquid X.

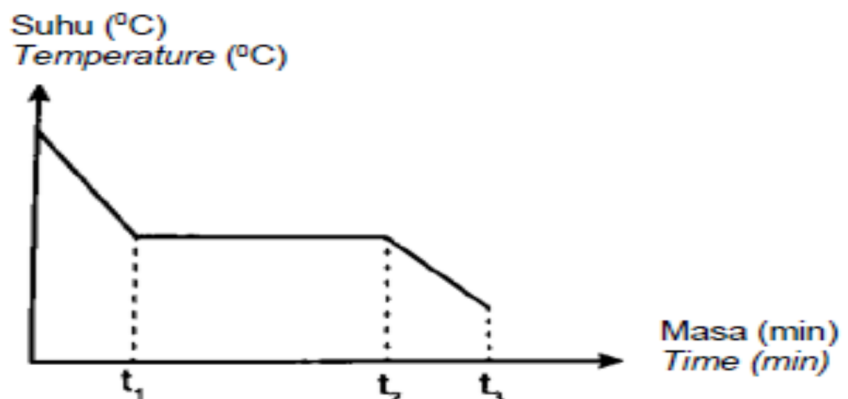


Antara yang berikut, pernyataan manakah yang betul? Which of the following statements is correct?

- A Keadaan fizik antara  $t_1$  ke  $t_2$  adalah cecair dan pepejal / Physical state from  $t_1$  to  $t_2$  is liquid and solid
- B Daya tarikan antara zarah diatasi pada  $t_2$  / Attraction force between particles is overcome at  $t_2$
- C Semua zarah bergetar pada  $t_1$  / All particles vibrate at  $t_1$
- D Takat beku ialah  $Y$  °C / Freezing point is  $Y$  °C

**[Kedah2021-Set02-25]**

25. Rajah menunjukkan lengkung penyejukan bagi cecair A. Diagram shows the cooling curve of liquid A.



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

A Semua zarah berada dalam keadaan cecair pada  $t_1$  hingga  $t_2$   
The particles are all in the liquid state at  $t_1$  to  $t_2$

B Dari  $t_2$  ke  $t_3$ , zarah-zarah tersusun padat tetapi tidak teratur.  
From  $t_2$  to  $t_3$ , particles are arranged in pack but not in orderly manner

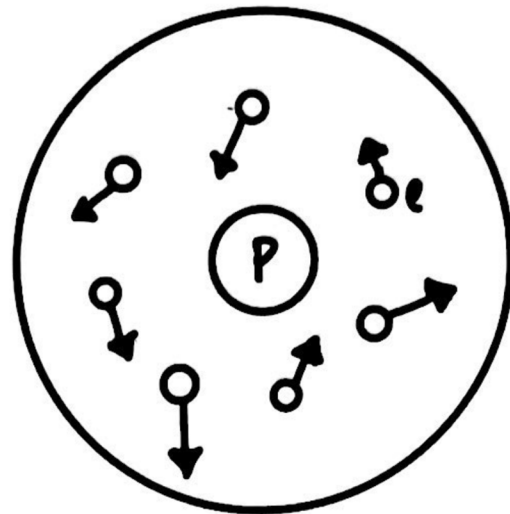
C Tenaga haba dibebaskan ke persekitaran pada  $t_1$  ke  $t_2$ , zarah-zarah cecair menarik antara satu sama lain untuk membentuk pepejal  
Heat is released to the surroundings at  $t_1$  to  $t_2$  so that the liquid particles attract one another to form solid.

D Daya tarikan antara zarah-zarah adalah lebih kuat di  $t_1$  ke  $t_2$  berbanding  $t_2$  ke  $t_3$   
The forces of attraction between the particles are stronger in  $t_1$  to  $t_2$  than in  $t_2$  to  $t_3$

## 2.2 Perkembangan Model Atom

[Johor2021-01]

1. Rajah 1 menunjukkan satu model atom.  
Diagram 1 shows a model of an atom.



Antara yang berikut, saintis manakah yang memperkenalkan model ini?  
Which of the following scientist introduced this model?

- A Neils Bohr
- B John Dalton
- C James Chadwick
- D Ernest Rutherford

[Perlis2021-01]

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

	Ahli sains/ Scientist	Menjumpai/ Discovered
A	Ernest Rutherford	Neutron/ neutron
B	J. J. Thompson	Elektron/ electron
C	James Chadwick	Proton/ proton
D	John Dalton	Proton/ proton

**[Negeri Sembilan2021-03]**

3. Siapakah yang menjumpai elektron dalam model atom?  
Who discovered electron in atomic model?

- A Neils Bohr
- B J. J. Thompson

- C James Chadwick
- D Ernest Rutherford

**[Kedah2021-Set01-01]**

1. Siapakah yang menjumpai proton?  
Who discover protons?

- A Neils Bohr
- B J. J. Thomson

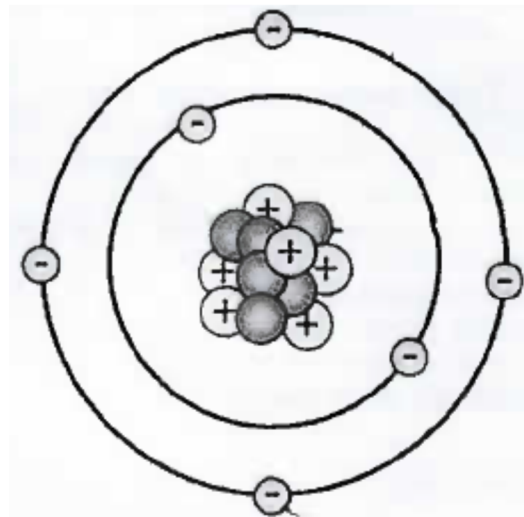
- C John Dalton
- D Ernest Rutherford

**2.3 Struktur Atom**

**[Terengganu2021-12]**

12. Rajah 3 menunjukkan struktur atom.  
Diagram 3 below shows structure of atom.

Di manakah kedudukan proton di dalam struktur atom itu?  
Where is the position of proton in the structure of the atom?



- A Di dalam nucleus/ in the nucleus
- B Di dalam nukleon/ in the nucleon

- C Di dalam nuclear/ In the nuclear
- D Di dalam petala/ In the shell

**[Kedah2021-Set02-21]**

21. Unsur S mempunyai 4 neutron dan 3 proton. Perwakilan standard bagi unsur S adalah  
Element S has 4 neutrons and 3 protons. Standard representation of element S is

A	7	3	S
B	4	3	S
C	7	4	S
D	7	2	S

**[Kedah2021-Set01-08]**

8. Rajah menunjukkan perwakilan piawai bagi atom natrium.  
Diagram shows the standard representation of sodium atom.

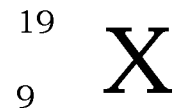


Apakah bilangan elektron valens bagi atom tersebut?  
What is the number of valence electron of the atom?

- A 1                      B 2                      C 11                      D 12

**[Terengganu2021-02]**

2. Rajah 1 menunjukkan simbol atom bagi unsur X.  
Diagram 1 shows the atomic symbol of element X.



Antara berikut, apakah yang diwakili oleh angka 19?  
Which of the following represents 19?

- A Nombor proton  
Proton number                      C Bilangan neutron  
Number of neutrons
- B Nombor nukleon  
Nucleon number                      D Bilangan elektron  
Number of electrons

**[Perlis2021-03]**

3. Antara berikut manakah simbol bagi unsur kromium, mangan dan kalium?  
Which of the following are symbols for the elements of chromium, manganese and potassium?

	Kromium Chromium	Mangan Manganese	Kalium Potassium
A	C	Mg	K
B	C	Mn	P
C	Cr	Mg	P
D	Cr	Mn	K

**[Melaka2021-02]**

2. Apakah simbol bagi unsur kromium, kuprum, mangan dan kalium?  
What are the symbols for the element chromium, copper, manganese and potassium?

	Kromium Chromium	Kuprum Copper	Mangan Manganese	Kalium Potassium
A	C	Co	Mg	K
B	C	Cu	Mn	P
C	Cr	Co	Mg	P
D	Cr	Cu	Mn	K

**[Perlis2021-17]**

17. Ion  $Y^+$  mempunyai 12 neutron dan 10 elektron. Antara berikut, yang manakah menunjukkan nombor proton dan nombor nukleon bagi atom Y?  
 $Y^+$  ion has 12 neutrons and 10 electrons. Which of the following is the proton number and nucleon number for atom Y?

	Nombor proton Proton number	Nombor nukleon Nucleon number
A	10	23
B	11	23
C	11	12
D	23	11

**[Terengganu2021-24]**

24. Jadual 1 menunjukkan bilangan proton, neutron dan elektron bagi zarah F dan G.

Table 1 shows the number of protons, neutrons and electrons for particles F and G.

Zarah Particle	Bilangan proton Number of protons	Bilangan neutron Number of neutrons	Bilangan elektron Number of electrons
F	12	12	12
G	19	20	18

Antara berikut yang manakah adalah benar mengenai zarah F dan G ? Which of the following is true about particles F and G ?

A Jisim satu mol atom F ialah 24 g  
 The mass of one mole of atom F is 24g

C Bilangan elektron valens atom G ialah 8  
 The number of valence electron of atom G is 8

B Nombor nukleon atom G ialah 38  
 The nucleon number of atom G is 38

D Zarah F dan G adalah atom  
 Particles F and G are atoms

**[Perlis2021-22] F4 Bab 02 struktur atom**

22. Jadual 1 menunjukkan unsur-unsur dengan nombor proton masing-masing.  
 Table 1 shows elements with their respective proton number.

Unsur Element	Nombor proton Proton number
W	7
X	9
Y	17
Z	19

Pasangan unsur manakah yang mempunyai sifat kimia yang sama?  
Which pair of elements has the same chemical properties?

A W dan X/ W and X  
B W dan Y/ W and Y

C X dan Y/ X and Y  
D X dan Z/ X and Z

**[Selangor2021-Set02-01] F Bab 2 struktur**

8. Jadual 1 menunjukkan bilangan elektron dan neutron bagi ion  $Y^+$  dan ion  $Z^{3-}$ .  
Table 1 shows the number of electrons and neutrons of ion  $Y^+$  and ion  $Z^{3-}$ .

Ion Ion	Bilangan neutron Number of neutrons	Bilangan elektron Number of electrons
$Y^+$	21	18
$Z^{3-}$	16	20

Antara berikut manakah susunan elektron yang betul bagi atom Y dan atom Z?  
Which of the following is the correct electron arrangement of atom Y and atom Z?

	Y	Z
A	2.8.7	2.8.3
B	2.8.8	2.8
C	2.8.8.1	2.5
D	2.1	2.4

**[Selangor2021-Set01-08] F Bab 2 struktur**

8. Rajah 1 menunjukkan simbol perwakilan piawai bagi atom berillium.  
Diagram 1 shows the standard representation symbol of beryllium atom.

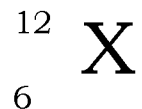


Apakah bilangan elektron valens bagi atom berillium?  
What is the number of valence electron for beryllium atom?

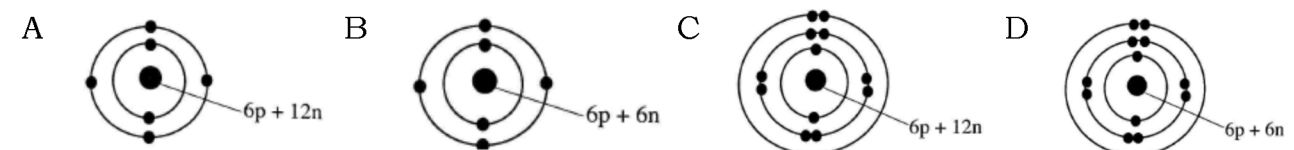
A 2                      B 3                      C 4                      D 9

**[SBP2021-31] Bab 2 struktur**

31. Rajah 31 menunjukkan perwakilan piawai bagi atom unsur X.  
Diagram 31 shows the standard representation of atom of element X.



Antara berikut, yang manakah menunjukkan struktur atom X?  
Which of the following shows the structure of atom X?



## 2.4 Isotop Dan Penggunaanya

### [Kedah2021-Set01-21]

21. Antara yang berikut, yang manakah adalah persamaan isotop bagi unsur?  
Which of the following are the similarities of isotopes of elements?

I Bilangan neutron  
Number of neutrons

III Sifat fizik  
Physical properties

II Bilangan proton  
Number of protons

IV Sifat kimia  
Chemical properties

A I dan III/ I and III  
B I dan IV/ I and IV

C II dan III/ II and III  
D II dan IV/ II and IV

### [Selangor2021-Set01-01]

14. Karbon-12 dan karbon-14 merupakan isotop. Apakah persamaan yang dimiliki oleh kedua-dua atom ini?

Carbon-12 and carbon-14 are isotopes. What is the similarities do both atoms have?

I Bilangan proton  
Number of protons

III Sifat fizik  
Physical properties

II Bilangan neutron  
Number of neutrons

IV Sifat kimia  
Chemical properties

A I dan II/ I and II  
B I dan IV/ I and IV

C II dan III/ II and III  
D III dan IV/ III and I

### [Kelantan2021-15]

15. Jadual 1 menunjukkan maklumat tentang isotop dalam sampel bagi rubidium.

Table 1 shows information about the isotopes in a sample of rubidium.

Isotop Isotope	Bilangan proton Number of protons	Bilangan neutron Number of neutrons	Peratus isotop dalam sampel Percentage of isotope in sample
1	37	48	72
2	37	50	28

Hitung jisim atom relatif bagi sampel rubidium ini.

Calculate the relative atomic mass of this sample of rubidium.

A 34.84

B 48.60

C 85.56

D 86.00

**[Johor2021-31]**

31. X mengandungi dua isotop  $^{35}_{17}\text{X}$  dan  $^{37}_{17}\text{X}$ . Kelimpahan semula jadi  $^{35}_{17}\text{X}$  ialah 75% dan  $^{37}_{17}\text{X}$  ialah 25%. Hitungkan jisim atom relatif X.  
 X consists of two isotopes,  $^{35}_{17}\text{X}$  and  $^{37}_{17}\text{X}$ . The natural abundance of  $^{35}_{17}\text{X}$  is 75% and  $^{37}_{17}\text{X}$  is 25%. Calculate the relative atomic mass of X.

- A 35.0                                      B 35.5                                      C 36.5                                      D 37.0

**[Kedah2021-Set02-08]**

8. Jadual di bawah menunjukkan beberapa isotop dan kegunaannya.  
 Table below shows several isotopes and their uses.

	Isotop Isotope	Kegunaan Uses
I	Iodin-131 Iodine-131	Mengesan ketumbuhan dalam otak dan ketidakaturan kelenjar tiroid Locate brain tumor and thyroid gland disorder
II	Karbon-12 Carbon-12	Untuk mengukur kadar penyerapan baja oleh tumbuhan To measure the rate of absorption of fertilisers by plant
III	Natrium-24 Sodium-24	Mengkaji peredaran darah dan mengesan sekiranya berlaku salur darah tersumbat Study blood circulation and detect the positions of blood clots
IV	Kobalt-60 Cobalt-60	Untuk menganggar usia fosil To estimate the age of fossils

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

- A I dan II/ I and II                                      C II dan IV/ II and IV  
 B I dan III/ I and III                                      D III dan IV/ III and IV

**3.0 Konsep Mol, Formula Dan Persamaan Kimia**

**3.1 Jisim Atom Relatif Dan Jisim Molekul Relatif**

**[Kedah2021-Set01-33]**

33. Antara yang berikut, manakah benar tentang maksud jisim atom relatif?  
 Which of the following is true about the meaning of relative atomic mass?

A Purata jisim satu atom bagi unsur itu apabila dibandingkan dengan 1/12 kali jisim satu atom karbon-12  
 The average mass of one atom of the element when compared with 1/12 of the mass of a carbon-12 atom



B Purata jisim satu molekul bagi bahan itu apabila dibandingkan dengan 1/12 kali jisim satu atom karbon-12

The average mass of one molecule of the substance when compared with 1/12 of the mass of a carbon-12 atom

C Purata jisim satu atom bagi unsur itu apabila dibandingkan dengan 12 kali jisim satu atom karbon-12

The average mass of one atom of the element when compared with 12 of the mass of a carbon-12 atom

D Purata jisim satu atom bagi unsur itu apabila dibandingkan dengan jisim satu atom hidrogen-1

The average mass of one atom of the element when compared with the mass of a hydrogen-1 atom

**[Johor2021-02]**

2. Rajah 2 menunjukkan satu atom magnesium dibandingkan dengan atom piawai karbon-12.

Diagram 2 shows a magnesium atom compared to standard atom of carbon-12.

Apakah jisim atom relatif bagi magnesium?

What is the relative atomic mass of magnesium?

- A 2
- C 24

- B 12
- D 48



**[Kedah2021-Set02-29]**

29. Jisim tiga atom unsur Y adalah sama dengan jisim empat atom karbon. Y bukan simbol sebenar unsur itu. Apakah jisim formula relatifnya?

[Jisim atom relatif: C = 12 ]

The mass of three atoms of element Y is equal to the mass of four carbon atoms.

Y is not actual symbol of the element. What is the relative atomic mass of element Y? [Relative atomic mass: C = 12 ]

- A 12

- B 16

- C 36

- D 48

**[Melaka2021-30]**

30. Plaster of paris atau plaster gipsum sering digunakan untuk merawat pesakit yang mengalami kecederaan pada tulang. Ia terdiri daripada serbuk putih halus kalsium sulfat hemihidrat,  $(\text{CaSO}_4)_2 \cdot \text{H}_2\text{O}$ .

Berapakah jisim molar kalsium sulfat hemihidrat?

[Jisim atom relatif: Ca = 40; S = 32; O = 16; H = 1]

Plaster of paris or gypsum plaster is often used to treat patients with bone injuries. It consists of a fine white powder of calcium sulphate hemihydrate,  $(\text{CaSO}_4)_2 \cdot \text{H}_2\text{O}$ . What is the molar mass of calcium sulphate hemihydrate?

[Relative atomic mass: Ca = 40; S = 32; O = 16; H = 1]

- A 154

- B 272

- C 208

- D 290

**[Negeri Sembilan 2021-31]**

31. Formula bagi oksida P ialah  $P_2O$ . 21.6 g P oksida bertindak balas lengkap dengan serbuk karbon membentuk 19.2 g logam P.

Antara yang berikut, yang manakah merupakan jisim atom relatif bagi P?

Formula of oxide P is  $P_2O$ . 21.6 g of oxide P react completely with carbon powder to form 19.2 g of metal P.

Which of the following is the relative atomic mass of P?

[Jisim atom relatif:  $O=16$ ] [Relative atomic mass:  $O=16$ ]

A 32

B 64

C 128

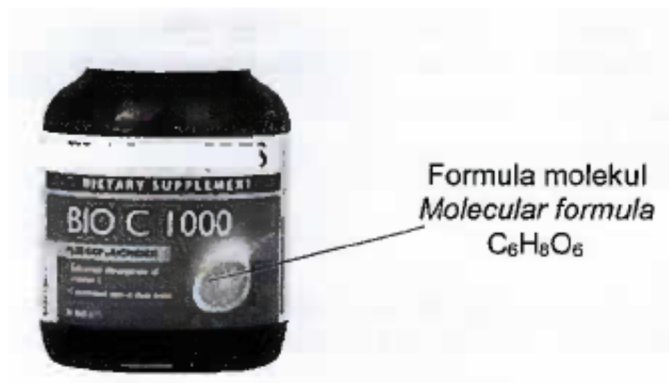
D 256

**[Terengganu 2021-26]**

26. Rajah 7 menunjukkan satu jenis vitamin penting yang diperlukan untuk kesihatan kita. Berapakah jisim molekul relatif vitamin tersebut?

Diagram 1 shows one type of essential vitamin that is needed for our health. What is the relative molecular mass of the vitamin?

[Jisim atom relatif/Relative atomic mass:  $H=1$ ,  $C=12$ ,  $O=16$ ]



A 20

B 66

C 176

D 198

**3.2 Konsep Mol**

**[Kedah 2021-Set02-01]**

2. Antara pernyataan berikut yang manakah benar bagi 1 mol bahan?

Which of the following statement is true for 1 mole of substance?

A 1 mol zink mengandungi  $6.02 \times 10^{23}$  molekul

1 mol of zinc contains  $6.02 \times 10^{23}$  molecules

B 1 mol ammonia mengandungi bilangan atom yang sama seperti dalam 12g karbon-12

1 mol of ammonia contains the same number of atoms as in 12g of carbon-12.

C 1 mol karbon dioksida mengandungi bilangan molekul yang sama dengan bilangan atom dalam 12g karbon-12

1 mol of carbon dioxide contains the same number of molecules as the number of atoms in 12g carbon-12.

D 1 mol gas oksigen mengandungi  $6.02 \times 10^{23}$  atom.

1 mol of oxygen gas contains  $6.02 \times 10^{23}$  atoms.

**[Selangor2021-Set01-02]**

2. Apakah yang dimaksudkan dengan pemalar Avogadro?

What is the meaning of Avogadro constant?

A Jisim bagi satu mol bahan  
Mass of one mole of a substance

C Isi padu yang dipenuhi oleh satu mol gas  
Volume occupied by one mole of gas

B Tekanan bagi satu mol bahan  
Pressure of one mole of a substance

D Bilangan zarah dalam satu mol bahan  
Number of particles in one mole of a substance

**[SBP2021-18]**

18. Berapakah bilangan atom dalam 1 mol gas sulfur dioksida?

[Pemalar Avogadro,  $N_A = 6.02 \times 10^{23} \text{ mol}^{-1}$ ]

What is the number of atoms in 1 mol of sulphur dioxide gas

[Avogadro constant,  $N_A = 6.02 \times 10^{23} \text{ mol}^{-1}$ ]

A  $6.02 \times 10^{23}$

B  $1.204 \times 10^{24}$

C  $1.806 \times 10^{24}$

D  $2.408 \times 10^{24}$

**[Negeri Sembilan2021-17]**

17. Antara yang berikut, yang manakah mempunyai bilangan atom yang sama dengan 0.5 mol argon?

Which of the following has same number of atoms as in 0.5 mol of argon?

A 0.1 mol metana,  $\text{CH}_4$   
0.1 mol of methane,  $\text{CH}_4$

C 0.1 mol sulfur trioksida,  $\text{SO}_3$   
0.1 mol of sulphur trioxide,  $\text{SO}_3$

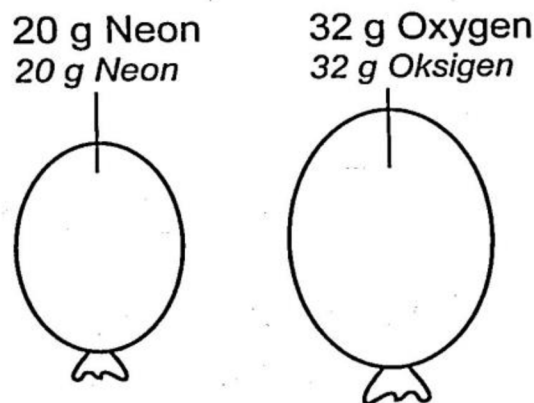
B 0.1 mol metanol,  $\text{CH}_3\text{OH}$   
0.1 mol of methanol,  $\text{CH}_3\text{OH}$

D 0.1 mol karbon dioksida,  $\text{CO}_2$   
0.1 mol of carbon dioxide,  $\text{CO}_2$

**[Melaka2021-03]**

3. Rajah 1 menunjukkan dua jenis gas yang diisi ke dalam dua biji belon.

Diagram 1 shows two types of gases filled in two balloons.



Pernyataan manakah yang betul tentang bilangan atom dalam gas neon?

[Jisim atom relatif: Ne = 20; O = 16]

Which statement is correct about the number of atoms on neon gas?

[Relative atomic mass: Ne = 20; O = 16]

A Sama seperti bilangan molekul gas oksigen

Same as number of molecules in oxygen gas

B Mempunyai bilangan molekul yang lebih banyak daripada gas oksigen

More than the number of molecules in oxygen gas

C Dua kali lebih banyak daripada bilangan molekul dalam gas oksigen

Two times more than the number of molecules in oxygen gas

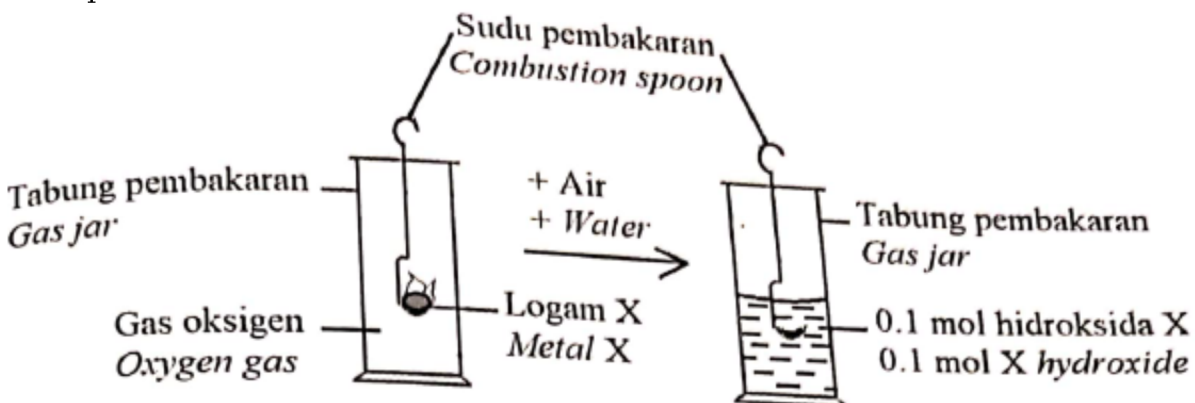
D 20 kali lebih banyak daripada bilangan molekul dalam gas oksigen

20 times more than the number of molecules in oxygen gas

**[SBP2021-33]**

33. Rajah 33 menunjukkan langkah- langkah yang dijalankan untuk mengkaji sifat kimia unsur Kumpulan 1.

Diagram 33 shows the steps carried out to investigate the chemical properties of Group 1 element.



Apakah isi padu gas oksigen yang diperlukan untuk bertindak balas lengkap dalam bertindak balas ini?

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

What is the volume of oxygen gas needed to react completely in this reaction?

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

A  $0.6 \text{ dm}^3$

B  $0.8 \text{ dm}^3$

C  $1.2 \text{ dm}^3$

D  $1.4 \text{ dm}^3$

**[Selangor2021-Set02-02]**

2. Bahan yang manakah mengandungi  $6.02 \times 10^{23}$  atom?

Which substance contains  $6.02 \times 10^{23}$  atoms?

A 1.0 mol gas helium

1.0 mol of helium gas

C 1.0 mol ammonia

1.0 mol of ammonia

B 1.0 mol gas oksigen

1.0 mol of oxygen gas

D 1.0 mol natrium klorida

1.0 mol of sodium chloride

**[Kelantan2021-28]**

28. Sebuah katrij penunu Bunsen mengandungi 2.75 kg gas butana,  $C_4H_{10}$ . Berapakah bilangan mol gas itu? [Jisim atom relatif: H = 1, C = 12]

A Bunsen burner cartridge contains 2.75 kg butane gas,  $C_4H_{10}$ .

What is the number of moles of the gas? [Relative atomic mass : H = 1, C = 12]

A 23.71

B 24.55

C 47.41

D 49.11

**3.3 Formula Kimia**

**[Kelantan2021-05]**

5. Antara formula kimia berikut, yang manakah betul?

Which of the following chemical formulae is correct?

A  $Li_2O$

B  $KBr_2$

C  $Al_3Cl$

D  $MgNO_3$

**[Kedah2021-Set01-02]**

2. Formula kimia bagi kuprum(I) oksida ialah

Chemical formula of copper(I) oxide is

A  $CuO$

B  $CuO_2$

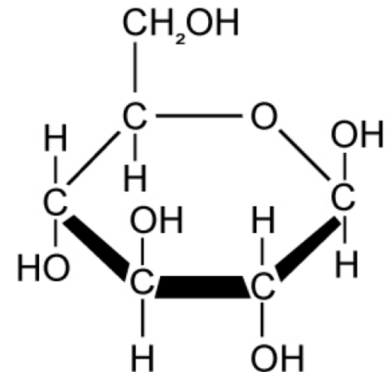
C  $Cu_2O$

D  $Cu_2O_2$

**[Selangor2021-Set01-01]**

26. Rajah 7 menunjukkan formula struktur bagi suatu sebatian yang disintesis oleh tumbuhan hijau seinasa fotosintesis.

Diagram 7 shows the structural formula of a compound synthesised by green plant during photosynthesis.



Apakah nisbah teringkas bagi unsur karbon, hidrogen dan oksigen bagi sebatian itu?

What is the simplest ratio of the elements carbon, hydrogen and oxygen for the compound?

A 1:1:1

B 1:2:1

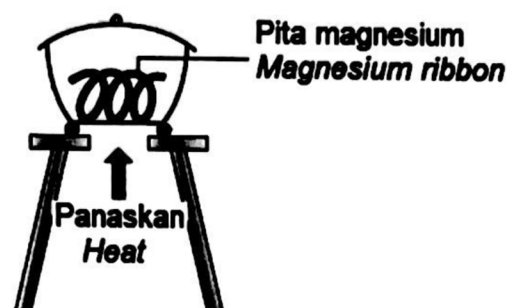
C 2:1:2

D 6:12:6

**[Johor2021-24]**

24. Rajah 13 menunjukkan susunan radas untuk menentukan formula empirik magnesium oksida.

Diagram 13 shows the apparatus set-up to determine the empirical formula of magnesium oxide.



Antara yang berikut, langkah manakah yang betul untuk memastikan pita magnesium dapat bertindak balas dengan oksigen dan terbakar sepenuhnya?  
Which of the following steps is correct to ensure the magnesium ribbon reacts with oxygen and burnt completely?

I Ulangi proses pemanasan, penyejukan dan penimbangan sehingga jisim tetap diperoleh.  
Repeat the process of heating, cooling and weighing until a constant mass is obtained.

II Panaskan pita magnesium dengan kuat di dalam mangkuk pijar tanpa penutupnya.  
Heat the magnesium ribbon strongly in the crucible without its lid.

III Tutup mangkuk pijar dengan penutupnya sebaik sahaja pita magnesium mula terbakar.  
Cover the crucible with its lid as soon as the magnesium ribbon starts burning.

IV Buka dan tutup tudung mangkuk pijar sekali-sekala semasa pemanasan  
Open and close the crucible lid once in a while during heating

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

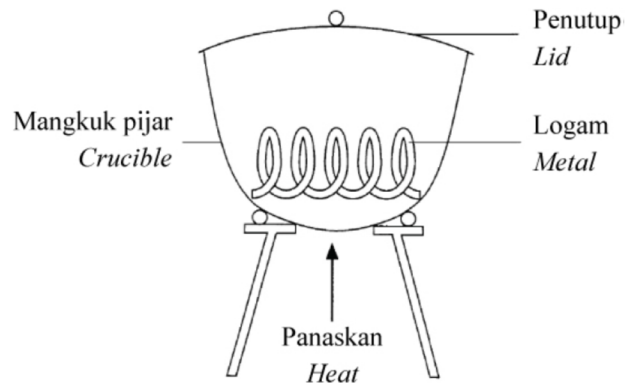
**[Selangor2021-Set02-20]**

20. Rajah 7 menunjukkan susunan radas untuk menentukan formula empirik logam oksida.

Diagram 7 shows the apparatus set-up to determine the empirical formula of metal oxide.

Pernyataan yang manakah menerangkan mengapa mangkuk pijar perlu ditutup dengan penutupnya apabila logam mula terbakar?

Which statement explains why the crucible need to be covered by its lid when the metal starts to burn?



A Untuk mengelakkan asap logam oksida dari terbebas  
To prevent metal oxide fumes from being released

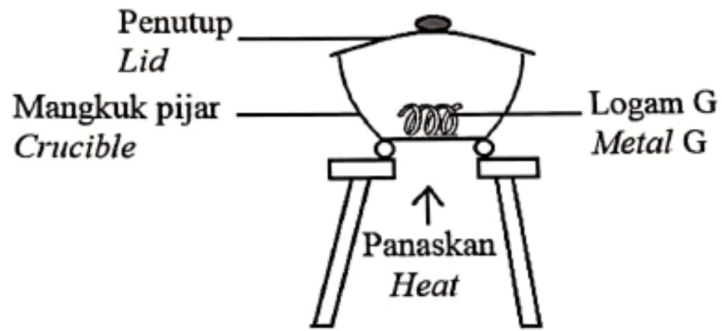
B Untuk membenarkan oksigen bertindak balas dengan logam  
To allow oxygen to reacts with the metal

C Untuk mendapatkan jisim logam oksida yang tetap  
To obtain a constant mass of metal oxide

D Untuk mengelakkan logam terbakar dengan berlebihan  
To avoid metal from over heating

**[SBP2021-04]**

4. Rajah 4 menunjukkan susunan radas untuk menentukan formula empirik oksida logam G. Diagram 4 shows the setup of apparatus to determine the empirical formula of oxide of metal G.



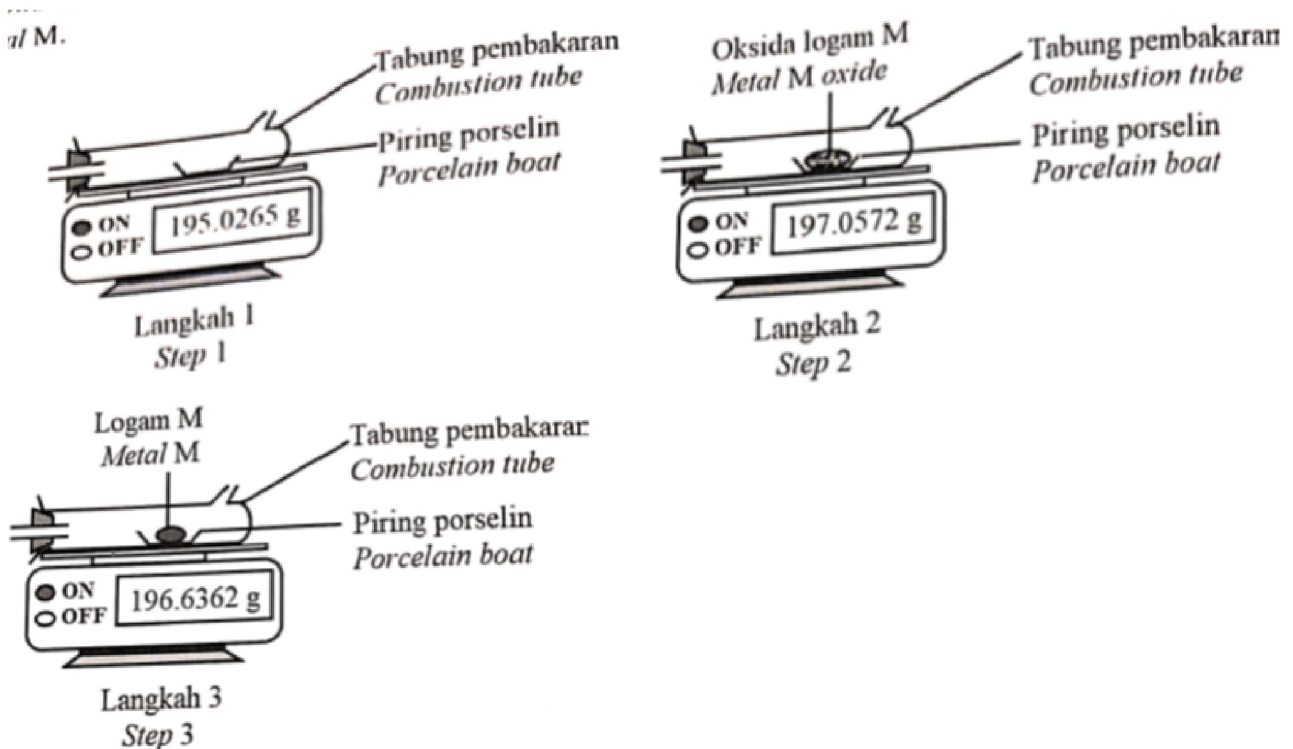
Apakah logam G?/ What is metal G?

- A Argentum/ Silver
- B Aluminium/ Aluminium

- C Ferum/ Iron
- D Stanum/ Tin

**[SBP2021-32]**

32. Rajah 32 menunjukkan langkah-langkah penimbangan untuk menentukan formula empirik bagi oksida logam M. Diagram 32 shows the weighing steps taken to determine the empirical formula of the oxide of metal M



Apakah formula empirik bagi oksida logam M?  
What is the empirical formula of metal M?

[Jisim atom relatif: O = 16, M = 64] [Relative atomic mass : O = 16, M = 64]

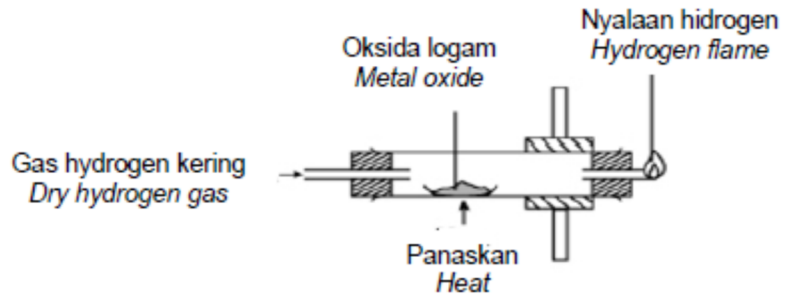
- A MO

- B M<sub>2</sub>O

- C MO<sub>2</sub>

**[Kedah2021-Set02-09]**

9. Rajah menunjukkan susunan radas untuk menentukan formula empirik suatu oksida logam  
Diagram shows the set-up of the apparatus used to determine the empirical formula of a metal oxide.



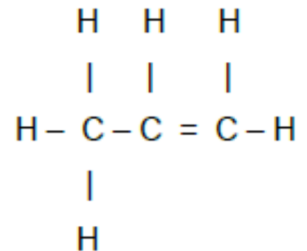
Antara oksida logam berikut yang manakah sesuai digunakan dalam eksperimen?

Which one of the following metal oxides is suitable to be used in the experiment?

- A MgO                                      B  $Al_2O_3$                                       C ZnO                                      D  $Ag_2O$

**[Kedah2021-Set01-09]**

9. Rajah menunjukkan formula struktur propena.  
Diagram shows the structural formula of propene.



Apakah formula empirik bagi propena?  
What is the empirical formula of propene?

- A CH                                      B  $CH_2$                                       C  $C_3H_6$                                       D  $C_3H_8$

**[Perlis2021-33]**

33. 9.75 g unsur X bertindak balas dengan 63.5 g unsur Y untuk membentuk satu sebatian. Apakah formula empirik bagi sebatian yang terbentuk?

9.75 g of element X reacts with 63.5 g of element Y to form a compound.

What is the empirical formula of the compound formed?

[Jisim atom relatif: X = 39; Y = 127] [Relative atomic mass: X = 39; Y = 127]

- A  $XY_2$                                       B  $X_2Y$                                       C  $X_2Y_3$                                       D  $X_3Y_2$   
D  $M_2O_3$

**[Selangor2021-Set02-27]**

27 Rajah 9 menunjukkan komposisi suatu sebatian.

Diagram 9 shows the composition of a certain compound.



Unsur Element	Peratus (%) Percentage (%)
X	15.23
Y	52.98
Z	31.79



Apakah formula empirik bagi sebatian tersebut?

What is the empirical formula of the compound?

[Jirim atom relatif: X=23;Y=80; Z=16] [Relative atomic mass, X=23; Y=80; Z = 16]

A XYZ

B XY<sub>2</sub>Z

C XYZ<sub>3</sub>

D XYZ<sub>4</sub>

**[Johor2021-32]**

32. Berapakah peratus komposisi air mengikut jisim dalam ferum(II) sulfat terhidrat, FeSO<sub>4</sub>.7H<sub>2</sub>O?

[Jisim atom relatif: H = 1, O = 16, S = 32, Fe = 56]

What is the percentage composition of water by mass in hydrated iron(II) sulphate, FeSO<sub>4</sub>.7H<sub>2</sub>O?

[Relative atomic mass: H=1,O= 16, S = 32, Fe = 56]

A 6.47%

B 9.00%

C 45.32%

D 71.20%

**[Kedah2021-Set02-17]**

17. Rajah menunjukkan periuk yang diperbuat dari keluli nirkarat. Keluli nirkarat mengandungi 73% besi, 1% karbon, 18% kromium dan 8% nikel. Diagram shows a pot made of stainless steel. Stainless steel contains 73% iron, 1% carbon, 18% chromium and 8% nickel.



Hitung jisim besi yang diperlukan untuk menghasilkan periuk yang berjisim 665 g.

Calculate the mass of iron required to produce a pot of mass 665 g

A 146.30 g

B 147.00 g

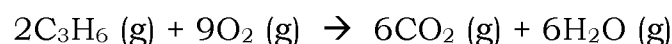
C 485.45 g

D 419.00 g

**3.4 Persamaan Kimia**

**[Johor2021-38]**

38. Persamaan berikut menunjukkan pembakaran lengkap gas propena. The following equation shows the complete combustion of propene gas.



Berapakah jisim air yang dihasilkan apabila 2.1 g gas propena terbakar dengan lengkap?

What is the mass of water produced when 2.1 g of propene gas is burnt completely?

[Jisim atom relatif: H=1; C=12; O=16][Relative atomic mass: H=1; C=12; O= 16]

A 0.90 g

B 2.70 g

C 3.60 g

D 5.40 g

**[Melaka2021-31]**

31. Persamaan di bawah mewakili tindak balas untuk mengekstrak aluminium daripada aluminium oksida.

The equation below represents the reaction to extract aluminium from aluminium oxide.



Berapakah jisim aluminium yang boleh diekstrakkan daripada 102 g aluminium oksida?

What is the mass of aluminium that can be extracted from 102 g of aluminium oxide?

[Jisim atom relatif: O = 16; Al = 27] [Relative atomic mass: O = 16; Al = 27]

A 13.5 g

B 27.0 g

C 54.0 g

D 108.0 g

**[Selangor2021-Set01-01]**

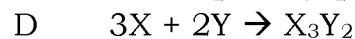
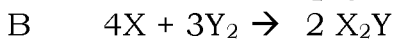
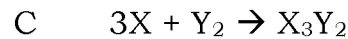
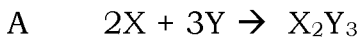
27. Formula ion bagi unsur X dan Y adalah seperti berikut.

The formula of ion for element X and Y are as follow.



Antara persamaan yang berikut, manakah mewakili tindak balas antara X dan Y?

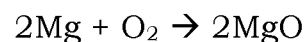
Which of the following equation represents the reaction between X and Y?



**[Kedah2021-Set02-33]**

33. Persamaan berikut menunjukkan tindak balas antara magnesium dan oksigen.

The following equation represent the reaction between magnesium and oxygen



Antara berikut yang manakah pernyataan yang benar?

Which of the following statements is correct?

[Jisim atom relatif: O=16, Mg=24 ; Pemalar Avogadro,  $N_A = 6.02 \times 10^{23} \text{ mol}^{-1}$ ]

[Relative atomic mass of O=16, Mg=24;

Avogadro constant,  $N_A=6.02 \times 10^{23} \text{ mol}^{-1}$ ]

A. 2 mol atom magnesium bertindak balas dengan 2 mol atom oksigen untuk menghasilkan 2 mol magnesium oksida.

2 moles of magnesium atoms react with 2 moles of oxygen atoms to produce 2 moles of magnesium oxide.

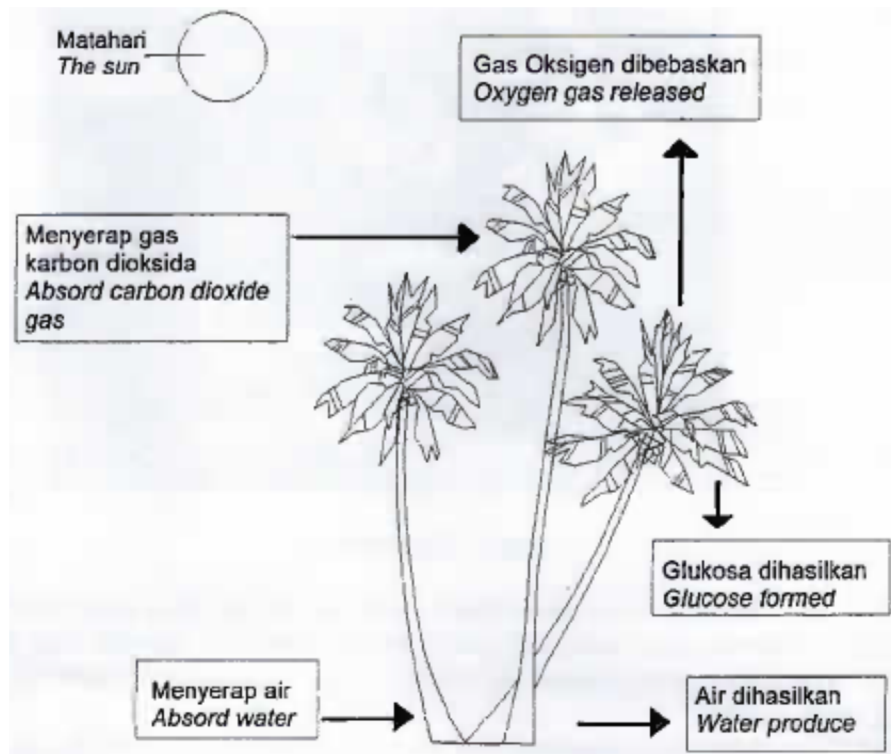
B 24 g atom magnesium bertindak balas dengan 1 mol molekul oksigen untuk menghasilkan 2 mol magnesium oksida .  
 24 g magnesium atoms react with 1 mole of oxygen molecules to produce 2 moles of magnesium oxide

C  $6.02 \times 10^{23}$  atom magnesium bertindak balas dengan  $3.01 \times 10^{23}$  molekul oksigen untuk menghasilkan 2 mol magnesium oksida  
 $6.02 \times 10^{23}$  magnesium atoms react with  $3.01 \times 10^{23}$  oxygen molecules to produce 2 moles of magnesium oxide

D 1 mol atom magnesium bertindak balas dengan 0.5 mol molekul oksigen untuk menghasilkan 1 mol magnesium oksida  
 1 mole of magnesium atoms react with 0.5 mole of oxygen molecules to produce 1 moles of magnesium oxide

**[Terengganu2021-37]**

37. Rajah 12 menunjukkan proses fotosintesis bagi pokok kelapa. Diagram 12 shows the process of photosynthesis for a coconut tree



Apakah isipadu gas oksigen yang dibebaskan jika 1.3 dm<sup>3</sup> gas karbon dioksida digunakan?  
 What is the volume of oxygen gas produce if 1.3 dm<sup>3</sup> of carbon dioxide gas is used?

[Isipadu molar gas pada keadaan bilik = 24 dm<sup>3</sup> mol<sup>-1</sup>]  
 [Molar volume of gas at room condition = 24 dm<sup>3</sup> mol<sup>-1</sup>]

- A 0.65 dm<sup>3</sup>                      B 1.30 dm<sup>3</sup>                      C 1.73 dm<sup>3</sup>                      D 2.60 dm<sup>3</sup>

**[Kedah2021-Set01-29]**

29. 1.2 g unsur X bertindak balas dengan 0.8 g unsur Y untuk membentuk satu sebatian yang mempunyai formula XY.  
 1.2 g of element X react with 0.8 g of element Y to form a compound with the formula XY.

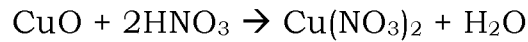
Berapakah jisim atom relatif X? / What is the relative atomic mass of X?  
 [Jisim atom relatif Y ialah 16] [Relative atomic mass of Y is 16]

- A 40                                      B 27                                      C 24                                      D 16

**[Terengganu2021-13]**

13. Persamaan berikut mewakili tindak balas antara serbuk kuprum(II) oksida dengan asid nitrik cair.

The following equation represents the reaction between copper(II) oxide and nitric acid.



Berapakah jisim kuprum(II) nitrat yang terbentuk apabila 1.6 g serbuk kuprum(II) oksida bertindak balas lengkap dengan asid nitrik?

What is the mass of copper(II) nitrate produced when 1.6 g of copper(II) oxide react completely with nitric acid?

[Jisim atom relatif: Cu=64, N=14, O=16][Relative atomic mass:Cu=64,N=14, O=16]

A 1.88 g

B 2.24 g

C 2.52 g

D 3.76 g

**4.0 Jadual Berkala Unsur**

**4.1 Perkembangan Jadual Berkala Unsur**

**[Kedah2021-Set02-01]**

1. Apakah zarah subatom yang ditemui oleh Ernest Rutherford?

Which subatomic particle was discovered by Ernest Rutherford?

A Neutron

B Elektron

C Proton

Neutron

Electron

Proton

**[Kelantan2021-03]**

3. Siapakah ahli sains yang telah menyusun unsur-unsur berdasarkan Hukum Oktaf.

Who is the scientist who has compiled the elements based on the Octave Law.

A Joseph John Thomson

C John W Dobereiner

B James Chadwick

D John Newlands

**[Terengganu2021-03]**

3. Pernyataan berikut adalah mengenai susunan unsur di dalam Jadual Berkala Unsur.

The following statement is about the arrangement of the elements in the Periodic Table of Elements.

**Unsur dikelaskan mengikut kumpulan tertentu seperti kumpulan gas, bukan logam, logam dan oksida logam.**

**Elements classified according to certain group such as gases, non-metals, metals and metal oxides.**

Antara saintis berikut, siapakah yang membuat pernyataan di atas?

Which of the following scientists made the above statement?

A Henry Moseley

C Antoine Lavoisier

B John Newlands

D Dmitri Mendeleev

## 4.2 Susunan Unsur Dalam Jadual Berkala Unsur Moden

### [Perlis2021-04]

4. Unsur-unsur dalam Jadual Berkala disusun berdasarkan pertambahan  
Elements in the Periodic Table are arranged according to an increase in

A nombor proton  
proton number

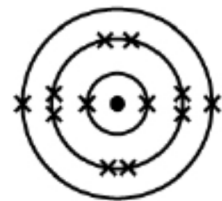
C jisim atom relatif  
relative atomic mass

B nombor nukleon  
nucleon number

D jisim molekul relatif  
relative molecular mass

### [Selangor2021-Set01-09]

9. Rajah 2 menunjukkan susunan elektron bagi atom M.  
Diagram 2 shows the electron arrangement of an atom M.



Antara berikut yang manakah kedudukan unsur M dalam  
Jadual Berkala Unsur?

Which of the following is the position of element M in the  
Periodic Table of Elements?

	Kumpulan/ Group	Kala/ Period
A	2	2
B	2	3
C	12	2
D	12	3

## 4.3 Unsur Dalam Kumpulan 18

### [Negeri Sembilan2021-05]

5. Berikut menunjukkan kegunaan bagi gas X.  
The following shows the uses for gas X.

• Digunakan di dalam lampu 'flash'  
pada kamera  
Used in flashlight of cameras

• Digunakan di dalam laser untuk  
rawatan retina mata  
Used in lasers for eye retina  
treatment

Apakah gas X?/What is gas X?

A Kripton/ Krypton  
B Xenon/ Xenon

C Radon/ Radon  
D Neon/ Neon

### [Kedah2021-Set02-03]

3. Antara berikut, unsur yang manakah terletak dalam Kumpulan 18 dalam  
Jadual Berkala Unsur?

Which of the following elements are located in the Group 18 in the Periodic Table  
of Elements?

A Helium dan Krypton  
Helium and Crypton

C Argon dan Platinum  
Argon and Platinum

B Mangan dan Indium  
Manganese and Indium

D Xenon dan Selenium  
Xenon and Selenium

**[Melaka2021-32]**

32. Seorang pemilik restoran menggunakan lampu elektrik yang berwarna-warni untuk menarik pelanggan datang ke kedainya. Pernyataan yang manakah menerangkan sifat bahan yang digunakan untuk membuat lampu tersebut?

A restaurant owner uses colourful electric lights to attract his customers. Which statement explains the properties of the substance used for making such lights?

A Saiz atom yang besar  
Big atomic size

B Takat lebur dan takat didih yang tinggi  
High melting and boiling points

C Kecenderungan nukleus atom untuk melepaskan elektron berkurang  
Strength of the nucleus of the atom to release electron decreases

D Atom-atom tidak menderma, menerima atau berkongsi elektron dengan atom unsur lain  
Atoms do not donate, accept nor share electrons with the atoms of other elements

**[Selangor2021-Set01-01]**

15. Ciri manakah yang sama bagi semua unsur dalam Kumpulan 18 dalam Jadual Berkala Unsur?

Which characteristic is similar for all elements in Group 18 in the Periodic Table of Elements?

A Takat lebur dan didih yang tinggi  
High melting and boiling point

C Wujud sebagai gas monoatom  
Exist as monoatomic gas

B Membentuk sebatian berwarna  
Form coloured compound

D Wujud sebagai gas dwiatom  
Exist as diatomic gas

**[Selangor2021-Set02-15]**

15. Rajah 4 menunjukkan lampu papan iklan yang diperbuat daripada X.

Diagram 4 shows advertisement light board which made of X.

Dalam kumpulan manakah X terletak dalam Jadual Berkala Unsur?

In which group is X located in the Periodic Table of Elements?



A Kumpulan 1  
Group 1

C Kumpulan 17  
Group 17

B Kumpulan 18  
Group 18

D Kumpulan 15  
Group 15

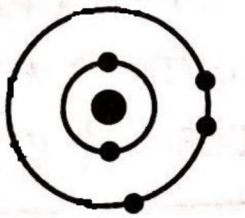
#### 4.4 Unsur Dalam Kumpulan 1

**[Kedah2021-Set02-22]**

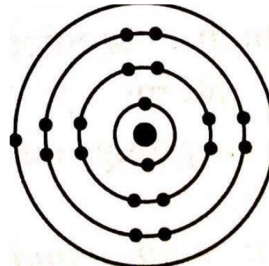
22. Antara gambarajah berikut, yang manakah mewakili susunan unsur bagi suatu unsur Kumpulan 1?

Which of the following elements are in Group 1 in the Periodic Table of Elements?

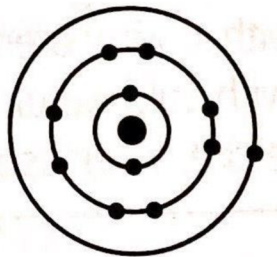
I



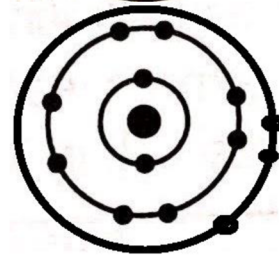
III



II



IV



A I dan III/ I and III  
B I dan IV/ I and IV

C II dan III/ II and III  
D II dan IV/ II and IV

**[Melaka2021-18]**

18. Atom X mempunyai empat petala dengan petala terakhir berisi satu elektron. Pernyataan manakah menerangkan sifat kimia bagi atom X?

Atom X has four shells with its last shell occupied by a single electron.

Which statement describes the chemical properties of atom X?

A Bertindak balas antara satu sama lain untuk membentuk molekul dwiatom.  
React with each other to form diatomic molecule.

B Bertindak balas dengan halogen untuk membentuk pepejal putih.  
Reacts with halogen to form white solid.

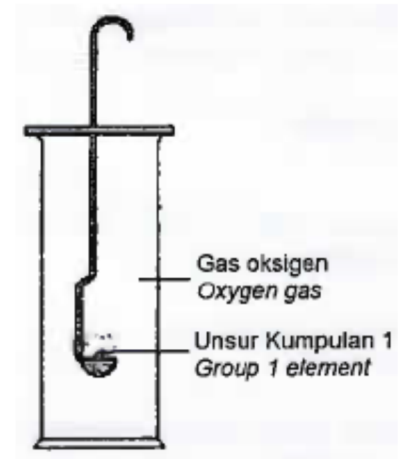
C Bertindak balas dengan asid untuk menghasilkan gas karbon dioksida.  
Reacts with acids to produce carbon dioxide.

D Bertindak balas dengan oksigen untuk menghasilkan oksida amfoterik.  
Reacts with oxygen to produce amphoteric oxides.

**[Terengganu2021-27]**

27. Rajah 8 menunjukkan susunan radas untuk mengkaji kereaktifan unsur dalam Kumpulan 1 Jadual Berkala Unsur bertindak balas dengan oksigen.

Diagram 8 shows the apparatus set-up to study the reactivity of Group 1 elements of the Periodic Table of elements in reaction with oxygen.



Jadual 2 menunjukkan pemerhatian bagi setiap tindak balas.

Table 2 shows the observation for each reaction.

Unsur Element	Pemerhatian Observation
X	Terbakar sangat cergas dengan nyalaan ungu Burns vigorously with purple flame
Y	Terbakar perlahan dengan nyalaan merah Burns slowly with red flame
Z	Terbakar sangat cergas dengan nyalaan kuning Burns vigorously with yellow flame

Antara berikut, yang manakah tertib secara menurun yang betul bagi kereaktifan unsur ini dengan oksigen?

Which of the following is the correct descending order for the reactivity of this element with oxygen?

A X, Y, Z

B X, Z, Y

C Y, Z, X

D Z, Y, X

**[Negeri Sembilan2021-33]**

33. Rajah 9 menunjukkan Jadual Berkala Unsur yang tidak lengkap. L dan M bukan simbol sebenar bagi unsur.

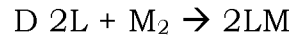
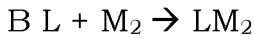
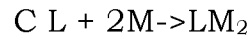
Diagram 9 shows an incomplete Periodic Table of Element. L and M are not the actual symbol for element.



Unsur L boleh bertindak balas dengan unsur M menghasilkan satu sebatian ion. Antara yang berikut, yang manakah persamaan kimia yang seimbang bagi tindak balas ini?

Element L can react with element M to produce an ionic compound.

Which of the following is the balanced chemical equation for this reaction?



#### 4.5 Unsur Dalam Kumpulan 17

##### [Selangor2021-Set02-09]

9. Takat didih bromin lebih tinggi daripada klorin.

Pernyataan manakah menerangkan fenomena ini dengan tepat?

The boiling point of bromine is higher than chlorine.

Which statement exactly explains this phenomenon?

A Ikatan kovalen antara molekul bromin adalah lebih kuat

The covalent bond between bromine molecules are stronger

B Daya tarikan Van der Waals antara molekul bromin adalah lebih kuat

Van der Waals attraction forces between bromine molecules are stronger

C Saiz atom bromin adalah lebih besar

The atomic size of bromine is bigger

D Nombor proton bromin adalah lebih besar

The proton number of bromine is bigger

##### [Negeri Sembilan2021-18]

18. Tindak balas fluorin dengan unsur lain adalah lebih cergas berbanding iodin. Antara yang berikut, pernyataan manakah yang paling baik menerangkan tentang perkara di atas?

The reaction of fluorine with other elements is more vigorous compared to iodine.

Which of the following is the best to explain the above statement?

A Saiz atom fluorin lebih kecil daripada saiz atom iodin

Atomic size of fluorine is smaller than atomic size of iodine

B Fluorin dalam keadaan gas dan iodin dalam keadaan pepejal pada keadaan bilik

Fluorine is in gaseous state and iodine is in solid state at room condition

C Fluorin terletak di atas iodin dalam kumpulan yang sama dalam Jadual Berkala Unsur

Fluorine is located above iodine in the same group in the Periodic Table of Element

D Daya tarikan nukleus terhadap elektron dalam atom fluorin lebih kuat berbanding iodin  
Nuclei attraction towards electrons in fluorine atom is stronger than iodine

**[Melaka2021-17]**

17. Iodin ialah satu unsur Kumpulan 17. Pernyataan manakah yang benar berkenaan iodin?

Iodine is a Group 17 element. Which statement regarding iodine is true?

A Iodin wujud sebagai cecair pada suhu bilik.  
Iodine exists as a liquid at room temperature

B Iodin bertindak balas dengan ferum untuk menghasilkan ferum (II) iodida  
Iodine reacts with iron to form iron (II) iodide

C Iodin bertindak balas dengan air untuk menghasilkan gas hidrogen  
Iodine reacts with water to produce hydrogen gas

D Iodin bertindak balas dengan kalium untuk menghasilkan kalium iodida.  
Iodine reacts with potassium to form potassium iodide

**4.6 Unsur Dalam Kala 3**

**[Johor2021-03]**

3. Satu unsur mempunyai ciri-ciri berikut:  
An element has the following properties:

• Takat lebur yang tinggi  
High melting point

• Kekonduksian elektrik yang baik  
Good electrical conductivity

• Lebih daripada satu nombor pengoksidaan  
More than one oxidation numbers

• Membentuk sebatian berwarna  
Forms coloured compounds

Apakah unsur yang menunjukkan ciri-ciri di atas?  
What element could display the properties above?

A Klorin/ Chlorine  
B Kuprum/ Copper

C Sulfur/ Sulphur  
D Strontium/ Strontium

**[SBP2021-05]**

5 Antara berikut, yang manakah ciri-ciri istimewa logam peralihan?  
Which of the following are the special characteristics of transition metals?

I Mengkonduksi elektrik  
Conduct electricity

III Mempunyai takat lebur yang rendah  
Has low melting point

II Bertindak sebagai mangkin  
Act as catalyst

IV Membentuk sebatian berwarna  
Form coloured compound

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

**[SBP2021-16]**

16. Jadual 16 menunjukkan susunan elektron bagi atom unsur W, X, Y dan Z.  
 Table 16 shows the electron arrangement for atom of the elements W, X, Y and Z.

Unsur Element	W	X	Y	Z
Susunan elektron Electron arrangement	2.1	2.4	2.8.6	2.8.7

Unsur yang manakah terletak dalam Kala 3, Kumpulan 16 dalam Jadual Berkala Unsur?

Which element is located in Period 3, Group 16 the Periodic Table of Elements?

A W

B X

C Y

D Z

**[Perlis2021-21]**

21. Apakah kala untuk unsur dengan nombor proton 20?

What is the period for an element with proton number of 20?

A 5

B 4

C 3

D 2

**[Kelantan2021-31]**

31. Rajah 10 menunjukkan Jadual Berkala Unsur yang terdiri daripada unsur P, Q, R, S dan T

Diagram 10 shows the Periodic Table of Elements consisting of the elements P, Q, R, S and T



Susun unsur P, Q, R, S dan T berdasarkan pertambahan saiz jejari atom.

Arrange the elements P, Q, R, S and T based on the increase in atomic radius size.

**A** T, R, S, Q, P

**B** P, R, T, Q, S

**C** R, T, P, Q, S

**D** P, Q, R, S, T

**[Kelantan2021-09]**

9. Antara pernyataan berikut yang manakah benar bagi unsur kala 3 dari kiri ke kanan dalam Jadual Berkala Unsur?

Which of the following statement is true about elements in period 3 from left to right in Periodic Table of Elements

A Sifat kelogaman unsur bertambah  
Metallic properties of elements increase

C Keelektronegatifan unsur berkurang  
Electronegativity of the elements decrease

B Bilangan elektron valens berkurang  
Electron valence decrease

D Saiz atom berkurang kerana bilangan proton bertambah  
Atomic size decrease because of the proton number increase

**[Kedah2021-Set02-37]**

37. Jadual menunjukkan pemerhatian apabila oksida bagi unsur –unsur dalam jadual berkala unsur dilarutkan dalam air

Table shows the observation when oxides of elements in the Periodic Table of elements is added to water.

Oksida unsur kala 3 Oxides of element in Period 3	Pemerhatian Observations
$W_2O_3$	Tiada perubahan No changes
XO	Larut membentuk larutan tak berwarna Dissolves to form a colourless solution
$Y_2O$	Larut membentuk larutan tak berwarna Dissolves to form a colourless solution

Apakah susunan yang betul mengikut pengurangan nombor proton unsur-unsur itu?

What is the correct arrangement in decreasing proton number of the elements?

A Y,X, W

B Y,W,X

C X,W,Y

D W,X,Y

**[Kedah2021-Set01-03]**

3. Antara berikut, unsur yang manakah adalah Unsur Peralihan dalam Jadual Berkala Unsur?

Which of the following elements are Transition Elements in the Periodic Table of Elements?

A Helium dan Krypton  
Helium and Crypton

C Kuprum dan Platinum  
Copper and Platinum

B Mangan dan Indium  
Manganese and Indium

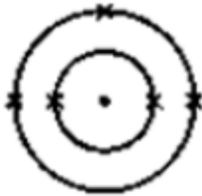
D Nikel dan Selenium  
Nickel and Selenium

**[Kedah2021-Set01-22]**

22. Antara berikut, yang manakah susunan elektron mewakili unsur Kumpulan 13 dalam Jadual Berkala Unsur?

Which of the following electron arrangements represent element of Group 13 in the Periodic Table of Elements?

I



III



II



IV



A I dan III/ I and III  
B I dan IV/ I and IV

C II dan III/ II and III  
D II dan IV/ II and IV

**[Kedah2021-Set01-37]**

37. Jadual menunjukkan pemerhatian apabila oksida bagi unsur-unsur dalam Jadual Berkala Unsur ditambah ke dalam air.

Table show the observation when oxide of elements in the Periodic Table of Elements are added into water.

Oksida unsur dalam Kala 3 Oxides of element in Period 3	Pemerhatian Observation
$W_2O_3$	Tiada perubahan No changes
XO	Tiada perubahan No changes
$Y_2O$	Larut membentuk larutan tak berwarna Dissolves to form a colourless solution

Antara berikut manakah susunan yang betul mengikut pertambahan nombor proton bagi unsur-unsur tersebut?

Which of the following is the correct arrangement in increasing proton number of the elements?

A W, X, Y

B Y, W, X

C X, W, Y

D Y, X, W

**[Johor2021-17]**

17. Unsur Y terletak di sebelah kanan Jadual Berkala Unsur. Antara yang berikut, kombinasi manakah yang menunjukkan jenis dan sifat yang betul bagi oksida Y?

Element Y is located on the right of the Periodic Table of Elements. Which of the following combinations shows the correct type and property of the oxide of Y?

	Jenis oksida/ Type of oxide	Sifat oksida/ Property of oxide
A	Logam/ Metallic	Bes/ Basic
B	Logam/ Metallic	Amfoterik/ Amphoteric
C	Bukan logam/ Non-metallic	Amfoterik/ Amphoteric
D	Bukan logam/ Non-metallic	Asid/ Acidic

**[Johor2021-28]**

28. Rajah 14 menunjukkan unsur-unsur W, X, Y dan Z di dalam Jadual Berkala Unsur. Huruf-huruf di dalam jadual berkala bukan simbol sebenar unsur-unsur. Diagram 14 shows the elements of W, X, Y and Z in a Periodic Table of Elements. The letters in the periodic table are not the actual symbols of the elements.

Antara yang berikut, pernyataan manakah yang benar?

Which of the following statements is correct?

A W dan Z membentuk ion-ion bercas -1.

W and Z form ions with charge of -1

B Saiz atom X lebih besar daripada atom Y.

Atomic size of X is larger than Y.

C Y dan Z mempunyai bilangan petala berisi elektron yang sama.

Y and Z have the same number of shells occupied with electrons

D X mempunyai tiga elektron lebih banyak berbanding W pada petala terluarnya.

X has three more electrons than W on its outermost shell.

**[Melaka2021-04]**

4. Antara berikut, pernyataan manakah yang benar tentang perubahan sifat unsur yang berlaku apabila merentasi Kala 3 dalam Jadual Berkala Unsur?  
Which of the following statements is correct about the changes in properties of elements across Period 3 in the Periodic Table of Element?

A Jejari atom semakin bertambah  
The atomic radius is increasing

B Keelektronegatifan unsur semakin berkurang  
The electronegativity of the elements is decreasing

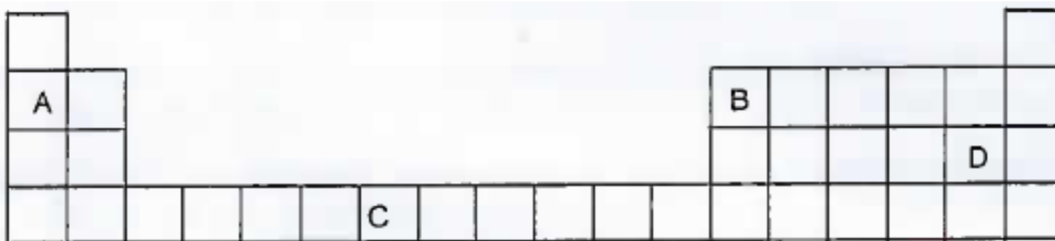
C Daya tarikan nukleus terhadap elektron semakin bertambah  
Nucleus attraction force to the electron is increasing

D Sifat oksida berubah daripada oksida asid kepada amfoterik kepada oksida bes  
The properties of oxides change from acidic oxides to amphoteric to base oxides

**[Terengganu2021-14]**

14. Rajah 4 menunjukkan sebahagian daripada Jadual Berkala Unsur. Diagram 4 shows part of the Periodic Table of Elements.

Antara berikut yang manakah merupakan unsur peralihan?  
Which of the following is a transition element?



**5.0 : Ikatan Kimia**

**5.1 Asas Pembentukan Sebatian**

**[Perlis2021-05]**

5. Sebatian manakah yang terbentuk melalui pemindahan elektron?  
Which compound is formed by transferring electrons?

A Oksigen  
Oxygen

C Natrium klorida  
Sodium chloride

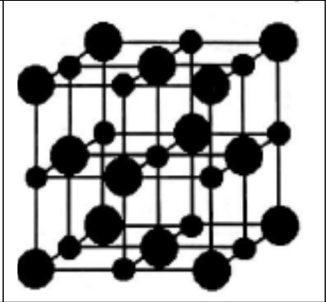
B Karbon dioksida  
Carbon dioxide

D Hidrogen peroksida  
Hydrogen peroxide

**5.2 Ikatan Ion**

**[Johor2021-04]**

4. Rajah 3 menunjukkan struktur kekisi bagi satu sebatian ion.  
Diagram 3 shows the lattice structure of an ionic compound.



Sebatian manakah berkemungkinan mempunyai struktur tersebut?

Which substance is likely to have such structure?

A Magnesium oksida  
Magnesium oxide

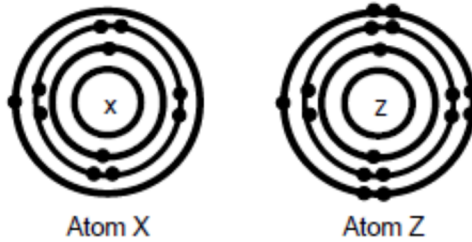
B Karbon monoksida  
Carbon monoxide

C Aluminium klorida  
Aluminium chloride

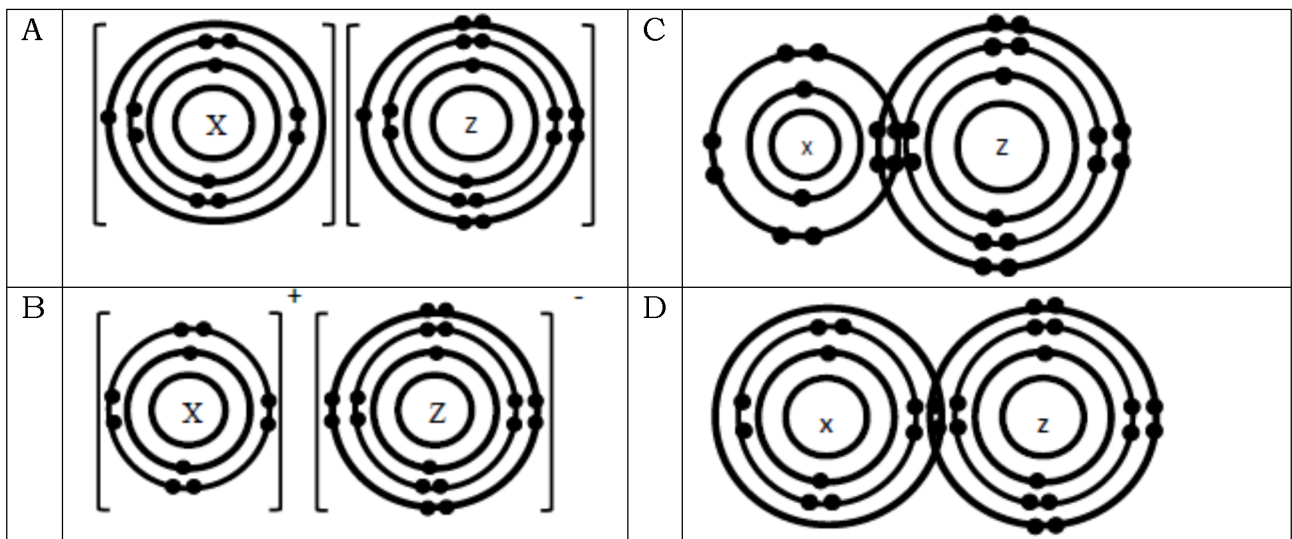
**[Melaka2021-20]**

20. Rajah 4 menunjukkan susunan elektron bagi dua atom X dan Z masing-masing.

Diagram 4 shows the electron arrangement of two atoms X and Z respectively.



Rajah manakah menunjukkan ikatan yang terbentuk antara atom X dan atom Z?  
Which diagram shows bond formed between atom X and atom Z?





**[SBP2021-20]**

20. Jadual 20 menunjukkan maklumat bagi atom unsur Q dan R.

Table 20 shows the information of atom of elements Q and R.

Unsur Element	Nombor proton Proton number	Nombor nukleon Nucleon number
Q	5	11
R	8	6

Apakah formula sebatian yang terbentuk antara unsur Q dan R?

What is the formula of the compound formed between elements Q and R?

A  $Q_3R_2$

B  $Q_2R_3$

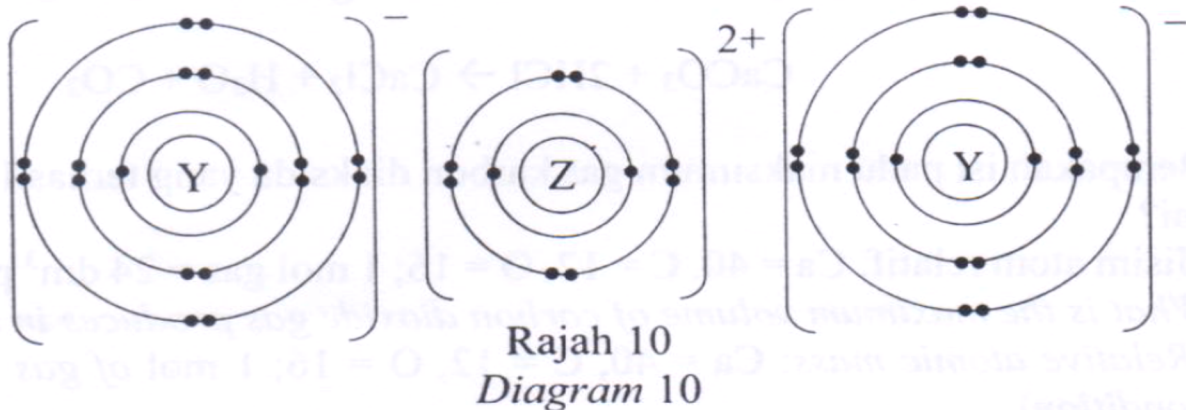
C  $Q_2R$

D  $QR_2$

**[Negeri Sembilan2021-34]**

34. Rajah 10 menunjukkan susunan elektron bagi satu sebatian dengan formula  $ZY_2$ .

Diagram 10 shows the electron arrangement of a compound with formula  $ZY_2$ .



Apakah nombor proton bagi atom Z dan atom Y?

What are the proton number of atom Z and atom Y?

	Nombor proton atom Z Proton number of atom Z	Nombor proton atom Y Proton number of atom Y
A	8	19
B	10	18
C	11	16
D	12	17

**[Selangor2021-Set01-03]**

3. Antara bahan berikut, yang manakah merupakan sebatian ion?

Which of the following substance is an ionic compound?

A Etanol  
Ethanol

C Magnesium oksida  
Magnesium oxide

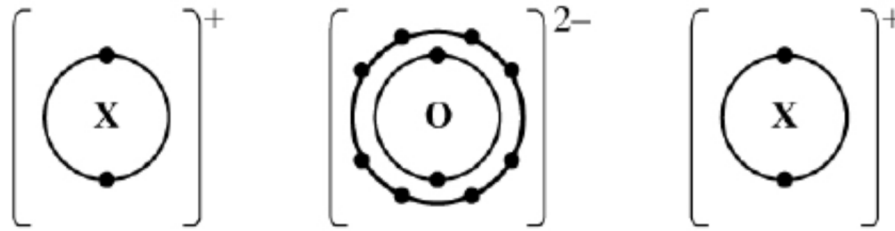
B Sulfur dioksida  
Sulphur dioxide

D Tetraklorometana  
Tetrachloromethane

**[Selangor2021-Set02-35]**

35. Rajah 14 menunjukkan susunan elektron bagi suatu sebatian.

Diagram 14 shows the electron arrangement of a compound.



Apakah nombor proton bagi atom X dan atom O?

What are the proton number of atoms X and O?

	Atom X	Atom O
A	3	8
B	3	12
C	3	6
D	2	6

**5.3 Ikatan Kovalen**

**[Terengganu2021-04]**

4. Antara berikut, yang manakah benar berkaitan ikatan kovalen?

Which of the following is correct about covalent bond?

A Ikatan yang terbentuk melibatkan semua elektron dalam sesuatu atom Bond formed involving all electrons in an atom

B Ikatan kovalen adalah sejenis ikatan kimia Covalent bond is a type of chemical bond

C Ikatan yang terbentuk kerana atom ingin melepaskan elektron Bond formed because atom wants to released electron

D Ikatan yang terbentuk apabila berlaku pemindahan atau perkongsian elektron. Bond formed when transfer or share of electrons occur.

**[Selangor2021-Set02-03]**

3. Bahan yang manakah merupakan sebatian kovalen?

Which substance is a covalent compound?

A Aluminium oksida  
Aluminium oxide

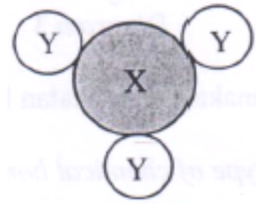
C Naftalena  
Naphthalene

B Kuprum(II) sulfat  
Copper(II) sulphate

D Magnesium klorida  
Magnesium chloride

**[Negeri Sembilan2021-04]**

4. Rajah 2 menunjukkan struktur bagi satu sebatian.  
Diagram 2 shows the structure of a compound.



Antara yang berikut, yang manakah mungkin sebatian ini?  
Which of the following could be the compound?

- |   |                    |   |                                       |
|---|--------------------|---|---------------------------------------|
| A | Air<br>Water       | C | Karbon dioksida<br>Carbon dioxide     |
| B | Ammonia<br>Ammonia | D | Hidrogen klorida<br>Hydrogen chloride |

**[Kedah2021-Set02-10]**

10. Molekul manakah mempunyai ikatan kovalen ganda dua di antara atomnya?  
Which molecule has a double covalent bond between its atom?  
[Nombor proton/ Proton Number: H = 1, N=7, O =8, Cl = 9]

- |                        |                     |                        |                       |
|------------------------|---------------------|------------------------|-----------------------|
| A Nitrogen<br>Nitrogen | B Oksigen<br>Oxygen | C Hidrogen<br>Hydrogen | D Fluorin<br>Fluorine |
|------------------------|---------------------|------------------------|-----------------------|

**[Kelantan2021-16]**

16. Unsur P dan unsur Q bertindak balas untuk membentuk satu sebatian kovalen dengan formula  $PQ_2$ .  
Antara berikut yang manakah benar?  
Element P and Q react to form a covalent compound with formula  $PQ_2$ .  
Which of the following is true?

	Susunan elektron atom P Electron arrangement of atom P	Susunan elektron atom Q Electron arrangement of atom Q
A	2.8.2	2.8.7
B	2.4	2.6
C	2.5	2.7
D	2.1	2.7

**[Selangor2021-Set01-01]**

21. Jadual 1 menunjukkan nombor proton bagi empat unsur.  
Table 1 shows the proton number of four elements.

Unsur Element	Nombor Proton Proton number
W	3
X	13
Y	6
Z	17

Antara pasangan unsur-unsur berikut yang manakah membentuk sebatian yang tak terlarut dalam air?

Which of the following pair of elements forms a compound that is insoluble in water?

- |           |           |           |           |
|-----------|-----------|-----------|-----------|
| A W dan Z | B X dan Z | C W dan Y | D Y dan Z |
| W and Z   | X and Z   | W and Y   | Y and Z   |

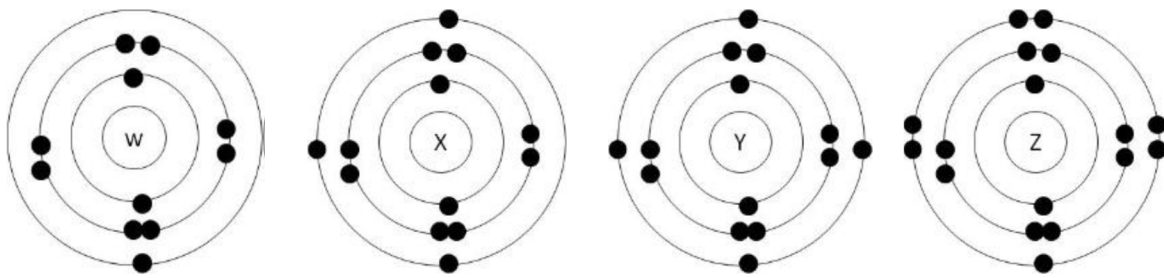
**[Melaka2021-06]**

6. Rajah 2 menunjukkan susunan elektron bagi atom-atom W, X, Y dan Z.

W, X, Y dan Z adalah bukan simbol sebenar bagi unsur-unsur tersebut.

Diagram 2 shows the electrons arrangements of atoms W, X, Y and Z.

W, X, Y, and Z are not the actual symbols of the elements.



Pasangan unsur-unsur manakah yang membentuk suatu sebatian yang tak larut dalam air?

Which pair of elements forms a compound that is insoluble in water?

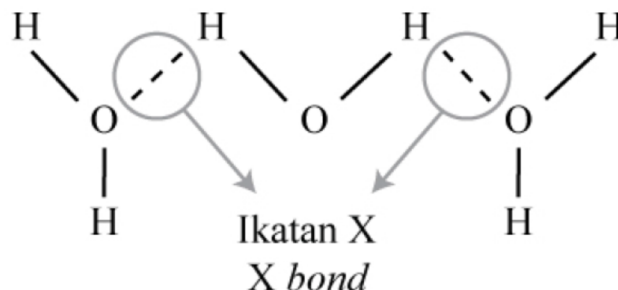
- |           |           |           |           |
|-----------|-----------|-----------|-----------|
| A W dan Z | B X dan Z | C W dan Y | D Y dan Z |
| W and Z   | X and Z   | W and Y   | Y and Z   |

**5.4 Ikatan Hidrogen**

**[Selangor2021-Set01-01]**

35. Rajah 11 menunjukkan ikatan yang terbentuk dalam dan di antara molekul air.

Diagram 1 1 shows the bond formed in and between water molecules.



Apakah ikatan X?/ What is bond X?

- |                |               |               |              |
|----------------|---------------|---------------|--------------|
| A Ikatan datif | B Ikatan      | C Ikatan      | D Ikatan ion |
| Dative bond    | hidrogen      | kovalen       | Ionic bond   |
|                | Hydrogen bond | Covalent bond |              |

**[SBP2021-19]**

19. Antara bahan berikut, yang manakah membentuk ikatan hidrogen dengan air?

Which of following substances forms hydrogen bond with water?

A Metana  
Methane

Bromine

D Hidrogen  
klorida

Hydrogen  
chloride

B Bromin

C Ammonia  
Ammonia

**[Melaka2021-38]**

38. Rambut yang basah melekat sesama sendiri telah dikaitkan dengan konsep dan peranan ikatan hidrogen dalam kehidupan harian.

Pernyataan manakah dapat menerangkan pembentukan ikatan hidrogen?

Wet hair stick together has been linked to the concept and role of hydrogen bonding in daily life.

Which statement can explain the formation of hydrogen bonds?

A Molekul protein akan membentuk ikatan dengan molekul air  
Protein molecules will form bonds with water molecules

B Daya tarikan Van der Waals yang lemah dalam molekul air  
Weak Van der Waals force in water molecules

C Pasangan elektron bebas dalam molekul air, H<sub>2</sub>O akan dikongsi dengan ion hidrogen  
The lone pair of electrons in water molecule, H<sub>2</sub>O will be shared with hydrogen ion

**[Selangor2021-Set02-21]**

21.

**Etanol larut di dalam air./ Ethanol dissolves in water.**

Pernyataan yang manakah menerangkan dengan tepat mengapa etanol larut di dalam air?

Which statement exactly explains why ethanol dissolves in water?

A Molekul etanol membentuk ikatan kovalen dengan molekul air  
Ethanol molecules form covalent bond with water molecules

B Molekul etanol membentuk daya tarikan Van der Waals dengan molekul air  
Ethanol molecules form Van der Waals attraction forces with water molecules

C Molekul etanol membentuk ikatan hidrogen dengan molekul air  
Ethanol molecules form hydrogen bond with water molecules

D Molekul etanol membentuk ikatan datif dengan molekul air  
Ethanol molecules form dative bond with water molecules

**[Kedah2021-Set01-30]**

30. Antara aktiviti berikut, yang manakah melibatkan pembentukan ikatan hidrogen?

Which of the following activities involve formation of hydrogen bond?



A I dan II  
I and II

B I dan III  
I and III

C II dan III  
II and III

**[Melaka2021-05]**

5. Ikatan hidrogen boleh terbentuk antara atom hidrogen dan atom  
Hydrogen bond can be formed between hydrogen atom and atom of

A fluorin  
fluorine

B klorin  
chlorine

C bromin  
bromine

D iodin  
iodine

**[Johor2021-14]**

14. Antara yang berikut, sebatian manakah ikatan hidrogen tidak wujud?  
Which of the following compounds hydrogen bond does not exist?

A Air,  $H_2O$   
Water,  $H_2O$

C Hidrogen fluorida, HF  
Hydrogen fluoride, HF

B Ammonia,  $NH_3$   
Ammonia,  $NH_3$

D Hidrogen klorida, HCl  
Hydrogen chloride, HCl

**[Kedah2021-Set02-30]**

30. Ahmad membasahkan jari sebelum menyelak helaian. Dia mendapati kaedah ini lebih cepat untuk menyelak helaian. Apakah jenis ikatan yang terbentuk di X?

Ahmad lick his finger to turn pages. He noticed that this method is easier to turn pages. What type of bond formed at X?



A Ikatan Datif  
Dative bond

C Ikatan Kovalen  
Covalent bond

B Ikatan Logam  
Metallic bond

D Ikatan Hidrogen  
Hydrogen bond

### 5.5 Ikatan Datif

#### [Perlis2021-25]

25. Zarah-zarah manakah yang bergabung untuk membentuk ikatan datif?  
Which particles combine to form a dative bond?

I Ion klorida  
Chloride ion

III Molekul air  
Water molecule

II Ion hidrogen  
Hydrogen ion

IV Molekul ammonia  
Ammonia molecule

A I dan II  
I and II

C II dan III  
II and III

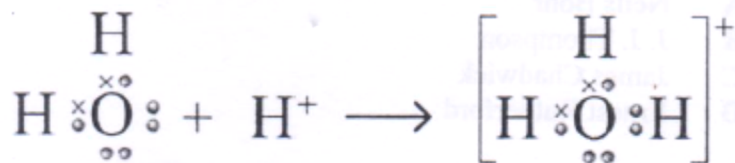
B I dan IV  
I and IV

D III dan IV  
III and IV

#### [Negeri Sembilan2021-06]

6. Rajah 3 menunjukkan pembentukan ikatan bagi membentuk ion hidroksonium.  
Diagram 3 shows the formation of bond to form hydroxonium ion.

Diagram 3 shows the formation of bond to form hydroxonium ion.



Antara yang berikut, yang manakah jenis ikatan kimia yang terlibat dalam sebatian ini?

Which of the following is the type of chemical bond involved in this compound?

A Ion  
Ionic

B Datif  
Dative

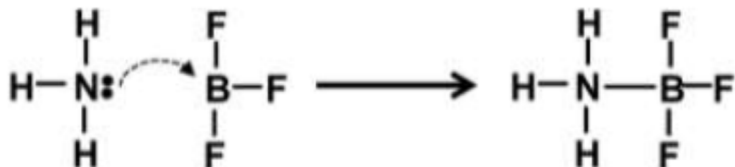
C Logam  
Metallic

D Hidrogen  
Hydrogen

#### [Kelantan2021-38]

38. Rajah 14 menunjukkan pembentukan ammonia boron trifluorida apabila ammonia  $\text{NH}_3$  bertindak balas dengan boron trifluoride  $\text{BF}_3$ .

Diagram 14 shows the formation of ammonia boron trifluoride when ammonia  $\text{NH}_3$  reacts with boron trifluoride  $\text{BF}_3$



Apakah ikatan kimia yang ditunjukkan dalam Rajah 14?

What is the chemical bond shown in Diagram 14?

A Ikatan ion  
Ionic bond

Dative bond  
C Ikatan logam  
Metallic bond

D Ikatan hidrogen  
Hydrogen bond

B Ikatan datif

**[Kedah2021-Set01-04]**

4. Apakah maksud ikatan datif?

What is the meaning of dative bond?

A Ikatan yang terbentuk yang melibatkan pemindahan elektron

A bond formed involving transfer of electron

B Ikatan yang terbentuk apabila pasangan elektron yang dikongsi datang daripada satu atom sahaja

A bond formed when the electron pair that is shared comes from one atom only

C Ikatan yang terbentuk melibatkan daya tarikan elektrostatik antara lautan elektron dan ion logam bercas positif

A bond formed involving electrostatic attraction force between sea of electron and positively charged metal ion

**5.6 Ikatan Logam**

**[Kedah2021-Set02-04]**

4. Apakah maksud ikatan logam?

What is the meaning of metallic bond?

A Ikatan yang terbentuk melibatkan perpindahan elektron

A bond formed involving transfer of electron

B Ikatan yang terbentuk apabila pasangan elektron yang dikongsi datang daripada satu atom sahaja

A bond formed when the shared paired electron comes from one atom only

C Ikatan yang terbentuk melibatkan daya tarikan elektrostatik antara lautan elektron dan ion logam bercas positif

A bond formed involving electrostatic attraction force between sea of electron and positively charged metal ion

**[Perlis2021-06]**

6. Sebatian manakah dipadankan dengan betul jenis ikatannya?

Which compound is correctly matched with its type of bonds?

	Bahan/ Substance	Jenis ikatan/ Type of bonds
A	Oksigen/ Oxygen	Ion/ Ionic
B	Ammonia/ Ammonia	Kovalen/ Covalent
C	Natrium oksida/ Sodium oxide	Kovalen/ Covalent
D	Sulphur trioksida/ Sulphur trioxide	Ion/ Ionic



## 5.7 Sebatian Ion Dan Sebatian Kovalen

### [Kedah2021-Set02-23]

23. Antara pasangan sifat fizik berikut, yang manakah benar tentang glukosa,  $C_6H_{12}O_6$ ?

Which of the following pairs of physical properties of glucose,  $C_6H_{12}O_6$ ?

	Keterlarutan dalam air Solubility in water	Kekonduksian elektrik dalam leburan Electrical conductivity when molten
A	Larut Soluble	Mengkonduksi Conducting
B	Larut Soluble	Not conducting Tidak mengkonduksi
C	Tidak larut Insoluble	Mengkonduksi Conducting
D	Tidak larut Insoluble	Not conducting Tidak mengkonduksi

### [Terengganu2021-28]

28. Bilangan proton atom R ialah 19 manakala bilangan proton atom Q ialah 8. Atom R bertindak balas dengan atom Q untuk membentuk sebatian Z.

Antara berikut yang manakah sifat bagi sebatian Z?

The number of protons of atom R is 19 while the number of protons of atom Q is 8. Atom R reacts with atom Q to form compound Z.

Which of the following is a property of the compound Z ?

A Larut di dalam pelarut organik  
Soluble in organic solvent

C Takat lebur dan takat didih yang rendah

Low melting and boiling point

B Pepejal putih pada keadaan bilik  
White solid at room condition

D Boleh mengalirkan elektrik dalam semua keadaan

Can conduct electric in all state

### [Terengganu2021-15]

15. Antara perbandingan berikut, yang manakah betul mengenai sebatian ion dan sebatian kovalen?

Which of the following comparison is correct about ionic compounds and covalent compounds?

	Sebatian ion Ionic compounds	Sebatian kovalen Covalent compounds
A	Mempunyai takat lebur dan didih yang rendah	Mempunyai takat lebur dan didih yang tinggi

	Have low melting and boiling points	Have high melting and boiling points.
B	Tidak mengkonduksikan elektrik Do not conduct electricity.	Mengkonduksikan elektrik dalam larutan akueus atau leburan. Conduct electricity in aqueous solution or molten state.
C	Larut dalam air. Dissolve in water:	Larut dalam pelarut organik. Dissolve in organic solvents.

**[Negeri Sembilan2021-19]**

19. Antara pasangan sifat fizik berikut, yang manakah benar tentang plumbum(II) bromida?

Which of the following pairs of physical properties of lead(II) bromide is true?

	Keterlarutan dalam air Solubility in water	Kekonduksian elektrik dalam leburan Electrical conductivity in molten state
A	Larut Soluble	Mengkonduksi Conduct
B	Larut Soluble	Tidak mengkonduksi Does not conduct
C	Tidak larut Insoluble	Tidak mengkonduksi Does not conduct
D	Tidak larut Insoluble	Mengkonduksi Conduct

**[Kedah2021-Set01-23]**

23. Antara berikut, yang manakah pasangan sifat fizik yang benar tentang magnesium klorida?

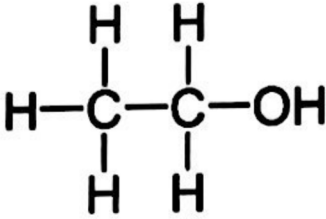
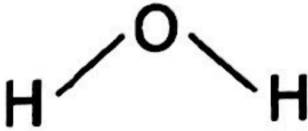
Which of the following pair of physical properties is correct about magnesium chloride?

	Keterlarutan dalam air Solubility in water	Kekonduksian elektrik dalam keadaan leburan Electrical conductivity in molten state
A	Larut Soluble	Mengkonduksi Conducting
B	Larut Soluble	Tidak mengkonduksi Not conducting
C	Tidak larut Insoluble	Mengkonduksi Conducting
D	Tidak larut Insoluble	Tidak mengkonduksi Not conducting

**[Johor2021-18]**

18. Rajah 9 menunjukkan struktur dan takat didih bagi etanol dan air yang biasanya digunakan sebagai pelarut.

Diagram 9 shows the structure and boiling points of ethanol and water which are commonly used as solvent.

	
Etanol/ Ethanol	Air/ Water
Takat didih:/ Boiling point	Takat didih/ Boiling point:
78 °C	100°C

Antara yang berikut, pernyataan manakah yang paling tepat menjelaskan takat didih air dan etanol?

Which of the following statements is the most accurately explain the difference in boiling points of water and ethanol?

A Daya tarikan di antara molekul air adalah lebih kuat daripada daya tarikan antara molekul etanol.

Intermolecular forces of attraction between water molecules are stronger than between ethanol molecules.

B Daya tarikan di antara molekul air adalah lebih kuat daripada ikatan kovalen dalam molekul etanol.

Intermolecular forces of attraction between water molecules are stronger than covalent bonds within ethanol molecules.

C Ikatan kovalen di antara atom dalam molekul air adalah lebih kuat daripada ikatan kovalen di antara atom dalam molekul etanol.

Covalent bonds between atom in water molecules are stronger than covalent bond between atom in ethanol molecules.

**[SBP2021-06]**

6. Antara berikut, yang manakah sifat sebatian ion?

Which of the following is the property of ionic?

A Wujud sebagai gas  
Exists as gas

C Tidak boleh mengkonduksi elektrik  
Cannot conduct electricity

B Larut dalam pelarut organik  
Dissolves in organic solvent

D Mempunyai takat lebur dan takat didih yang tinggi  
Has high melting point and boiling point

## 6.0 : Asid, Bes Dan Garam

### 6.1 peranan air dalam menunjukkan keasidan dan kealkalian

#### Melaka2021-08]

8. Manakah antara pernyataan berikut benar mengenai asid?

Which of the following statements is true about an acid?

I Asid menukarkan kertas litmus merah kepada biru

An acid turns red litmus paper blue

II Asid mengandungi ion hidrogen dalam larutan akueus

An acid contains hydrogen ion in aqueous solution

III Asid mempunyai pH lebih dari 7

An acid has a pH more than 7

IV Asid bertindakbalas dengan logam untuk membebaskan gas hidrogen

An acid reacts with metal to give off hydrogen gas

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

#### [SBP2021-21]

21. Dalam satu eksperimen, kertas penunjuk semesta lembap bertukar dariada hijau kepada ungu apabila gas X dialirkan kepadanya.

Antara pernyataan berikut, yang manakah betul tentang X?

In an experiment, damp universal indicator paper changes from green to purple when gas X is delivered to it.

Which of the following statements is correct about X?

A Nilai pH kurang daripada 7

pH value less than 7

C X mempunyai kepekatan ion hidrogen yang tinggi

X has high concentration of hydrogen ion

B X mengion dalam air menghasilkan ion hidroksida

X ionises in water produces hydroxide ion

D X terhasil daripada tindak balas antara asid dan alkali

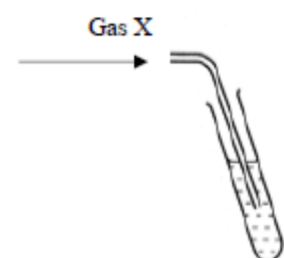
X is produced from the reaction between acid and alkali

#### [Kedah2021-Set02-39]

39. Rajah di bawah menunjukkan Gas X dialirkan ke dalam air suling. Larutan yang dihasilkan menukarkan warna kertas litmus biru kepada merah.

Diagram below shows Gas X is bubbled into distilled water.

The solution obtained changes blue litmus paper to red.



Gas X ialah.../ Gas X could be...

A Ammonia  
Ammonia

C Carbon monoxide  
Karbon monoksida

B Sulphur dioxide  
Sulfur dioksida

D Nitrogen monoxide  
Nitrogen monoksida

**[Melaka2021-19]**

19. Jadual 3 menunjukkan keputusan ujian menggunakan penunjuk metil jingga.

Table 3 shows the results of a test using methyl orange indicator.

Larutan Solution	Warna penunjuk Colour of solution
Cuka Vineger	Merah Red
Y	Jingga Orange
Air kapur Limewater	Kuning Yellow

Apakah larutan Y?/ What is solution Y ?

A Asid hidroklorik  
Hydrochloric acid

C Larutan ammonia  
Ammonia solution

B Larutan natrium hidroksida  
Sodium hydroxide solution

D Larutan natrium klorida  
Sodium chloride solution

**6.2 Nilai pH**

**[Kedah2021-Set01-11]**

11. Jadual menunjukkan larutan P, Q, R dan S dengan nilai pH.

Table shows solutions P, Q, R and S with their pH values.

Larutan/ Solution	P	Q	R	S
pH	3	7	9	11

Antara larutan berikut, yang manakah akan bertindak balas dengan magnesium untuk menghasilkan gas hidrogen?

Which of the following solution reacts with magnesium to produce hydrogen gas?

A P

B Q

C R

D S

**[Kedah2021-Set02-11]**

11. Jadual menunjukkan larutan A, B, C, D dan E dengan nilai pH.  
Table shows solutions A, B, C, D and E with their pH values.

Larutan/ Solution	A	B	C	D	E
pH	5	6	7	9	11

Dua larutan yang manakah akan menghasilkan larutan neutral apabila dicampurkan?

Which of the two solutions will produce neutral solution when mixed?

- A A and B                      B D and E                      C C and D                      D B and E  
A dan B                      D dan E                      C dan D                      B dan E

**[Selangor2021-Set02-10]**

10. Jadual 2 menunjukkan nilai pH bagi dua larutan dengan kepekatan yang sama.

Table 2 shows the pH values of two solutions with the same concentration.

Larutan Solution	pH
X	8
Y	13

Pernyataan manakah yang menerangkan perbezaan antara nilai pH itu? Which statement explains the differences in the pH values?

A X mengion lengkap dalam air manakala Y mengion separa dalam air X ionizes completely in water whereas Y ionizes partially in water

B Bilangan mol ion hidroksida dalam X adalah lebih tinggi daripada Y The number of mole of hydroxide ion in X is higher than Y

C Darjah pengionan Y adalah lebih tinggi daripada X The degree of ionization of Y is higher than X

D Kepekatan ion hidroksida dalam X adalah lebih daripada Y The concentration of hydroxide ion in X is more than Y

**[Kelantan2021-14]**

14. Tentukan nilai pH larutan barium hidroksida,  $\text{Ba(OH)}_2$  yang berkepekatan  $0.05 \text{ mol dm}^{-3}$ .

Determine the pH value of a solution of barium hydroxide,  $\text{Ba(OH)}_2$  at a concentration of  $0.05 \text{ mol dm}^{-3}$ .

- A 1.3                      B 12.7                      C 13.0                      D 14.0

**[Terengganu2021-25]**

25. Hitung nilai pH bagi larutan alkali Q yang mempunyai ion hidroksida,  $\text{OH}^-$   $0.5 \text{ mol dm}^{-3}$ ?

Determine the pH value of alkali Q solution that contains hydroxide ion,  $\text{OH}^-$   $0.5 \text{ mol dm}^{-3}$ ?

A pH = 0.3

B pH = 3.0

C pH = 12.4

D pH = 13.7

**[Melaka2021-09]**

9. Berapakah kemolaran larutan natrium hidroksida, NaOH dengan nilai pH 12.0?

What is the molarity of sodium hydroxide solution, NaOH with pH value is 12.0?

A  $0.01 \text{ mol dm}^{-3}$

C  $0.03 \text{ mol dm}^{-3}$

B  $0.02 \text{ mol dm}^{-3}$

D  $0.04 \text{ mol dm}^{-3}$

**6.3 Kekuatan Asid Dan Alkali**

**[Kelantan2021-07]**

7. Antara zarah-zarah dalam larutan ammonia, apakah zarah yang menyebabkan larutan ammonia bersifat alkali?

Among the particles in ammonia solution, what are the particles that cause the ammonia solution to be alkaline?

A  $\text{NH}_3$

B  $\text{NH}_4^+$

C  $\text{OH}^-$

**[Negeri Sembilan2021-07]**

7. Antara ion yang berikut, yang manakah menunjukkan sifat alkali?

Which of the following ion shows alkaline properties?

A Ion oksida  
Oxide ion

C Ion ammonia  
Ammonium ion

B Ion hidrogen  
Hydrogen ion

D Ion hidroksida  
Hydroxide ion

**[Selangor2021-Set01-01]**

16. Antara berikut yang manakah asid kuat?

Which of the following is a strong acid P.

A Asid formik  
Formic acid

C Asid karbonik  
Carbonic acid

B Asid etanoik  
Ethanoic acid

D Asid nitrik  
Nitric acid

**[Johor2021-05]**

5 Antara yang berikut, yang manakah asid lemah?

Which of the following is a weak acid?

A Asid hidroklorik  
Hydrochloric acid

C Asid etanoik  
Ethanoic acid

B Asid sulfurik  
Sulphuric acid

D Asid nitrik  
Nitric acid

**[Perlis2021-07]**

7. Antara yang berikut, yang manakah betul tentang larutan asid lemah?

Which of the following is correct about weak acid solution?

A Mengion separa dalam air  
Partially ionised in water

C Kepekatan larutan adalah tinggi  
Concentration of the solution is high

B Mengion lengkap dalam air  
Completely ionised in water

D Larutan tidak bertindak balas dengan alkali  
Solution does not react with alkali

**[Melaka2021-07]**

7. Rajah 3 menunjukkan satu bahan kimia, Y.

Diagram 3 shows a chemical substance, Y.

Apakah definisi yang sesuai bagi bahan Y?

What is the most suitable definition for substance Y?

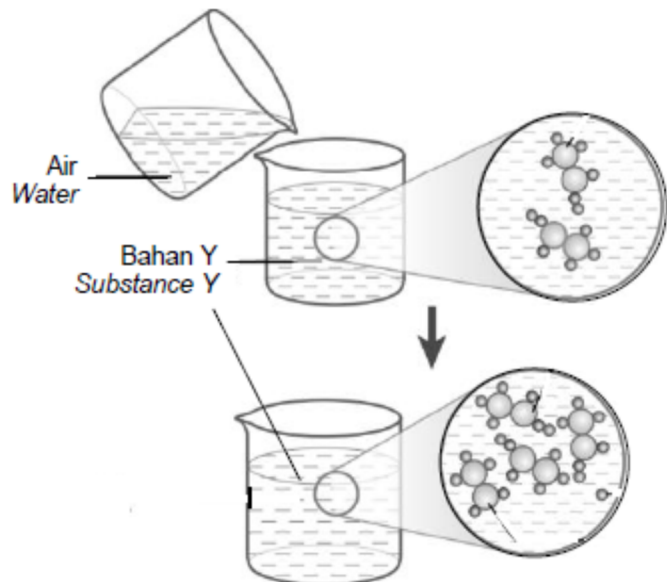
A Sebatian ion yang terbentuk apabila ion hidrogen daripada asid digantikan dengan ion logam atau ion ammonium

Ionic compound formed when hydrogen ion from an acid is replaced by metal ion or ammonium ion

B Larutan yang diketahui kepekataannya dengan tepat  
Solution which its concentration is known accurately

C Bahan kimia yang mengion dalam air dan menghasilkan kepekatan ion hidroksida yang tinggi  
Chemical substance that ionizes in water to produce higher concentration of hydroxide ions

D Bahan kimia yang mengion separa dalam air untuk menghasilkan kepekatan ion hidrogen yang rendah  
Chemical substance that ionizes in water to produce lower concentration of hydrogen ions





**[Perlis2021-08]**

8. Asid manakah yang mengandungi bilangan ion hidrogen yang paling tinggi?  
Which acid contains the highest number of hydrogen ions?

A 25 cm<sup>3</sup> asid nitrik 1 mol dm<sup>-3</sup>  
25 cm<sup>3</sup> of 1 mol dm<sup>-3</sup> nitric acid

B 25 cm<sup>3</sup> asid etanoik 1 mol dm<sup>-3</sup>  
25 cm<sup>3</sup> of 1 mol dm<sup>-3</sup> ethanoic acid

C 25 cm<sup>3</sup> asid sulfurik 1 mol dm<sup>-3</sup>  
25 cm<sup>3</sup> of 1 mol dm<sup>-3</sup> sulphuric acid

D 25 cm<sup>3</sup> asid hidroklorik 1 mol dm<sup>-3</sup>  
25 cm<sup>3</sup> of 1 mol dm<sup>-3</sup> hydrochloric acid

**[Negeri Sembilan2021-20]**

20. Jadual 1 menunjukkan maklumat tentang dua asid yang berbeza.  
Table 1 shows information about two different acids.

Asid X/ Acid X	Asid Y/ Acid Y
<ul style="list-style-type: none"> <li>• Digunakan dalam pembuatan jeruk buah Used in making fruit pickles</li> <li>• Asid monoprotik Monoprotic acid</li> <li>• pH = 4.8</li> </ul>	<ul style="list-style-type: none"> <li>• Digunakan dalam akumulator asid- plumbum Used in lead-acid accumulator</li> <li>• Asid diprotik Diprotic acid</li> <li>• pH = 1.0</li> </ul>

Antara yang berikut, pernyataan manakah benar mengenai asid X dan asid Y?  
Which of the following statement is true about acid X and acid Y?

A Asid X mempunyai kepekatan ion hidrogen yang lebih tinggi berbanding asid Y  
Acid X has higher concentration of hydrogen ion than acid Y

B Asid X mengion separa dalam air manakala asid Y mengion secara lengkap di dalam air  
Acid X ionises partially in water while acid Y ionises completely in water

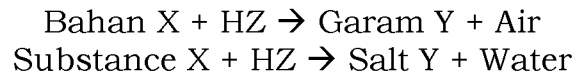
C Asid X bertindak balas dengan karbonat logam manakala asid Y tidak bertindak balas dengan karbonat logam  
Acid X reacts with metal carbonate while acid Y does not react with metal carbonate

### 6.4 Sifat-Sifat Kimia Asid Dan Alkali

#### [Kedah2021-Set02-31]

31. Persamaan kimia menunjukkan satu persamaan kimia bagi bahan X bertindak balas dengan asid monoprotik (HZ).

The chemical equation shows a chemical equation for the reaction between Substance X and Monoprotic acid (HZ).



Merujuk kepada persamaan di atas, apakah kemungkinan terbaik bagi bahan X dan Y?

Referring to the equation above, what could be the best for substance X and Y be?

	Bahan X/ Substance X	Garam Y/ Salt Y
A	Zink karbonat Zinc carbonate	Zink sulfat Zinc sulphate
B	Kuprum(II) oksida Copper(II) oxide	Kuprum(II) klorida Copper(II) chloride
C	Logam magnesium Magnesium metal	Magnesium nitrat Magnesium nitrate
D	Natrium hidroksida Sodium hydroxide	Natrium klorida Sodium chloride

#### [Selangor2021-Set01-01]

28. Rajah 8 menunjukkan satu pemerhatian apabila cengkerang kerang dimasukkan ke dalam bikar yang mengandungi cuka.

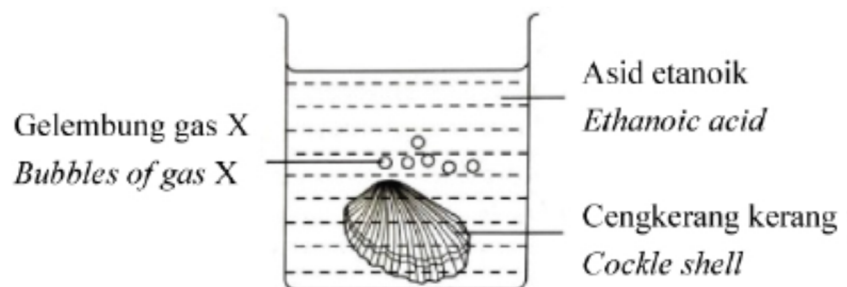


Diagram 8 shows an observation when a cockle shell is put into a beaker containing vinegar.

Apakah X?/ What is X?

A Oksigen  
Oxygen

C Sulfur dioksida  
Sulphur dioxide

B Hidrogen  
Hydrogen

D Karbon dioksida  
Carbon dioxide

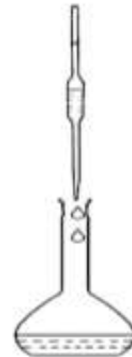
## 6.5 kepekatan larutan akueus

### 6.6 Larutan Piawai

#### [Kelantan2021-27]

27. Rajah 8 menunjukkan penyediaan larutan piawai natrium karbonat,  $\text{Na}_2\text{CO}_3$  dengan melarutkan 10.6 g natrium karbonat di dalam air suling dan menjadikan isi padu sehingga  $100 \text{ cm}^3$ .

Diagram 8 shows the preparation of standard solution of sodium carbonate,  $\text{Na}_2\text{CO}_3$  by dissolving 10.6 g of sodium carbonate in distilled water and making the volume up to  $100 \text{ cm}^3$ .



Berapakah isipadu larutan piawai yang disediakan perlu digunakan jika seorang pelajar ingin menyediakan  $50 \text{ cm}^3$  larutan natrium karbonat  $0.5 \text{ mol dm}^{-3}$ ?

What is the volume of standard solution prepared that should be used if a student wants to prepare  $50 \text{ cm}^3$  of  $0.5 \text{ mol dm}^{-3}$  sodium carbonate solution?

[Jisim formula relatif :  $\text{Na}_2\text{CO}_3 = 106$ ] [Relative formula mass :  $\text{Na}_2\text{CO}_3 = 106$ ]

A  $10.0 \text{ cm}^3$

B  $12.5 \text{ cm}^3$

C  $25.0 \text{ cm}^3$

D  $50.0 \text{ cm}^3$

#### [Kelantan2021-37]

37. Dalam suatu tindak balas, 4.6 g natrium telah ditindak balaskan dengan gas oksigen dalam sebuah balang gas. Hasil tindak balas ialah pepejal putih.

Sebahagian pepejal ini telah dilarutkan ke dalam  $25 \text{ cm}^3$  air suling membentuk larutan tidak berwarna, berkepekatan  $2 \text{ mol dm}^{-3}$  yang menukarkan warna kertas litmus merah kepada biru.

Berapakah jisim pepejal putih yang telah bertindak balas dengan air suling untuk menghasilkan larutan tidak berwarna tersebut.

In a reaction, 4.6 g of sodium is reacted with oxygen gas in a gas jar. The result of the reaction is a white solid. Some of the solid is dissolved in  $25 \text{ cm}^3$  of distilled water to form a colourless solution and the concentration is  $2 \text{ mol dm}^{-3}$ . The solution changed the colour of litmus paper from red to blue.

What is the mass of white solid that has reacted with the distilled water to produce the colourless solution.

[Jisim atom relatif : Na = 23, O = 16] [Relative atomic mass: Na = 23, O = 16]

A 2.3 g

B 3.1 g

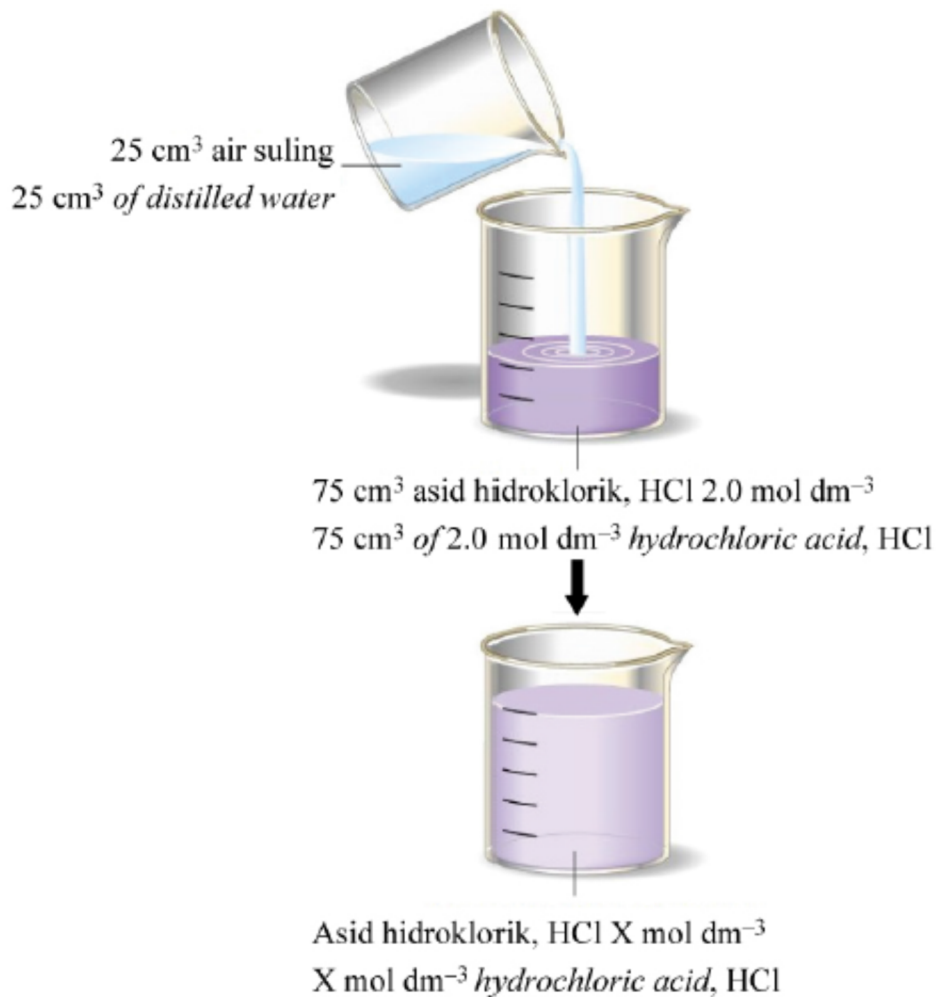
C 6.2 g

D 6.6 g

#### [Selangor2021-Set02-29]

29. Rajah 11 menunjukkan  $75 \text{ cm}^3$  asid hidroklorik  $2.0 \text{ mol dm}^{-3}$  yang dicairkan kepada  $X \text{ mol dm}^{-3}$  apabila  $25 \text{ cm}^3$  air suling ditambahkan.

Diagram 11 shows  $75 \text{ cm}^3$  of  $2.0 \text{ mol dm}^{-3}$  hydrochloric acid that is diluted to  $X \text{ mol dm}^{-3}$  when  $25 \text{ cm}^3$  of distilled water is added.



Berapakah isi padu asid hidroklorik cair yang perlu digunakan untuk meneutralkan 25 cm<sup>3</sup> natrium hidroksida 3.0 mol dm<sup>-3</sup>?

What is the volume of the dilute hydrochloric acid that should be used to neutralise 25 cm<sup>3</sup> of 3.0 mol dm<sup>-3</sup> sodium hydroxide?

A 50 cm<sup>3</sup>

B 37 cm<sup>3</sup>

C 375 cm<sup>3</sup>

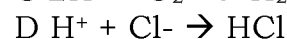
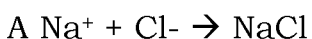
D 500 cm<sup>3</sup>

## 6.7 Peneutralan

### [Kedah2021-Set02-19]

19. Apabila asid hidroklorik dan natrium hidroksida bertindak balas, persamaan ion bagi tindak balas tersebut diwakili oleh

When hydrochloric acid and sodium hydroxide react, the ionic equation for the reaction can be represented by



### [Perlis2021-38]

38. 20 cm<sup>3</sup> larutan hidroksida logam X 0.5 mol dm<sup>-3</sup> bertindak balas lengkap dengan 20 cm<sup>3</sup> larutan asid nitrik 1.0 mol dm<sup>-3</sup>.

Apakah formula garam nitrat logam X yang dihasilkan?

20 cm<sup>3</sup> of 0.5 mol dm<sup>-3</sup> metal X hydroxide solution reacts completely with 20 cm<sup>3</sup> of 1.0 mol dm<sup>-3</sup> nitric acid.

What is the formula of metal X nitrate salt produced?

A XNO<sub>3</sub>

B X(NO<sub>3</sub>)<sub>2</sub>

C X(NO<sub>3</sub>)<sub>3</sub>

**[Selangor2021-Set01-10]**

10. Pasangan manakah adalah bahan tindak balas dalam tindak balas peneutralan?

Which pairs are reactants in neutralisation reaction?

I Asid sulfurik + natrium hidroksida  
Sulphuric acid + sodium hydroxide

III Asid sulfurik + kalsium karbonat  
Sulphuric acid + calcium carbonate

II Asid hidroklorik + kuprum(II) oksida  
Hydrochloric acid + copper (II) oxide

IV Asid hidroklorik + kalium karbonat  
Hydrochloric acid + potassium carbonate

A I dan II  
I and II

B I dan IV  
I and IV

C II dan III  
II and III

D III dan IV  
III and IV

**[Kedah2021-Set01-19]**

19. Antara larutan berikut, yang manakah mempunyai bilangan ion hidrogen, H<sup>+</sup> yang sama seperti dalam 50 cm<sup>3</sup> asid sulfurik, H<sub>2</sub>SO<sub>4</sub> 0.1 mol dm<sup>-3</sup>?

Which of the following solutions have the same number of hydrogen ions, H<sup>+</sup>, as in 50 cm<sup>3</sup> of 0.1 mol dm<sup>-3</sup> sulphuric acid, H<sub>2</sub>SO<sub>4</sub>?

I 100 cm<sup>3</sup> asid etanoik, CH<sub>3</sub>COOH 0.1 mol dm<sup>-3</sup>  
100 cm<sup>3</sup> of 0.1 mol dm<sup>-3</sup> ethanoic acid, CH<sub>3</sub>COOH

II 50 cm<sup>3</sup> asid fosforik, H<sub>3</sub>PO<sub>4</sub> 0.1 mol dm<sup>-3</sup>  
50 cm<sup>3</sup> of 0.1 mol dm<sup>-3</sup> phosphoric acid, H<sub>3</sub>PO<sub>4</sub>

III 100 cm<sup>3</sup> asid hidroklorik, HCl 0.1 mol dm<sup>-3</sup>  
100 cm<sup>3</sup> of 0.1 mol dm<sup>-3</sup> hydrochloric acid, HCl

IV 50 cm<sup>3</sup> asid nitrik, HNO<sub>3</sub> 0.2 mol dm<sup>-3</sup>  
50 cm<sup>3</sup> of 0.2 mol dm<sup>-3</sup> nitric acid, HNO<sub>3</sub>

A I dan II  
I and II

B I dan III  
I and III

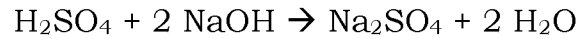
C II dan IV  
II and IV

D III dan IV  
III and IV

**[Kedah2021-Set01-10]**

10. Persamaan kimia berikut mewakili tindak balas antara asid sulfurik dengan larutan natrium hidroksida.

The following chemical equation represents a reaction between sulphuric acid and sodium hydroxide solution.



Apakah isipadu asid sulfurik  $0.5 \text{ mol dm}^{-3}$  yang diperlukan untuk meneutralkan  $25 \text{ cm}^3$  larutan natrium hidroksida  $0.1 \text{ mol dm}^{-3}$ ?

What is the volume of  $0.5 \text{ mol dm}^{-3}$  sulphuric acid required to neutralise  $25 \text{ cm}^3$  of  $0.1 \text{ mol dm}^{-3}$  sodium hydroxide?

A  $0.625 \text{ cm}^3$

B  $1.25 \text{ cm}^3$

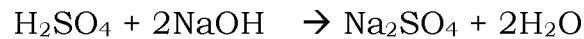
C  $2.5 \text{ cm}^3$

D  $5.0 \text{ cm}^3$

**[Terengganu2021-29]**

29. Persamaan berikut mewakili tindak balas antara larutan natrium hidroksida dengan asid sulfurik cair.

The following equation represents the reaction between sodium hydroxide solution and dilute sulphuric acid.



Apakah isipadu  $0.5 \text{ mol dm}^{-3}$  asid sulfurik yang diperlukan untuk meneutralkan  $25 \text{ cm}^3$   $0.5 \text{ mol dm}^{-3}$  larutan natrium hidroksida?

What is the volume of  $0.5 \text{ mol dm}^{-3}$  sulphuric acid needed to neutralise  $25.0 \text{ cm}^3$  of  $0.5 \text{ mol dm}^{-3}$  sodium hydroxide?

A  $12.5 \text{ cm}^3$

B  $25.0 \text{ cm}^3$

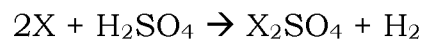
C  $50.0 \text{ cm}^3$

D  $75.0 \text{ cm}^3$

**[Selangor2021-Set02-26]**

26. Persamaan berikut mewakili tindak balas logam X dengan asid sulfurik.

The following equation represents the reaction of metal X with sulphuric acid.



Berapakah jisim logam X yang diperlukan untuk bertindak balas dengan  $100 \text{ cm}^3$  asid sulfurik  $0.5 \text{ mol dm}^{-3}$ ?

What is the mass of metal X that required to react with  $100 \text{ cm}^3$  of  $0.5 \text{ mol dm}^{-3}$  sulphuric acid? [Jisim atom relatif/ Relative atomic mass:  $\text{X} = 23$ ]

A  $2.3 \text{ g}$

B  $23 \text{ g}$

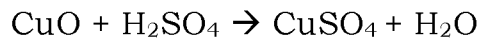
C  $1.15 \text{ g}$

D  $1150 \text{ g}$

**[Perlis2021-32]**

32. Persamaan berikut mewakili tindak balas antara  $100 \text{ cm}^3$  asid sulfurik  $1.0 \text{ mol dm}^{-3}$  dan  $10 \text{ g}$  kuprum(II) oksida.

The following equation represents the reaction between  $100 \text{ cm}^3$  of  $1.0 \text{ mol dm}^{-3}$  sulphuric acid and  $10 \text{ g}$  copper(II) oxide.



Berapakah jisim kuprum(II) oksida yang masih tidak bertindak balas?

[Jisim atom relatif : Cu = 64, O = 16]

What is the mass of copper(II) oxide that remains unreacted?

[Relative atomic mass: Cu = 64, O = 16]

A 2 g

B 4 g

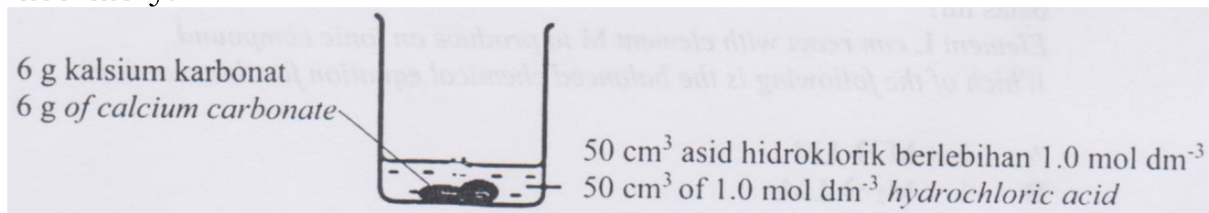
C 8 g

D 10 g

**[Negeri Sembilan 2021-32]**

32. Rajah 8 menunjukkan satu eksperimen yang dijalankan oleh sekumpulan pelajar di makmal.

Diagram 8 shows an experiment carried out by a group of students in the laboratory.



Persamaan kimia bagi tindak balas dalam Rajah 8 adalah seperti berikut:

The chemical equation for the reaction in Diagram 8 is as below:



Berapakah isi padu maksimum gas karbon dioksida yang terhasil dalam eksperimen ini?

[Jisim atom relatif: Ca = 40, C = 12, O = 16; 1 mol gas = 24 dm<sup>3</sup> pada keadaan bilik]

What is the maximum volume of carbon dioxide gas produces in the experiment?

[Relative atomic mass: Ca = 40, C = 12, O = 16; 1 mol of gas = 24 dm<sup>3</sup> at room condition]

A 0.60 dm<sup>3</sup>

B 1.20 dm<sup>3</sup>

C 1.44 dm<sup>3</sup>

**[Perlis 2021-35]**

35. Persamaan berikut mewakili tindak balas antara 50 cm<sup>3</sup> asid hidroklorik 1.0 mol dm<sup>-3</sup> dengan ketulan kalsium karbonat.

The following equation represents the reaction between 50 cm<sup>3</sup> of 1.0 mol dm<sup>-3</sup> hydrochloric acid with calcium carbonate chips.



Berapakah bilangan molekul karbon dioksida yang dibebaskan?

[Pemalar Avogadro: 6.02 × 10<sup>23</sup> mol<sup>-1</sup>]

What is the number of carbon dioxide molecules released?

[Avogadro constant: 6.02 × 10<sup>23</sup> mol<sup>-1</sup>]

A 1.505 × 10<sup>22</sup>

B 3.01 × 10<sup>22</sup>

C 6.02 × 10<sup>23</sup>

D 1.204 × 10<sup>24</sup>

**[Kedah2021-Set01-31]**

31. Persamaan kimia berikut menunjukkan penceraian barium hidroksida dalam air.

The following chemical equation shows the dissociation of barium hydroxide in water.



Berapakah bilangan mol ion hidroksida dalam 250 cm<sup>3</sup> barium hidroksida 0.2 mol dm<sup>-3</sup>?

What is the number of moles of hydroxide ion in 250 cm<sup>3</sup> of 0.2 mol dm<sup>-3</sup> barium hydroxide?

A 0.05 mol

B 0.10 mol

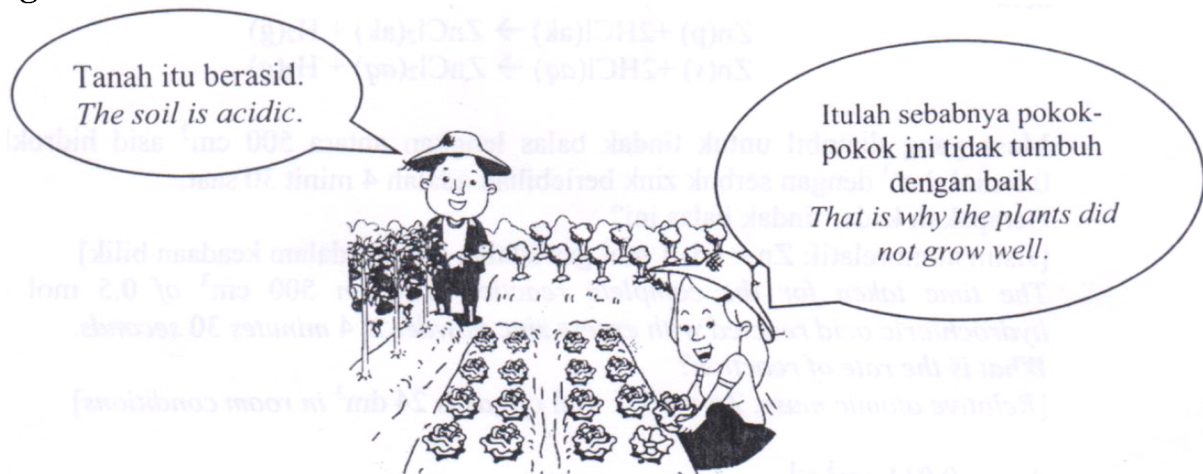
C 0.20 mol

D 0.80 mol

**[Negeri Sembilan2021-35]**

35. Rajah 11 menunjukkan perbualan antara dua orang petani.

Diagram 11 shows conversation between two farmers.



Berdasarkan perbualan dalam Rajah 11, bahan manakah yang sesuai untuk mengatasi masalah yang dihadapi oleh petani tersebut?

Based on the conversation in Diagram 11, which of the following substance is suitable to overcome problem faced by the farmer?

A Barium sulfat  
Barium sulphate

C Natrium oksida  
Sodium oxide

B Kalsium oksida  
Calcium oxide

D Kalsium klorida  
Calcium chloride

**[SBP2021-35]**

35. Pengeluaran hasil tanaman di Ladang ANZ berkurangan akibat daripada masalah tanah. Sampel tanah itu dilarutkan dalam air suling dan beberapa ujian dijalankan ke atas larutan itu. Didapati tanah tersebut telah dicemari oleh asid monoprotik X. Asid itu dititratkan dengan 25 cm<sup>3</sup> larutan kalsium hidroksida 0.001 mol dm<sup>-3</sup> yang telah ditambah dengan tiga titik fenolftalein.

Jadual 35 menunjukkan keputusan daripada ujian yang dijalankan.



The crop production at ANZ Farm is decreasing due to a soil problem. The soil sample is dissolved in distilled water and a few tests are carried out on the solution. It is found that the soil is polluted by monoprotic acid X. The acid is titrated with 25 cm<sup>3</sup> of 0.001 mol dm<sup>-3</sup> of calcium hydroxide solution that is added with three drops of phenolphthalein.

Table 35 shows the results of the test carried out.

Isi padu asid X Volume of acid X (cm <sup>3</sup> )	49.50	49.60	49.70	49.80	49.90
Warna fenolftalein Dalam campuran larutan Colour of Phenolphthalein In solution mixture	Merah jambu Pink	Merah jambu Pink	Merah jambu Pink	Tidak Berwarna colourless	Tidak berwarna colourless

Apakah nilai pH asid X?/ What is the pH value of acid X?

A 3.0

B 3.3

C 3.6

D 4.6

### 6.8 Garam, Hablur Dan Kegunaan Dalam Kehidupan Harian

#### [Perlis2021-09]

9. Antara berikut, yang manakah merupakan garam terlarutkan?  
Which of the following is a soluble salt?

A Barium sulfat  
Barium sulphate

C Natrium karbonat  
Sodium carbonate

B Kalsium sulfat  
Calcium sulphate

D Magnesium karbonat  
Magnesium carbonate

#### [Selangor2021-Set02-16]

16 Antara yang berikut, yang manakah garam tak terlarutkan?  
Which of the following is an insoluble salt?

A Natrium karbonat  
Sodium carbonate

C Barium sulfat  
Barium sulphate

B Kalsium klorida  
Calcium chloride

D Argentum nitrat  
Silver nitrate

**[Negeri Sembilan2021-21]**

21. Antara yang berikut, larutan yang manakah membentuk mendakan putih apabila ditambahkan ke dalam larutan plumbum(II) nitrat?

Which of the following solution forms white precipitate when added into lead(II) nitrate solution?

I Kalium sulfat  
Potassium sulphate

III Kalium iodida  
Potassium iodide

II Natrium klorida  
Sodium chloride

IV Natrium dikromat(VI)  
Sodium dichromate(VI)

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

**[Kedah2021-Set02-05]**

5. Nyatakan bahan asas dalam pembinaan struktur di bawah.  
State the material used to make this building structure below.



A Magnesium sulfat  
Magnesium sulfate

C Zink Nitrat  
Zinc nitrate

B Kalsium karbonat  
Calcium carbonate

D Aluminium oksida  
Aluminium oxide

**6.9 Penyediaan Garam**

**[Negeri Sembilan2021-22]**

22. Antara garam berikut, yang manakah dapat disediakan melalui tindak balas antara asid dan logam?

Which of the following salts can be prepared through reaction between acid and metal?

A Argentum nitrat  
Silver nitrate

C Magnesium sulfat  
Magnesium sulphate

B Natrium karbonat  
Sodium carbonate

D Kuprum(II) klorida  
Copper(II) chloride

**[Johor2021-33]**

33. Seorang murid dikehendaki menyediakan garam barium sulfat di dalam makmal. Antara berikut, persamaan kimia yang manakah sesuai dalam penyediaan garam tersebut?

A student is required to prepare barium sulphate salt in the laboratory.

Which of the following chemical equations are suitable to prepare the salt?

- 1  $\text{Ba}(\text{NO}_3)_2 + \text{ZnSO}_4 \rightarrow \text{BaSO}_4 + \text{Zn}(\text{NO}_3)_2$   
 II  $\text{BaCO}_3 + \text{Na}_2\text{SO}_4 \rightarrow \text{BaSO}_4 + \text{Na}_2\text{CO}_3$   
 III  $\text{BaCl}_2 + \text{K}_2\text{SO}_4 \rightarrow \text{BaSO}_4 + 2\text{KCl}$   
 IV  $\text{Ba}(\text{OH})_2 + \text{H}_2\text{SO}_4 \rightarrow \text{BaSO}_4 + 2\text{H}_2\text{O}$

A I dan II  
I and II

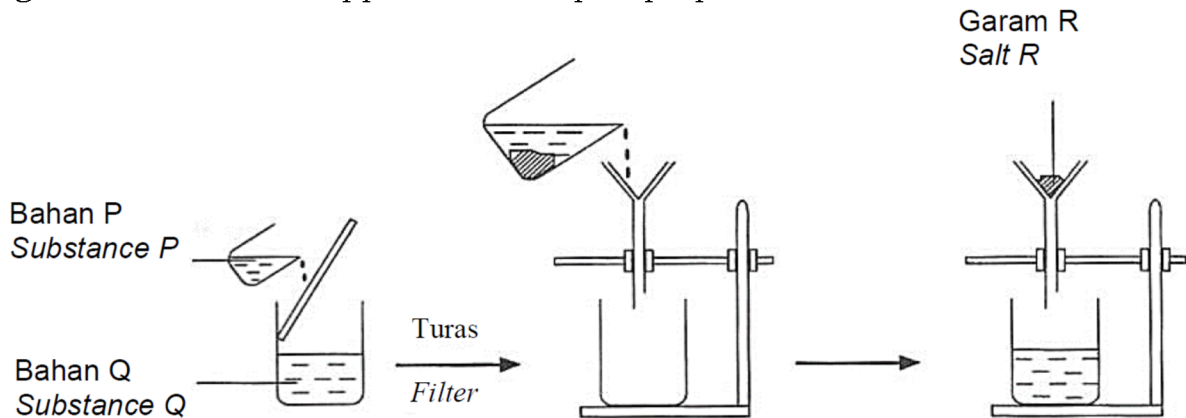
B I dan III  
I and III

C II dan IV  
II and IV

D III dan IV  
III and IV

**[Melaka2021-39]**

39. Rajah 13 menunjukkan susunan radas untuk menyediakan suatu garam. Diagram 13 shows the apparatus set-up to prepare a salt.



Padanan manakah betul?/ Which of the following is correct?

	Bahan P Substance P	Bahan Q Substance Q	Garam R Salt R
A	Magnesium nitrat Magnesium nitrate	Kalsium sulfat Calcium sulphate	Magnesium sulfat Magnesium sulphate
B	Barium nitrat Barium nitrate	Natrium sulfat Sodium sulphate	Barium sulfat Barium sulphate
C	Kalium sulfat Potassium sulphate	Argentum nitrat Silver nitrate	Kalium nitrat Potassium nitrate
D	Asid sulfurik Sulphuric acid	Larutan natrium hidroksida Sodium hydroxide solution	Natrium sulfat Sodium sulphate

**[Terengganu2021-16]**

16. Antara yang berikut, yang manakah akan menghasilkan garam tak terlarutkan?

Which of the following will produce an insoluble salt?

A Asid sulfurik dan zink  
Sulphuric acid and zinc

B Asid sulfurik dan barium hidroksida  
Sulphuric acid and barium hydroxide

C Asid hidroklorik dan kuprum(II) oksida  
Hydrochloric acid and copper(II) oxide

D Asid hidroklorik dan natrium hidroksida  
Hydrochloric acid and sodium hydroxide

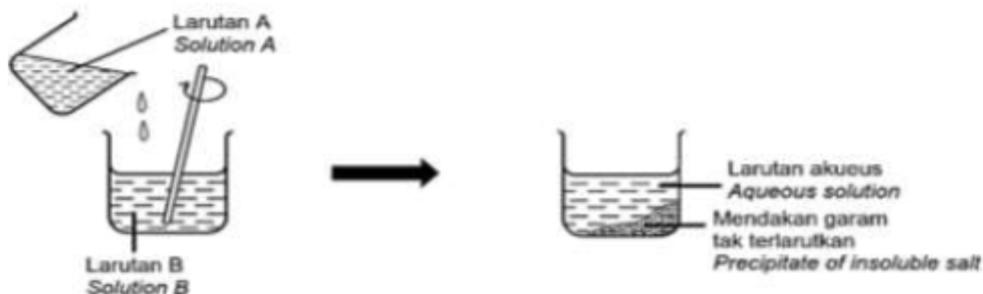
**[Kelantan2021-12]**

12. Garam tak terlarutkan disediakan dengan mencampur dua larutan akueus menerusi tindak balas penguraian ganda dua.

Rajah 4 menunjukkan bagaimana garam tak terlarutkan dihasilkan di dalam makmal.

Insoluble salts are prepared by mixing two aqueous solutions through the double decomposition reaction.

Diagram 4 shows how insoluble salts are produced in the laboratory.



Pilih dua bahan yang boleh menghasilkan garam tak terlarutkan menerusi kaedah yang sama.

Choose two substances that can produce insoluble salt by the same method

	Larutan A Solution A	Larutan B Solution B
A	Plumbum(II) oksida Lead(II) oxide	Asid sulfurik Sulphuric acid
B	Barium nitrat Barium nitrate	Natrium sulfat Sodium sulphate
C	Kalsium klorida Calcium chloride	Magnesium nitrat Magnesium nitrate
D	Magnesium hidroksida Magnesium hydroxide	Kalsium nitrat Calcium nitrate

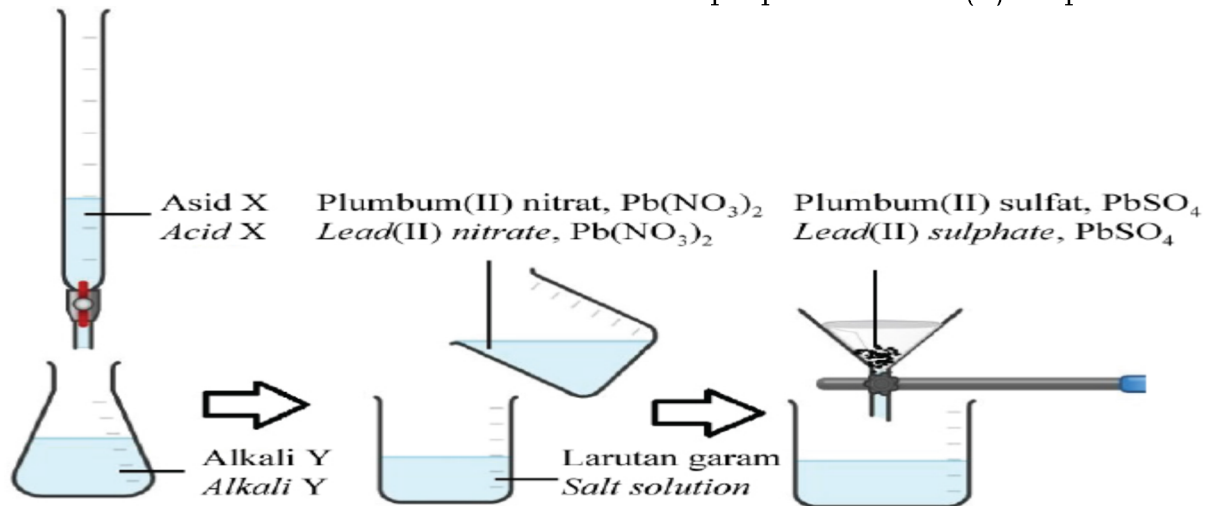
**[Selangor2021-Set02-37]**

37. Rajah 15 menunjukkan langkah-langkah penyediaan garam plumbum(II) sulfat.

Apakah asid dan alkali yang boleh digunakan untuk menyediakan garam plumbum(II) sulfat?

Diagram 15 shows the preparation steps of lead(II) sulphate salt.

What are the acid and alkali that can be use to prepare the lead(II) sulphate salt?

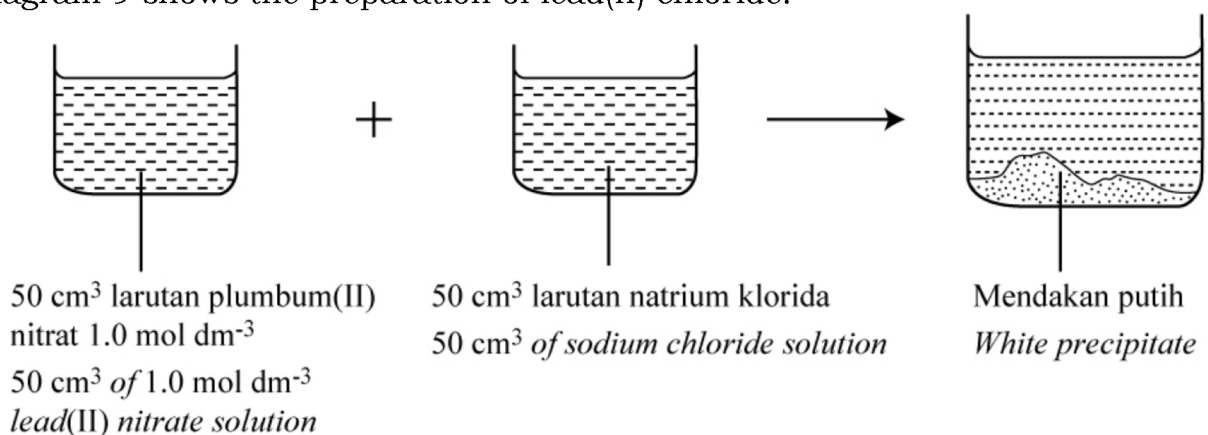


	Asid X/ Acid X	Alkali Y/ Alkali Y
A	Asid sulfurik Sulphuric acid	Natrium klorida Sodium chloride
B	Asid sulfurik Sulphuric acid	Natrium hidroksida Sodium hydroxide
C	Asid hidroklorik Hydrochloric acid	Natrium hidroksida Sodium hydroxide
D	Argentum nitrat Silver nitrate	Natrium hidroksida Sodium hydroxide

**[Selangor2021-Set01-01]**

29. Rajah 9 menunjukkan penyediaan plumbum(II) klorida.

Diagram 9 shows the preparation of lead(II) chloride.



Berapakah kepekatan larutan natrium klorida yang diperlukan untuk bertindak balas lengkap dengan larutan plumbum(II) nitrat?

What is the concentration of sodium chloride solution needed to react completely with lead(II) nitrate solution?

A  $0.5 \text{ mol dm}^{-3}$

B  $1.0 \text{ mol dm}^{-3}$

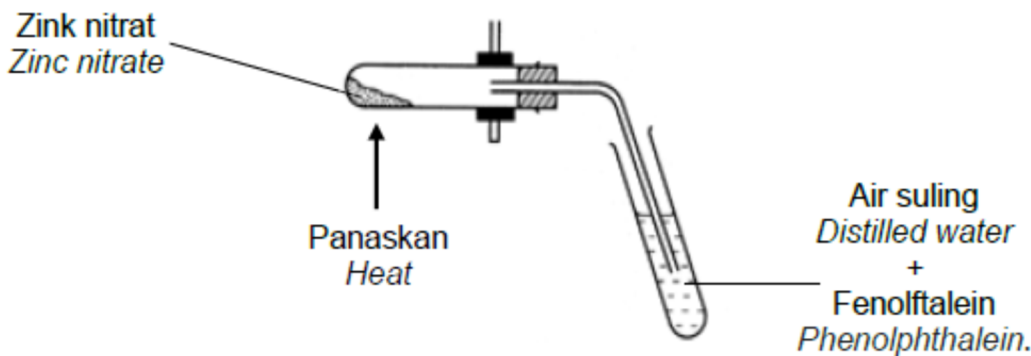
C  $1.5 \text{ mol dm}^{-3}$

D  $2.0 \text{ mol dm}^{-3}$

### 6.10 Tindakan Haba Ke Atas Garam

#### [Kedah2021-Set01-39]

39. Rajah menunjukkan pengaliran gas yang terbebas daripada pemanasan zink nitrat ke dalam air suling yang mengandungi beberapa titis larutan fenolftalein. Diagram shows the flow of gas liberated by heating of zinc nitrate into distilled water which contains a few drops of phenolphthalein.



Antara berikut pemerhatian manakah yang betul?  
Which of the following is the correct observation?

A Larutan bertukar dari tidak berwarna ke merah jambu.  
The solution turns from colourless to pink.

B Larutan bertukar dari merah jambu ke tidak berwarna.  
The solution turns from pink to colourless.

C Larutan bertukar dari merah ke ungu.  
The solution turns from red to purple.

D Larutan kekal tidak berwarna.  
The solution remains colourless.

#### [SBP2021-02]

7. Garam X terurai kepada satu garam yang lain dan satu gas apabila dipanaskan dengan kuat.

Apakah garam X?

Salt X decompose to another salt and a gas when it is heated strongly.

What is salt X?

A Magnesium karbonat  
Magnesium carbonate

C natrium nitrat  
Sodium nitrate

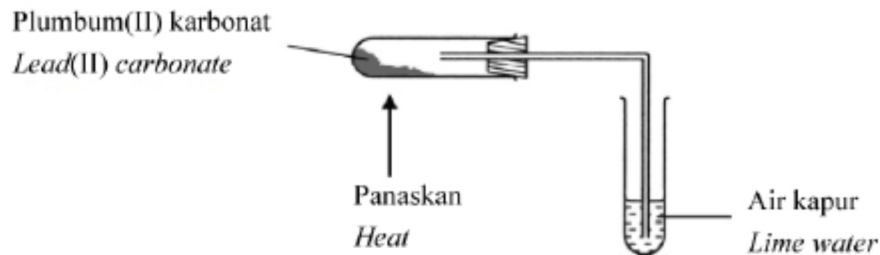
B Kalium karbonat  
Potassium carbonate

D Zink nitrat  
Zinc nitrate

**[Selangor2021-Set02-28]**

28. Rajah 10 menunjukkan susunan radas untuk mengkaji kesan haba ke atas garam.

Diagram 10 shows the set-up of apparatus to study the effect of heat on salt.



Rajah 10  
Diagram 10

Berapakah isi padu gas yang terbebas apabila 24 g plumbum(II) karbonat digunakan pada keadaan bilik?

[Jisim atom relatif: Pb = 207; C = 12; O = 16;

Isi padu molar gas = 24 dm<sup>3</sup> mol<sup>-1</sup> pada keadaan bilik]

What is the volume of gas released when 24 g of lead(II) carbonate is used at room condition?

[Relative atomic mass: Pb = 207; C = 12; O = 16;

Molar volume of gas = 24 dm<sup>3</sup> mol<sup>-1</sup> at room condition]

A 1.10 dm<sup>3</sup>

B 2.01 dm<sup>3</sup>

C 2.16 dm<sup>3</sup>

D 3.24 dm<sup>3</sup>

**6.11 Analisis Kualitatif**

**[SBP2021-22]**

22. Larutan barium klorida telah dicampurkan dengan larutan ammonium sulfat di dalam bikar.

Antara berikut, ion yang manakah hadir dalam mendakan garam yang terbentuk?

Barium chloride solution is mixed with ammonium sulphate solution in a beaker. Which of the following ions present in the salt precipitate formed?.

I Ion sulfat  
Sulphate ion

III Ion klorida  
Chloride ion

II Ion barium  
Barium ion

IV Ion ammonium  
Ammonium ion

A I dan II  
I and II

B I dan III  
I and III

C II dan III  
II and III

D III dan IV  
III and IV

**[Melaka2021-40]**

40. Seorang murid ingin mengenal pasti kation yang hadir dalam suatu larutan garam. Apabila larutan natrium hidroksida ditambah ke dalam larutan garam itu, mendakan perang terbentuk.

Apakah kaedah yang perlu dilakukan seterusnya dan apakah pemerhatian yang dijangkakan untuk mengesahkan kehadiran kation itu?

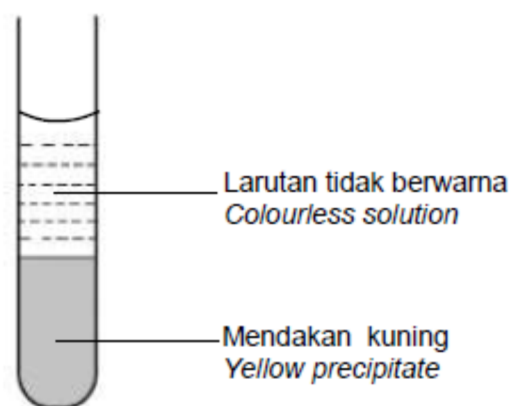
A student wants to identify cation that present in a salt solution. When sodium hydroxide solution is added into the salt solution, brown precipitate is formed. What is the method that need to be done next and the observation expected to confirm the presence of the cation?

	Kaedah Method	Pemerhatian Observation
A	Hangatkan larutan Warm up the solution	Gas yang terbebas menukarkan kertas litmus merah kepada biru Gas released turns red litmus into blue
B	Panaskan larutan Heat up the solution	Gas yang terbebas mengeruhkan air kapur Gas released turns lime water chalky
C	Tambahkan larutan kalium tiosianat Add potassium thiocyanate solution	Larutan merah darah dihasilkan Red blood solution produced
D	Tambahkan larutan kalium manganat (VII) berasid Add acidic potassium manganate (VII) solution	Larutan ungu dinyahwarnakan Purple solution is decolourised

**[Kelantan2021-32]**

32. Rajah II menunjukkan tindak balas antara 8.0 cm<sup>3</sup> larutan plumbum(II) nitrat, 1.0 mol dm<sup>-3</sup> dengan larutan 5.0 cm<sup>3</sup> larutan kalium kromat(VI), 1.0 mol dm<sup>-3</sup>. Diagram II shows the reaction between 8.0 cm<sup>3</sup> solution of lead(II) nitrate, 1.0 mol dm<sup>-3</sup> and 5.0 cm<sup>3</sup> solution of potassium chromate(VI), 1.0 mol dm<sup>-3</sup>.

Apakah ion-ion yang hadir dalam larutan tidak berwarna di atas mendakan. What are the ions present in the colourless solution above the precipitate.



A K<sup>+</sup>, NO<sub>3</sub><sup>-</sup>, Pb<sup>2+</sup>

B K<sup>+</sup>, NO<sub>3</sub><sup>-</sup>, CrO<sub>4</sub><sup>2-</sup>

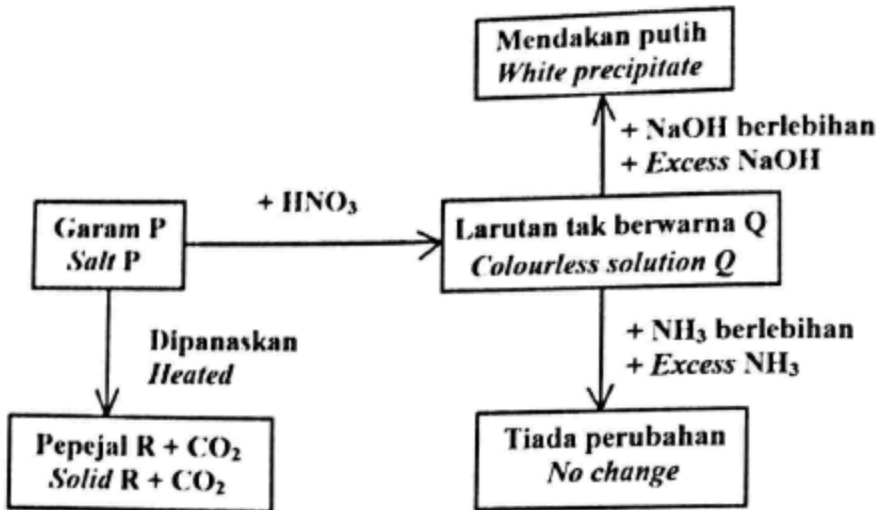
C Pb<sup>2+</sup>, NO<sub>3</sub><sup>-</sup>

D K<sup>+</sup>, NO<sub>3</sub><sup>-</sup>



**[SBP2021-39]**

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



Apakah bahan tindak balas yang digunakan untuk menyediakan garam P?  
What are the reactants used to prepare salt P?

A Asid dan alkali  
Acid and alkali

C Logam karbonat dan asid  
Carbonate metal and acid

B Alkali dan ion logam  
Alkali and metal ion

D Dua larutan garam terlarutkan  
Two soluble salt solutions

**[Johor2021-39]**

39. Analisis kualitatif garam ialah satu teknik yang digunakan untuk mengenal pasti kation dan anion yang hadir dalam satu garam. Rajah 16 menunjukkan carta alir analisis kualitatif ke atas garam X.

Qualitative analysis of salt is a technique used to identify the cation and anion present in a salt. Diagram 16 shows a flow chart of qualitative analysis on salt X.



Apakah bahan yang boleh digunakan untuk menguji kehadiran kation dan anion larutan garam Y?

What are the reagents can used to test the presence of cation and anion in salt solution Y?

	Kation Cation	Anion Anion
A	Larutan ammonia Ammonia solution	Asid nitrik cair dan larutan argentum nitrat Dilute nitric add and silver nitrate solution
B	Larutan natrium hidroksida Sodium hydroxide solution	Asid nitrik cair dan larutan barium nitrat Dilute nitric add and barium nitrate solution
C	Larutan natrium hidroksida Sodium hydroxide solution	Asid nitrik cair dan larutan argentum nitrat Dilute nitric add and silver nitrate solution
D	Larutan ammonia Ammonia solution	Asid nitrik cair dan larutan barium nitrat Dilute nitric acid and barium nitrate solution

**[Perlis2021-24]**

24. Larutan X membentuk mendakan hijau apabila dicampur dengan larutan natrium karbonat, tetapi membentuk larutan biru apabila dicampur dengan larutan kalium sulfat.

Apakah larutan X?

Solution X formed green precipitate when added with sodium carbonate solution but blue solution formed when added with potassium sulphate solution.

What is solution X?

A Kalsium nitrat  
Calcium nitrate

C Barium klorida  
Barium chloride

B Ferum(II) nitrat  
Iron(II) nitrate

D Kuprum(II) klorida  
Copper(II) chloride

**[Perlis2021-36]**

36. Semasa perintah kawalan pergerakan (PKP) baru-baru ini, Ahmad menghabiskan masanya dengan memakan banyak makanan rapu sambil menonton televisyen. Pada suatu hari, Ahmad rasa teramat sakit pada bahagian abdomennya dan terus ke klinik untuk mendapatkan rawatan. Ahmad perlu minum segelas 'Barium meal' sebelum doktor melakukan X-ray pada bahagian abdomennya. 'Barium meal' ini diperbuat daripada garam barium sulfat di mana garam ini membantu imej usus kelihatan jelas pada filem X-ray.

Antara yang berikut, larutan yang manakah sesuai digunakan untuk menentusahkan kehadiran anion dalam garam tersebut?

During movement control order (MCO) recently, Ahmad spent most of his time eating a lot of junk foods while watching television. One day, he felt excruciating abdominal pain and rushed to a clinic for treatment. Ahmad needed to drink a glass of Barium meal before the doctor ran an X-ray on his abdomen. A barium meal is made of barium sulphate salt which helps the image of intestines appear on X-ray films clearly.

Which of the following solutions are suitable to verify the presence of anion in that salt?

I Asid hidroklorik  
Hydrochloric acid

III Larutan barium klorida  
Barium chloride solution

II Asid sulfurik  
Sulphuric acid

IV Larutan natrium sulfat  
Sodium sulphate solution

A I dan II  
I and II

B I dan III  
I and III

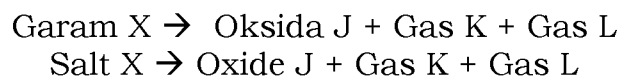
C II dan IV  
II and IV

D III dan IV  
III and IV

**[Perlis2021-40]**

40. Seorang pelajar telah menjalankan ujian terhadap garam X dengan cara melakukan pemanasan terhadap garam tersebut. Persamaan kimia bagi mewakili penguraian garam itu dan pemerhatian bagi ujian tersebut adalah seperti di bawah.

A student carried out a test on salt X by heating the salt. The chemical equation to represent the decomposition of the salt and the observation for the test are shown below.



Pemerhatian  
Observation

Oksida J berwarna hitam ketika panas dan sejuk  
An oxide J is black when hot and cold  
Gas K berwarna perang terbebas  
Brown gas K is released

Gas tidak berwarna L menyalakan kayu uji berbara  
The colourless L gas released ignites the glowing wooden splinter

Antara yang berikut, yang manakah benar tentang ujian itu?  
Which of the following is true about the test?

A J adalah magnesium  
J is magnesium

C Gas K adalah gas nitrogen dioksida  
Gas K is nitrogen dioxide gas

B Warna garam X adalah hitam  
The colour of salt X is black

D Garam X adalah kuprum(II)  
karbonat  
Salt X is copper(II) carbonate

**[Terengganu2021-38]**

38. Rajah 13 menunjukkan keadaan tangan anak Encik Zamri setelah mendapatkan rawatan di hospital selepas mengalami kemalangan sewaktu bermain futsal bersama rakan-rakannya. Tangan tersebut telah dibalut dengan suatu bahan X.

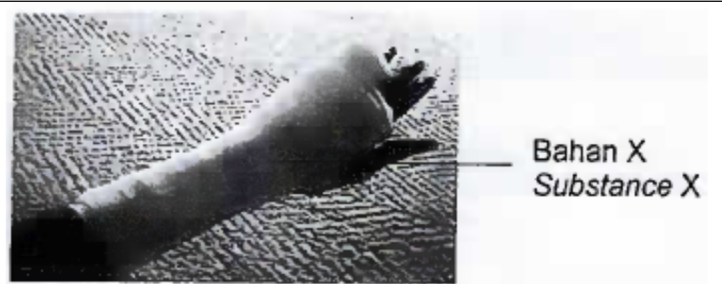


Diagram 13 shows the picture of hand Mr Zamri son after get the treatment when injured during he played futsal with his friends. The hand is covered by the substance X.

Bahan X terbentuk apabila kalsium nitrat bertindak balas dengan natrium sulfat. Hitung jisim bahan X apabila  $25 \text{ cm}^3$  natrium sulfat  $0.5 \text{ mol dm}^{-3}$  bertindak balas dengan kalsium nitrat.

Substance X is formed when calcium nitrate reacts with sodium sulphate.

Calculate the mass of substance X when  $25 \text{ cm}^3$  of  $0.5 \text{ mol dm}^{-3}$  sodium sulphate reacts with calcium nitrate.

[Jisim atom relatif/Relatif Atomic Mass : Ca=40, S=32, O=16]

A 0.85 g

B 1.70 g

C 2.20 g

D 3.40 g

**[Selangor2021-Set01-01]**

37. Siti merendam sekeping kertas turas dalam bikar yang mengandungi larutan P, kemudian dia menggunakan larutan Q untuk menulis KIMIA di atas kertas turas setelah kertas turas kering. Tulisan pada kertas turas tersebut berwarna kuning.

Antara berikut yang manakah pasangan larutan P dan larutan Q?

Siti immersed a piece of filter paper into a beaker containing solution P, then she used solution Q to write CHEMISTRY on the filter paper after the filter paper was dried. The wording on the filter paper is yellow in colour.

Which of the following pairs is solution P and solution Q?

A Natrium iodida dan argentum nitrat  
Sodium iodide and silver nitrate

B Natrium iodida dan plumbum(II) nitrat  
Sodium iodide and lead(II) nitrate

C Barium klorida dan natrium nitrat  
Barium chloride and sodium nitrate

D Barium klorida dan kuprum(II) nitrat  
Barium chloride and copper(II) nitrate

## 7.0: Kadar Tindak Balas

### 7.1 Penentuan Kadar Tindak Balas

#### [Terengganu2021-05]

5. Apakah maksud kadar tindak balas?  
What is the meaning of the rate of reaction?

A Pertambahan kuantiti bahan tindak balas  
Increase in quantity of reactant

B Pengurangan kuantiti hasil tindak balas  
Decrease in quantity of product

C Pengurangan kuantiti hasil tindak balas dengan masa  
Decrease in quantity of product against time

D Pertambahan kuantiti hasil tindak balas dengan masa  
Increase in quantity of product against time

#### [Kedah2021-Set01-12]

12. Kadar tindak balas mengukur perubahan kuantiti bahan tindak balas atau hasil tindak balas per unit masa. Apakah unit yang betul bagi kadar tindak balas?

Rate of reaction measures the change in the quantity of reactants or products per unit time. What is the correct unit of rate of reaction?

A  $\text{cm}^3$  per saat  
 $\text{cm}^3$  per second

B  $\text{cm}^3$  saat<sup>-1</sup>  
 $\text{cm}^3$  second<sup>-1</sup>

C  $\text{cm}^3$  per s  
 $\text{cm}^3$  per s

D  $\text{cm}^3$  s<sup>-1</sup>  
 $\text{cm}^3$  s<sup>-1</sup>

#### [Kelantan2021-23]

23. Proses yang manakah mempunyai kadar tindak balas yang paling tinggi?  
Which process has the highest rate of reaction?

A Fotosintesis  
Photosynthesis

C Respirasi  
Respiration

B Pembakaran  
Combustion

D Pengaratan  
Rusting

**[Negeri Sembilan2021-08]**

8. Antara yang berikut, proses yang manakah mempunyai kadar tindak balas paling tinggi?

Which of the following process has the highest rate of reaction?

A Fotosintesis  
Photosynthesis

C Pembakaran petrol  
Combustion of petrol

B Penapaian gula  
Fermentation of sugar

D Pengaratan pagar besi  
Rusting of iron gate

**[Kedah2021-Set01-26]**

26. Antara berikut, bahan tindak balas manakah yang dapat ditentukan kadar tindak balas dengan mengukur perubahan isipadu gas per unit masa?

Which of the following reactants can be determined the rate of reaction by measuring the change in volume of gas per unit time?

A Larutan kalium manganat(VII) berasid dengan larutan natrium bromida  
Acidified potassium manganate(VII) solution with sodium bromide solution

B Larutan natrium hidroksida dengan asid sulfurik pekat  
Sodium hydroxide solution with concentrated sulphuric acid

C Larutan kalsium nitrat dengan larutan natrium karbonat  
Calcium nitrate solution with sodium carbonate solution

D Kalsium karbonat dengan asid hidroklorik  
Calcium carbonate with hydrochloric acid

**[Terengganu2021-17]**

17. Persamaan berikut mewakili tindak balas antara natrium tiosulfat,  $\text{Na}_2\text{S}_2\text{O}_3$  dengan asid sulfurik,  $\text{H}_2\text{SO}_4$ .

The following equations represents the reaction between sodium thiosulphate,  $\text{Na}_2\text{S}_2\text{O}_3$  and sulphuric acid,  $\text{H}_2\text{SO}_4$ .



Kaedah manakah yang paling sesuai untuk menentukan kadar tindak balas?  
Which method is most suitable to determine the rate of reaction?

A Tentukan perubahan suhu larutan dengan masa.  
Determine the change in temperature of the solution with time.

B Tentukan isipadu air yang dihasilkan dengan masa.  
Determine the volume of water produced with time.

C Tentukan penghasilan kuantiti mendakan sulfur, S yang tetap dengan masa.  
Determine the production of a quantity of sulphur precipitate, S which is constant with time.

D Tentukan perubahan kepekatan natrium tiosulfat,  $\text{Na}_2\text{S}_2\text{O}_3$  dengan masa.  
Determine the change in concentration of sodium thiosulfate,  $\text{Na}_2\text{S}_2\text{O}_3$  with time.

**[SBP2021-08]**

8. Antara kaedah berikut, yang manakah tidak boleh menentukan kadar tindak balas?

Which of the following methods cannot determine the rate of reaction?

A Menentukan perubahan tekanan gas per unit masa  
Determine the change in pressure of gas per unit time

B Menentukan isi padu gas yang dihasilkan per unit masa  
Determine the volume of the gas given off per unit time

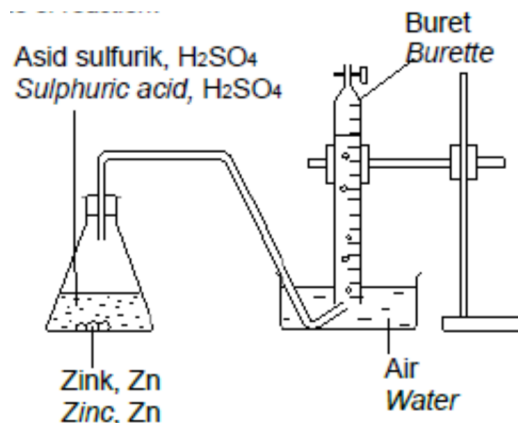
C Menentukan perubahan suhu bahan tindak balas per unit masa  
Determine the change in temperature of the reactant per unit time

D Menentukan perubahan jisim bahan tindak balas per unit masa  
Determine the change in mass of reactant per unit time

**[Melaka2021-21]**

21. Rajah 5 menunjukkan tindak balas antara zink, Zn dan asid sulfurik, H<sub>2</sub>SO<sub>4</sub> bagi menentukan kadar tindak balas.

Diagram 5 shows the reaction between zinc, Zn and sulphuric acid, H<sub>2</sub>SO<sub>4</sub> to determine the rate of reaction.



Antara yang berikut, perubahan yang manakah paling sesuai diukur bagi menentukan kadar tindak balas?

Which of the following changes is most suitable to measure to determine the rate of reaction?

A Pengurangan jisim zink terhadap masa  
Decreased of zinc mass over time

B Pembentukan mendakan terhadap masa  
Formation of precipitate over time

C Penambahan isipadu gas hidrogen yang terbebas terhadap masa  
Increased volume of hydrogen gas released over time

D Perubahan nilai pH yang berlaku bagi hasil tindak balas terhadap masa  
Changes in pH values of product of reaction over time

**[Selangor2021-Set01-01]**

31. 0.20 mol serbuk zink bertindak balas dengan asid nitrik cair berlebihan. Selepas 5 minit, 0.05 mol zink tertinggal sebagai baki.

Apakah kadar tindak balas purata bagi tindak balas ini?

0.20 mol of zinc powder react with excess dilute nitric acid. After 5 minutes, 0.05 mol of zinc remains as residue.

What is the average rate of reaction for the reaction?

[Jisim atom relatif bagi Zn = 65] [Relative atomic mass of Zn = 65]

- A 0.65 g min<sup>-1</sup>                      B 1.95 g min<sup>-1</sup>                      C 2.60 g min<sup>-1</sup>                      D 3.25 g min<sup>-1</sup>

**[Melaka2021-10]**

10. Jadual 1 menunjukkan jumlah isipadu gas oksigen yang dikumpul pada setiap selang masa 30 saat semasa penguraian hidrogen peroksida.

Table 1 shows the total volume of oxygen gas collected at 30 second intervals during the decomposition of hydrogen peroxide.

Masa (s) Time (s)	0	30	60	90	120
Isipadu gas (cm <sup>3</sup> ) Volume of gas(cm <sup>3</sup> )	0.00	11.00	20.00	24.00	24.00

Hitungkan kadar tindak balas purata bagi tindak balas tersebut.

Calculate the average rate of reaction for the reaction.

- A 0.20 cm<sup>3</sup> s<sup>-1</sup>                      B 0.27 cm<sup>3</sup> s<sup>-1</sup>                      C 0.37 cm<sup>3</sup> s<sup>-1</sup>                      D 0.50 cm<sup>3</sup> s<sup>-1</sup>

**[Selangor2021-Set02-30]**

30. Jadual 5 menunjukkan isi padu gas karbon dioksida terkumpul dalam satu eksperimen. Table 5 shows the volume of carbon dioxide gas collected in an experiment.

Masa (s) Time (s)	0	30	60	90	120	150	180	210	240
Isi padu gas (cm <sup>3</sup> ) Volume of gas (cm <sup>3</sup> )	0.0	5.4	9.5	12.8	15.0	15.9	16.3	16.5	16.5

Apakah kadar tindak balas purata keseluruhan?

What is the overall average rate of reaction?

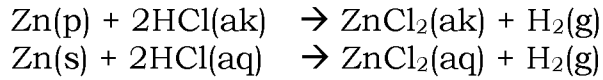
- A 0.069 cm<sup>3</sup> s<sup>-1</sup>                      B 0.079 cm<sup>3</sup> s<sup>-1</sup>                      C 0.091 cm<sup>3</sup> s<sup>-1</sup>                      D 0.092 cm<sup>3</sup> s<sup>-1</sup>



**[Negeri Sembilan 2021-36]**

36. Berikut adalah persamaan kimia bagi tindak balas antara zink dan asid hidroklorik.

The following is the chemical equation for the reaction between zinc and hydrochloric acid.



Masa yang diambil untuk tindak balas lengkap antara 500 cm<sup>3</sup> asid hidroklorik 0.5 mol dm<sup>-3</sup> dengan serbuk zink berlebihan adalah 4 minit 30 saat.

Berapakah kadar tindak balas ini?

[Jisim atom relatif: Zn = 65, 1 mol gas adalah 24 dm<sup>3</sup> dalam keadaan bilik]

The time taken for the complete reaction between 500 cm<sup>3</sup> of 0.5 mol dm<sup>-3</sup> hydrochloric acid reacted with excess zinc powder is 4 minutes 30 seconds.

What is the rate of reaction?

[Relative atomic mass: Zn = 65, 1 mol of gas is 24 dm<sup>3</sup> in room conditions]

A 0.011 cm<sup>3</sup> s<sup>-1</sup>

B 0.022 cm<sup>3</sup> s<sup>-1</sup>

C 11.11 cm<sup>3</sup> s<sup>-1</sup>

D 22.22 cm<sup>3</sup> s<sup>-1</sup>

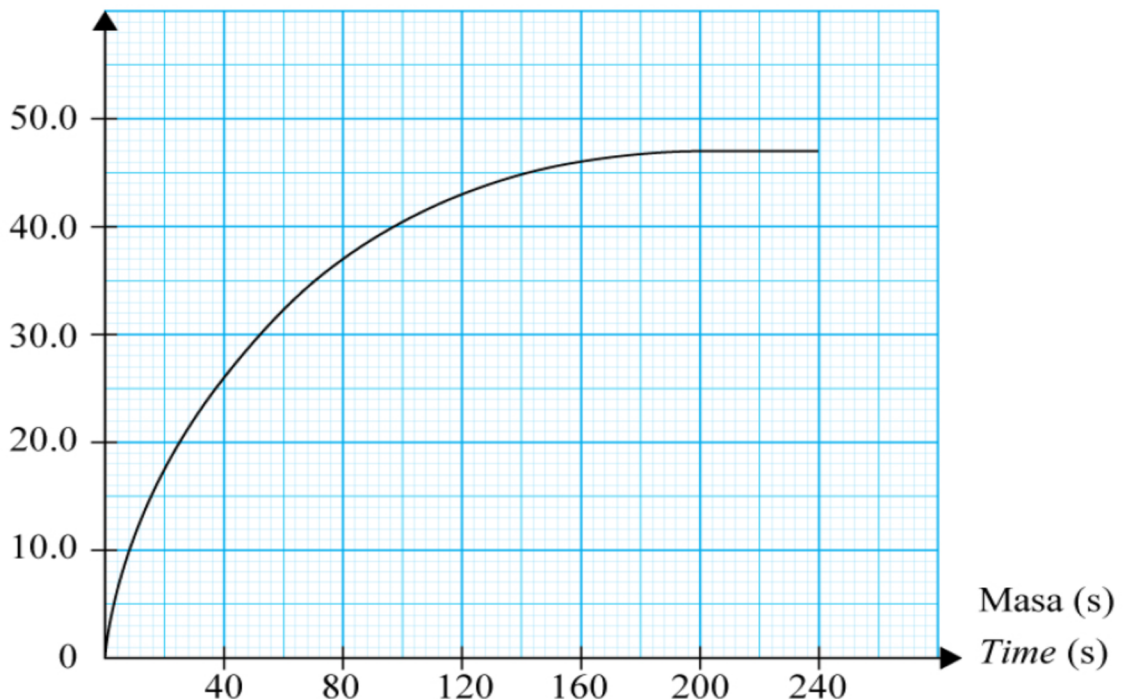
**[Selangor 2021-Set02-31]**

31. Dalam satu eksperimen, ketulan zink berlebihan bertindak balas dengan asid hidroklorik cair. Isi padu gas hidrogen yang terbebas dicatatkan pada sela masa 40 saat. Graf isi padu gas hidrogen melawan masa adalah ditunjukkan dalam Rajah 12.

In an experiment, excess zinc granules react with dilute hydrochloric acid. The volume of hydrogen gas released is recorded at intervals of 40 seconds. The graph of volume of hydrogen gas against time is shown in Diagram 12.

Isi padu gas hidrogen (cm<sup>3</sup>)

*Volume of hydrogen gas (cm<sup>3</sup>)*



Berapakah kadar tindak balas pada masa 60 saat?

What is the rate of reaction at the 60th second?

- A  $1.50 \text{ cm}^3 \text{ s}^{-1}$       B  $0.85 \text{ cm}^3 \text{ s}^{-1}$       C  $0.25 \text{ cm}^3 \text{ s}^{-1}$       D  $3.75 \text{ cm}^3 \text{ s}^{-1}$

**[Kelantan2021-18]**

18. Jadual 2 menunjukkan isipadu gas karbon dioksida terkumpul dalam satu eksperimen

Table 2 shows the volume of carbon dioxide gas collected in an experiment

Masa (s) Time (s)	0	30	60	90	120	150	180	210	240
Isipadu CO <sub>2</sub> (cm <sup>3</sup> ) Volume of CO <sub>2</sub> (cm <sup>3</sup> )	0	20.0	30.0	31.0	32.0	32.5	33.0	33.0	33.0

Berapakah kadar tindak balas purata?

What is the average rate of reaction?

- A  $0.14 \text{ cm}^3 \text{ s}^{-1}$       B  $0.18 \text{ cm}^3 \text{ s}^{-1}$       C  $0.22 \text{ cm}^3 \text{ s}^{-1}$       D  $0.37 \text{ cm}^3 \text{ s}^{-1}$

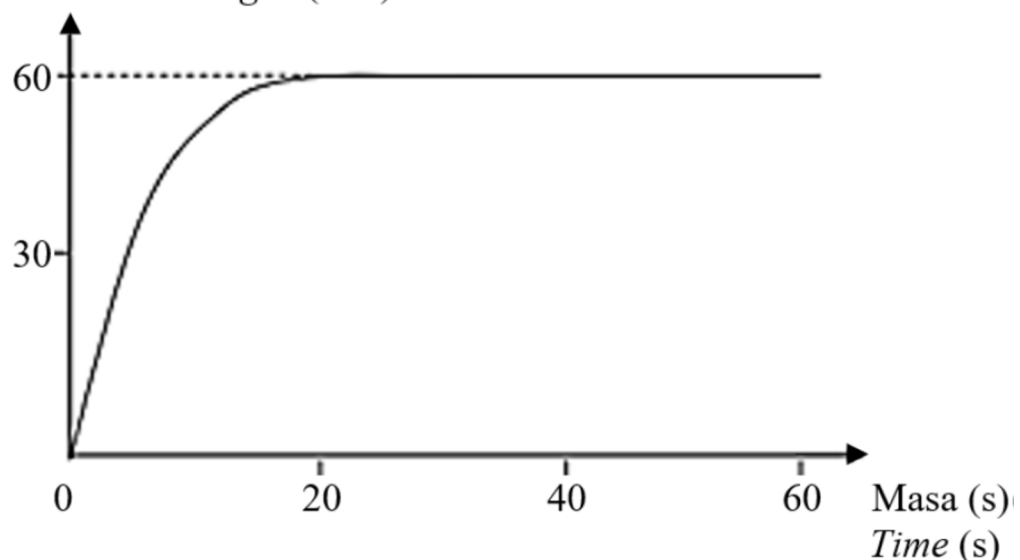
**[Perlis2021-37]**

37. Rajah 7 menunjukkan graf isipadu gas yang terbebas melawan masa bagi tindak balas antara asid hidroklorik dengan ketulan marmar berlebihan.

Diagram 7 shows a graph of the volume of gas released against time for the reaction between hydrochloric acid with excess marble chips.

Isi padu gas karbon dioksida (cm<sup>3</sup>)

Volume of carbon dioxide gas (cm<sup>3</sup>)



Apakah kadar tindak balas purata bagi tindak balas itu?

What is the average rate of the reaction?

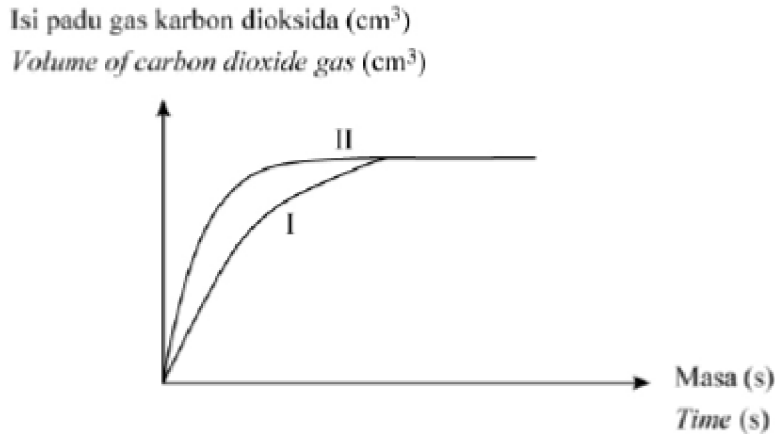
- A  $0.5 \text{ cm}^3 \text{ s}^{-1}$       B  $0.75 \text{ cm}^3 \text{ s}^{-1}$       C  $1.5 \text{ cm}^3 \text{ s}^{-1}$       D  $3.0 \text{ cm}^3 \text{ s}^{-1}$

## 7.2 Faktor Yang Mempengaruhi Kadar Tindak Balas

[Selangor2021-Set02-22]

22. Rajah 8 menunjukkan lengkung yang diperolehi apabila kalsium karbonat bertindak balas dengan asid hidroklorik.

Diagram 8 shows curves which are obtained when calcium carbonate reacts with hydrochloric acid.



Keadaan bahan tindak balas yang manakah menghasilkan lengkung I dan II?  
Which conditions of reactants produce curve I and II?

	Lengkung I Curve I	Lengkung I Curve I
A	Ketulan kalsium karbonat berlebihan + 50 cm <sup>3</sup> asid hidroklorik 1.0 mol dm <sup>-3</sup> Excess calcium carbonate granules + 50 cm <sup>3</sup> of 1.0 mol dm <sup>-3</sup> hydrochloric acid	Ketulan kalsium karbonat berlebihan + 50 cm <sup>3</sup> asid hidroklorik 2.0 mol dm <sup>-3</sup> Excess calcium carbonate granules + 50 cm <sup>3</sup> of 2.0 mol dm <sup>-3</sup> hydrochloric acid
B	Ketulan kalsium karbonat berlebihan + 50 cm <sup>3</sup> asid hidroklorik 2.0 mol dm <sup>-3</sup> Excess calcium carbonate granules + 50 cm <sup>3</sup> of 2.0 mol dm <sup>-3</sup> hydrochloric acid	Serbuk kalsium karbonat berlebihan + 50 cm <sup>3</sup> asid hidroklorik 2.0 mol dm <sup>-3</sup> Excess calcium carbonate powder + 50 cm <sup>3</sup> of 2.0 mol dm <sup>-3</sup> hydrochloric acid
C	Ketulan kalsium karbonat berlebihan + 50 cm <sup>3</sup> asid hidroklorik 1.0 mol dm <sup>-3</sup> Excess calcium carbonate granules + 50 cm <sup>3</sup> of 1.0 mol dm <sup>-3</sup> hydrochloric acid	Serbuk kalsium karbonat berlebihan + 50 cm <sup>3</sup> asid hidroklorik 2.0 mol dm <sup>-3</sup> Excess calcium carbonate powder + 50 cm <sup>3</sup> of 2.0 mol dm <sup>-3</sup> hydrochloric acid
D	Ketulan kalsium karbonat berlebihan + 50 cm <sup>3</sup> asid hidroklorik 1.0 mol dm <sup>-3</sup> Excess calcium carbonate granules + 50 cm <sup>3</sup> of 1.0 mol dm <sup>-3</sup> hydrochloric acid	Ketulan kalsium karbonat berlebihan + 100 cm <sup>3</sup> asid hidroklorik 1.0 mol dm <sup>-3</sup> Excess calcium carbonate granules + 100 cm <sup>3</sup> of 1.0 mol dm <sup>-3</sup> hydrochloric acid

**[Selangor2021-Set01-04]**

4. Antara berikut faktor manakah yang mempengaruhi kadar tindak balas?  
Which of the following is the factor that affect the rate of reaction?

A Saiz hasil tindak balas  
Size of the product

C Kehadiran mangkin  
The presence of the catalyst

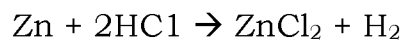
B Kepekatan hasil tindak balas  
Concentration of the product

D Suhu hasil tindak balas  
Temperature of the product

**[Selangor2021-Set01-01]**

22. Persamaan berikut mewakili tindak balas antara serbuk zink berlebihan dengan asid hidroklorik.

The following equation represents the reaction between excess zinc powder and hydrochloric acid.



Bagaimanakah penghasilan hidrogen boleh ditingkatkan?

How the production of hydrogen can be increased\*!

A Meningkatkan saiz zink  
Increase the size of the zinc

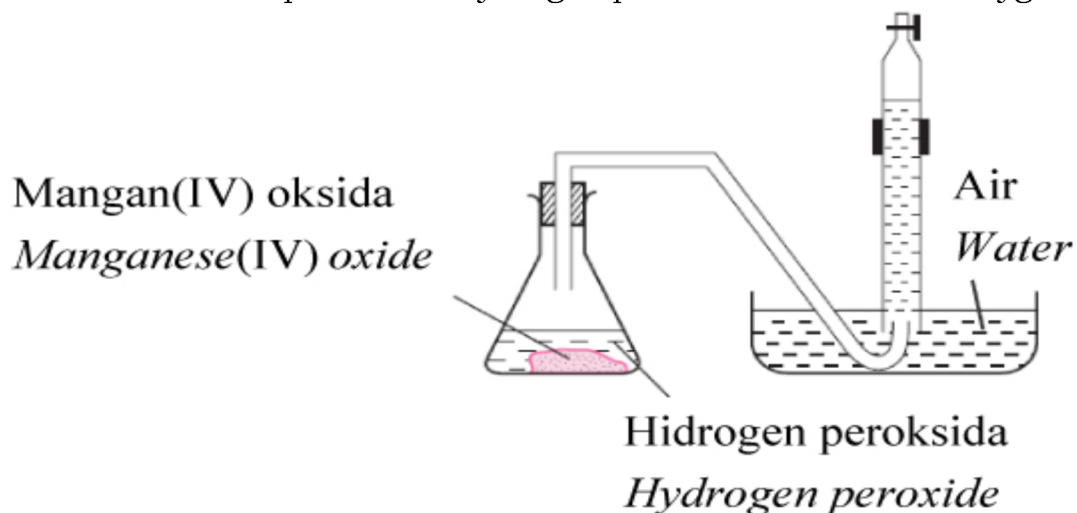
B Meningkatkan isi padu air dalam asid hidroklorik  
Increase the volume of water in the hydrochloric acid

C Meningkatkan isi padu asid hidroklorik  
Increase the volume of the hydrochloric acid

D Meningkatkan suhu asid hidroklorik  
Increase the temperature of the hydrochloric acid

**[Selangor2021-Set02-04]**

4 Rajah 1 menunjukkan penguraian hidrogen peroksida kepada air dan oksigen.  
Diagram 1 shows decomposition of hydrogen peroxide to water and oxygen.



Apakah yang perlu dilakukan untuk meningkatkan kadar penguraian hidrogen peroksida?

What should be done to increase the rate of decomposition of hydrogen peroxide?

A Tambah air  
Add water

B Gunakan kelalang kon yang lebih kecil  
Use smaller conical flask

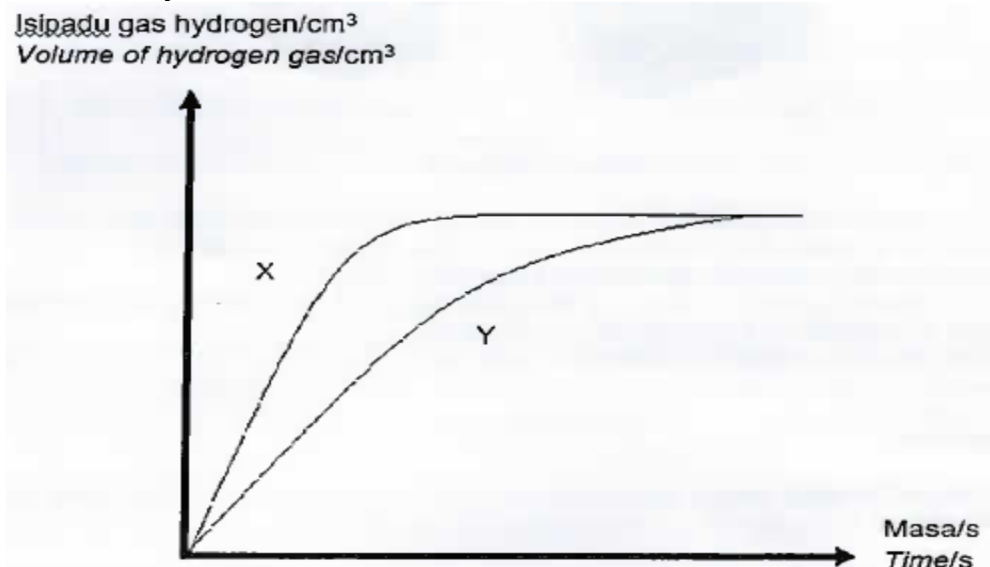
C Keluarkan mangan(IV) oksida  
Remove manganese(IV) oxide

D Meningkatkan kepekatan hidrogen peroksida  
Increase the concentration of hydrogen peroxide

**[Terengganu2021-30]**

30. Rajah 9 menunjukkan lengkung Y apabila 9 g ketulan zink berlebihan bertindak balas dengan 50 cm<sup>3</sup> 1.0 mol dm<sup>-3</sup> asid hidroklorik.

Diagram 9 shows curve Y obtained when 9 g of granulated zinc reacted with 50 cm<sup>3</sup> 1.0 mol dm<sup>-3</sup> hydrochloric acid.



Antara tindak balas berikut, yang manakah menghasilkan lengkung X? Which of the following reactions produce curve X?

A 9 g serbuk zink + 50 cm<sup>3</sup> 1.0 mol dm<sup>-3</sup> asid hidroklorik  
9 g zinc powder + 50 cm<sup>3</sup> 1.0 mol dm<sup>-3</sup> hydrochloric acid

B 9 g serbuk zink + 50 cm<sup>3</sup> 2.0 mol dm<sup>-3</sup> asid hidroklorik  
9 g zinc powder + 50 cm<sup>3</sup> 2.0 mol dm<sup>-3</sup> hydrochloric acid

C 9 g ketulan zink + 100 cm<sup>3</sup> 1.0 mol dm<sup>-3</sup> asid hidroklorik  
9 g granulated zinc + 100 cm<sup>3</sup> 1.0 mol dm<sup>-3</sup> hydrochloric acid

D 9 g ketulan zink + 50 cm<sup>3</sup> 2.0 mol dm<sup>-3</sup> asid hidroklorik  
9 g granulated zinc + 50 cm<sup>3</sup> 2.0 mol dm<sup>-3</sup> hydrochloric acid

**[SBP2021-24]**

24. Persamaan ion berikut mewakili tindak balas antara larutan natrium tiosulfat dan asid sulfurik.

The following ionic equation represents the reaction between sodium thiosulphate solution and sulphuric acid.



Antara pernyataan berikut, yang manakah menerangkan kesan peningkatan suhu larutan natrium tiosulfat ke atas kadar tindak balas?

Which of the following statements explains the effect of the increasing of the temperature of sodium thiosulphate solution on the rate of reaction?

A Tenaga kinetik ion tiosulfat bertambah

Kinetic energy of thiosulphate ions increases

B Tenaga pengaktifan tindak balas bertambah

Activation energy of the reaction increases

C Bilangan ion tiosulfat per unit isi padu bertambah

Concentration of thiosulphate ions per unit volume increases

D Masa perlanggaran antara ion hidrogen dan ion tiosulfat bertambah

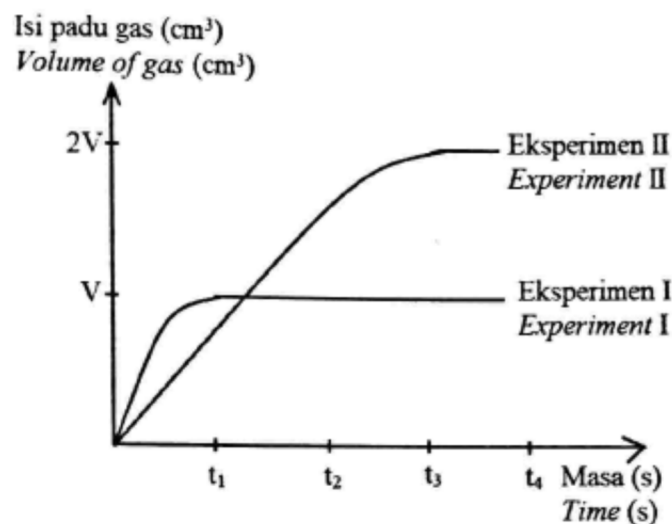
The time of collision between hydrogen ions and thiosulphate ions increases

**[SBP2021-40]**

40. Rajah 40 menunjukkan graf isi padu gas melawan masa bagi dua set eksperimen untuk mengkaji faktor yang mempengaruhi kadar tindak balas. Lengkung I mewakili tindak balas antara 40 cm<sup>3</sup> asid nitrik 0.05 mol dm<sup>-3</sup> dan serbuk stanum berlebihan.

Diagram 40 shows a graph of volume of gas against time for two sets of experiments to study the factor that affects the rate of reaction.

Curve I represents the reaction between 40 cm<sup>3</sup> of 0.05 mol dm<sup>-3</sup> nitric acid and excess tin powder.



Jika eksperimen diulang dengan menggunakan larutan asid nitrik yang lain, keadaan manakah menghasilkan lengkung II?

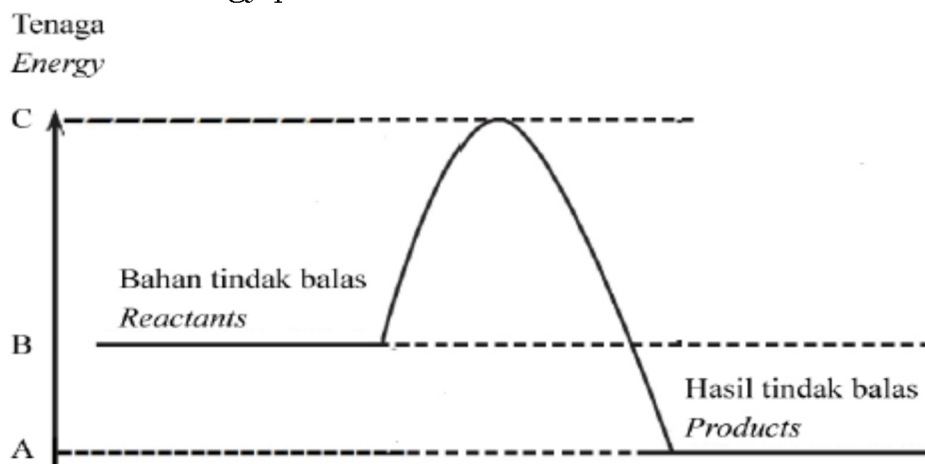
If the experiment is repeated using another solution of nitric acid, which conditions produce curve II?

	Kepekatan asid nitrik (mol dm <sup>-3</sup> ) Concentration of nitric acid (mol dm <sup>-3</sup> )	Isi padu asid (cm <sup>3</sup> ) Volume of acid (cm <sup>3</sup> )
A	0.03	200
B	0.04	100
C	0.05	80
D	0.10	40

**[Selangor2021-Set02-06]**

6. Rajah 2 menunjukkan profil tenaga bagi satu tindak balas.

Diagram 2 shows an energy profile for a reaction.



Apakah tenaga pengaktifan bagi tindak balas ini?

What is the activation energy for this reaction?

A C-A

B C-B

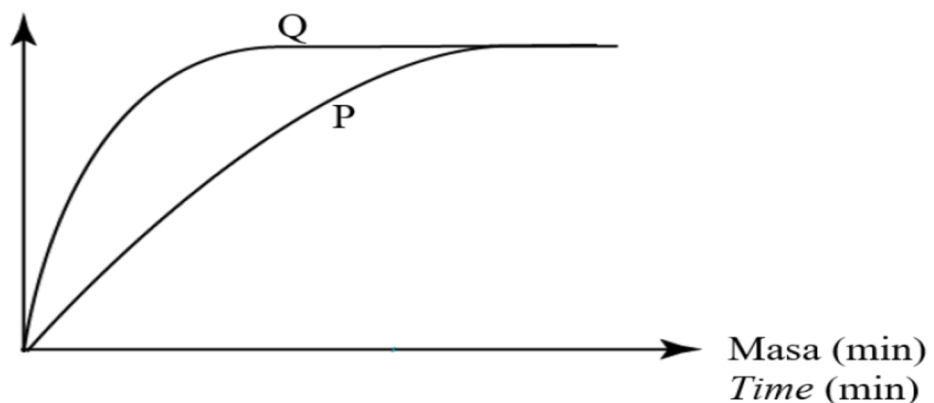
C B-A

**[Perlis2021-39]**

39. Rajah 8 menunjukkan lengkung P dan lengkung Q yang diperoleh bagi penguraian larutan hidrogen peroksida dengan kehadiran suatu mangkin.

Diagram 8 shows the curve P and Q obtained for decomposition of hydrogen peroxide solution in the presence of a catalyst.

Isi padu gas oksigen (cm<sup>3</sup>)  
Volume of oxygen gas (cm<sup>3</sup>)



Lengkung P terhasil dengan menggunakan 50 cm<sup>3</sup> larutan hidrogen peroksida 1.0 mol dm<sup>-3</sup> pada suhu 21°C.

Curve P is obtained by using 50 cm<sup>3</sup> of 1.0 mol dm<sup>-3</sup> of hydrogen peroxide solution at temperature 21°C.

Antara berikut, yang manakah dapat menghasilkan lengkung Q?  
Which of the following would obtain curve Q?

	Hidrogen peroksida/ Hydrogen peroxide		Suhu (°C)
	Isipadu (cm <sup>3</sup> ) Volume (cm <sup>3</sup> )	Kepekatan (mol dm <sup>-3</sup> ) Concentration (mol dm <sup>-3</sup> )	Temperature (°C)
A	25	0.5	30
B	25	1.0	25
C	50	0.5	25
D	50	1.0	30

**[Perlis2021-10]**

10. Suatu mangkin meningkatkan kadar tindak balas kerana ia meningkatkan  
A catalyst increases the rate of reaction because it increases

A the activation energy.  
tenaga pengaktifan.

C the frequency of collisions.  
frekuensi pelanggaran.

B the number of particles.  
bilangan zarah-zarah.

D the frequency of effective collisions.  
frekuensi perlanggaran berkesan.

**[Negeri Sembilan2021-23]**

23. Hidrogen peroksida akan terurai secara semula jadi menjadi air dan gas oksigen selepas satu tempoh.

Apakah yang perlu dilakukan untuk melambatkan proses ini?

Hydrogen peroxide will decompose naturally into water and oxygen gas after a period of time.

What should be done to slow this process?

A Menambahkan kuprum(II) sulfat  
Adding copper(II) sulphate

C Menyimpannya di dalam peti sejuk  
Store it in refrigerator

B Menambahkan mangan(IV) oksida  
Adding manganese(IV) oxide

D Meletakkannya di rak dalam makmal  
Put it on the rack in laboratory

**[Kelantan2021-24]**

24. Apakah mendakan kuning yang terbentuk apabila larutan natrium tiosulfat, Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> bertindak balas dengan asid sulfurik, H<sub>2</sub>SO<sub>4</sub>?

What is the yellow precipitate formed when sodium thiosulphate, Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> solution reacts with sulphuric acid, H<sub>2</sub>SO<sub>4</sub>?



A Sulfur dioksida  
Sulphur dioxide

C Natrium sulfat  
Sodium sulphate

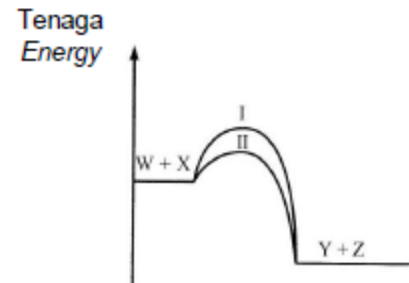
B Sulfur trioksida  
Sulphur trioxide

D Sulfur  
Sulphur

**[Kedah2021-Set02-12]**

12. Rajah menunjukkan gambar rajah profil tenaga bagi suatu tindak balas.

Diagram shows the energy profile diagram of a reaction.



Berdasarkan Teori Perlanggaran, faktor manakah menerangkan perubahan lengkungan I kepada lengkungan II?

Based on the Collision Theory, which factor explains the changes of curve I to curve II?

A Kepekatan bahan tindak balas  
Concentration of reactant

C Suhu bahan tindak balas  
Temperature of reactant

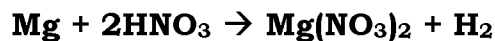
B Kehadiran mangkin  
Presence catalyst

D Saiz bahan tindak balas  
Size of reactant

**[Kedah2021-Set02-26]**

26. Persamaan berikut mewakili tindak balas antara kepingan magnesium dan asid nitrik.

The following equation represent the reaction between magnesium strip and nitric acid.



Which method is the most suitable to increase the rate of reaction?

Kaedah manakah yang paling sesuai digunakan untuk meningkatkan kadar tindak balas?

A Guna serbuk magnesium  
Use magnesium powder

C Mengurangkan suhu asid nitrik  
Reduce the temperature of nitric acid

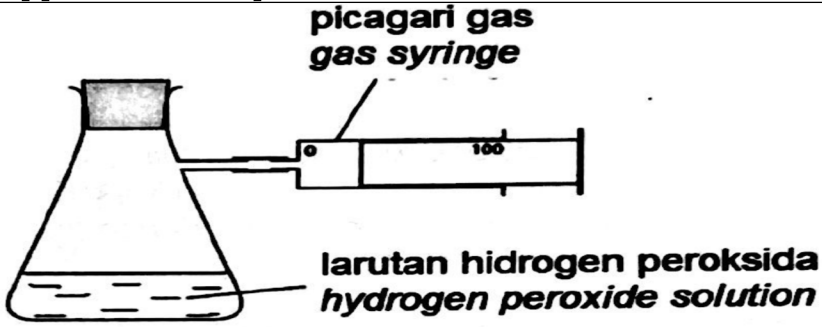
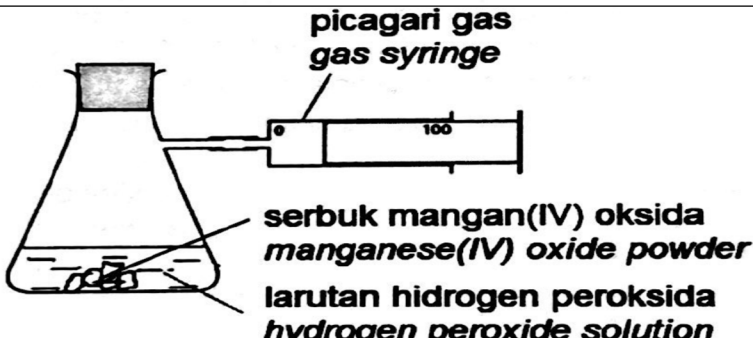
B Mengurangkan isi padu asid nitrik  
Reduce the volume of nitric acid

D Mengurangkan kepekatan asid nitrik  
Decrease the concentration of nitric acid

**[Johor2021-26]**

26. Seorang murid menjalankan dua eksperimen untuk mengkaji kadar penguraian larutan hidrogen peroksida 0.1 mol dm<sup>-3</sup>. Jadual 2 menunjukkan susunan radas untuk menjalankan eksperimen tersebut.

A student carried out two experiments to investigate the rate of decomposition of  $0.1 \text{ mol dm}^{-3}$  hydrogen peroxide solution. Table 2 shows the apparatus set up to carry out the experiments.

Eksperimen Experiments	Susunan Radas Apparatus set-up
I	 <p><b>picagari gas</b> <b>gas syringe</b></p> <p><b>larutan hidrogen peroksida</b> <b>hydrogen peroxide solution</b></p>
II	 <p><b>picagari gas</b> <b>gas syringe</b></p> <p><b>serbuk mangan(IV) oksida</b> <b>manganese(IV) oxide powder</b></p> <p><b>larutan hidrogen peroksida</b> <b>hydrogen peroxide solution</b></p>

Masa yang diambil untuk eksperimen II adalah lebih singkat daripada eksperimen I. Apakah fungsi mangan(IV) oksida dalam eksperimen II?  
The time taken for experiment II is shorter than experiment I.  
What is the function of manganese(IV) oxide in experiment II?

A Meningkatkan tenaga kinetik tindak balas  
Increases the kinetic energy of the reaction

B Meningkatkan bilangan zarah per unit isi padu bahan tindak balas  
Increases the number of particles per unit volume of the reactant

C Menyediakan laluan alternatif dengan tenaga pengaktifan yang lebih rendah  
Provides an alternative route with lower activation energy

D Menyediakan jumlah luas permukaan yang lebih besar terdedah kepada perlanggaran untuk tindak balas  
Provides a larger total surface area exposed to collision for the reaction

**[Kedah2021-Set02-34]**

34. Apabila kepekatan bahan tindak balas meningkat, kadar tindak balas akan meningkat. Pernyataan yang manakah menerangkan mengapa tindak balas meningkat?

When the concentration of reactant increases, the rate of reaction increases.  
Which statement explains why the rate of reaction increases?

A Bilangan perlanggaran berkesan meningkat  
The number of effective collision increases

B Tenaga kinetik zarah bertindak balas meningkat  
The kinetic energy of reacting particles increases

C Jumlah bilangan zarah yang bertindak balas per unit isipadu meningkat  
The total number of reacting particles per unit volume increases

D Jumlah luas permukaan bahan tindak balas meningkat  
The total surface area of reactant increases

**[Johor2021-34]**

34. Jadual 3 menunjukkan jisim sulfur trioksida yang terbentuk pada suhu berlainan semasa Proses Sentuh dalam masa 150 minit.  
Table 3 shows the mass of sulphur trioxide formed at different temperatures during the Contact Process within 150 minutes.

Suhu/ Temperature (°C)	Jisim sulfur trioksida/ Mass of sulphur trioxide (kg)
300	175
400	100
500	60
600	50

Antara yang berikut, suhu yang manakah menghasilkan kadar tindak balas tertinggi?

Which of the following temperature produce the highest rate of reaction?

A 300°C

B 400°C

C 500°C

D 600°C

**7.3 Aplikasi Faktor Yang Mempengaruhi Kadar Tindak Balas Dalam Kehidupan**

**[Selangor2021-Set01-01]**

30. Seorang tukang masak ingin menang dalam pertandingan Master Chef dengan menyediakan puf durian dalam masa yang singkat. Untuk menyelesaikan masalah itu, beliau perlu membuat perubahan dalam penyediaan bahan makanan tersebut.

Pilih perubahan yang betul untuk menyelesaikan masalah itu.

A chef wants to win the Master Chef competition by preparing durian puff in the shortest time. To solve the problem, he had to make changes in the preparation of the food. Choose the correct changes to solve the problem.

A Tambah air di luar puf durian semasa memasak  
Add on water outside the durian puff while cooking

B Tambah lebih inti durian  
Add more durian filling

C Saiz puf durian yang kecil  
Smaller in size of the durian puff

D Suhu ketuhar yang lebih tinggi (dari 180°C ke 350°C)  
Higher temperature for the oven (from 180°C to 350 °C)

#### 7.4 Teori Pelanggaran

##### [Kedah2021-Set01-34]

34. Yang manakah menerangkan maksud perlanggaran berkesan?  
Which of the following explains the meaning of effective collision?

A Perlanggaran yang menyebabkan tindak balas  
The collision that cause reaction

B Perlanggaran yang berlaku semasa tindak balas  
The collision occur during reaction

C Tenaga perlanggaran yang kurang dari tenaga pengaktifan  
Collision energy that less than the activation energy

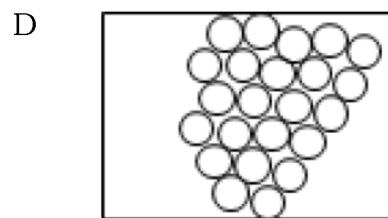
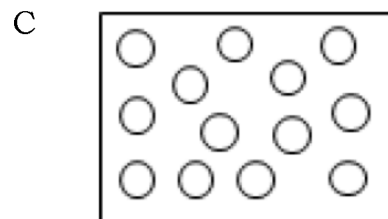
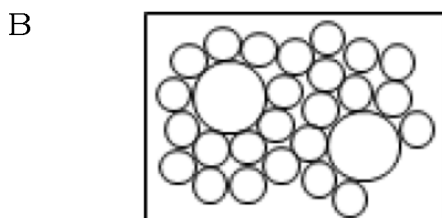
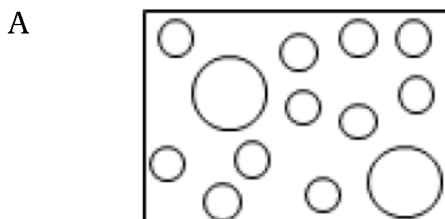
D Perlanggaran yang mempunyai tenaga pengaktifan paling tinggi  
The collision that has the highest activation energy

#### 8.0 : Bahan Buatan Dalam Industri

##### 8.1 Aloi Dan Kepentingannya

##### [Perlis2021-12]

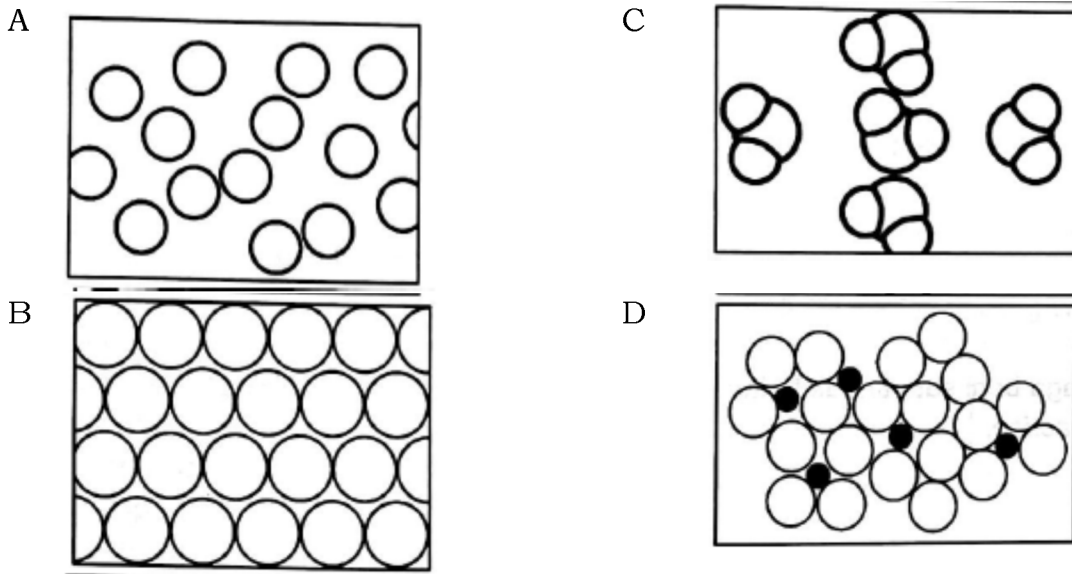
12. Antara berikut, yang manakah menunjukkan susunan atom dalam aloi?  
Which of the following shows the arrangement of the atoms in an alloy?



**[Johor2021-07]**

7. Antara yang berikut, rajah manakah menunjukkan susunan zarah dalam gangsa?

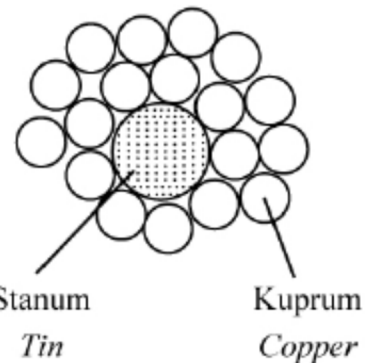
Which of the following diagram shows the arrangement of particles in bronze?



**[Selangor2021-Set01-01]**

11. Rajah 3 menunjukkan susunan atom dalam gangsa.

Diagram 3 shows the arrangement of atoms in bronze.



Apakah fungsi atom stanum?  
What is the function of tin atom?

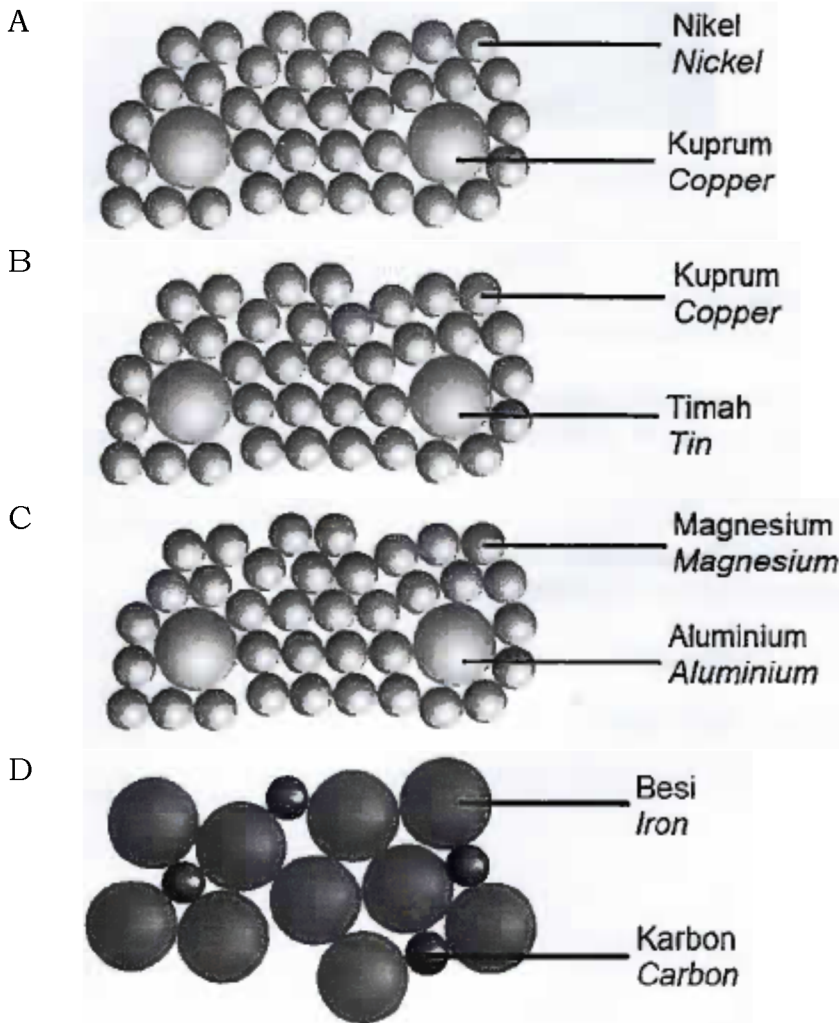
- A Untuk menambahkan ruang antara atom-atom kuprum  
To increase space between copper atoms
- B Untuk mengelakkan kuprum mengalami pengoksidaan  
To prevent copper undergoes oxidation
- C Untuk menguatkan ikatan antara atom-atom kuprum  
To strengthen the bond between copper atoms
- D Untuk mengurangkan lapisan atom-atom kuprum daripada menggelongsor dengan mudah  
To reduce the layer of copper atoms from sliding easily

**[Terengganu2021-22]**

22. Landasan kereta api perlu diperbuat daripada bahan yang keras dan kuat untuk mencegah kemalangan yang tidak diinginkan akibat masalah pada landasan. Kombinasi bahan yang manakah paling sesuai untuk membuat landasan kereta api?

Railroad tracks should be made of hard and strong material to prevent unwanted accidents due to problems on the tracks.

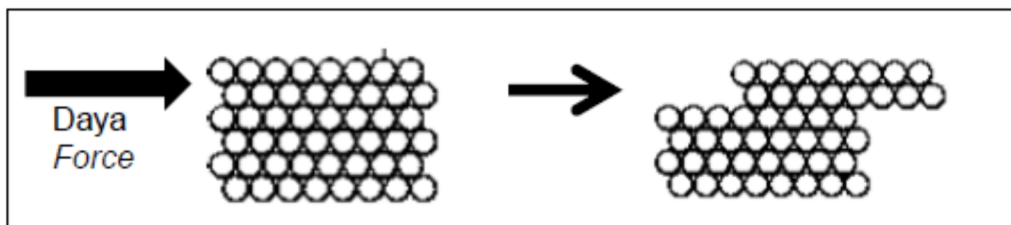
Which combination of materials is most suitable for making a railroad track?



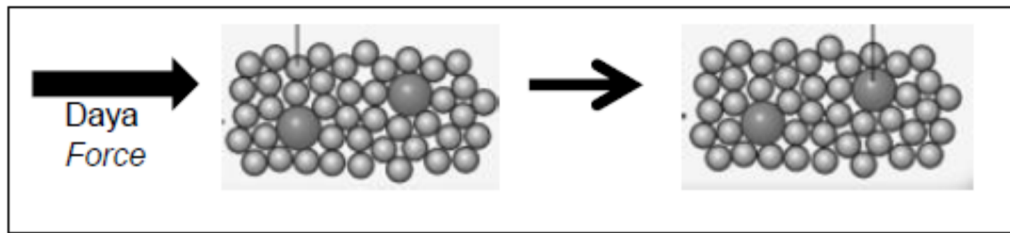
**[Kedah2021-Set01-13]**

13. Rajah menunjukkan susunan atom dalam logam tulen dan aloi apabila daya dikenakan.

Diagram shows the arrangement of atoms in pure metal and alloy when a force is applied.



Susunan atom dalam logam tulen  
Arrangement of atoms in pure metal



Susunan atom dalam aloi  
Arrangement of atoms in alloy

Antara berikut yang manakah paling tepat menerangkan sifat logam tulen dan aloi?

Which of the following most accurately describes the properties of pure metal and alloy?

A Logam tulen lebih lembut berbanding aloi  
Pure metal is softer than alloy

B Logam tulen bersifat mulur berbanding aloi  
Pure metal is ductile compared to alloy

C Logam tulen mudah ditempa berbanding aloi  
Pure metal is malleable than alloy

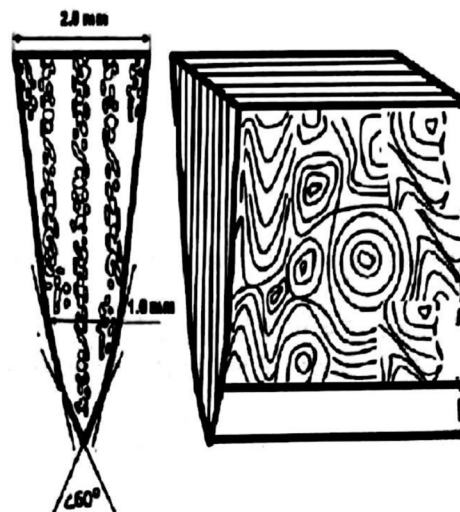
**[Johor2021-29]**

29. Rajah 15 menunjukkan keratan rentas dan corak keluli pedang Damascus yang terkenal dengan kekerasannya.

Diagram 15 shows the cross section and pattern of Damascus steel sword which hardness is famously known.

Antara yang berikut, yang manakah benar berkenaan ciri-ciri kekerasannya?

Which of the following is correct about its hardness property?



A Atom-atom terdiri daripada saiz yang sama  
Atoms are made up of the same size

B Atom-atom tersusun dengan teratur  
Atoms are arranged in orderly manner

C Atom-atom mudah untuk menggelongsor di antara satu sama lain  
Atoms are easier to slide over each other

D Atom-atom asing telah mengganggu susunan teratur atom tulen  
Foreign atoms disrupt the orderly arrangement of pure atom.

**[Melaka2021-33]**

33. Keluli digunakan dalam pembuatan/ Steel is used in manufacture of

I



III



II



IV



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

**[Kedah2021-Set02-13]**

13. Ketulenan aloi emas diukur dalam unit karat (K). Emas 24 K merupakan emas tulen tanpa campuran logam lain. Jadual menunjukkan ketulenan beberapa jenis emas.

The purity of gold alloys is measured in units of carat (K). 24 K gold is pure gold without any mixture of other metals. Table shows the purity of some types of gold.

Ketulenan /K Purity /K	Bahagian emas The gold part	Bahagian logam lain Other metal parts
24 K	24	0
22 K	22	2
20 K	20	4
18 K	18	6

Aminah ingin membeli sebertuk cincin berlian. Antara ketulenan emas yang manakah sesuai bagi Aminah yang mempunyai hobi sukan lasak ?

Aminah want to buy a diamond ring. Which of the gold purity is suitable for Aminah who has a hobby of extreme sports?

A 18 K

B 20 K

C 22 K

D 24 K

**[Kelantan2021-11]**

11. Rajah 3 menunjukkan peralatan pembedahan iaitu sejenis aloi yang mengandungi ferum sebagai komponen utama  
Diagram 3 shows a surgical equipments which is an alloy contain iron as the main component.

Manakah antara berikut merupakan atom-atom asing aloi tersebut?

Which of the following are foreign atoms of the alloy?





A Mangan dan zink  
Manganese and zinc

C Kromium dan nikel  
Chromium and nickel

B Aluminium dan magnesium  
Aluminium and magnesium

D Kuprum dan antimoni  
Copper and antimony

**[Selangor2021-Set02-11]**

11. **Gangsa adalah lebih keras daripada kuprum tulen.**  
**Bronze is harder than pure copper.**

Pernyataan yang manakah menerangkan fenomena di atas dengan tepat?  
Which statement exactly explains phenomena above?

A Ruang kosong antara atom kuprum tulen adalah lebih besar daripada gangsa  
The empty spaces between the pure copper atoms are bigger than bronze

B Kehadiran atom bendasing dalam gangsa mengganggu susunan teratur atom kuprum tulen

The presence of foreign atoms in bronze disrupts the orderly arrangement of pure copper atoms

C Ikatan antara atom dalam gangsa adalah lebih kuat  
Bond between atom in bronze is stronger

D Kehadiran atom bendasing dalam gangsa mengurangkan atom kuprum tulen daripada menggelongsor antara satu sama lain dengan mudah

The presence of foreign atoms in bronze reduces the pure copper atoms from sliding over one another easily

**[Terengganu2021-06]**

6. Aloi X diperbuat dengan mencampurkan besi dengan karbon, kromium dan nikel. Apakah X?

Alloy X is made by mixing iron with carbon, chromium and nickel.  
What is X?

A Keluli  
Steel

C Gangsa  
Bronze

B Piuter  
Pewter

D Keluli nirkarat  
Stainless steel

**[Negeri Sembilan2021-10]**

10. Rajah 4 menunjukkan satu kegunaan aloi M.  
Diagram 4 shows one use of alloy M.

Apakah aloi M?  
What is alloy M?



A Gangsa  
Bronze

B Loyang  
Brass

C Duralumin  
Duralumin

D Keluli nirkarat  
Stainless steel

**[SBP2021-10]**

10. Duralumin digunakan dalam pembuatan badan kapal terbang.  
Antara unsur-unsur berikut, yang manakah terdapat dalam duralumin?  
Duralumin is used in manufacturing of the body of aeroplane.  
Which of the following elements contains in duralumin?

I Zink  
Zinc

II Karbon  
Carbon

III Magnesium  
Magnesium

IV Aluminium  
Aluminium

A I dan II  
I and II

B I dan III  
I and III

C II dan IV  
II and IV

D III dan IV  
III and IV

**8.2 Komposisi Kaca Dan Kegunaannya**

**[Melaka2021-11]**

11. Unsur utama yang hadir dalam kaca adalah  
The main element present in glass is

A Plumbum  
Lead

B Natrium  
Sodium

C Silikon  
Silicon

D Boron  
Boron

**[SBP2021-12]**

12. Rajah 12 menunjukkan sebuah teleskop  
Diagram 12 shows a telescope.

Antara berikut, yang manakah digunakan untuk membuat bahagian X?

Which of the following is used to make part X?



A Kaca plumbum  
Lead crystal glass

C Kaca soda kapur  
Soda lime glass

B Kaca borosilikat  
Borosilicate glass

D Kaca silika terlakur  
Fused silica glass

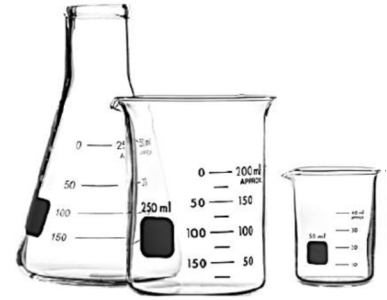
**[Perlis2021-27]**

27. Rajah 4 menunjukkan barang yang diperbuat daripada sejenis kaca.

Diagram 4 shows items made from a type of glass.

Apakah jenis kaca yang digunakan dalam penghasilan barang tersebut?

What is the type of glass used in making the items?



A Kaca soda kapur  
Soda-lime glass

C Kaca silika terlakur  
Fused silica glass

B Kaca plumbum  
Lead crystal glass

D Kaca borosilikat  
Borosilicate glass

**[Perlis2021-28]**

28. Bagi menghasilkan kaca yang lebih tahan terhadap haba dan bahan kimia, bahan X ditambah ke dalam kaca soda kapur dalam proses pembuatannya.

Apakah X?

In order to produce a glass that is more resistant to heat and chemicals, substance X is added to soda lime glass in the manufacturing process.

What is X?

A Boron oksida  
Boron oxide

C Kalsium karbonat  
Calcium carbonate

B Natrium karbonat  
Sodium carbonate

D Plumbum(II) oksida  
Lead(II) oxide

**[Negeri Sembilan2021-09]**

9. Gelas manakah yang dipadankan betul dengan kegunaannya?

Which glass is correctly matched to its uses?

	Gelas/ Glass	Kegunaan/ Uses
A	Kaca silika terlakur Fused silica glass	Membuat kanta teleskop Making telescope lens
B	Kaca soda kapur Soda-lime glass	Membuat radas kaca makmal Making laboratory glassware
C	Kaca plumbum Lead crystal glass	Membuat bekas kaca Making glass containers
D	Kaca borosilikat Borosilicate glass	Membuat prisma Making prisms

**[Selangor2021-Set02-17]**

17. Kaca yang manakah dipadankan betul dengan kegunaannya?

Which glass is correctly matched to its uses?

	Kaca Glass	Kegunaan Use
A	Kaca silika terlakur Fused silica glass	Mentol elektrik Electrical bulbs
B	Kaca soda kapur Soda lime glass	Alat radas makmal seperti tabling uji dan bikar Laboratory apparatus such as test tubes and beakers
C	Kaca plumbum Lead glass	Barangan kaca kristal dan kaca hiasan Crystal glassware and decorative glassware
D	Kaca borosilikat Borosilicate glass	Membuat kanta dan kaca mata Making lenses and spectacles

**[Kedah2021-Set01-05]**

5. Apabila silika dipanaskan bersama-sama bahan kimia yang lain, pelbagai kaca dengan sifat yang berbeza terhasil namun tetap mempunyai sifat asas yang sama.

When silica is heated together with other chemicals, various glasses with different properties are produced yet have the same basic properties.

Antara yang berikut, yang manakah sifat asas kaca?

Which of the following is a basic property of glass?

A Kalis air  
Waterproof

C Telap air  
Water permeable

B Konduktor haba  
Heat conductor

D Keras dan kuat  
Hard and strong

**[Kedah2021-Set01-17]**

17. Kaca fotokromik terhasil apabila kaca digabungkan bersama-sama argentic klorida dan kuprum(I) klorida. Apabila didedahkan kepada cahaya matahari, kaca fotokromik menjadi gelap.

Photochromic glass is produced when glass is combined with silver chloride and copper(I) chloride. When exposed to sunlight, the photochromic glass darkens.

Antara berikut yang manakah persamaan setengah yang menerangkan fenomena tersebut?

Which of the following is the half equation that describes the phenomenon?

A  $\text{Cl}^- \rightarrow \text{Cl} + \text{e}$

B  $\text{Ag}^+ + \text{e} \rightarrow \text{Ag}$

C  $\text{Cu} \rightarrow \text{Cu}^+ + \text{e}$

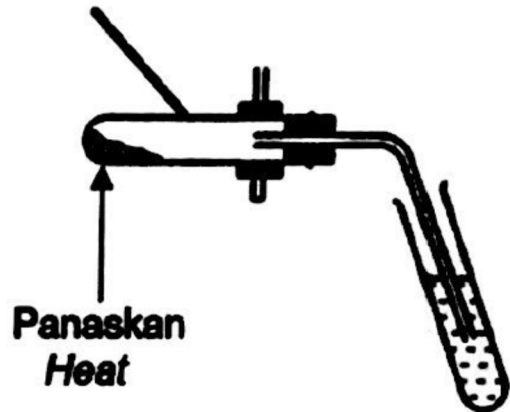
**[Johor2021-15]**

15 Rajah 7 menunjukkan kegunaan radas X di dalam satu eksperimen. Diagram 7 shows the use of apparatus in an experiment.

Apakah jenis kaca yang sesuai digunakan untuk membuat radas X?

What is the suitable type of glass to make apparatus X?

**Radas X  
Apparatus X**



A Kaca soda kapur  
Soda lime glass

B Kaca borosilikat  
Borosilicate glass

C Kaca fotokromik  
Photochromic glass

D Kaca plumbum  
Lead glass

**8.3 Komposisi Seramik Dan Kegunaannya**

**[Terengganu2021-18]**

18. Rajah 5 menunjukkan sejenis bahan seramik tradisional. Diagram 5 shows a type of traditional ceramic material.

Apakah komponen utama untuk membuat bahan seramik ini?  
What is the major component used in the making of this ceramic material?



A Aluminium silikat  
Aluminium silicate

B Ferum(III) oksida  
Iron(III) oxide

C Silikon karbida  
Silicon carbide

D Kuprum(I) klorida  
Copper(I) chloride

**8.4 Bahan Komposit Dan Kepentingannya**

**[Kelantan2021-29] F4 Bab 08 komposit**

29. Rajah 9 menunjukkan pembentukan bahan komposit daripada komponen asalnya

Diagram 9 shows the formation of a composite material from its original components



Berdasarkan Rajah 9, mengapakah konkrit yang diperkukuhkan digunakan untuk membina bangunan dan jambatan berbanding konkrit?

Based on Diagram 9, why reinforced concrete is used to build buildings and bridges compared to concrete?

A lebih keras daripada konkrit  
harder than concrete

B mempunyai ketahanan mampatan yang lebih tinggi  
has higher compressive resistance

C mempunyai ketahanan regangan yang lebih tinggi  
has higher tensile resistance

D hanya dapat dibentuk kepada bentuk yang terhad  
can only be formed to a limited form

**[Terengganu2021-31]**

31. Alat yang ditunjukkan di dalam Rajah 10 di atas, diperbuat daripada sejenis bahan komposit yang terdiri daripada bahan matriks dan bahan pengukuhan.

Mengapakah kaca tersebut dipilih untuk membuat alat itu?

Material shows in diagram 10 above is produced by a type of composite materials that is matrix substance and strengthening substance.

Why this glass is choosed to make that material?



A Tahan lasak  
Durable

B Tahan kakisan  
Resistant to corrosion

C Penebat elektrik  
Electrical insulator

D Lengai terhadap bahan kimia  
Inert to chemical substances

**[Kelantan2021-34]**

34. Rajah 12 menunjukkan cakera brek dan cakera pemotong yang dibuat dari seramik termaju.

Bahan X digunakan dalam pembuatan cakera brek dan cakera pemotong, kerana sifatnya yang kuat, keras, tahan kejutan terma dan rintangan yang tinggi terhadap haba.



Diagram 12 shows a brake disc and a cutting disc made of advanced ceramic. Material X is used in the manufacture of brake discs and cutting discs, due to its strong, hard, thermal shock resistance and high resistance to heat.

Apakah X?/ What is X?

A Silika  
Silica

C Silikon karbida  
Silicon carbide

B Alumina  
Alumina

D Zirkonium oksida  
Zirconium oxide

**[Selangor2021-Set01-01]**

17 Maklumat berikut adalah mengenai bahan Z yang digunakan dalam kereta api peluru.

The following information is about substance Z that is used in bullet train.

**Mengkonduksi elektrik tanpa rintangan pada suhu rendah**  
**Conducts electricity with no resistance at low temperature**

Apakah bahan Z?/ What is substance Z?

A Superkonduktor  
Superconductor

B Kaca fotokromik  
Photochromic glass

C Konkrit yang diperkukuhkan  
Reinforced concrete

**[SBP2021-23]**

23. Bahan S di gunakan untuk membuat cakera brek dan cakera pemotong. Antara pernyataan berikut, yang manakah menerangkan mengapa bahan S sesuai untuk kegunaan tersebut?

Substance S is used to make a brake disc and a cutting disc.

Which of the following statements explain why substance S is suitable for the user?

A Atom-atom dalam bahan S diikat oleh ikatan kovalen dan ikatan ion yang kuat  
The atoms in substance S are bonded by a strong covalent bonds and ionic bonds

B Bahan S mempunyai pekali pengembangan terma yang rendah  
 Substance S has low thermal expansion coefficient

C Bahan S mempunyai kekuatan regangan yang tinggi  
 Substance S has a high stretching strength

D Elektron dalam bahan S tidak boleh bergerak bebas  
 The electron in substance S cannot move freely

**[Negeri Sembilan 2021-24]**

24. Jadual 2 menunjukkan maklumat tentang suatu bahan komposit R.  
 Table 2 shows the information about a composite material R.

Bahan komposit Composite material	Bahan matriks Matrix substance	Bahan pengukuhan Strengthening Substance	Kegunaan Use
R	Plastik Plastic	Gentian kaca silika Silica glass fibres	Menghantar maklumat dan data dalam bentuk cahaya Transmit information and data in the form of light

Apakah R?/ What is R?

A Kaca gentian  
Fibre glass

C Superkonduktor  
Superconductors

B Gentian optik  
Optical fibre

D Kaca fotokromik  
Photochromic glass