Chem Quest

2025

TINGKATAN 4

Jom A+ Kimia

SPM 2024

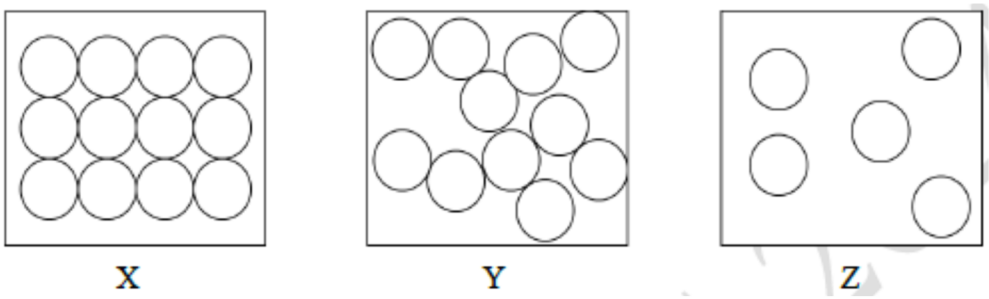
PERCUMA - TIDAK DIJUAL

[Johor – Batu Pahat – Muar – Pasir Gudang]
[Kedah – Kelantan – Negeri Sembilan]
[Perak - Pahang – Perlis – Putrajaya]
[Selangor- Terengganu MPP3]
[JUJ- Melaka – Sarawak = 19Set]

[Negeri–Daerah–Sekolah]

Nama : ..... Kelas : .....

[2024 JUJ Set2-01] Rajah 1 menunjukkan tiga keadaan jirim bagi air, iaitu X, Y dan Z.
Diagram 1 shows three states of matter of water, which are X, Y and Z.



(a) Nyatakan keadaan fizikal bagi/ *State the physical state of:*

X : .....

Y : .....

Z : ..... [3M]

(b) Apabila air berubah daripada keadaan Y kepada keadaan Z, nyatakan perubahan bagi :
When water changes from state Y to state Z, state the changes in:

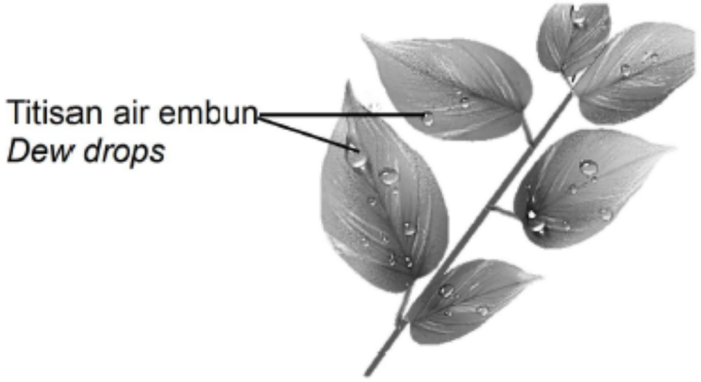
(i) tenaga zarah/ *energy of particles*

..... [1M]

(ii) daya tarikan antara zarah-zarah
forces of attraction between the particles

..... [1M]

[2024 Kelantan-02] Rajah 2 menunjukkan pembentukan titisan embunyang terbentuk pada daun di waktu pagi
Diagram 2 showing the formation of dew drops formed on the leaves in the morning



Berdasarkan Rajah 2/ Based on Diagram 2

(a) Namakan proses perubahan semasa pembentukan titisan air pada daun tersebut.
Name the process that change during the formation of water droplets on the leaves.

..... [1M]

(b)(i) Apakah jenis zarah yang terdapat dalam air? ..... [1M]
What types of particles are found in water?

(ii) Lukiskan susunan zarah air sebelum berubah menjadi titisan air.
Draw the arrangement of water particles before they turn into water droplets.

[1M]

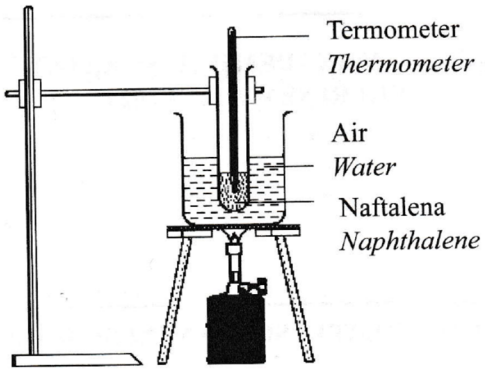
(c) Sekiranya air dipanaskan sehingga suhu 100°C, apakah perubahan yang akan berlaku kepada zarah-zarah air dari segi tenaga kinetik dan pergerakan zarah dalam air tersebut.
If the water is heated to a temperature of 100°C, what changes will happen to the water particles in terms of kinetic energy and the movement of the particles in the water.

.....

.....

..... [2M]

[2024 Negeri Sembilan-01] Rajah 1 menunjukkan susunan radas untuk menentukan takat lebur bagi naftalena.
Diagram 1 shows apparatus set-up to determine the melting point of naphthalene.



(a) Nyatakan maksud takat lebur./ *State the meaning of melting point.*

.....

..... [1M]

(b) Nyatakan jenis zarah bagi naftalena dan keadaan fiziknya selepas dipanaskan.
State the type particle of naphthalene and its physical state after heating.

Jenis zarah/ *Type of particles* : .....

Keadaan fizik/ *Physical state* : ..... [2M]

(c) Berdasarkan Rajah 1, namakan kaedah pemanasan dan terangkan mengapa kaedah ini digunakan.
Based on Diagram 1, name the method of heating and explain why this method is used.

Kaedah : .....
Method

Alasan : .....
Reason

..... [2M]

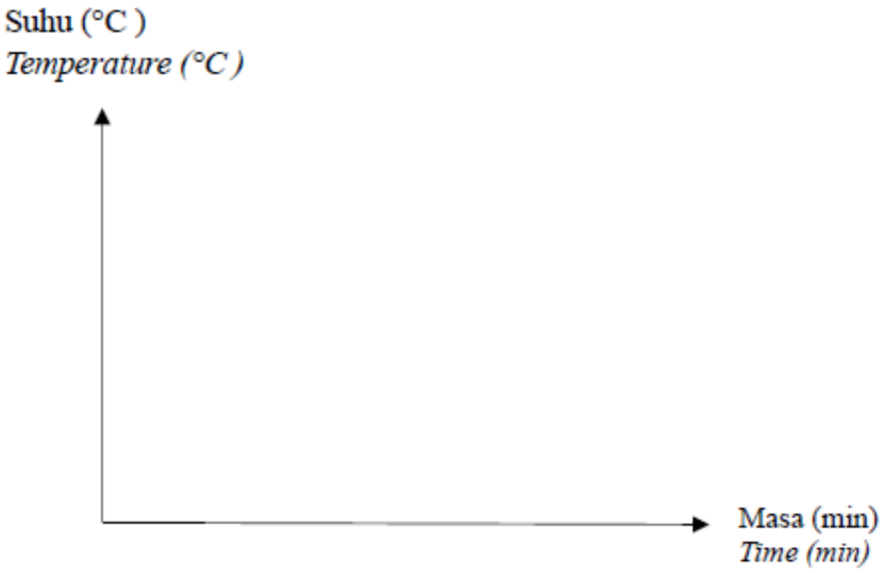
[2024 Johor Pasir Gudang-03] Metanol dengan formula CH_3OH ialah sebatian organik dengan takat lebur -97°C dan takat didih 65°C.
Methanol with the formula CH_3OH is an organic compound with melting point of -97°C and boiling point of 65°C.

(a) Nyatakan jenis zarah metanol. ..... [1M]
State the type of particle of methanol.

(b) Nyatakan pergerakan zarah metanol pada 100°C.
State the movement of methanol particles at 100°C.

..... [1M]

(c) Lakarkan graf suhu melawan masa apabila metanol dipanaskan daripada suhu bilik kepada 100°C.
Sketch the graph of temperature against time when methanol is heated from room temperature to 100°C.



[2M]

(d) (i) Takat didih dan takat lebur iodin ialah 184° C dan 114°C.
Nadia menyejukkan iodin dari suhu 200°C ke suhu bilik. Namakan proses yang berlaku.
Boiling and melting point of iodine is 184°C and 114°C.
Nadia cools iodine from 200°C to the room temperature. Name the process involved.

..... [1M]

(ii) Lukis susunan zarah iodin pada suhu 200°C.
Draw the arrangement of iodine particles at a temperature of 200°C.

[1M]

[2024 Johor-03]Jadual 1 menunjukkan takat lebur dan takat didih bagi tiga bahan.
Table 1 shows the melting point and boiling point of three substances.

Bahan *Substances*	Takat lebur (°C) *Melting point (°C)*	Takat didih (°C) *Boiling point (°C)*
P	80	218
R	-101.0	-25.0
S	801.0	1413.0

Jadual 1/ Table 1

(a) Apakah yang dimaksudkan dengan takat beku?
What is meant by freezing point?

.....

..... [1M]

(b) Nyatakan bahan yang wujud dalam keadaan gas pada suhu 10 °C.
Name substance that exists in the state of gas at 10 °C.

..... [1M]

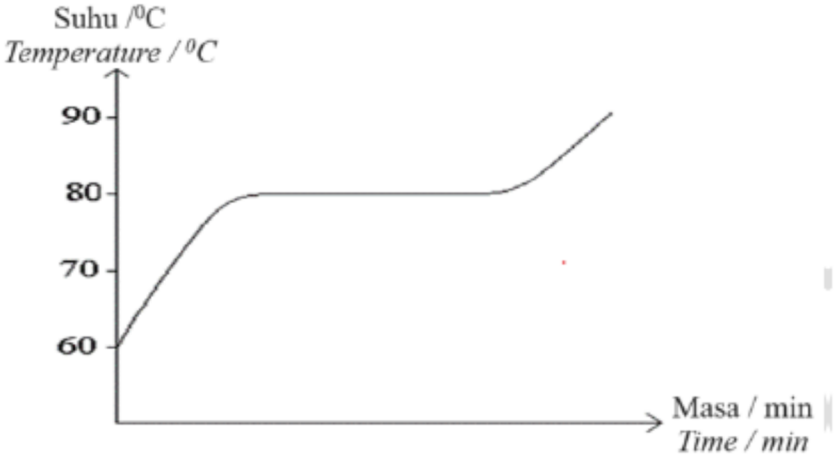
(c) (i) Lakarkan graf suhu melawan masa bagi bahan P apabila ia disejukkan daripada suhu 70 °C sehingga mencapai suhu 30 °C.
Sketch the graph of temperature against time for substance P when it is cooled from 70 °C until it reaches a temperature 30°C.

[2M]

(ii) Lukiskan susunan radas bagi proses penyejukan bahan P.
Draw an apparatus set-up for cooling process of substance P.

[2M]

[2024 JUJ Set1-02] Rajah 2.1 menunjukkan lengkung pemanasan bagi menentukan takat lebur naftalena.
Diagram 2.1 shows heating curve to determine the melting point of naphthalene.



(a) Nyatakan maksud takat lebur./ *State the meaning of melting point.*

.....

..... [1M]

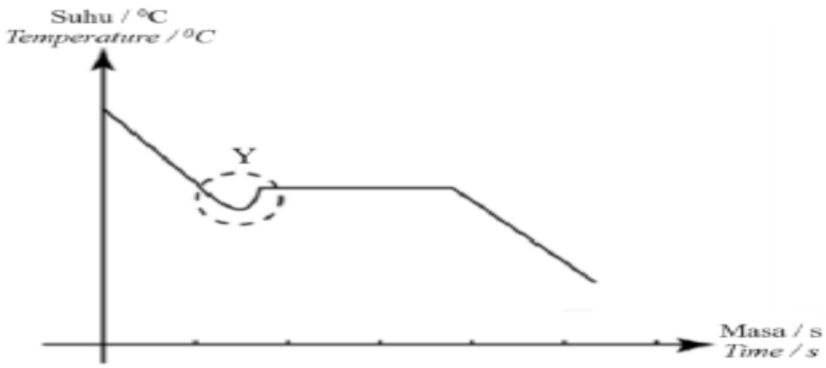
(b) Nyatakan keadaan fizik naftalena pada suhu bilik.
State the physical state of naphthalene at room temperature.

..... [1M]

(c) Ahmad menyejukkan naftalena dan mendapati suhu berkurangan dan menjadi malar pada satu peringkat dan kemudian berkurang semula.
Ahmad cooled the naphthalene and observed that the temperature decreases and becomes constant at one stage and then decreases again.

(i) Ramalkan suhu yang malar itu. ..... [1M]
Predict the constant temperature.

(ii) Graf dalam Rajah 2.2 dilakar oleh Ahmad setelah menjalankan eksperimen penyejukan naftalena.
Graph in Diagram 2.2 is sketched by Ahmad after carried out the experiment cooling of naphthalene.



Apakah yang berlaku di kawasan Y? Berikan sebab mengapa keadaan tersebut berlaku.
What happen at area Y? Give a reason why the situation occurs.

.....

..... [2M]

[2024-Sarawak-Set01-04] Jadual 3 menunjukkan takat lebur dan takat didih bahan P, Q, R, S dan T.
Table 3 shows the melting and boiling point of substance P, Q, R, S and T.

Bahan *Substance*	Takat lebur (°C) *Melting point (°C)*	Takat didih (°C) *Boiling point (°C)*
P	-111.0	-46.0
Q	-83.0	44.0
R	90.8	873.0
S	841.0	1713.0

Berdasarkan Jadual 3,/ *Based on Table 3,*

(a) (i) Nyatakan satu bahan yang wujud dalam keadaan gas pada suhu bilik.
State one substance that exists in a gas state at room temperature.

..... [1M]

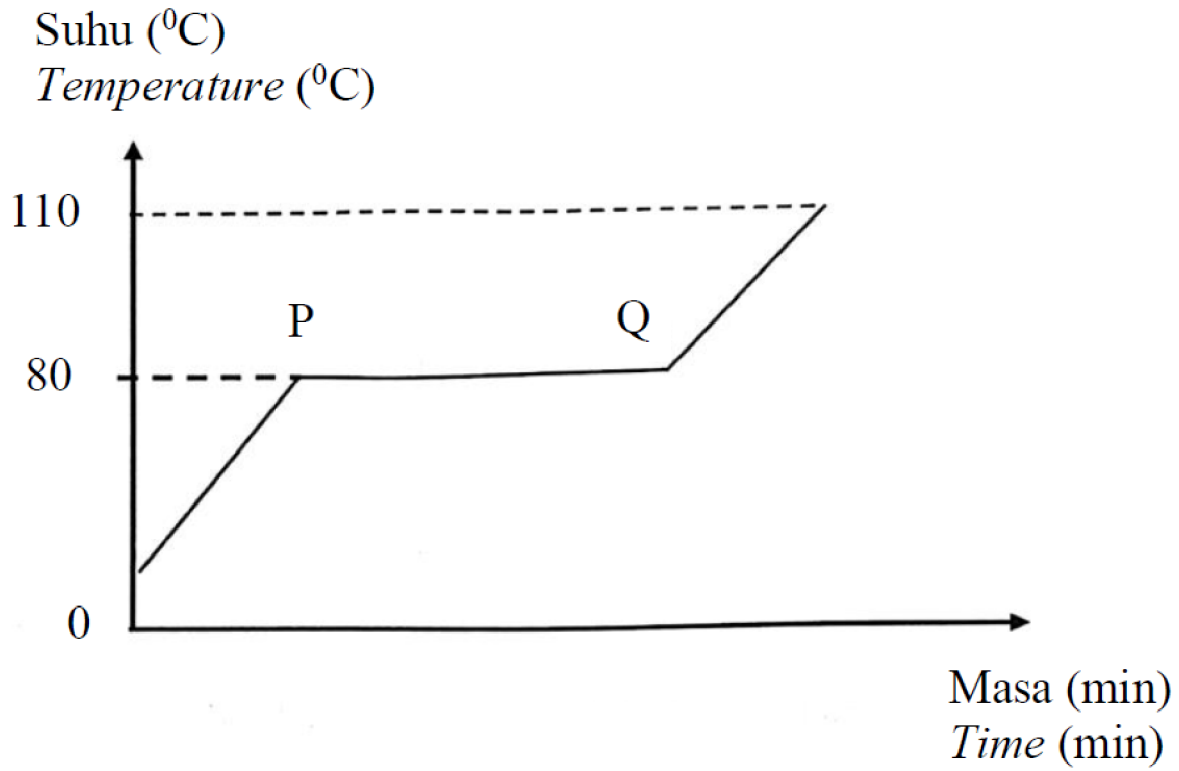
(ii) Bahan manakah yang akan melalui proses pendidihan apabila diletakkan dalam kukus air yang mempunyai suhu 100.0 °C?
Which substance will undergoes the boiling process when placed in steaming water that has a temperature of 100.0 °C?

..... [1M]

(iii) Lukis susunan zarah bagi bahan Q pada suhu -10.0 °C.
Draw the arrangement of particles in substance Q at temperature of -10.0 °C.

[1M]

(b) Rajah 3 menunjukkan graf suhu melawan masa bagi pemanasan naftalena, $C_{10}H_8$.
Diagram 3 shows a graph of temperature against time for heating of naphthalene, $C_{10}H_8$.



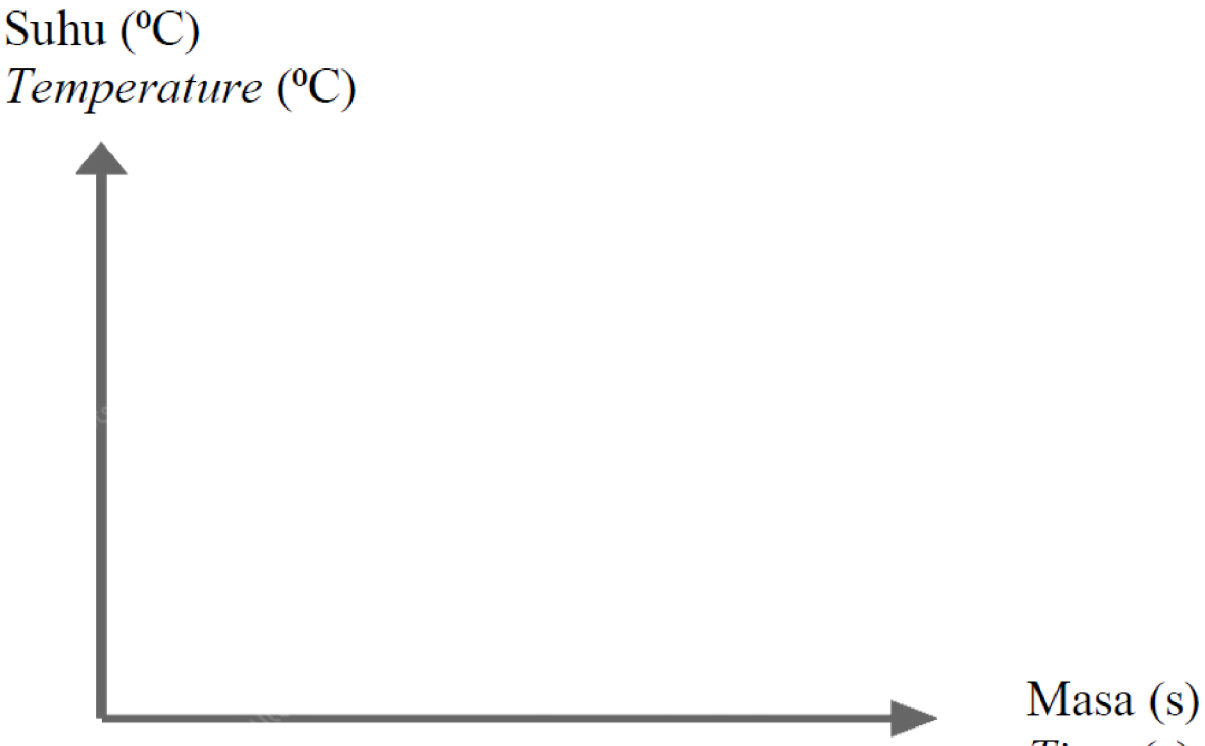
(i) Berdasarkan Rajah 3, didapati tiada perubahan suhu berlaku dari P ke Q. Terangkan jawapan anda.
Based on Diagram 3, it is found that no change in temperature occurs from P to Q. Explain your answer.

.....

.....

..... [2M]

(ii) Cecair naftalena kemudiannya disejukkan kepada suhu bilik. Lakarkan graf suhu melawan masa bagi penyejukan naftalena dan tandakan takat bekunya pada graf tersebut.
Naphthalene liquid is then cooled to the room temperature. Sketch a graph of temperature against time for the cooling of naphthalene and mark its freezing point on the graph.



[2M]

[2024 Johor Pasir Gudang-03] Rajah 3 menunjukkan perwakilan piawai bagi atom X, Y dan Z. Huruf yang digunakan bukan simbol sebenar bagi atom-atom tersebut.
Diagram 3 shows the standard representation for atom X, Y dan Z. The letter used are not the actual symbols of the atoms.

$^{23}_{11}X$ $^{12}_{6}Y$ $^{14}_{6}Z$

Berdasarkan Rajah 3,/ *Based on Diagram 3,*

(a) Nyatakan maksud nombor proton./ *State the meaning of proton number.*

.....

..... [1M]

(b) Tuliskan susunan elektron bagi atom Y. ..... [1M]
Write the electron arrangement of atom Y.

(c) (i) Berdasarkan Rajah 3, atom manakah yang mempunyai sifat kimia yang sama? Terangkan jawapan anda.
Based on Diagram 3, which atoms have the same chemical properties? Explain your answer.

.....

..... [2M]

(ii) Lukis struktur atom bagi atom Z./ *Draw the atomic structure of atom Z.*

[2M]

[2024-Kedah-03] Jadual 3.1 menunjukkan bilangan proton dan bilangan neutron bagi atom R, S dan T.
Table 3.1 shows the number of proton and the number of neutron of atoms R,S and T.

Atom *Atom*	Bilangan proton *Number of proton*	Bilangan neutron *Number of neutron*
R	12	13
S	14	15
T	14	16

(a) Nyatakan tiga zarah subatom dalam suatu atom.
State three subatomic particles in an atom.

..... [1M]

(b) Berdasarkan Jadual 3.1
Based on Table 3.1 :

(i) Mengapakah atom S dan T mempunyai sifat kimia yang sama?
Why are atoms S and T have the same chemical properties?

..... [1M]

(ii) Lukiskan susunan elektron bagi ion R.
Draw the electron arrangement of ion R.

[2M]

(c) Jadual 3.2 menunjukkan maklumat mengenai klorin. Klorin mengandungi dua isotop. Berdasarkan maklumat yang diberi, hitungkan nombor nukleon isotop Cl-y.
Table 3.2 shows information about chlorine. Chlorine have two isotopes. Based on given information, calculate nucleon number for Cl-y isotope.
[Jisim atom relatif / Relative atomic mass : Cl = 35.5]

Isotop *Isotope*	Kelimpahan semulajadi *Natural abundance*
Cl-35	75%
Cl-y	25%

Jadual 3.2 / Table 3.2

[2M]

[2024 Putrajaya-01] Jadual 1 menunjukkan nombor proton dan nombor nukleon tiga zarah iaitu V, W dan Y.
Table 1 shows the proton number and nucleon number of three particles V, W and Y.

Zarah *Particle*	Nombor Proton *Proton number*	Bilangan neutron *Number of neutron*	Nombor Nukleon *Nucleon number*
V	6	6	12
W	11		23
Y	11	13	24

(a) Berdasarkan Jadual 1, nyatakan bilangan neutron bagi W.
Based on Table 1, state the number of neutrons of W.

.....

..... [1M]

(i) Berikan maksud isotop./ *Define isotopes.*

.....

..... [1M]

(ii) Kenal pasti dua zarah yang merupakan isotop.
Identify two particles that are isotopes.

..... [1M]

(c) Terangkan mengapa/ *Explain why ,*

(i) Isotop menunjukkan sifat fizik yang berbeza.
Isotopes show different physical properties.

..... [1M]

(ii) Isotop menunjukkan sifat kimia yang sama.
Isotopes show same chemical properties.

..... [1M]

[2024-Selangor-Set02-03] Jadual 2 menunjukkan maklumat tentang atom P, Q, R dan S.
Table 2 shows the information on atoms P, Q, R and S.

Atom *Atom*	Bilangan proton *Number of protons*	Bilangan neutron *Number of neutrons*
P	6	6
Q	6	8
R	12	12
S	13	14

(a) Nyatakan satu zarah subatom yang berada dalam nukleus suatu atom.
State one subatomic particle present in the nucleus of an atom.

..... [1M]

(b) Atom-atom manakah yang merupakan isotop? ..... [1M]
Which atoms are isotopes?

(c) Nyatakan bilangan elektron valens bagi atom S. ..... [1M]
State the number of valence electron of atom S.

(d) (i) Lukiskan susunan elektron bagi ion R.
Draw the electron arrangement of ion R.

[2M]

(ii) Kelimpahan semula jadi ialah peratus isotop yang wujud dalam suatu sampel semula jadi unsur.
Hitung jisim atom relatif bagi R dalam ^{24}R (79%), ^{25}R (10%) dan ^{26}R (11%).
Natural abundance is the percentage of isotopes exist in a sample of element naturally.
Calculate the relative atomic mass of R in ^{24}R (79%), ^{25}R (10%) and ^{26}R (11%).

[1M]

[2024-Selangor-Set1-03] Jadual 1 menunjukkan maklumat tentang atom P, Q, R dan S.
Table 1 shows the information on atoms P, Q, R and S.

Atom Atom	Bilangan proton Number of protons	Bilangan neutron Number of neutrons
P	11	12
Q	11	13
R	17	18
S	20	20

(a) Nyatakan satu zarah subatom yang berada dalam nukleus suatu atom.
State one subatomic particle present in the nucleus of an atom.

..... [1M]

(b) Atom-atom manakah yang merupakan isotop? ..... [1M]
Which atoms are isotopes?

(c) Nyatakan bilangan elektron valens bagi atom S. ..... [1M]
State the number of valence electron of atom S.

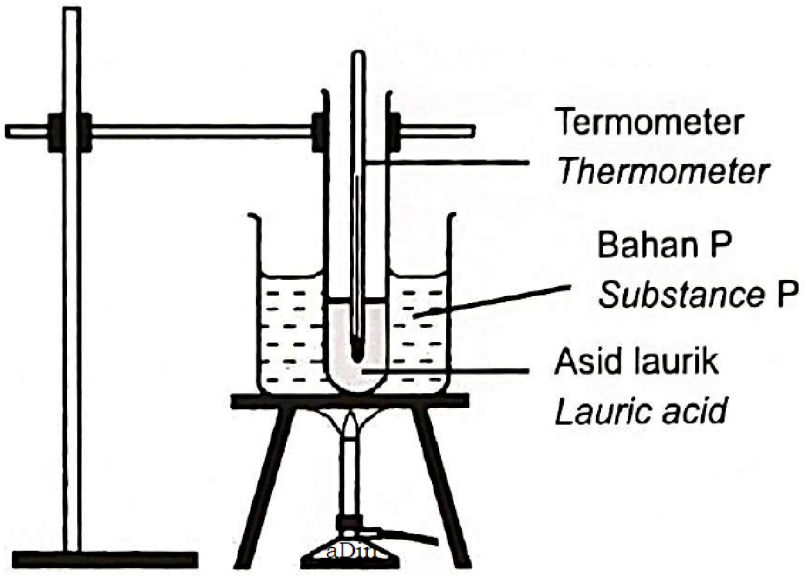
(d)(i) Lukiskan susunan elektron bagi ion R.
Draw the electron arrangement of ion R.

[2M]

(ii) Kelimpahan semula jadi ialah peratus isotop yang wujud dalam suatu sampel semula jadi unsur.
Hitung jisim atom relatif bagi R dalam ^{35}R (75.8%) dan ^{37}R (24.2%).
Natural abundance is the percentage of isotopes exist in a sample of element naturally.
Calculate the relative atomic mass ofR in ^{35}R (75.8%) and ^{37}R (24.2%).

[1M]

[2024 – Terengganu-02] Asid laurik, $C_{12}H_{24}O_2$ adalah sejenis asid lemak yang boleh diperolehi daripada buah kelapa. Rajah 2 menunjukkan susunan radas bagi aktiviti pemanasan pepejal asid laurik. Pepejal asid laurik dipanaskan daripada suhu bilik ke 60.0°C dan didapati ia mula melebur pada suhu 43.8°C.
Laurie acid, $C_{12}H_{24}O_2$ is type of fatty acid that can be obtained from coconut. Diagram 2 shows the apparatus set-up for heating activity of lauric acid. Laurie acid is heated from room temperature to 60.0°C and it begins to melt at 43.8°C



(a) Nyatakan jenis zarah bagi asid laurik. ..... [1M]
State the type of particle of lauric acid.

(b) Asid laurik perlu dikacau sepanjang pemanasan dijalankan sehingga ia melebur.
Lauric acid should be stirred throughout the heating until it melts.

(i) Mengapakah asid laurik perlu dikacau sepanjang proses pemanasan?
Why lauric acid should be stirred throughout heating process?

..... [1M]

(ii) Nyatakan takat lebur asid laurik. ..... [1M]
State the melting point of lauric acid.

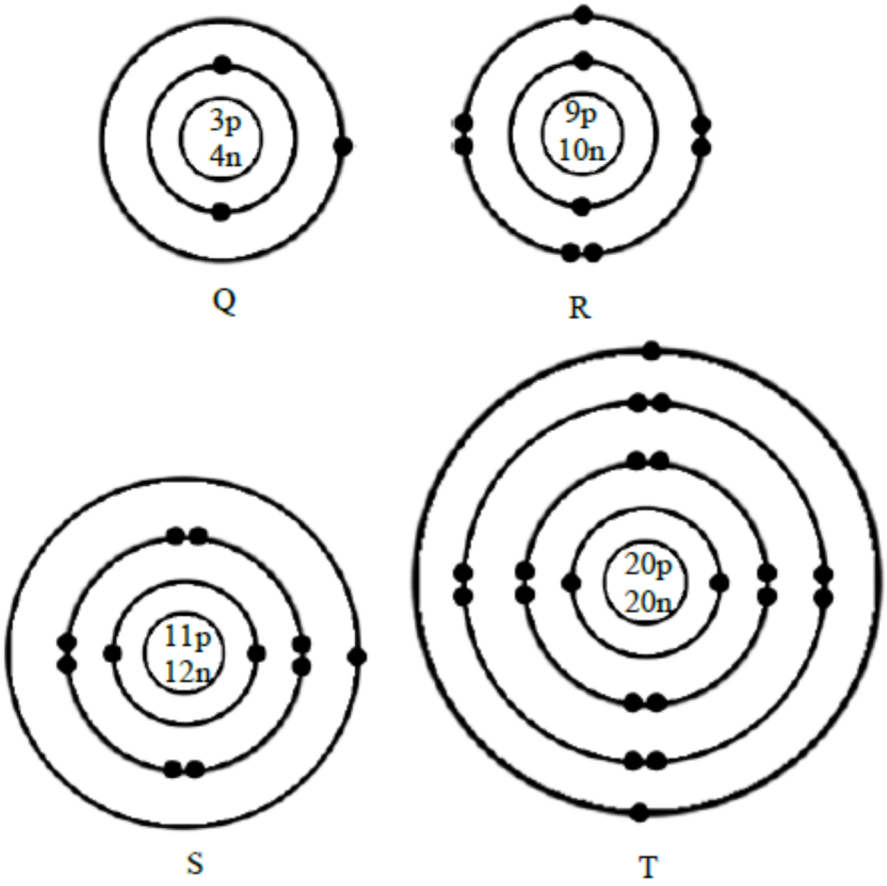
(c)(i) Cadangkan bahan P. ..... [1M]
Suggest substance P.

(ii) Beri sebab/ *Give reason.*

.....

..... [1M]

[2024 Perlis-03] Rajah 3 menunjukkan struktur atom bagi unsur Q, R, S dan T.
Diagram 3 shows atomic structure for elements Q, R, S and T.



(a) Nyatakan zarah subatom yang bercas neutral. ..... [1M]
State subatomic particle that neutral charged.

(b) Berapakah bilangan elektron dalam atom Q? ..... [1M]
How many electrons in atom Q?

(c) Nyatakan nombor nukleon bagi S dan T.
State nucleon number for S and T.

S : ..... T : ..... [2M]

(d) Atom R dan S dapat bertindak balas untuk membentuk satu sebatian. Tuliskan persamaan kimia bagi tindak balas itu.
Atoms R and S can react to form a compound.
Write a chemical equation for this reaction.

..... [1M]

[2024 Putrajaya-06] (a) (i) Tuliskan formula untuk menunjukkan hubungan antara bilangan mol dan bilangan zarah untuk sesuatu bahan.
Write a formula to show the relationship between the number of moles and the number of particles for a substance.

Bilangan mol =
Number of moles

[1M]

(ii) Cari bilangan mol atom dalam satu sampel yang mengandungi 9.03×10^{20} atom zink.
Find the number of moles of atoms in a sample containing 9.03×10^{20} atoms of zinc.
[Pemalar Avogadro ialah/ Avogadro constant is 6.02×10^{23} mol^{-1}]

[1M]

(iii) Sebuah tangki mengandungi 2 mol gas sulfur trioksida. Berapakah bilangan atom oksigen dalam tangki itu?
[Isipadu molar gas pada suhu bilik ialah 24 dm^3 mol^{-1}; Pemalar Avogadro ialah 6.02×10^{23} mol^{-1}]
A tank contains 2 moles of sulphur trioxide gas. What is the number of oxygen atoms of in the tank?
[Molar volume of gas at room temperature is 24 dm^3 mol^{-1}; Avogadro constant is 6.02×10^{23} mol^{-1}]

[1M]

(b) Satu tindak balas diwakili oleh persamaan berikut:
A reaction is represented by the following equation:

$$4Na + O_2 \rightarrow 2Na_2O$$

Berdasarkan persamaan di atas, berikan
Based on the equation above, give

(i) maklumat secara kualitatif/ *qualitative information*

..... [1M]

(ii) maklumat kuantitatif dari segi entiti asas
quantitative information based on basic entities

..... [1M]

(c) Kuprum(II) oksida diturunkan oleh gas hidrogen membentuk air dan kuprum.
Copper(II) oxide is reduced by hydrogen gas to form water and copper.

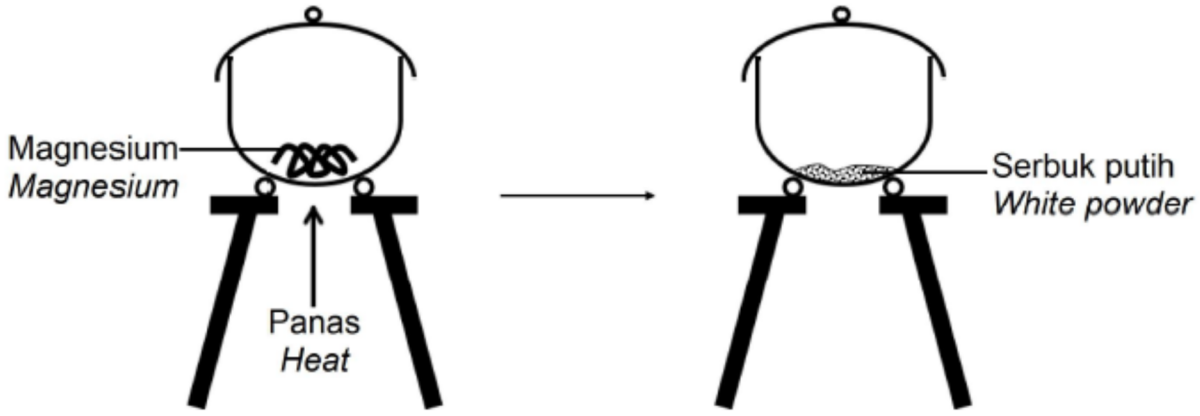
(i) Tuliskan persamaan tindak balas yang berlaku.
Write the equation of the reaction that takes place.

..... [1M]

(ii) Jika 8 g kuprum (II) oksida bertindak balas sempurna dengan gas hidrogen, hitungkan jisim kuprum yang terhasil.
[Jisim atom relatif: O =16; Cu = 64]
If 8 g of copper (II) oxide reacts completely with hydrogen gas, calculate the mass of copper produced.
[Relative atomic mass: O = 16; Cu = 64]

[3M]

[2024 Kelantan-03] Rajah 3 menunjukkan perubahan yang berlaku semasa aktiviti menentukan formula empirik bagi oksida logam magnesium.
Diagram 3 shows the changes that occur during the activity of determining the empirical formula for magnesium metal oxide.



(a) Tuliskan formula kimia bagi serbuk putih. ..... [1M]
Write the chemical formula for the white powder

(b) (i) Tuliskan persamaan kimia bagi tindak balas yang ditunjukkan dalam Rajah 3
Write the chemical equation for the reaction shown in Diagram 3

..... [2M]

(ii) Nyatakan dua maklumat secara kualitatif dan kuantitatif yang dapat diperolehi dari persamaan kimia di (b)(i).
State two information qualitatively and quantitatively that can be obtained from the chemical equation in (b)(i).

.....

.....

.....

..... [2M]

(c) Tentukan bilangan mol serbuk putih yang akan terhasil jika 0.5 mol oksigen telah digunakan untuk memastikan pembakaran telah lengkap berlaku.
Determine the number of moles of white powder that would be produced if 0.5 moles of oxygen were used to ensure complete combustion.

[1M]

[2024 Perak – Set 1-05] Jadual 4 menunjukkan persamaan bagi dua tindak balas melibatkan oksida logam P dan logam Q. Formula empirik bagi oksida P dan oksida Q ditentukan melalui Kaedah I dan Kaedah II.
Table 4 shows the equations for two reactions involving oxide of metal P and metal Q. The empirical formulae of P oxide and Q oxide are determined through Method I and Method II.

Kaedah *Method*	Persamaan *Equation*
I	$H_2 + PO \rightarrow P + H_2O$
II	$2Q + O_2 \rightarrow 2QO$

(a) Apakah yang dimaksudkan dengan formula empirik?
What is meant by empirical formula?

.....

..... [1M]

(b) Cadangkan nama logam Q. ..... [1M]
Suggest name of metal Q.

(c) Apabila 4.5 g unsur Q terbakar dengan lengkap menghasilkan 7.5 g oksida Q. Apakah formula empirik bagi oksida logam tersebut?
[Jisim atom relatif: Q = 24, O =16]
When 4.5 g of element Q is burnt completely forming 7.5 g of oxide of Q. What is the empirical formula of the metal oxide?
[Relative atomic mass : Q = 24, O = 16]

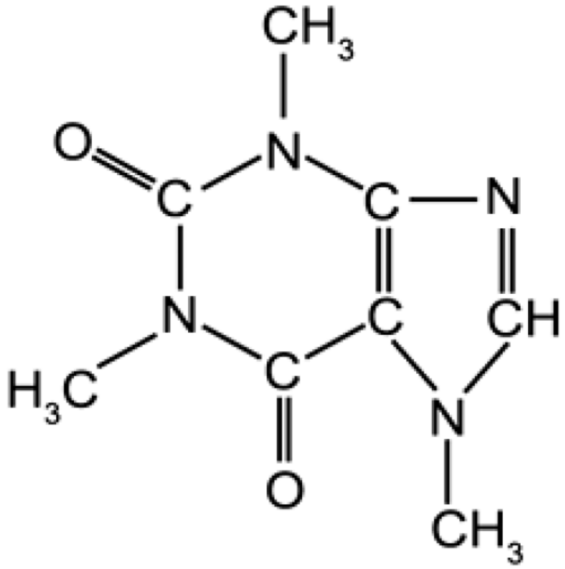
[4M]

(d) Kaedah yang manakah lebih sesuai digunakan untuk menentukan formula empirik bagi kuprum(II) oksida, CuO? Terangkan.
Which method is suitable to be used to determine the empirical formula of copper(II) oxide, CuO? Explain.

.....

..... [2M]

[2024 Perlis-05] Rajah 5.1 menunjukkan formula struktur bagi kafein yang boleh dijadikan sebagai baja semulajadi untuk tumbuhan.
Diagram 5.1 shows the structural formula of caffeine, which can be a natural fertiliser for plants.



(a)(i) Nyatakan formula molekul kafein tersebut. ..... [1M]
State the molecular formula of caffeine.

(ii) Kira peratus nitrogen mengikut jisim dalam kafein.
Calculate the percentage of nitrogen by mass in caffeine.
[Jisim atom relative/ *Relative atomic mass* : C = 12; H = 1; O = 16; N = 14]

[2M]

(iii) Baja biasanya mempunyai kandungan nitrogen yang tinggi. Nitrogen diperlukan untuk meningkatkan tumbesaran tumbuhan seperti sayuran. Antara contoh baja yang digunakan oleh petani ialah urea, $CO(NH_2)_2$.
Fertilisers usually have a high content of nitrogen. Nitrogen is needed to enhance the growth of plants such as vegetables. Among the examples of fertilisers used by farmers are urea, $CO(NH_2)_2$.

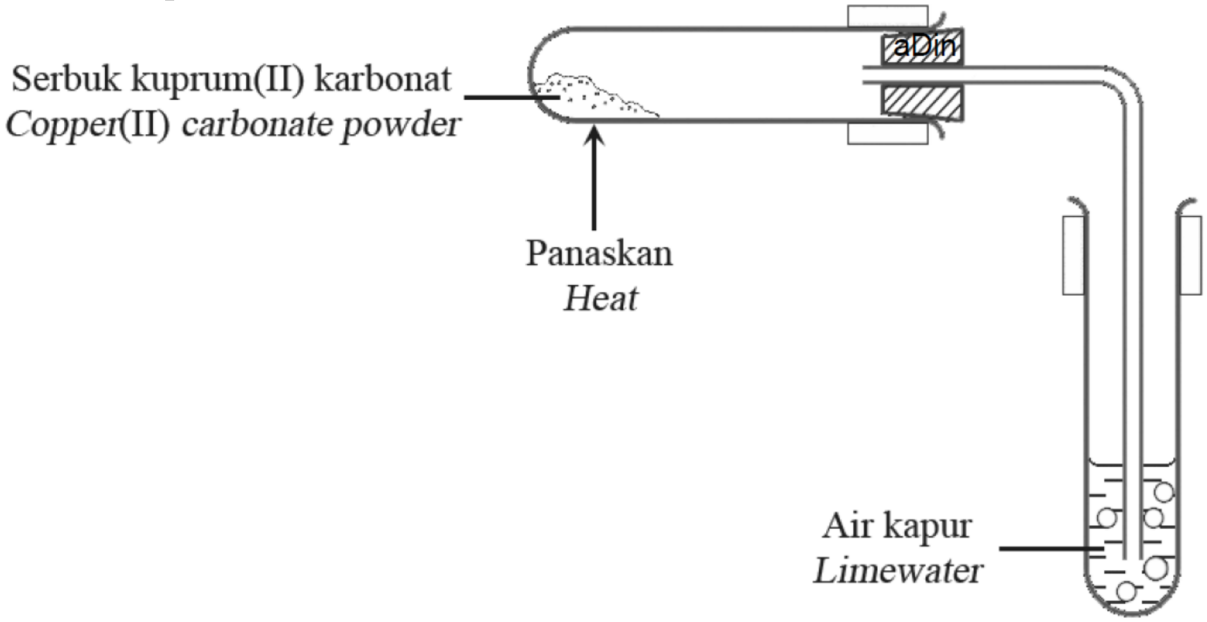
Berdasarkan peratus nitrogen mengikut jisim dalam kafein di 5(a)(ii) dan urea, tentukan baja yang terbaik yang patut digunakan oleh petani untuk tanamannya. Jelaskan.

Based on the percentage of nitrogen by mass in caffeine in 5(a)(ii) and urea, determine the best fertilisers that should be used by farmers for their plants. Explain.

.....

..... [2M]

(b) Rajah 5.2 menunjukkan susunan radas untuk penguraian serbuk kuprum(II) karbonat.
Diagram 5.2 shows the apparatus set up for the decomposition of copper(II) carbonate powder.



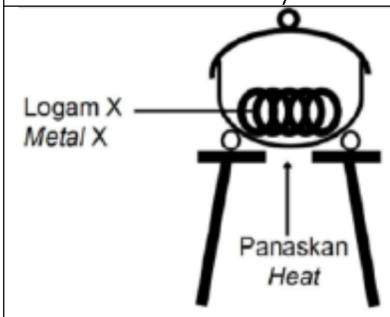
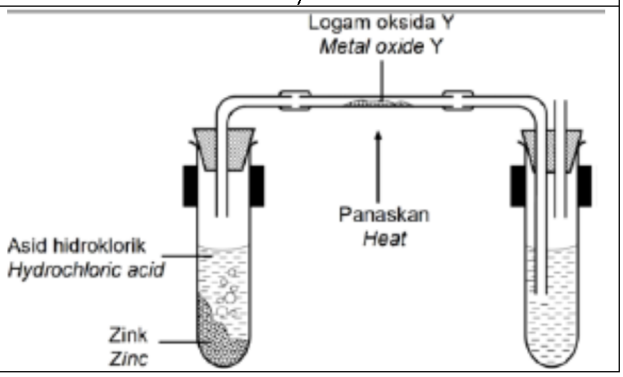
(i) Apakah fungsi air kapur?/ *What is the function of the limewater?*

..... [1M]

(ii) Tulis persamaan kimia yang seimbang bagi penguraian serbuk kuprum(II) karbonat itu.
Write a balanced chemical equation for the decomposition of copper(II) carbonate powder.

..... [2M]

[2024 Johor Muar-04] Rajah 4 menunjukkan dua kaedah yang digunakan untuk menentukan formula empirik bagi oksida logam X dan oksida logam Y.
Diagram 4 shows two methods used to determine the empirical formula for metal oxide X and metal oxide Y.

Kaedah I/ *Method I*	Kaedah II/ *Method II*
	

(a) Apakah maksud formula empirik?/ *What is meant by empirical formula?*

.....

..... [1M]

(b) Berdasarkan Rajah 4, cadangkan kaedah yang manakah sesuai digunakan untuk menentukan formula empirik bagi
Based on figure 4, suggest which method is suitable to use to determine the empirical formula for

Magnesium oksida/ *Magnesium oxide* : .....

Oksida plumbum/ *Lead oxide* : .....[2M]

(c) Jadual 1 menunjukkan maklumat yang diperolehi dari satu eksperimen menggunakan kaedah II dalam Rajah 4.
Table 1 shows the information obtained fro an experiment using Method II in Diagram 4.

Perkara/ *Description*	Jisim/ *Mass* (g)
Salur kaca *Glass tube*	4.128
Salur kaca + oksida logam Y *Glass tube + oxide of metal Y*	4.318
Salur kaca + logam Y *Glass tube + metal Y*	4.280

Jadual 1 /*Table* 1

(i) Tentukan formula empirik bagi oksida Y.
Determine the empirical formula for oxideY.
[Jisim atom relatif/ Relative atomic mass : O = 16, Y = 64]

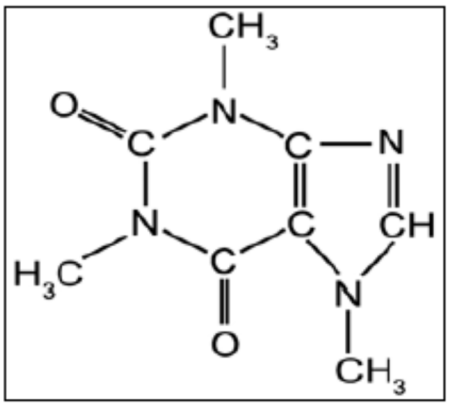
[3M]

(ii) Gas hidrogen dialirkan selama 10 saat sebelum pemanasan dimulakan Jelaskan mengapa
Hydrogen gas is flowed for 10 seconds before heating is started. Explain why.

.....

..... [1M]

[2024-Kedah-02] Rajah 2 menunjukkan formula struktur bagi kafeina.
Diagram 2 shows the structural formula of caffeine.



(a) Apakah maksud formula molekul?
What is the meaning of molecular formula?

.....

..... [1M]

(b) Berdasarkan Rajah 2,/ *Based on Diagram 2,*

(i) Namakan semua unsur yang terdapat dalam kafeina.
Name all the elements present in caffeine.

..... [1M]

(ii) Tuliskan formula molekul dan formula empirik bagi kafeina.
Write the molecular and empirical formula of caffeine.

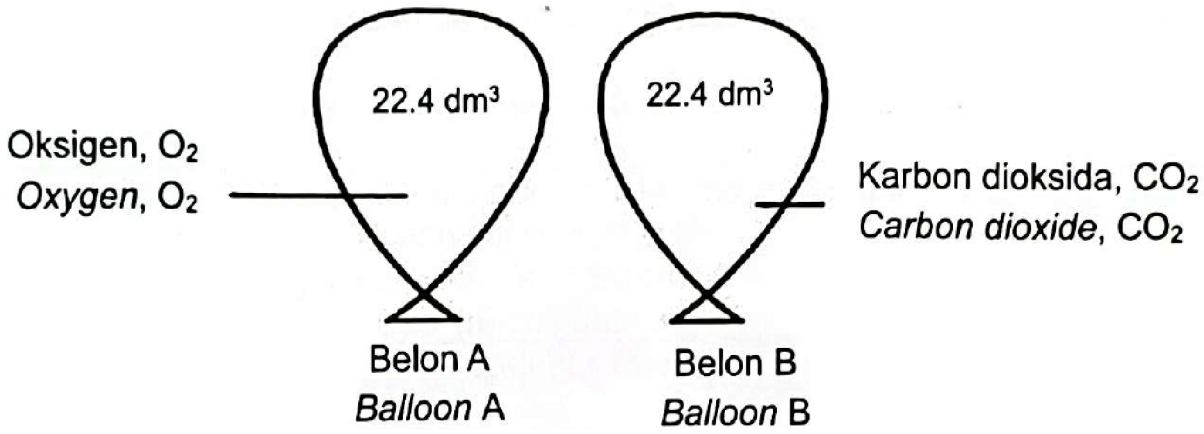
Formula molekul bagi kafeina *Molecular formula of caffeine*	Formula empirik bagi kafeina *Empirical formula of caffeine*

[2M]

(c) Nyatakan jenis zarah yang wujud dalam kafeina.
State the type of particle exist in caffeine.

..... [1M]

[2024 – Terengganu-04] (a) Rajah 4 menunjukkan dua biji belon yang masing-masing mengandungi isi padu gas oksigen dan gas karbon dioksida yang sama Isi padu yang ditempati oleh 1 mol gas.
The volume occupied by 1 mol of gasDiagram 4 shows two balloons containing same volume of oxygen gas and carbon dioxide gas at standard temperature and pressure, STP.



(i) Apakah maksud isi padu molar? *What is the meaning of molar volume?*

..... [1M]

(ii) Berapakah bilangan mol gas dalam belon A dan belon B?
What is the number of mol in balloon A and balloon B?
[Isi padu molar/ *Molar volume*: 22.4 dm^3 mol^{-1} at STP]

[1M]

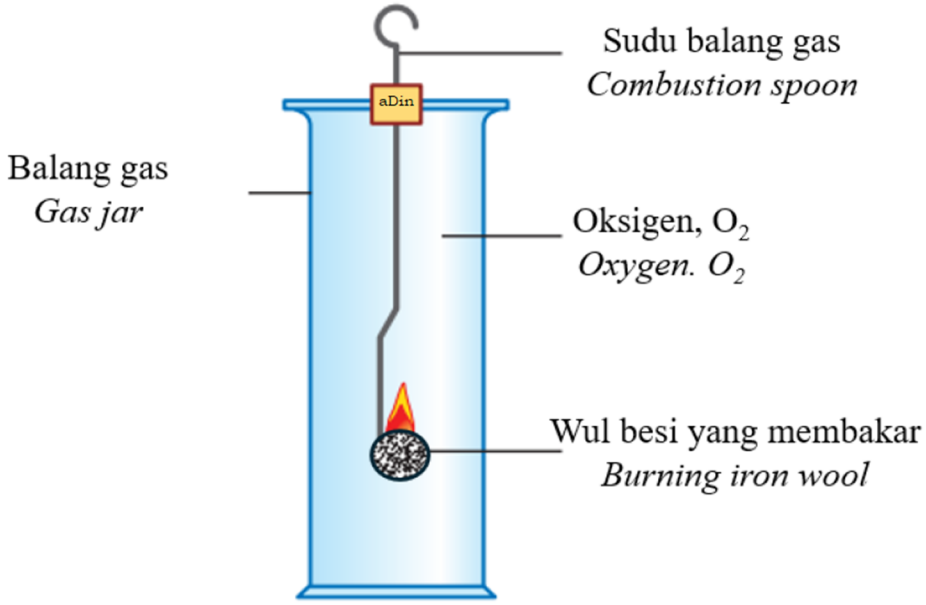
(iii)Nyatakan hubung kait antara bilangan mol gas dengan jisim gas dalam belon B.
State the relation between number of mol with mass of gas in balloon B.
[Jisim atom relatif/ Relative atomic mass: C=12, O=16]

..... [1M]

(b) Seorang ahli kimia menganalisis sebalian yang memberj bau buah pisang yang masak ranum. Dia mendapati sebatian ini mengandungi 64.62% karbon, 10.77% hidrogen dan 24.61% oksigen. Apakah formula empirik sebalian tersebut?
A chemist analyses the compounds that give off the smell of ripe bananas. He found this compound to contain 64.62% carbon, 10.77% hydrogen and 24.61% oxygen. What is the empirical formula of the compound?
[Jisim atom relatif / Relative atomic mass: C=12, H=1, O=16]

[4M]

[2024-Sarawak-Set02-03] Rajah 3 menunjukkan susunan radas yang digunakan untuk mengkaji tindak balas kimia antara wul besi dengan gas oksigen. Wul besi membakar dengan terang dalam oksigen, kemudian baki pepejal berwarna perang terhasil.
Diagram 3 shows the set-up of apparatus used to study the chemical reaction between iron wool and oxygen gas. The iron wool burns brightly in oxygen, then a brown solid residue is produced.



(a) Persamaan di bawah adalah bukan persamaan kimia yang seimbang.
The equation below is not a balanced chemical equation:

$$\text{.....Fe(p/s)} + \text{.....O}_2\text{(g/g)} \rightarrow \text{.....} \ Fe_2O_3\text{(p/s)}$$

Seimbangkan persamaan kimia di atas.
Balance the chemical equation above. *[1M]*

(b) Tafsirkan persamaan itu secara kualitatif dan kuantitatif.
Interpret the chemical equation qualitatively and quantitatively.

.....

..... [2M]

(c) Nyatakan jenis zarah dalam Fe_2O_3. ..... [1M]
State the type of particles in Fe_2O_3.

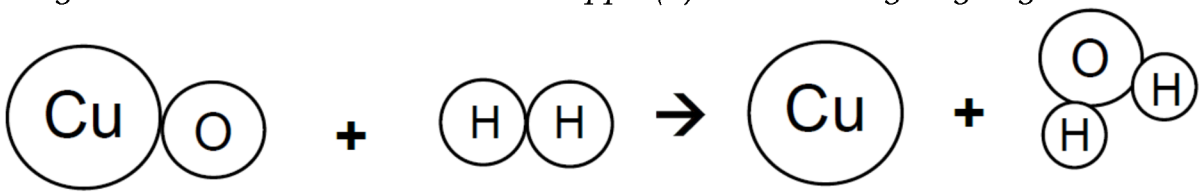
(d) Tuliskan formula kation bagi Fe_2O_3?
Write the formula of cation in Fe_2O_3?

..... [1M]

(e) Hitung jisim formula relatif bagi Fe_2O_3.
Calculate the relative formula mass of Fe_2O_3.
[Jisim atom relative/ *Relative atomic mass*: O=16, Fe=56]

[1M]

[2024-Melaka-01] Rajah 1 menunjukkan tindak balas antara kuprum(II) oksida dan gas hidrogen.
Diagram 1 shows reaction between copper(II) oxide and hydrogen gas.



(a) Nyatakan formula kimia bagi kuprum(II) oksida dan gas hidrogen.
State the chemical formula of copper(II) oxide and hydrogen gas.

Kuprum(II) oksida/ *Copper(II) oxide* : .....

Gas hydrogen/ *Hydrogen gas* : ..... [2M]

(b) Nyatakan warna bagi kuprum(II) oksida. ..... [1M]
State the colour of copper(II) oxide.

(c) Nyatakan maklumat kualitatif dan kuantitatif berdasarkan Rajah 1.
State the qualitative and quantitative information based on Diagram 1.

.....

..... [2M]

[2024-Selangor-Set1-06] Rajah 6 menunjukkan sejenis bahan bom mandian yang diperbuat daripada 2 bahan: natrium bikarbonat, $NaHCO_3$ dan asid sitrik, $C_6H_8O_7$. Garam natrium sitrat, $Na_3C_6H_5O_7$ dihasilkan dengan gas karbon dioksida dan air.
Diagram 6 shows a type of bath bomb made from 2 materials: sodium bicarbonate, $NaHCO_3$ *and citric acid,* $C_6H_8O_7$. *Sodium citrate salt,* $Na_3C_6H_5O_7$, *is produced along with carbon dioxide gas and water.*

Persamaan kimia bagi tindak balas antara dua bahan tersebut adalah seperti berikut:
The chemical equation for the reaction between the two substances is as follows:

$$\square\ NaHCO_3 + \square\ C_6H_8O_7 \rightarrow \square\ Na_3C_6H_5O_7 + \square\ CO_2 + \square\ H_2O$$

(a) Seimbangkan persamaan kimia pada ruangan kotak yang disediakan.
Balance the chemical equation in the boxes provided.

[2M]

(b) Nyatakan maklumat kualitatif dan maklumat kuantitatif yang boleh diperoleh daripada persamaan tersebut.
State qualitative information and quantitative information that can be obtained from the chemical equation.

.....

.....

.....

..... [3M]

(c) Maira menggunakan 2.52 g natrium bikarbonat, $NaHCO_3$ untuk bertindak balas dengan asid sitrik, $C_6H_8O_7$ bagi menghasilkan bom mandian.
Hitung jisim asid sitrik, $C_6H_8O_7$ yang perlu digunakan.
[Jisim atom relatif: H = 1, C = 12, O = 16, Na = 23]
Maira used 2.52 g of sodium bicarbonate, $NaHCO_3$ to be reacted with citric acid, $C_6H_8O_7$ to make the bath bomb.
Calculate the mass of the citric acid, $C_6H_8O_7$ that needs to be used.
[Relative atomic mass: H = 1, C = 12, O = 16, Na = 23]

[4M]

Esei

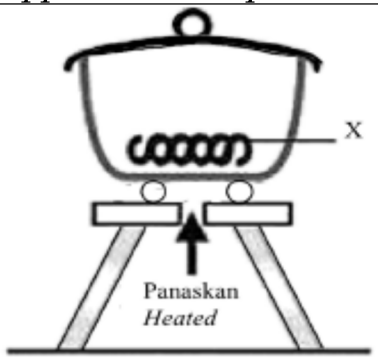
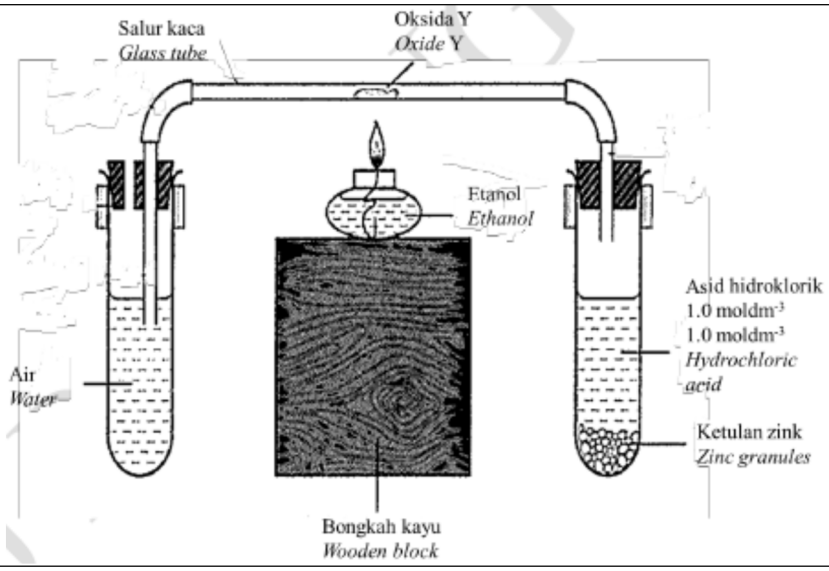
[2024 JUJ Set2-10] (a) Jadual 10.1 menunjukkan formula molekul dan formula empirik bagi benzena.
Table 10.1 shows the molecular formula and empirical formula for benzene.

Formula Molekul *Molecular Formula*	Formula Empirik *Empirical Formula*
C_6H_6	CH

Nyatakan maksud formula molekul dan banding bezakan formula molekul dan formula empirik bagi benzena.
State the meaning of molecular formula and compare the molecular formula and the empirical formula for benzene.

[6M]

(b) Jadual 10 menunjukkan Kaedah I dan Kaedah II yang digunakan untuk menentukan formula empirik bagi oksida logam X dan oksida logam Y
Table 10 shows Method I and Method II that is used to determine the empirical formula for metal oxide X and metal oxide Y

Kaedah *Method*	Susunan Radas *Apparatus set-up*
I	
II	

(i) Cadangkan logam X dan oksida logam Y. Banding bezakan antara Kaedah I dan Kaedah II dalam menentukan formula empirik oksida logam X dan oksida logam Y.
Suggest metal X and metal oxide Y. Compare and explain the differences between Method I and Method II in determining the empirical formula of metal oxide X and metal oxide Y.

[7M]

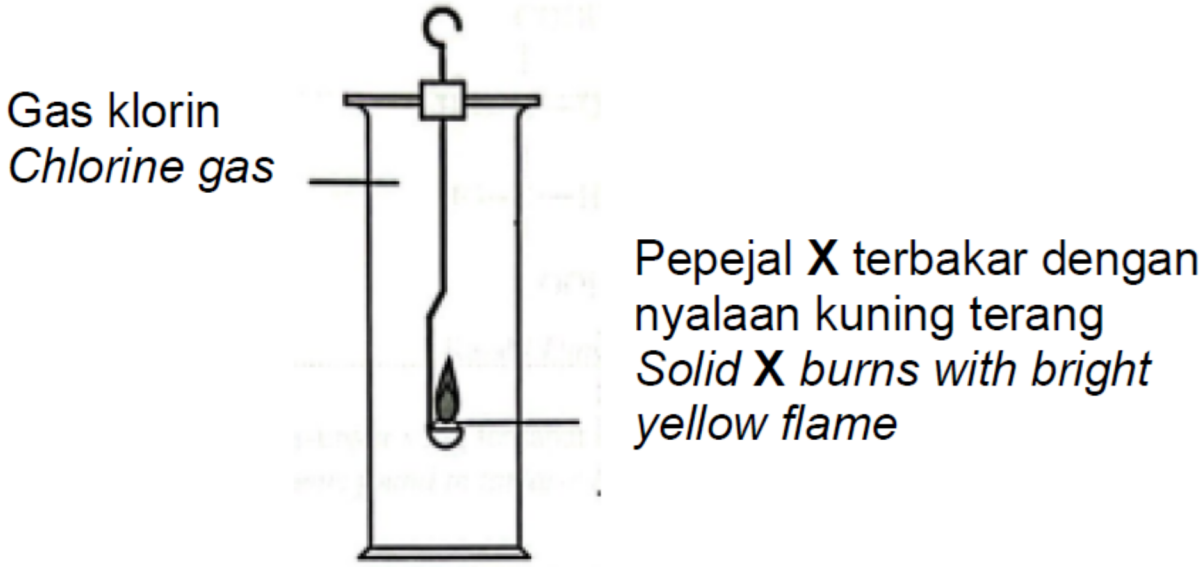
(ii) Jadual 10.2 menunjukkan data yang diperolehi daripada satu ekperimen yang dijalankan menggunakan Kaedah I.
Table 10.2 shows data obtained from an experiment conducted using Method I.

Penerangan *Description*	Jisim (g) *Mass (g)*
Jisim mangkuk pijar + penutup *Mass of crucible + lid*	22.60
Jisim mangkuk pijar + penutup + logam X *Mass of crucible + lid + X metal*	25.00
Jisim mangkuk pijar + penutup + oksida logam X *Mass of crucible + lid + metal oxide X*	26.60

Nyatakan warna oksida logam X dan tentukan formula empirik bagi oksida logam X. Tuliskan persamaan kimia bagi tindak balas tersebut.
State the colour of metal oxide X and determine the empirical formula of metal oxide X. Write the chemical equation for the reaction.
[JAR: X=24, O=16]

[7M]

[2024-Melaka-05] Unsur X terletak dalam Kumpulan 1 dan Kala 3 dalam Jadual Berkala Unsur. Rajah 5 menunjukkan susunan radas bagi satu eksperimen untuk mengkaji tindak balas antara unsur X dengan gas klorin.
Element X is located in Group 1 and Period 3 in the Periodic Table of Elements. Diagram 5 shows the apparatus set-up for an experiment to study the reaction between element X with chlorine gas.



(a) Nyatakan warna bagi gas klorin./State the colour of chlorine gas.

..... [1M]

(b) Nyatakan nama unsur X./ *State the name of element X.*

..... [1M]

(c) Tuliskan persamaan kimia bagi tindak balas ini.
Write the chemical equation for this reaction.

..... [2M]

(d) Hitungkan jisim hasil tindak balas yang terbentuk jika 0.5 mol X terbakar lengkap dalam gas klorin.
Calculate the mass of product formed if 0.5 mol of X burns completely in chlorine gas.
[Jisim molar hasil tindak balas/ *Molar mass of product* : 58.5 g mol^{-1}]

[2M]

(e) Unsur X dan klorin terletak dalam kala yang sama di dalam Jadual Berkala Unsur. Bandingkan keelektronegatifan bagi unsur X dan klorin. Berikan satu sebab.
Element X and chlorine are located in the same period in the Periodic Table of Elements. Compare the electronegativity of element X and chlorine. Give a reason.

.....

..... [2M]

[2024 Perak – Set 1-02] Jadual 2 menunjukkan beberapa sifat fizik bagi unsur Kumpulan 17 dalam Jadual Berkala Unsur.
Table 2 shows some physical properties of Group 17 elements in the Periodic Table of Elements.

Unsur *Element*	Takat lebur (°C) *Melting point (°C)*	Takat didih (°C) *Boiling point (°C)*	Jejari atom (nm) *Atomic radius (nm)*
Klorin, Cl *Chlorine*	-101	-34	0.099
Bromin, Br *Bromine*	-7	59	0.114
Iodin, I *Iodine*	114	184	0.133

(a)Nyatakan nama lain bagi unsur Kumpulan 17.
State the other name for Group 17 elements.

..... [1M]

(b) Nyatakan perubahan jejari atom apabila menuruni Kumpulan 17. Terangkan.
State the change in atomic radius when going down Group 17. Explain.

.....

..... [2M]

(c) Lukiskan susunan zarah bagi bromin pada suhu bilik.
Draw the arrangement of particles for bromine at room temperature.

[1M]

(d) Nyatakan satu langkah keselamatan yang harus diamalkan apabila mengendalikan klorin dan bromin di makmal.
State one safety step that should be practised when handling chlorine and bromine in the laboratory.

..... [1M]

[2024 Johor-02] Rajah 2 menunjukkan perwakilan piawai bagi unsur-unsur dalam kumpulan 17.
Diagram 2 shows standard representation of elements in group

$^{19}_{9}F$	$^{35}_{17}Cl$	$^{80}_{35}Br$	$^{127}_{33}I$
Fluorin *Fluorine*	Klorin *Chlorine*	Bromin *Bromine*	Iodin *Iodine*

(a)Apakah nama kumpulan 17?/ What is the name of Group 17?

..... [1M]

(b)Nyatakan warna gas klorin./ *State the colour of chlorine gas.*

..... [1M]

(c)Antara unsur-unsur dalam Rajah 2, yang manakah digunakan sebagai bahan dalam pemadam api?
Between the elements in Diagram 2, which is used as a material in fire extinguisher?

..... [1M]

(d) Atom fluorin lebih kecil daripada atom klorin.
Terangkan mengapa fluorin lebih mudah membentuk ion negatif berbanding atom klorin.
Fluorine atoms are smaller than chlorine atoms.
Explain why fluorine forms a negative ion more easily than chlorine.

.....

.....

..... [2M]

[2024 Perlis-01] Rajah 1 menunjukkan perwakilan piawai bagi unsur X, Y dan Z.
Diagram 1 shows the standard representation of elements X, Y and Z.

$^{23}_{11}X$	$^{35.5}_{17}Y$	$^{39}_{19}Z$

(a) Apakah maksud kumpulan?/ What is the meaning of groups?

..... [1M]

(b) Apakah nama lain bagi Kumpulan 17?/ What is another name of Group 17?

..... [1M]

(c) Semua unsur X, Y dan Z yang ditunjukkan dalam Rajah 1 boleh bertindak balas dengan air dan membentuk larutan yang berlainan nilai pH.
All elements X, Y and Z shown in Diagram 1 can react with water and form solutions with different pH values.

(i) Apabila Z bertindak balas dengan air, larutan hidroksida yang bersifat alkali dan gas tidak berwarna akan terbentuk. Namakan gas berkenaan.
When Z reacts with water, an alkaline hydroxide solution and a colourless gas are formed. Name the gas.

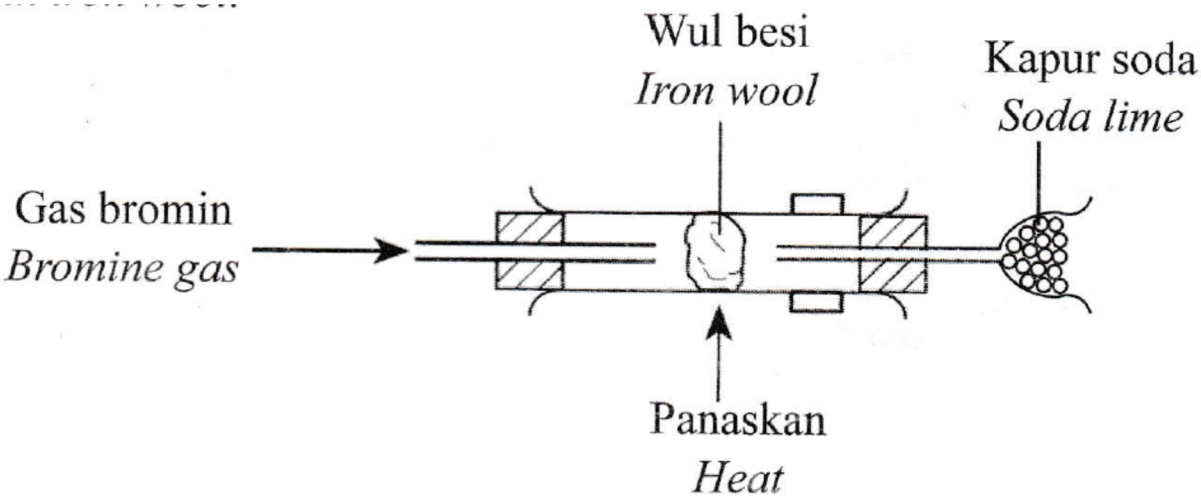
..... [1M]

(ii) Unsur yang manakah akan menghasilkan larutan berasid? Terangkan.
Which element will produce an acidic solution? Explain.

.....

..... [2M]

[2024 Negeri Sembilan-02] Rajah 2.1 menunjukkan susunan radas untuk tindak balas antara sejenis halogen dengan wul besi.
Diagram 2.1 shows set up of apparatus for the reaction between a with iron wool.



(a) Apakah warna gas bromin?/ *What is the colour of bromine gas?*

..... [1M]

(b) Tindak balas dalam Rajah 2.1 menghasilkan sejenis sebatian yang berwarna perang.
Namakan sebatian yang terbentuk dan tuliskan formula sebatian tersebut.
The reaction in Diagram 2.1 produces a brown colour compound.
Name the compound formed and write the formula for the compound.

Nama Name : .....

Formula/ *Formula* : ..... [2M]

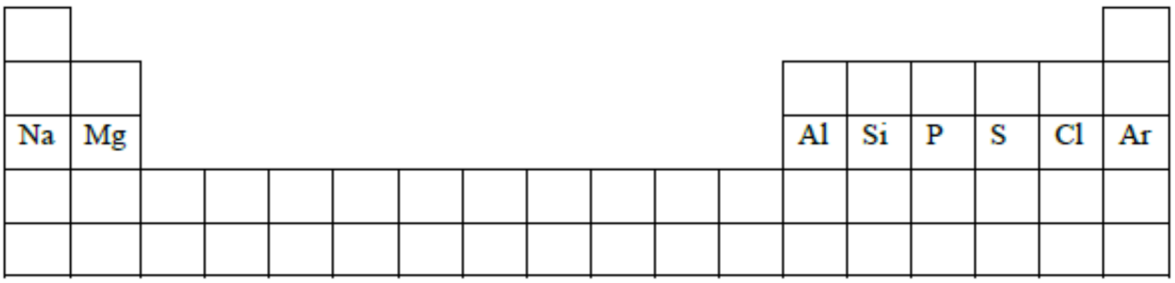
(c) (i) Saiz atom klorin lebih kecil daripada atom bromin.
Bandingkan kereaktifan klorin dan bromin apabila bertindak balas dengan wul besi.
Atomic size of chlorine is smaller than bromine atom.
Compare the reactivity of chlorine and bromine when reacts with iron wool.

..... [1M]

(ii) Terangkan jawapan anda di 2(c)(i).
Explain your answer in 2(c)(i).

..... [1M]

[2024 Johor Pasir Gudang-02] Rajah 2 menunjukkan unsur-unsur dalam Kala 3 pada Jadual Berkala Unsur.
Diagram 2 shows the element of Period 3 in Periodic Table of Elements.



Berdasarkan Rajah 2,/ Based on Diagram 2,

(a) Apakah yang dimaksudkan dengan kala?
What is meant by period?

..... [1M]

(b) Unsur manakah yang membentuk oksida amfoterik?
Which elements forms an amphoteric oxide?

..... [1M]

(c) (i) Antara unsur Na dan Cl, yang manakah mempunyai saiz atom yang lebih kecil?
Between the elements Na and Cl, which has the smaller atomic size?

..... [1M]

(ii) Terangkan sebab bagi jawapan anda di (c)(i).
Explain your answer in (d)(i)

.....

..... [2M]

[2024-Sarawak-Set01-02] Jadual 1 menunjukkan maklumat unsur dalam Jadual Berkala Unsur.
Table 1 shows the information of elements in Periodic Table of Elements.

Unsur *Element*	Na	Mg	Al	Si	P	S	Cl
Susunan elektron *Electron arrangement*	2.8.1	2.8.2	2.8.3	2.8.4	2.8.5	2.8.6	2.8.7
Jejari atom *Atomic radius*	186	160	143	118	110	104	100

(a) Apakah yang dimaksudkan dengan kala?/ *What is meant by period?*

..... [1M]

(b) (i) Kala yang manakah unsur itu terletak?
Which period are the elements placed?

..... [1M]

(ii) Beri satu sebab bagi jawapan di 1(b)(i).
Give one reason for the answer in 1(b)(i).

..... [1M]

(c) Nyatakan unsur yang wujud sebagai molekul dwiatom. ..... [1M]
State the element that exists as diatomic molecule.

(d) Unsur yang manakah ialah separa logam?
Which element is a semi-metal?

..... [1M]

[2024-Sarawak-Set02-04] Jadual 1 menunjukkan maklumat bagi unsur Kala 3 dalam Jadual Berkala Unsur.
Table 1 shows the information of Period 3 elements in the Periodic Table of Elements.

Unsur *Element*	Na	Mg	Al	Si	P	S	Cl	Ar
Nombor proton *Proton number*	11	12	13	14	15	16	17	18
Bilangan elektron valens *Number of valence electrons*	1	2	3	4	5	6	7	8

(a) (i) Mengapa unsur-unsur ini diletakkan dalam Kala 3?
Why are these elements placed in Period 3?

..... [1M]

(ii) Argon wujud sebagai gas monoatom. Jelaskan.
Argon exists as monoatomic gas. Explain.

.....

..... [1M]

(b) Klorin ditambah ke dalam air kolam renang untuk membersihkan kolam dan membunuh kuman. Hasil tindak balas bagi tindak balas klorin dan air ialah asid hidroklorik dan asid hipoklorus.
Chlorine is added into swimming pool to clean the pool and to kill germs. The products of the reaction of chlorine and water is hydrochloric acid and hypochlorous acid.

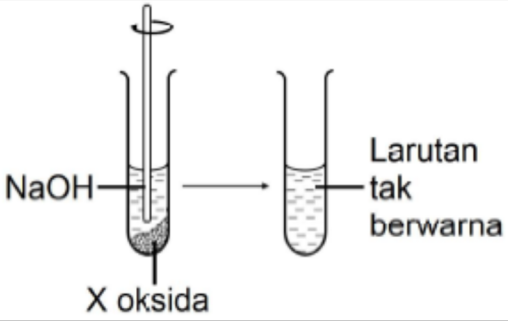
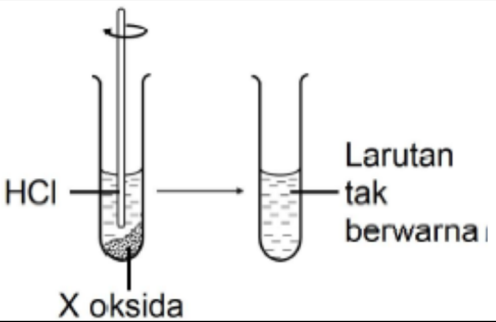
(i) Tuliskan persamaan kimia bagi tindak balas antara klorin dengan air kolam renang.
Write a chemical equation for the reaction between chlorine and swimming pool water.

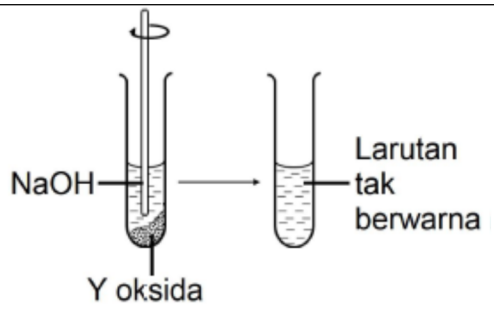
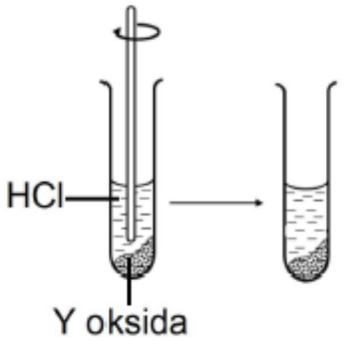
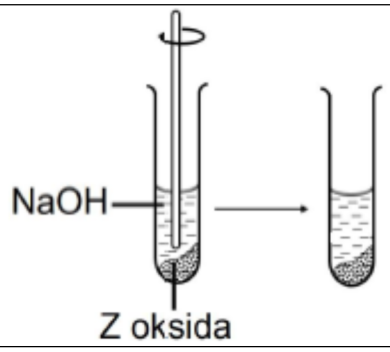
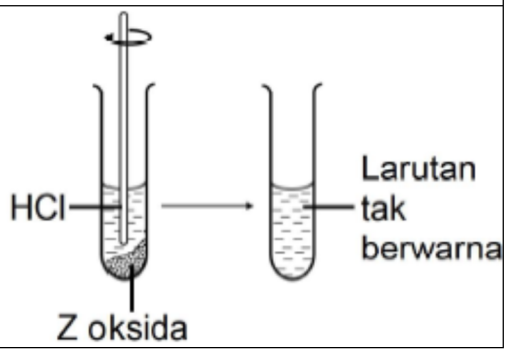
..... [2M]

(ii) Hitung jisim klorin yang perlu dilarutkan dalam 2 500 000 dm^3 air kolam renang untuk menghasilkan 0.00004 mol dm^{-3} asid hipoklorus.
[Jisim atom relatif: H=1, O=16, Cl = 35.5]
Calculate the mass of chlorine needed to be dissolved in 2 500 000 dm^3 of swimming pool water to produce 0.00004 mol dm^{-3} of hypochlorous acid.
[Relative atomic mass: H=1, O=16, Cl = 35.5]

[3M]

[2024 Kelantan-05] Rajah 5 menunjukkan pemerhatian bagi tindak balas oksida unsur yang terdapat dalam Kala 3 Jadual Berkala Unsur.
Diagram 5 shows the observation of the oxide reaction of elements found in Period 3 of the Periodic Table of Elements.

Oksida Unsur *Elements oxide*	Larutan Natrium hidroksida, NaOH 1 mol dm^{-3} *Sodium hydroxide solution, NaOH 1 mol dm^{-3}*	Asid hidroklorik, HCl 1 mol dm^{-3} *Hydrochloric acid, HCl 1 mol dm^{-3}*
X oksida *X oxide*		

Y oksida *Y oxide*		
Z oksida *Z oxide*		

(a) Mengapa unsur-unsur ini diletakkan dalam Kala 3?
Why are these elements placed in Period 3?

..... [1M]

(b) Berdasarkan Rajah 5, oksida bagi unsur yang manakah menunjukkan
Based on Diagram 5, which oxide of elements that shows

Sifat berasid/ *Acidic property* : .....

Sifat beralkali/ *Alkali property* : .....

Sifat amfoterik/ *Amphoteric property*: ..... [3M]

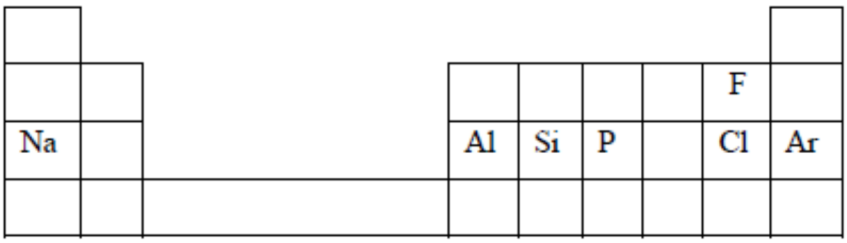
(c) (i) Formula kimia bagi Z oksida adalah ZO, menggunakan formula yang diberikan, tuliskan persamaa kimia bagi tindak balas antara Z oksida dan asid hidroklorik seperti Rajah 5
The chemical formula forZ oxide is ZO, using the given formula, write the chemical equation for the reaction between Z oxide and hydrochloric acid as shown in Diagram 5

..... [2M]

(ii) Hitungkan isipadu minimum bagi asid hidroklorik yang diperlukan untuk memastikan semua 0.005 mol Z oksida larut sepenuhnya.
Calculate the minimum volume of hydrochloric acid needed to ensure that all 0.005 mol of Z oxide is completely dissolved.

[2M]

[2024 Putrajaya-03] Rajah 2 menunjukkan sebahagian daripada Jadual Berkala Unsur.
Diagram 2 shows a part of the Periodic Table of Elements.



Berdasarkan Rajah 2,/ *Based on Diagram 2,*

(a) Apakah prinsip utama yang digunakan dalam penyusunan unsur-unsur di dalam Jadual Berkala Unsur?
What is the basic principle used in arrangement of elements in the Periodic Table of Elements?

..... [1M]

(b) Salah satu unsur di dalam Rajah 2 membentuk oksida yang boleh bertindak balas dengan asid dan juga alkali untuk menghasilkan garam dan air. Nyatakan istilah yang digunakan untuk menerangkan sifat oksida yang dihasilkan.
One of the elements in Diagram 2 formed an oxide with the ability to react with acid and also with alkali to produce salt and water. State the term used to explain the properties of the oxide produced.

..... [1M]

(c) (i) Bandingkan saiz atom aluminium, Al dengan saiz bagi atom klorin, Cl.
Compare the atomic size of aluminium, Al atom to the chlorine, Cl atom.

..... [1M]

(ii) Terangkan perbezaan saiz atom-atom tersebut.
Explain the difference in the atomic size of that atoms.

.....

.....

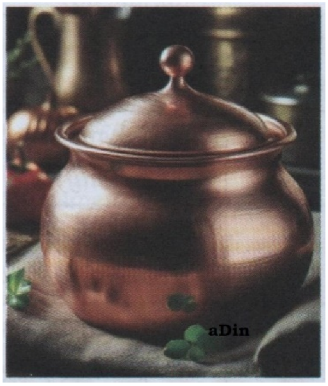
.....

..... [2M]

(iii) Susunkan semua unsur pada Rajah 2 mengikut pertambahan saiz atom.
Arrange all elements at Diagram 2 according to the increasing of atomic size.

..... [1M]

[2024-Selangor-Set02-02] Rajah 2 menunjukkan suatu periuk masakan yang diperbuat daripada kuprum.
Diagram 2 shows a cooking pot made from copper.



(a) Kuprum ialah suatu unsur yang terletak di antara Kumpulan 3 hingga 12 dalam Jadual Berkala Unsur. Namakan kumpulan unsur ini.
Copper is an element located between Group 3 to 12 of the Periodic Table of Elements. Name this group of elements.

..... [1M]

(b) Nyatakan dua ciri istimewa bagi kuprum.
State two special characteristics of copper.

.....

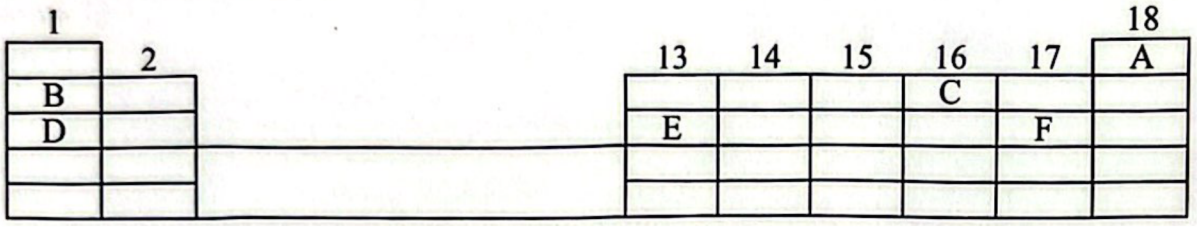
..... [2M]

(c) Dalam pembuatan periuk masakan, gas argon yang bersifat lengai digunakan semasa proses pengimpalan logam. Terangkan mengapa gas argon bersifat lengai.
In the production of cooking pots, argon gas which is inert is used during the metal welding process. Explain why argon gas is inert.

.....

..... [2M]

[2024-Selangor-Set1-02] Rajah 2 menunjukkan Jadual Berkala Unsur. Unsur-unsur yang dilabelkan bukan merupakan simbol unsur yang sebenar.
Diagram 2 shows the Periodic Table of Elements. The elements labelled are not the actual symbol of the elements.



(a) Nyatakan nama lain bagi Kumpulan 18. ..... [1M]
State another name for Group 18.

(b) Berdasarkan Jadual Berkala Unsur dalam Rajah 2,
Based on the Periodic Table of Elements in Diagram 2,

(i) nyatakan unsur yang wujud sebagai gas monoatom pada suhu bilik. Berikan sebab bagi jawapan anda.
state the element that exist as monoatomic gas at room temperature. Give a reason for your answer.

.....

.....

..... [3M]

(ii) Unsur X merupakan suatu unsur peralihan. Tandakan kedudukannya pada Jadual Berkala Unsur di Rajah 2 dengan "X".
Element X is a transition element. Mark its position in the Periodic Table of Elements in Diagram 2 with "X".

[1M]

[2024 – Terengganu-06] Rajah 6 menunjukkan unsur kala 3 yang tidak diwakili simbol sebenar unsur-unsur berkenaan.
Diagram 6 shows elements period 3 which do not represent the actual symbol of the elements.

16 32 P	17 35.5 Q	18 40 R

(a) (i) Tuliskan susunan elektron bagi atom R. ..... [1M]
Write the electron arrangement for atom P.

(ii) Mengapakah unsur P terletak pada kala 3?
Why element P located at period 3?

..... [1M]

(b) Gas Q merupakan gas berwarna bertindak balas dengan 1.12 g ferum menghasilkan pepejal perang.
Gas Q is a coloured gas reacts with 1.12 g iron to form brown solid.

(i) Tuliskan persamaan kimia tindak balas yang berlaku.
Write chemical equation for the reaction.

..... [2M]

(ii) Hitung isipadu gas Q yang terhasil pada keadaan bilik.
[1st padu molar gas keadaan bilik : 24 dm^3 mol^{-1}]
Calculate volume gas Q produced at room condition.
[Molar volume of gas at room condition: 24 dm^3 mol^{-1}]

[3M]

(c) (i) R tidak reaktif secara kimia. Jelaskan.
R is chemically unreactive. Explain.

..... [1M]

(ii) Nyatakan kegunaan unsur R./ *State the uses of element R.*

..... [1M]

[2024 Johor Pasir Gudang-02] Rajah 2 menunjukkan sebahagian daripada Jadual Berkala Unsur. P, Q, R, S, T dan U bukan simbol sebenar unsur-unsur.
Diagram 2 shows part of the Periodic Table of Elements. P, Q, R, S, T and U are not the actual symbols of the elements.

(a) Apakah prinsip asas yang digunakan dalam penyusunan unsur-unsur dalam Jadual Berkala Unsur?
What is the basic principle used in arranging the elements in the Periodic Table of Elements?

.....

..... [1M]

(b) Nyatakan kedudukan unsur R dalam Jadual Berkala Unsur.
State the position of element R in the Periodic Table of Elements.

..... [1M]

(c) Susun saiz atom bagi unsur-unsur dalam Rajah 2 mengikut tertib menurun.
Arrange the atomic size of elements in Diagram 2 in descending order.

..... [1M]

(d) Lukis susunan elektron bagi ion U.
Draw the electron arrangement of ion U.

[2M]

[2024-Kedah-04] Rajah 4 menunjukkan perwakilan piawai bagi atom-atom unsur X dan Y. Huruf yang digunakan bukan simbol sebenar unsur tersebut.
Diagram 4 shows the standard representation of the atoms of elements X and Y. The letters used are not the actual symbols of the elements.

$^{23}_{11}X$ $^{39}_{19}Y$

(a) Nyatakan bagaimana unsur-unsur disusun dalam Jadual Berkala Unsur
State how the elements are arranged in the Periodic Table of Elements.

..... [1M]

(b) Berdasarkan Rajah 4/ *Based on Diagram 4 :*

(i) Kenal pasti kumpulan bagi unsur X dan Y di dalam Jadual Berkala Unsur.
Identify the group of elements X and Y in the Periodic Table of Elements.

..... [1M]

(ii) Berikan sebab bagi jawapan di 4 (b)(i)
Give a reason for the answer in 4 (b)(i).

..... [1M]

(c) 0.2 mol unsur Y dimasukkan ke daiam sebuah kelalang kon yang berisi air dan gas yang terbebas dikumpulkan.
0.2 mol of element Y is placed in a conical flask containing water and the liberated gas are collected.

(i) Tulis persamaan kimia untuk menunjukkan tindak balas ini
Write a chemical equation to show the reaction.

..... [2M]

(ii) Hitung isipadu maksimum bagi gas yang terbebas.
Calculate the maximum volume of gas liberated.
[Isi padu molar: 24 dm^3 mol^{-1} pada keadaan bilik]
[Molar volume : 24 dm^3 mol^{-1} at room conditions]

[2M]

[2024-Johor Batu Pahat-06] Jadual 6 menunjukkan maklumat unsur dalam Jadual Berkala Unsur. Huruf yang digunakan bukan merupakan simbol sebenar unsur.
Table 6 shows the information of elements in the Periodic Table of Elements. The letters shown are not the actual symbols of the elements.

Unsur *Element*	P	Q	R	S	T	U	V
Nombor proton *Proton number*	11	12	13	14	15	16	17

(a) Berdasarkan jadual, nyatakan sifat oksida bagi oksida R.
Based on table, state the property of oxide for oxide R.

..... [1M]

(b) Unsur T bertindak balas dengan V membentuk sebatian X.
Nyatakan jenis ikatan bagi sebatian X.
Element T react with V to form compound X.
State the type of bond for compound X.

..... [1M]

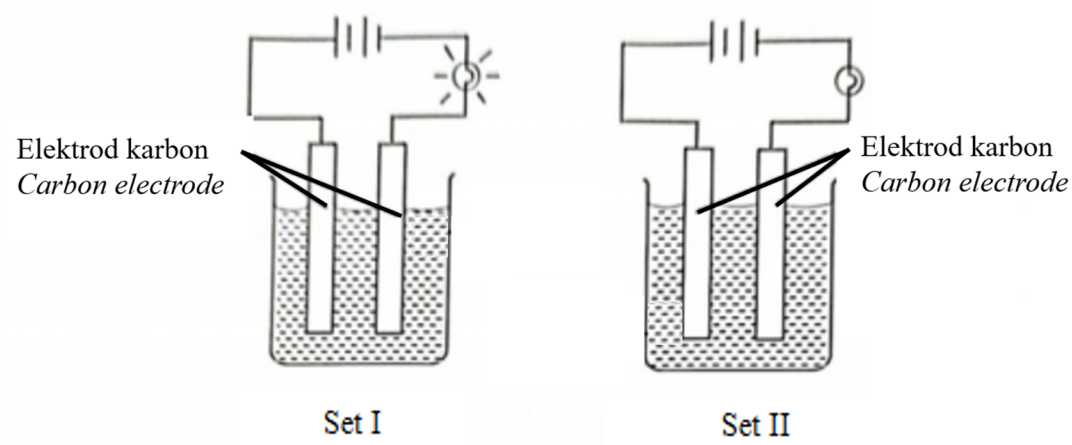
(c) (i) Unsur P bertindak balas dengan unsur V membentuk sebatian Y.
Tulis persamaan kimia bagi pembentukan sebatian Y.
Elements P react with elements V to form compound Y.
Write the chemical equation for the formation of compound Y.

..... [2M]

(ii) 0.05 mol P bertindak balas dengan V untuk membentuk sebatian Y.
Hitungkan isipadu V yang diperlukan.
0.05 mol P react with element V to form compound Y.
Calculate the volume of V required.
[Isipadu molar = 24 dm^3 mol^{-1} pada keadaan bilik]
[Molar volume = 24 dm^3 mol^{-1} at room conditions]

[2M]

(d) Rajah 6 Set I dan Set II menunjukkan radas bagi mengkaji kekonduksian elektrik bagi dua jenis sebatian yang berbeza.
Diagram 6 Set I and Set II shows an apparatus set-up to investigate the conductivity of electricity for two types of different compound.



Terangkan perbezaan pemerhatian bagi rajah Set I dan Set II.
Explain the different of observation for diagram Set I and Set II.

.....

.....

..... [3M]

[2024 JUJ Set2-08] Rajah 8.1 menunjukkan sebahagian daripada Jadual Berkala Unsur.
Diagram 8.1 shows part of the Periodic Table of Elements.

Huruf T, U, V, W, Y dan Z bukan mewakili simbol sebenar unsur.
The letters T, U, V, W, Y and Z do not represent the actual symbols of the elements.

(a) (i) Nyatakan nama lain bagi unsur Kumpulan 18.
State another name for Group 18 elements

..... [1M]

(ii) Satu unsur X mempunyai nombor proton 18. Tandakan kedudukan unsur X pada Jadual Berkala Unsur di atas dan tuliskan susunan elektronnya.
Element X has a proton number of 18. Mark the position of element X on the Periodic Table of Elements above and write its electron arrangement.

.....

..... [2M]

(b) (i) Unsur W dan T boleh bertindak balas dan membentuk suatu sebatian. Tuliskan persamaan kimia bagi tindak balas tersebut.
Elements W and T can react to form a compound.
Write the chemical equation for the reaction.

..... [2M]

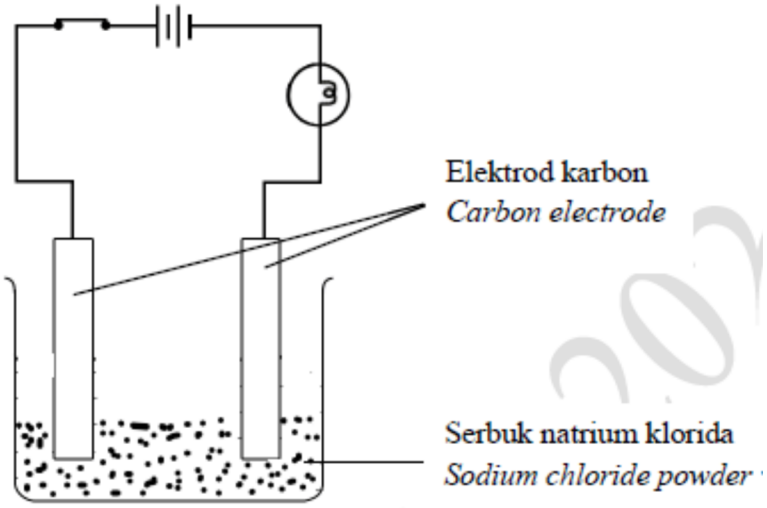
(ii) Huraikan secara ringkas pembentukan sebatian yang terhasil di (b)(i).
Describe briefly the formation of the compound formed in (b)(i).

.....

.....

..... [2M]

(c) Rajah 8.2 menunjukkan susunan radas untuk mengkaji sifat fizik natrium klorida.
Diagram 8.2 shows an apparatus set-up to study the physical state of sodium chloride.



Kumi telah menjalankan satu eksperimen dan mendapati mentol pada litar tidak menyala. Cadangkan satu kaedah yang sesuai untuk menyalakan mentol tersebut dan wajarkan jawapan anda.

Kumi has conducted an experiment and he found that the bulb on the circuit did not lights up. Suggest a suitable method to light up the bulb and justify your answer.

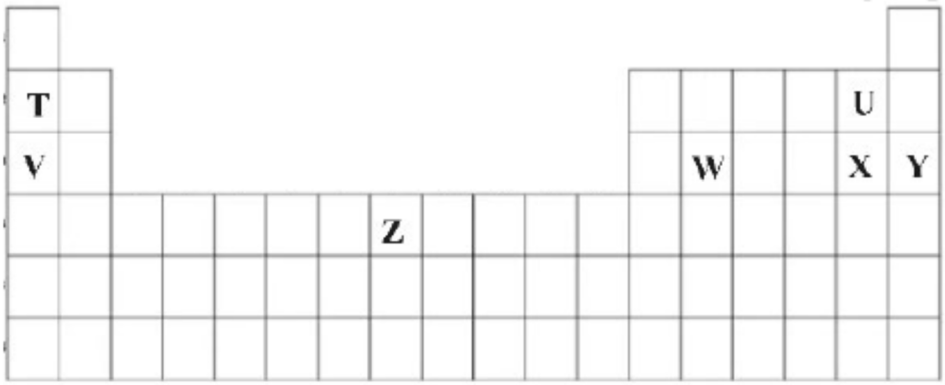
.....

.....

..... [3M]

Esei

[2024 JUJ Set1-09] Rajah 9.1 menunjukkan sebahagian daripada Jadual Berkala Unsur.
Diagram 9.1 shows part of the Periodic Table of Elements.



(a) Unsur Z mempunyai dua nombor pengoksidaan iaitu +2 dan +3. Nyatakan nama kumpulan bagi unsur Z dalam Jadual Berkala Unsur
Element Z has two oxidation numbers which are +2 and +3. State the name of group for element Z in the Periodic Table of Elements.

Unsur Z juga digunakan dalam Proses Haber.
The Z element is also used in the Haber Process.

$$N_2(g) + 3H_2(g) \underset{450 - 550\ ^\circ C,\ \mathbf{Z}}{\overset{200 - 300\ atm}{\rightleftharpoons}} 2NH_3(g)$$

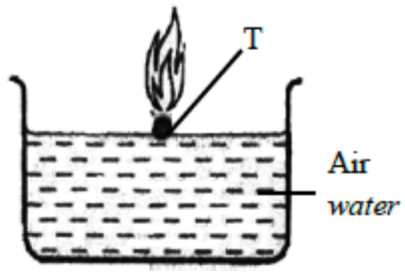
Nyatakan fungsi unsur Z dalam tindak balas di atas dan kesan penggunaan unsur Z dalam tindak balas tersebut.
State the function of element Z in the above reaction and the effect of using element Z in the reaction.

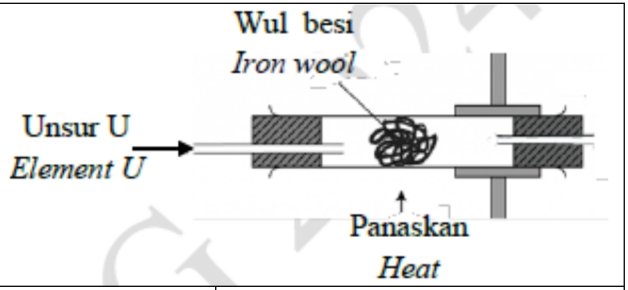
[3M]

(b) Mengapakah unsur V, W, X dan Y berada dalam kala yang sama?
Why are elements V, W, X and Y in the same period?

[1M]

(c) (i) Rajah 9.2 menunjukkan tindak balas unsur T dan unsur V dengan air dan unsur U dan unsur X dengan wul besi
Diagram 9.2 shows the reaction of element T and element V with water and element U and element X with iron wool





Unsur *Elements*	Pemerhatian *Observations*	Unsur *Elements*	Pemerhatian *Observations*
T	Bergerak perlahan-lahan di atas permukaan air. Terbakar dengan nyalaan merah. *Move slowly on the surface of the water. Burns with a red flame.*	U	Wul besi terbakar sangat terang dan membentuk pepejal perang apabila disejukkan. *Iron wool burns very brightly and forms a brown solid when cooled.*
V	Bergerak dengan pantas di atas permukaan air. Terbakar dengan nyalaan kuning yang cerah. *Move quickly on the surface of the water. Burns with a bright yellow flame.*	X	Wul besi terbakar terang dan membentuk pepejal perang apabila disejukkan. *Iron wool burns brightly and forms a brown solid when cooled.*

Berdasarkan Rajah 9.2, terangkan perbezaan kereaktifan antara
Based on Diagram 9.2, explain the differences in reactivity between

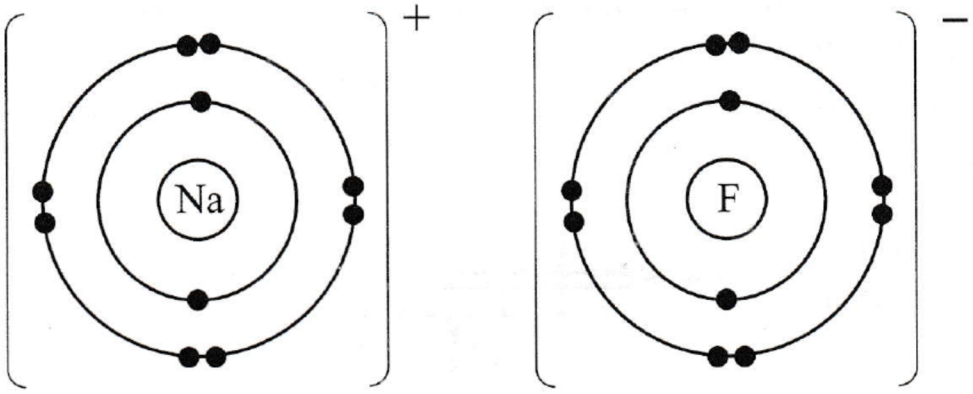
• Unsur T dan unsur V dengan air/ *Element U and element V with water*
• Unsur U dan unsur X dengan wul besi/ *Element U and element X with iron wool.*

[10M]

(ii) 72 cm^3 gas X dialirkan untuk bertindak balas dengan wul besi.
Tuliskan persamaan kimia yang berlaku dan hitung jisim pepejal perang yang terbentuk. 72 cm^3 of gas X is flowed to react with iron wool.
Write the chemical equation that occurs and calculate the mass of brown solid formed. [Jisim atom relatif // Relative atomic mass: Fe =56, X = 35.5]

[6M]

[2024 Negeri Sembilan-03] Rajah 3 menunjukkan susunan elektron bagi natrium fluorida.
Diagram 3 shows the electron arrangement of sodium fluoride.



(a) (i) Nyatakan jenis ikatan kimia dalam natrium fluorida.
State the type of chemical bond in sodium fluoride.

..... [1M]

(ii) Terangkan bagaimana ikatan kimia dalam 3(a)(i) terbentuk.
Explain how the chemical bond in 3(a)(i) is formed.

..... [1M]

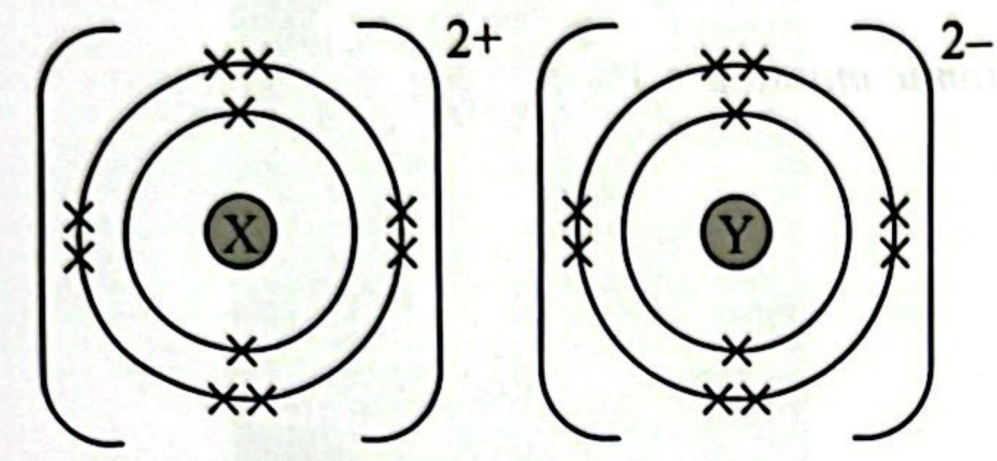
(b) (i) Natrium bertindak balas dengan gas fluorin untuk membentuk natrium fluorida.
Tuliskan persamaan kimia bagi tindak balas yang berlaku.
Sodium reacts with fluorine gas to form sodium fluoride.
Write a chemical equation for the reaction taken place.

..... [2M]

(ii) Dalam tindak balas 3(a)(i), 0.03 mol natrium telah bertindak balas dengan gas fluorin. Hitungkan jisim natrium fluorida yang terhasil.
[Jisim atom relatif: F = 19, Na = 23]
In the reaction in 3(b)(i), 0.03 mol sodium reacted with fluorine gas.
Calculate the mass of sodium fluoride produced.
[Relative atomic mass: F = 19. Na = 23]

[2M]

[2024-Selangor-Set1-04] Rajah 3 menunjukkan susunan elektron sebatian yang terbentuk daripada tindak balas bahan X dan Y.
Diagram 3 shows an electron arrangement of compound fanned from the reaction between substances X and Y.



Berdasarkan Rajah 3,/ *Based on Diagram 3,*

(a) (i) tuliskan susunan elektron bagi atom X. ..... [1M]
write the electron arrangement of atom X.

(ii) nyatakan jenis daya tarikan antara zarah-zarah dalam sebatian tersebut.
state the type of forces of attraction between particles in the compound.

..... [1M]

(iii) tuliskan persamaan kimia bagi pembentukan sebatian tersebut.
write the chemical equation for the formation of the compound.

..... [2M]

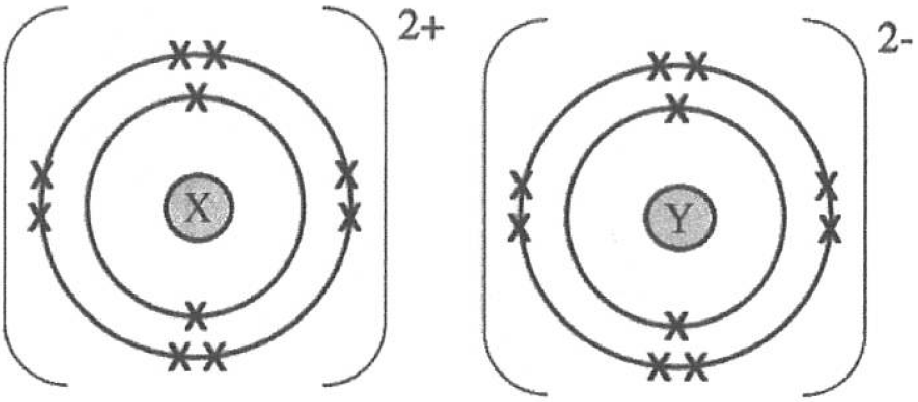
(iv) nyatakan satu sifat fizik bagi sebatian yang terbentuk.
state one physical property of the compound formed.

..... [1M]

(b) Kira jisim sebatian yang dihasilkan apabila 0.1 mol X bertindak balas dengan Y yang berlebihan.
Calculate the mass of compound produced when 0.1 mol of X react with excess Y.
[Jisim atom relative/ *Relative atomic mass*: Y = 16, X = 24]

[2M]

[2024-Johor Batu Pahat-08] Rajah 8 menunjukkan susunan elektron sebatian yang terbentuk daripada tindak balas bahan X dan Y.
Diagram 8 shows an electron arrangement of compound formed from the reaction between substance X and Y.



(a) (i) Tuliskan susunan elektron bagi atom X dan atom Y
Write the electron arrangement of atom X and atom Y

Atom X: ..... Atom Y : ..... [2M]

(ii) Nyatakan jenis daya tarikan antara zarah-zarah dalam sebatian tersebut.
State the type of forces of attraction between particles in the compund.

..... [1M]

(iii) Jelaskan proses pembentukan sebatian dalam Rajah 8.
Explain the process of formation of compound in Diagram 8.

.....

.....

..... [3M]

(b) Puan Juriah meletakkan pepejal putih ke dalam almari untuk menghalau lipas. Sifat fizik pepejal putih itu adalah seperti berikut:
Puan Juriah puts a white solid in a cupboard to keep the cockroach away. The physical properties of the white solid are as follows:

- Tidak boleh mengalirkan arus elektrik dalam semua keadaan.
  Cannot conduct electricity in any states.

- Takat lebur dan takat didih yang rendah
  Low melting point and boiling point

Berdasarkan maklumat tersebut, kenalpasti jenis sebatian pepejal putih itu dan terangkan ciri-ciri setiap satunya.

Based on the information, identify the type of compound of the white solid and explain each property.

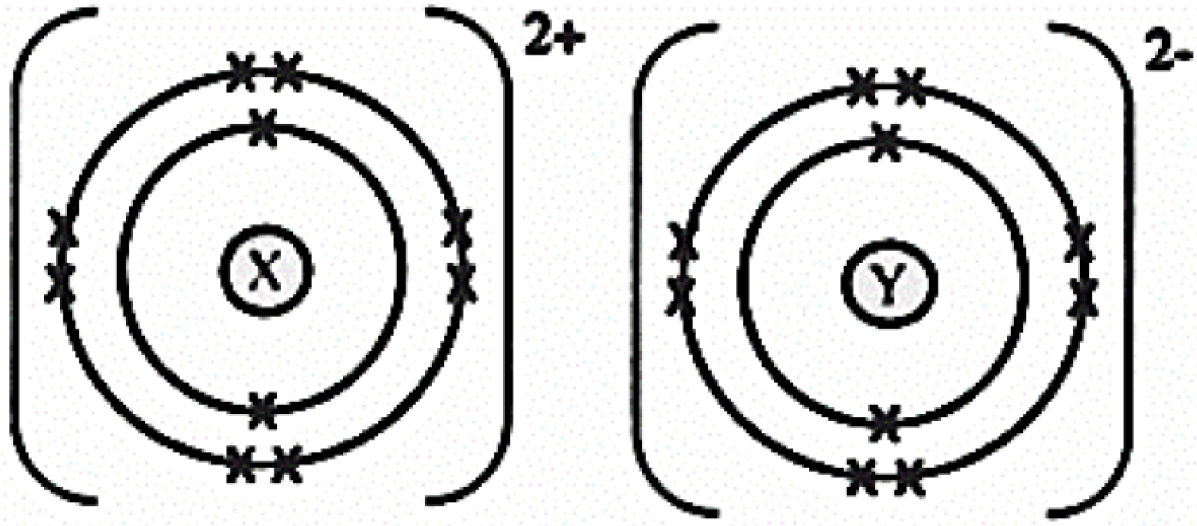
.....

.....

.....

..... [4M]

[2024-Sarawak-Set01-05] Rajah 4 menunjukkan susunan elektron bagi sebatian yang terbentuk daripada tindak balas antara unsur X dan unsur Y.
Diagram 4 shows an electron arrangement of compound formed between the reaction of element X and element Y.



Berdasarkan Rajah 4,/ Based on Diagram 4,

(a) (i) Tuliskan susunan elektron bagi atom X.
Write the electron arrangement of atom X.

..... [1M]

(ii) Nyatakan jenis daya tarikan antara zarah-zarah dalam sebatian tersebut.
State the type of forces of attraction between particles in the compound.

..... [1M]

(iii) Tuliskan persamaan kimia bagi pembentukan sebatian tersebut.
Write the chemical equation for the formation of the compound.

..... [1M]

(iv) Hitung jisim sebatian yang dihasilkan apabila 0.1 mol X bertindak balas dengan unsur Y yang berlebihan.
Calculate the mass of compound produced when 0.1 mol X reacts with excess element Y.
[Jisim atom relative/ *Relative atomic mass*: Y = 16, X = 24]

[2M]

(b) Puan Lee meletakkan pepejal putih ke dalam almari untuk menghalau lipas. Sifat fizik pepejal putih itu adalah seperti berikut:
Puan Lee puts a white solid in a cupboard to keep the cockroach away. The physical properties of the white solid are as follows:

• Tidak boleh mengalirkan arus elektrik dalam semua keadaan
Cannot conduct electricity in any states

• Takat lebur dan takat didih yang rendah
Low melting and boiling point

Berdasarkan maklumat di atas, kenal pasti jenis sebatian pepejal putih itu dan terangkan ciri-cirinya.
Based on the above information, identify the type of compound of the white solid and explain each property.

.....

.....

.....

.....

..... [3M]

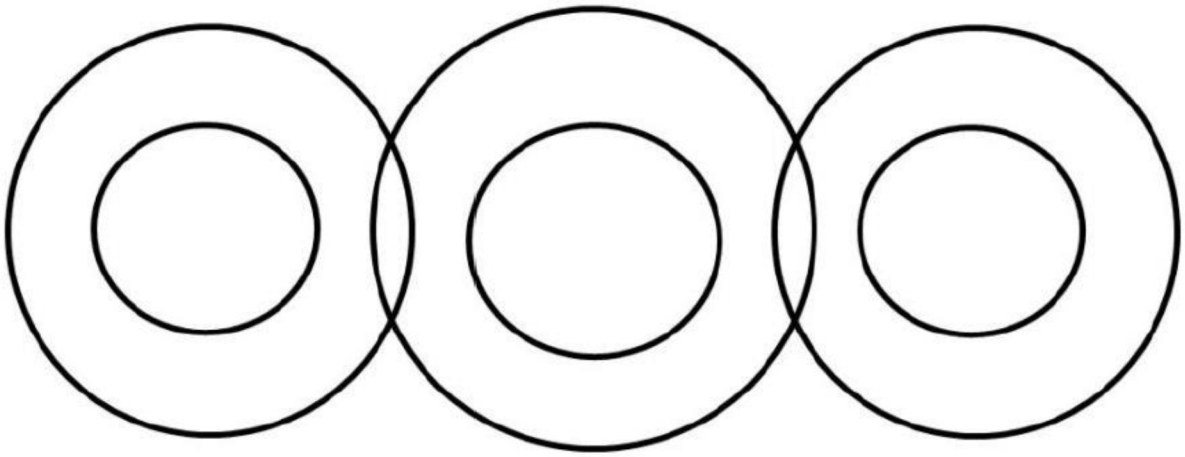
[2024 Perlis-04] Jadual 1 menunjukkan maklumat berkaitan unsur A dan unsur B.
Table 1 shows information for element A and element B.

Unsur *Elements*	Kala *Period*	Kumpulan *Group*
A	2	14
B	2	16

(a) Nyatakan maksud ikatan kovalen?/ *State the meaning of covalent bond?*

..... [1M]

(b) Berdasarkan Jadual 1, lengkapkan susunan elektron yang terbentuk daripada pembentukan ikatan antara unsur A dan B dalam Rajah 4.
Based on Table 1, complete the electron arrangement formed from the formation of bonds between element A and B at Diagram 4.



[2M]

(c) 14.4 g unsur A bertindak balas dengan unsur B secara lengkap menghasilkan sebatian yang terbentuk di 4(b).
14.4 g element A reacts with element B completely to produce compound in 4(b).

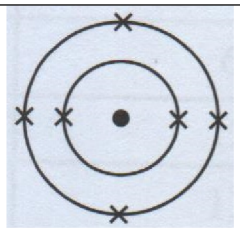
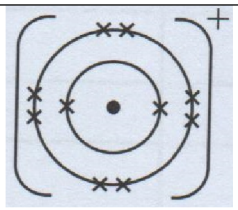
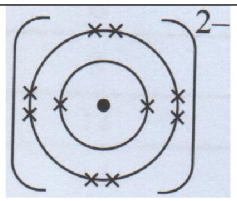
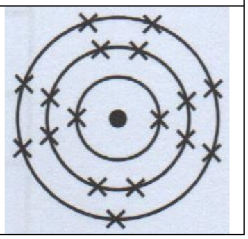
(i) Tuliskan persamaan kimia bagi tindak balas tersebut.
Write the chemical equation for the reaction.

..... [1M]

(ii) Berdasarkan persamaan kimia di 4(c)(i), kira isipadu maksimum sebatian yang terbentuk dalam keadaan bilik.
Based on the chemical equation in 4(c)(i), calculate the maximum volume of compound produced in room condition.
[Jisim atom relatif : A = 12; B = 16; isipadu molar gas : 24 dm^3 mol^{-1} pada keadaan bilik]
[Relative atomic mass : A = 12; B = 16; molar gas volume : 24 dm^3 mol^{-1} at

[3M]

[2024-Selangor-Set02-04] Jadual 3 menunjukkan susunan elektron bagi zarah W, X, Y dan Z.
Table 3 shows the electron arrangement of particles W, X, Y and Z.

zarah *particles*	W	X	Y	Z
Rajah susunan elektron *Diagram of electron arrangement*				

Berdasarkan Jadual 3,/ *Based on Table 3,*

(a) nyatakan jenis zarah yang terdapat dalam unsur W.
state the type of particle present in element W.

..... [1M]

(b) tulis susunan elektron bagi ion Z. ..... [1M]
write the electron arrangement of ion Z.

(c) tuliskan formula sebatian yang terbentuk apabila unsur X bertindak balas dengan unsur Y.
write the formula of the compound formed when element X reacts with element Y.

..... [1M]

(d) namakan daya yang wujud antara kedua-dua ion dalam sebatian di 4(c).
name the force that exists between the ions in the compound in 4(c).

..... [1M]

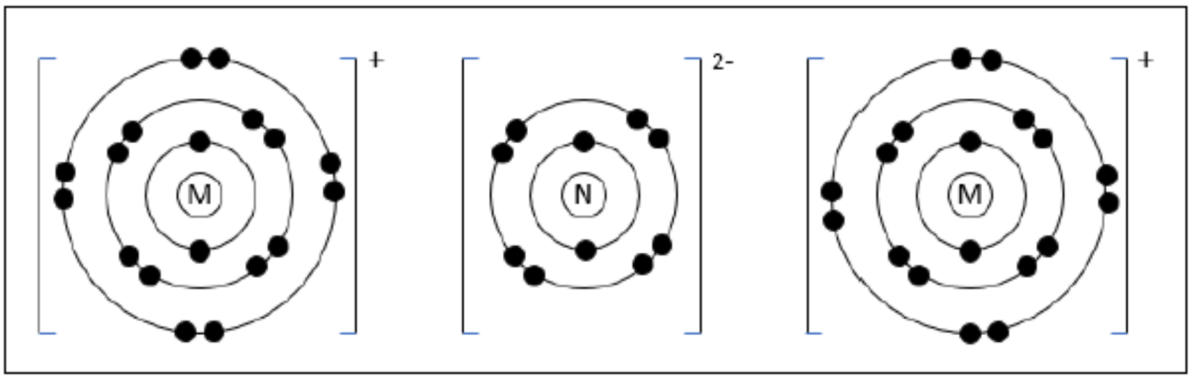
(e) (i) Unsur W bertindak balas dengan unsur Z menghasilkan satu sebatian.
Lukiskan susunan elektron bagi sebatian yang terbentuk.
Element W reacts with element Z to form a compound.
Draw the electron arrangement for the compound formed.

[2M]

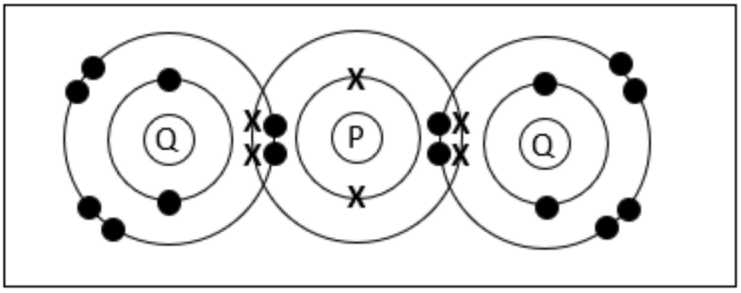
(ii) Nyatakan satu sifat fizik bagi sebatian yang terbentuk di 4(e)(i).
State one physical property of the compound formed in 4(e)(i).

..... [1M]

[2024-Kedah-01] Rajah 1 menunjukkan susunan elektron bagi dua jenis sebatian yang berbeza.
Diagram 1 shows the electron arrangement of two different types of compounds.



Sebatian A / Compound A



Sebatian B / Compound B

(a) Apakah tujuan sesuatu atom menderma elektron?
What is the purpose of an atom donating electron?

.....

..... [1M]

(b) Berdasarkan Rajah 1/ *Based on Diagram 1:*

(i) Tuliskan formula kimia bagi sebatian A.
Write the chemical formula of compound A.

..... [1M]

(ii) Nyatakan jenis ikatan yang terbentuk dalam sebatian B.
State the type of bond formed in compound B.

..... [1M]

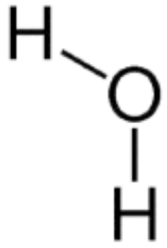
(iii) Tuliskan susunan elektron bagi atom Q.
Write the electron arrangement of atom Q.

..... [1M]

(iv) Sebatian yang manakah larut di dalam pelarut organik?
Which compound is soluble in organic solvent?

..... [1M]

[2024 JUJ Set1-03] Rajah 3.1 menunjukkan formula struktur bagi molekul air.
Diagram 3.1 shows the structural formula of water molecule.



(a) Nyatakan jenis ikatan dalam molekul air.
State the type of bond in water molecule.

..... [1M]

(b) Molekul air boleh membentuk ikatan hidrogen dengan molekul air yang lain.
Water molecule can form hydrogen bond with other water molecules.

(i) Nyatakan definisi ikatan hidrogen./ *State the definition of hydrogen bond.*

.....

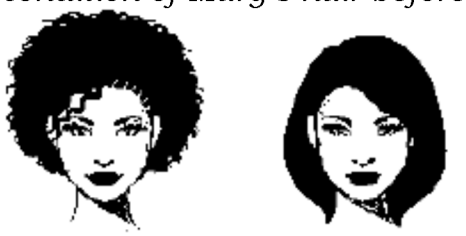
.....

..... [1M]

(ii) Lukiskan ikatan hidrogen yang terbentuk antara molekul air.
Draw the hydrogen bonds formed between water molecules.

[2M]

(c) Rajah 3.2 menunjukkan keadaan rambut Mary sebelum dan selepas mandi.
Diagram 3.2 shows the condition of Mary's hair before and after the shower.



Sebelum mandi
Before shower

Selepas mandi
After shower

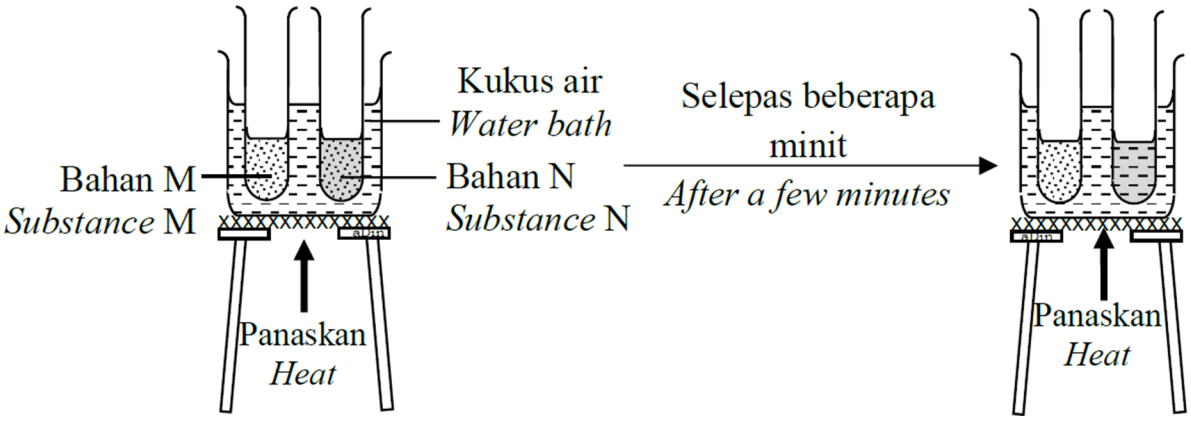
Terangkan mengapa rambut keriting Mary yang basah kelihatan lurus selepas mandi.
Explain why Mary's wet curly hair looks straight after a shower.

.....

.....

..... [2M]

[2024-Sarawak-Set02-02] (a) Rajah 2.1 menunjukkan susunan radas yang digunakan dalam eksperimen untuk membandingkan takat lebur sebatian ionik dan sebatian kovalen. Kedua-dua serbuk pepejal bahan M dan bahan N dipanaskan dalam kukus air dan keadaan fizikal dibandingkan selepas beberapa minit.
Diagram 2.1 shows the apparatus set-up used in an experiment to compare the melting point of ionic compound and covalent compound. Both powdered solid of substances M and N are heated in the water bath and the physical state is compared after a few minutes.



(i) Nyatakan maksud takat lebur./ *State the meaning of melting point.*

.....

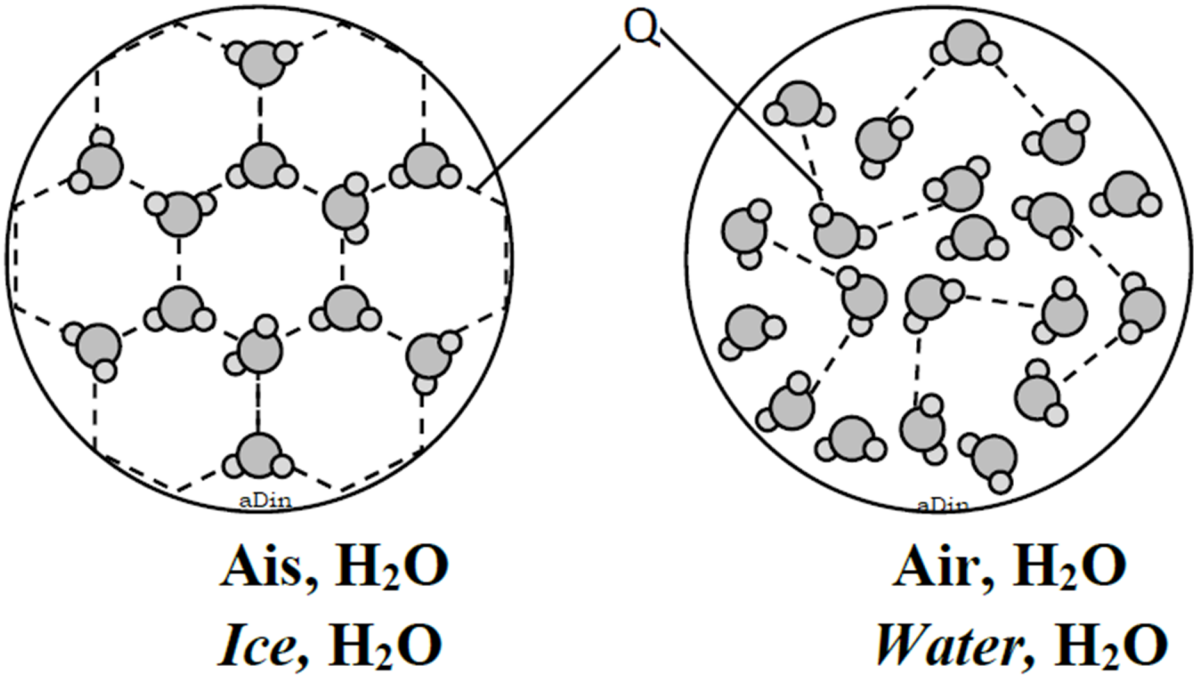
..... [1M]

(ii) Apakah jenis ikatan kimia yang membentuk zarah dalam sebatian N? Namakan satu contoh bahan N.
What is the type of chemical bond that forms particle in substance N? Name an example of substance N.

.....

..... [2M]

(b) Rajah 2.2 menunjukkan susunan molekul air, H2O dalam keadaan pepejal dan cecair.
Diagram 2.2 shows the arrangement of water molecules, H2O in solid and liquid states.



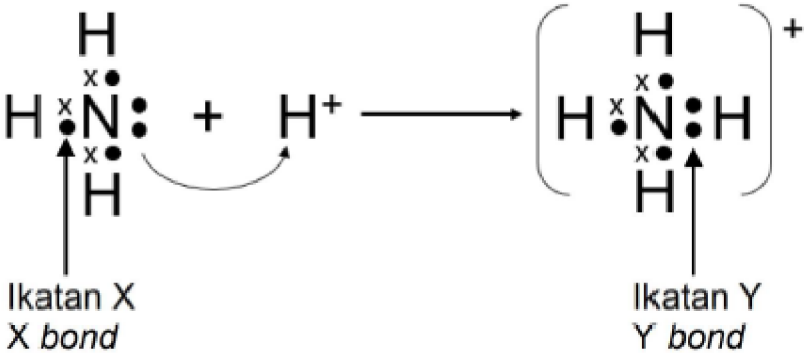
(i) Q ialah sejenis daya tarikan yang wujud di antara atom hidrogen, H dengan atom oksigen, O dari dua molekul air yang bersebelahan. Apakah Q?
Q is a force of attraction that exists between hydrogen atom, H and oxygen atom, O of two nearby water molecules. What is Q?

..... [1M]

(ii) Berdasarkan Rajah 2.2, nyatakan satu kesan Q terhadap sifat fizikal bagi air.
Based on Diagram 2.2, state one effect of Q on the physical property of water.

..... [1M]

[2024 Kelantan-01] Rajah 1 menunjukkan pembentukan ikatan kimia bagi ion ammonium, NH_4^+.
Diagram 1 shows the formation of chemical bonds for ammonium ions, NH_4^+



(a) Namakan/ *Name*

Ikatan X : ..... Ikatan Y : ..... [2M]
X bond *Y bond*

(b) Berapakah bilangan elektron valens bagi atom nitrogen?
How many valence electrons does a nitrogen atom have?

..... [1M]

(c) Terangkan bagaimana ikatan X dan ikatan Y berbeza dari sudut pengkongsian elektron.
Explain how X bonds and Y bonds differ in terms of electron sharing.

.....

.....

..... [2M]

Esei

[2024 Johor-09] (a) Rajah 9.1 menunjukkan perwakilan piawai bagi unsur X.
Diagram 9.1 shows standard representation of element X.

12 6	X

Unsur X bertindak balas dengan oksigen membentuk suatu sebatian. Sebatian yang terbentuk tidak mengkonduksi arus elektrik dalam semua keadaan.
Nyatakan nama unsur X dan jenis ikatan yang terbentuk dalam sebatian itu. Tulis persamaan kimia untuk tindak balas itu.
Element X reacts with oxygen to form a compound. The compound formed does not conduct electricity in all conditions.
State the name of element X and the type of bond formed in the compound. Write a chemical equation for the reaction.

[4M]

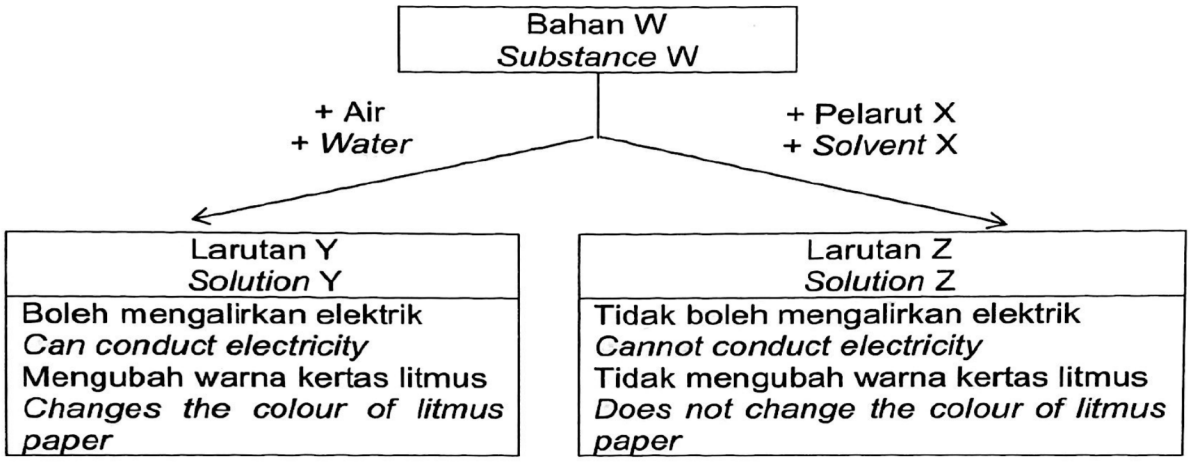
(b) Jadual 4 menunjukkan nombor proton bagi unsur P, Q, R dan S.
Table 4 shows the proton number of elements P, Q, R and S.

Unsur/ *Element*	P	Q	R	S
Nombor proton/ *Proton number*	6	8	19	20

Berdasarkan Jadual 3, unsur Q boleh membentuk sebatian dengan unsur P dan unsur S. Tulis persamaan kimia bagi tindak balas di antara unsur S dan Q dan lukiskan rajah susunan elektron untuk sebatian tersebut.
Bandingkan sifat fizik sebatian yang terbentuk di antara unsur P dan Q dan unsur Q dan S.
Based on Table 3, element Q can form a compound with element and element S. Write the chemical equation for the reaction between elements S and Q and draw the electron arrangement diagram for the compound formed.
Compare the physical characteristics of the compound formed between elements P and Q and elements Q and S

[10M]

(c) Rajah 9.2 menunjukkan carta aliran apabila dilarutkan dalam dua pelarut berlainan, air dan pelarut X, dan sifat-sifat larutan yang terhasil.
Diagram 9.2 shows a flow chart when substance W is dissolved in two different solvents, water and solvent X, and the properties of the solutions formed.



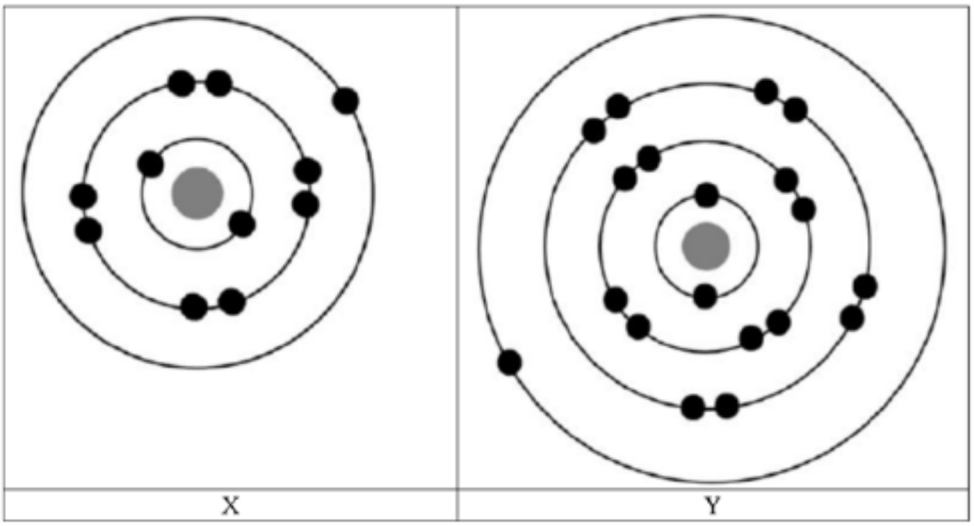
(i) Cadangkan bahan W dan pelarut X.
Suggest substance W and solvent X.

[2M]

(ii) Terangkan perbezaan sifat antara larutan Y dan larutan Z.
Explain the differences in properties between solution Y and Z.

[4M]

[2024 Johor Muar-10] (a) Rajah 10.1 menunjukkan susunan elektron bagi atom unsur X dan unsur Y yang terletak dalam kumpulan yang sama dalam Jadual Berkala Unsur.
Diagram 10.1 shows the electron arrangement for atoms of element X and element Y which are located in the same group in the Periodic Table of Elements.



Berdasarkan Rajah 10.1,/*Based on Diagram 10.1,*

(i) Nyatakan maksud bagi elektron valens dan nyatakan kumpulan di mana terletaknya unsur X dan unsur Y dalam Jadual Berkala Unsur
State the meaning of valence electron and state the group where element X and element Y are located in the Periodic table of Elements.

[2M]

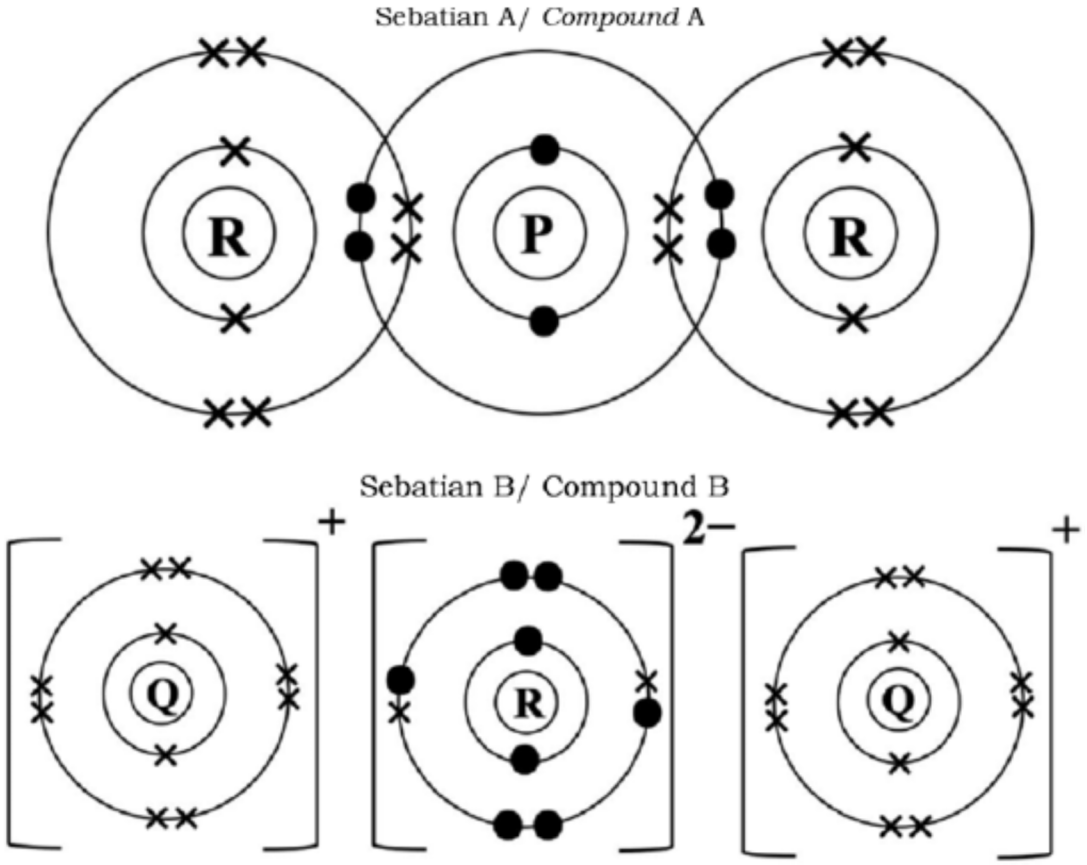
(ii) Tulis persamaan kimia bagi tindak balas antara unsur X dan gas oksigen. Hitung jisim hasil tindak balas yang diperoleh jika 1200 cm^3 gas oksigen digunakan dalam tindak balas tersebut.
Write the chemical equation for the reaction between element X and oxygen gas. Calculate the mass of the product obtained if 1200 cm^3 of oxygen gas is used in the reaction.
[Jisim atom relatif : O = 16, X = 23; Isipadu molar gas pada keadaan bilik = 24 dm^3mol^{-1}]
[Relatif atomic mass : O = 16, X = 23; Molar volume of gas at room condition = 24 dm^3mol^{-1}]

[5M]

(iii) Unsur X dan unsur Y menunjukkan sifat kimia yang sama tetapi dengan kereaktifan yang berbeza. Bandingkan kereaktifan unsur X dan unsur Y. Terangkan jawapan anda.
Element X and element Y shows the same chemical properties but with different reactivity. Compare the reactivity of element X and element Y. Explain your answer.

[3M]

(b) Rajah 10.2 menunjukkan susunan elektron bagi sebatian A dan sebatian B.
Diagram 10.2 shows the electron arrangement of compound A and compound B.



Berdasarkan Rajah 10.2, / *Based on Diagram 10.2,*

(i) Apakah maksud bagi kation?/ *What is the meaning of cation?*

[1M]

(ii) Unsur R bertindak balas dengan unsur P membentuk sebatian A manakala membentuk sebatian B apabila ia bertindak balas dengan unsur Q. Tentukan jenis ikatan yang terbentuk dalam sebatian A dan sebatian B. Terangkan pembentukan bagi salah satu sebatian sama ada sebatian A atau sebatian B

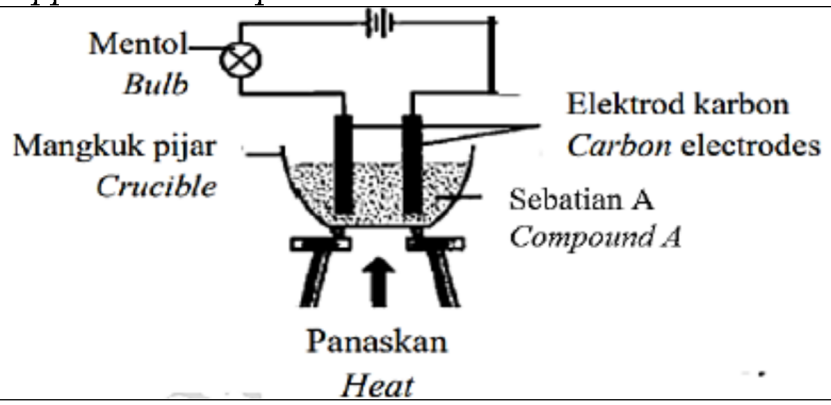
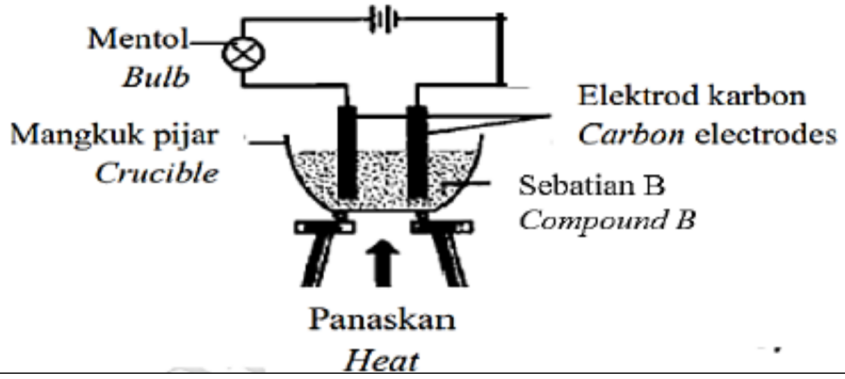
Element R reacts with element P to form compound A while compound B is formed when it reacts with element Q. Determine the type of bond formed in compound A and compound B. Explain the formation of one of the compounds either compound A or compound B.

[7M]

(iii) Takat lebur sebatian B adalah lebih tinggi daripada sebatian A. Terangkan mengapa.
The melting point of compound B is higher than compound A. Explain why.

[2M]

[2024 Johor Pasir Gudang-09] (a) Jadual 5 menunjukkan keputusan bagi dua set eksperimen untuk mengkaji kekonduksian elektrik antara sebatian ion dan sebatian kovalen.
Table 5 shows the result of two sets of experiment to study the electrical conductivity between ionic compound and covalent compound.

Set	Susunan radas *Apparatus set-up*	Pemerhatian *Observation*
I		Mentol menyala *Bulb lights up*
II		Mentol tidak menyala *Bulb does not light up*

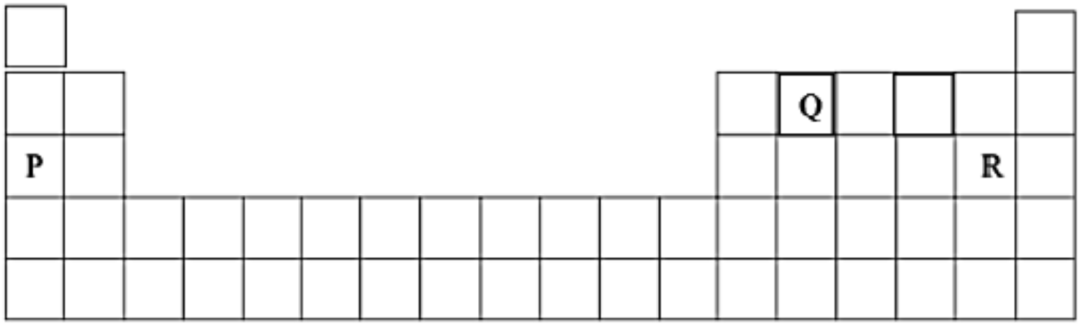
(i) Nyatakan jenis sebatian A dan B serta jenis zarah yang terdapat dalam kedua- dua sebatian tersebut.
State the types of compounds A and B and the types of particles found in both compounds.

[4M]

(ii) Bandingkan takat lebur bagi Sebatian A dan Sebatian B. Terangkan jawapan anda.
Compare the melting point of Compound A and Compound B. Explain your answer.

[4M]

(iii) Rajah 8 menunjukkan kedudukan unsur P, Q dan R dalam Jadual Berkala Unsur.
Diagram 8 shows the position of elements P, Q and R in the Periodic Table of Elements.



Berdasarkan Rajah 8/ *Based on Diagram 8*

Pilih unsur-unsur yang bertindak balas membentuk sebatian A dan sebatian B pada Jadual 5. Tuliskan formula kimia bagi sebatian A dan sebatian B. Huraikan bagaimana ikatan terbentuk dalam sebatian B
Choose the elements that react to form compound A and compound B in Table 5. Write the chemical formula for compound A and compound B.
Describe how bonds are formed in compound B.

[9M]

(b) Puan Chin ialah seorang juru dandan di sebuah salon. Puan Chin mendapati selepas rambut pelanggannya dicuci, rambut melekat sehingga sukar untuk disikat.
Mrs. Chin is a hairdresser in a salon. Mrs. Chin found that after her client's hair was washed, the hair was sticky and difficult to comb.

Nyatakan nama ikatan yang terbentuk yang menyebabkan rambut pelanggan tersebut melekat. Terangkan kesan ikatan tersebut terhadap rambut pelanggan Puan Chin.
State the name of the bond formed that cause the client's hair sticky. Explain the effect of the bond on Mrs. Chin's client's hair.

[3M]

[2024 Johor Pasir Gudang-09] (a) Apakah maksud ikatan logam?
What is the meaning of metal bonds?

[1M]

(b) Simbol atom bagi unsur X, Y dan Z ditunjukkan dalam Rajah 9.
The atomic symbols for the elements X, Y and Z are shown in Figure 9.

$^{16}_{8}X$ $^{23}_{11}Y$ $^{35}_{17}Z$

(i) Tuliskan susunan elektron bagi
Write the electron arrangement of
• Atom X
• Ion Z

[2M]

(ii) Y dan X boleh membentuk satu sebatian. Huraikan bagaimana sebatian itu terbentuk dan lukiskan susunan elektron bagi sebatian tersebut.
Y and X can form a compound Describe how the compound is formed and draw the electron arrangement for the compound formed

[7M]

(c) Zamani dan rakan-rakannya menjalankan eksperimen bagi mengkaji sifat sebatian ion dan sebatian kovalen. Jadual 5 menunjukkan keputusan eksperimen tersebut.
Zamani and his friends conducted an experiment to study the properties of ionic and covalent compounds. Table 5 shows the result of the experiment.

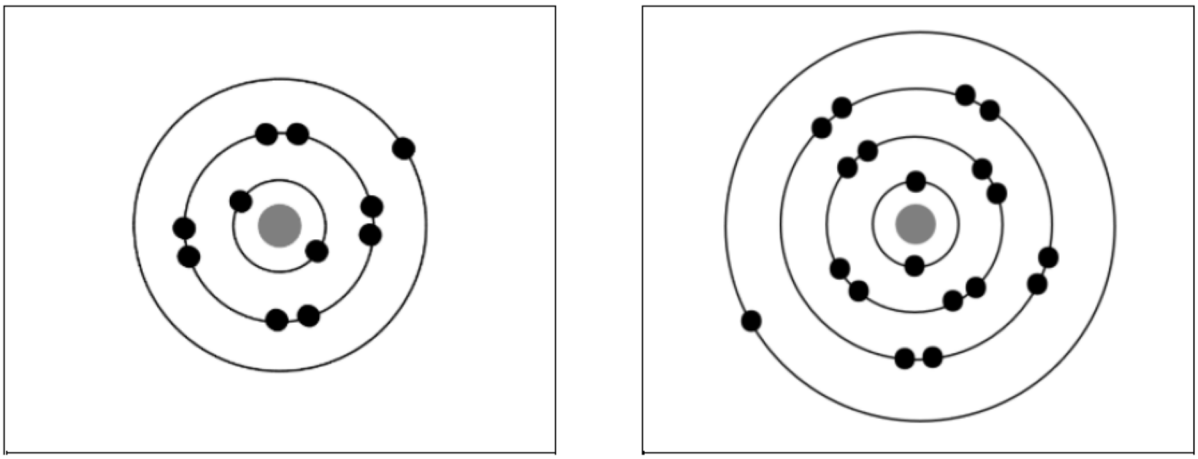
Sebatian *Compound*	Keadaan Fizik *Physical statement*	Kekonduksian Elektrik *Electrical conduction*	Takat Lebur *Melting point °C*
Plumbum(II) bromida *Lead(II) bromide*	Pepejal *Solid*	Mentol tidak menyala *Bulb does not light up*	373 °C
	Leburan *Molten*	Mentol menyala *Bulb light up*	
Naftalena *Naphtalene*	Pepejal *Solid*	Mentol tidak menyala *Bulb does not light up*	80 °C
	Leburan *Molten*	Mentol tidak menyala *Bulb does not light up*	

Jadual 5/ Diagram 5

Berdasarkan maklumat di atas, huraikan perbezaan pada keputusan eksperimen tersebut.
Based on the above information, describe the differences in the results of the experiment.

[10M]

[2024-Melaka-10] (a) Rajah 9 menunjukkan susunan elektron bagi atom unsur M dan atom unsur N yang terletak dalam kumpulan yang sama tetapi kala yang berbeza dalam Jadual Berkala Unsur.
Diagram 9 shows the electron arrangement for the atoms of elements M and N which are in the same group but different period in the Periodic Table of Elements.



Berdasarkan Rajah 9,/ *Based on Diagram 9,*

(i) Nyatakan maksud bagi kumpulan dan kala. Nyatakan kumpulan dan kala di mana terletaknya unsur N dalam Jadual Berkala Unsur.
State the meaning of group and period. State the group and period where element N are located in the Periodic Table of Elements.

[4M]

(ii) Tuliskan persamaan kimia bagi tindak balas antara unsur M dan gas oksigen. Hitungkan jisim hasil tindak balas yang diperoleh jika 1200 cm^3 gas oksigen digunakan dalam tindak balas tersebut.
[Jisim atom relatif: O = 16, M = 23; Isi padu molar gas pada keadaan bilik = 24 dm^3 mol^{-1}]
Write the chemical equation for the reaction between element M and oxygen gas. Calculate the mass of the product obtained if 1200 cm^3 of oxygen gas is used in the reaction.
[Relative atomic mass: O = 16, M = 23; Molar volume of gas at room condition = 24 dm^3 mol^{-1}]

[6M]

(b) Jadual 5 menunjukkan maklumat bagi atom unsur-unsur P, Q dan R.
Table 5 shows the information for atoms of elements P, Q and R.

Unsur/ *Elements*	P	Q	R
Nombor proton/ *Proton number*	6	11	8

Berdasarkan Jadual 5,/ *Based on Table 5,*

Pilih dua unsur yang boleh bertindak balas untuk membentuk dua jenis sebatian:
(i) Sebatian yang mempunyai takat lebur dan takat didih yang rendah,
(ii) Sebatian yang boleh mengalirkan arus elektrik dalam keadaan leburan dan akueus,

dan huraikan pembentukan ikatan bagi kedua-dua sebatian itu.

Choose two elements that can react to form two types of compounds:
(i) Compound that has low melting and boiling points,
(ii) Compound that can conduct electricity in molten and aqueous state,

and describe the formation of the bond in both compounds.

[10M]

[2024 Perak – Set 1-09] Rajah 8.1 menunjukkan perwakilan piawai bagi liga unsur W, X dan Y. Huruf-huruf ini bukan simbol sebenar unsur dalam Jadual Berkala Unsur.
Diagram 8.1 show the standard representative for three elements W, X and Y. These letters are not the actual symbols of the elements in The Periodic Table of Elements.

1 1	W		16 8	X		24 12	Y

(a)(i) Apakah maksud ikatan kovalen?
What is the meaning of covalent bond?

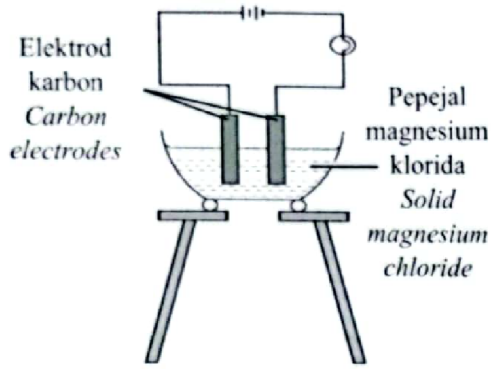
(ii) Berdasarkan Rajah 8.1, pilih dua jenis unsur yang berlainan untuk membentuk satu sebatian kovalen. Terangkan pembentukan sebatian tersebut, sertakan formula molekul dan rajah susunan elektron.
Based on Diagram 8.1, choose two different elements to form a covalent compound. Explain the formation of the compound, include the molecular formula and the electron arrangement diagram of the compound.

[7M]

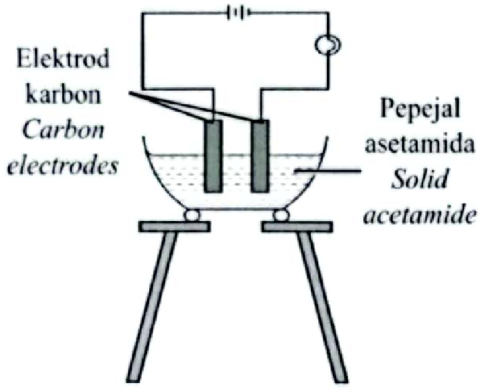
(b) Molekul ammonia boleh membentuk ikatan datif dengan ion hidrogen. Lukis struktur Lewis bagi ion yang terbentuk dan labelkan ikatan datif.
Ammonia molecule can form dative bond with hydrogen ion. Draw the Lewis structure for the ion formed and label the dative bond.

[2M]

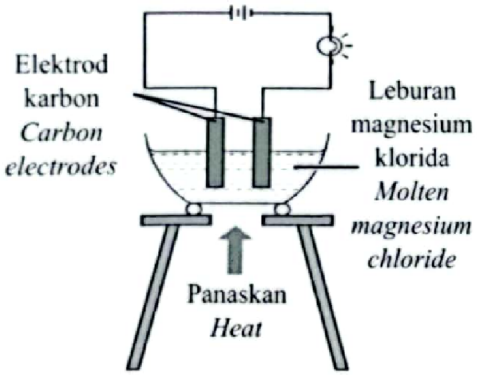
(c) Rajah 8.2 dan 8.3 menunjukkan susunan radas dan pemerhatian bagi satu eksperimen untuk mengkaji kekonduksian elektrik dan takat lebur dua jenis sebatian.
Diagram 8.2 and 8.3 shows the apparatus set-up and observations for an experiment to study the electrical conductivity and melting point of two types of compounds.



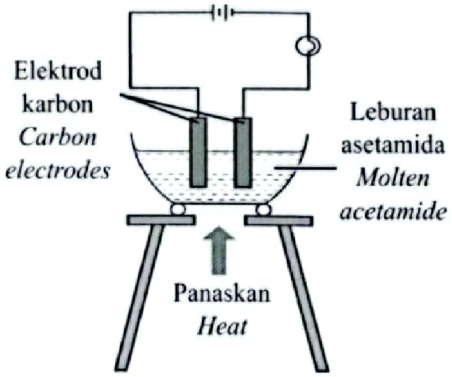
Rajah/ *Diagram* 8.2(a)



Rajah/ *Diagram* 8.2(b)



Rajah/ *Diagram* 8.3(a)



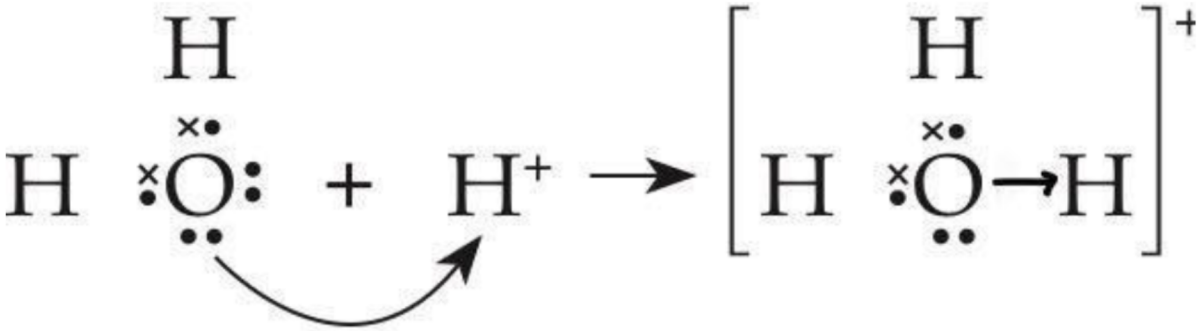
Rajah/ *Diagram* 8.3(b)

Berdasarkan pemerhatian dalam Rajah 8.2 dan Rajah 8.3, nyatakan jenis sebatian bagi magnesium klorida dan asetamida. Jelaskan perbezaan pemerhatian bagi kedua-dua jenis sebatian ini berdasarkan aspek berikut:
• Kekonduksian elektrik
• Takat lebur

Based on the observations in Diagram 8.2 and Diagram 8.3, state the type of compound for magnesium chloride and acetamide. Explain the difference in the observations for both compounds in term of:
• *Electrical conductivity*
• *Melting point*

[10M]

[2024 Putrajaya-10] (a) (i) Rajah 8.1 menunjukkan susunan elektron pembentukan ikatan datif bagi ion hidroksonium, H_3O^+.
Diagram 8.1 shows the electron arrangement for formation of dative bond of hydroxonium ion, H_3O^+.



Apakah yang dimaksudkan dengan ikatan datif?
What is meant by dative bond?

[1M]

(ii) Berdasarkan jawapan di 10 (a) (i), huraikan pembentukan ikatan datif tersebut.
Based on the answer in 10 (a) (i), describe the formation of the dative bond.

[4M]

(iii) Cadangkan satu sebatian lain yang mempunyai ikatan datif.
Suggest another compound that consists of dative bonds.

[1M]

(b) (i) Rajah 8.2 menunjukkan perwakilan piawai bagi atom logam magnesium. Elektron valens atom logam magnesium boleh didermakan dengan mudah dan boleh dinyahsetempatkan membentuk ion logam magnesium yang bercas positif. Lautan elektron terbentuk apabila semua elektron valens dinyahsetempatkan dan boleh bergerak bebas di antara struktur logam magnesium. Lautan elektron dan ion logam magnesium yang bercas positif membentuk ikatan logam dalam magnesium.
Diagram 8.2 shows the standard representation of magnesium metal atom. Valence electrons of metal atom magnesium can be donated easily and delocalised to form positively-charged magnesium metal ions. The sea of electrons formed when all the valence electrons delocalised and can move freely between the magnesium metal structure. The sea of electrons and the positively magnesium metal ion formed metallic bond in magnesium.

24	Mg
12	

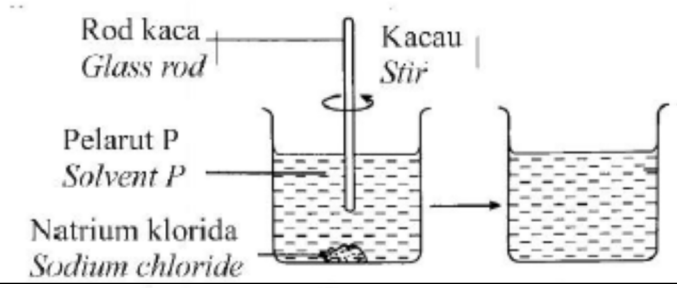
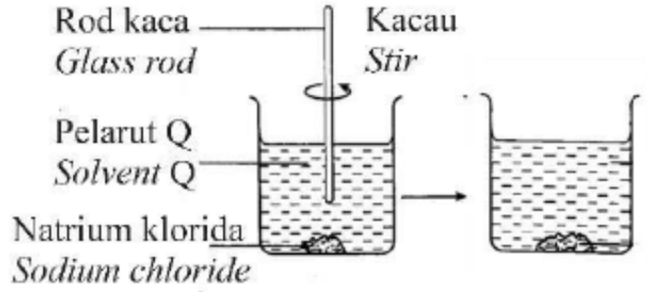
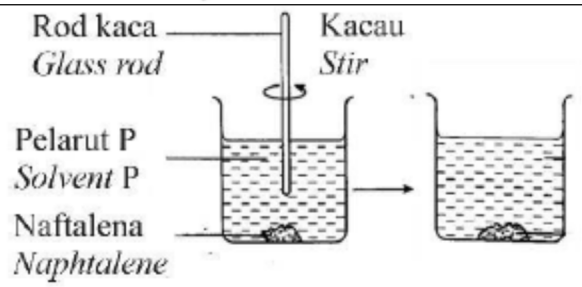
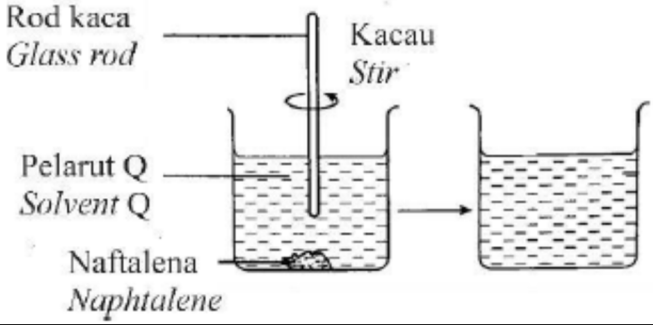
Namakan daya yang terhasil antara lautan elektron dan ion logam bercas positif.
Name the force formed between the sea of electrons and the positively-charged metal ions.

[1M]

(ii) Bagaimanakah logam magnesium boleh mengkonduksikan elektrik dalam keadaan pepejal?
How can magnesium metal conduct electricity in solid state?

[3M]

(c) Rajah 8.3 menunjukkan pemerhatian bagi empat eksperimen yang dijalankan bagi menentukan keterlarutan sebatian natrium klorida dan naftalena di dalam pelarut P dan Q.
Diagram 8.3 shows the observation for four experiments conducted to determine the solubility of sodium chloride and naphthalene compounds in solvent P and Q.

Eksperimen *Experiment*	Pemerhatian *Observation*
A	
B	
C	
D	

(i) Cadangkan pelarut P dan Q.
Suggest solvent P and Q.

[2M]

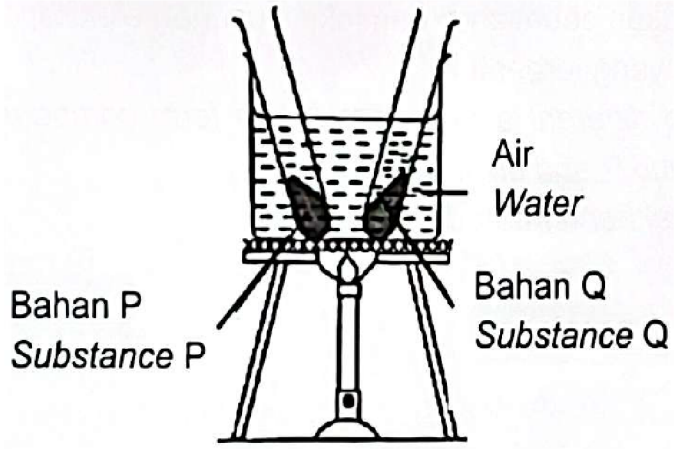
(ii) Apakah jenis ikatan yang wujud dalam sebatian natrium klorida dan naftalena?
What type of bonds exist in sodium chloride and naphthalene compounds?

[2M]

(iii) Terangkan mengapa terdapat perbezaan pemerhatian bagi experiment A dan B.
Explain why there are difference in observation for experiment A and B.

[6M]

[2024 – Terengganu-10] (a) Rajah 10 menunjukkan susunan radas dan pemerhatian bagi satu aktiviti untuk mengkaji satu sifat bagi sebatian ion dan sebatian kovalen. Bahan P dan bahan Q dipanaskan dalam kukus air dan kedua-dua bahan mempunyai ikatan kimia yang berbeza.
Diagram 10 shows apparatus set-up and observation for an activity to study one property of ionic compound and covalent compound. Substance P and substance Q are heated in water bath.

Susunan radas *Apparatus set up*	Pemerhatian *Observation*
	Pepejal putih bahan P melebur selepas dipanaskan selama 10 minit *White solid substance P melts after 10 minutes heated* Pepejal putih bahan Q kekal dalam bentuk pepejal selepas dipanaskan selama 10 minit *White solid substance Q remains as solid after 10 minutes heated*

(i) Nyatakan jenis sebatian bagi bahan P dan bahan Q. Terangkan perbezaan bagi pemerhatian yang diperolehi dalam Rajah 10.
State the type of compound for substance P and substance Q. Explain the differences of the observation obtained in Diagram 10.

[6M]

(ii) Jadual 10 menunjukkan nombor proton bagi unsur W, X, Y dan V.
Table 10 shows proton number of element W, X. Y and V.

Unsur/ *Element*	W	X	Y	V
Nombor Proton/ Proton number	6	8	10	12

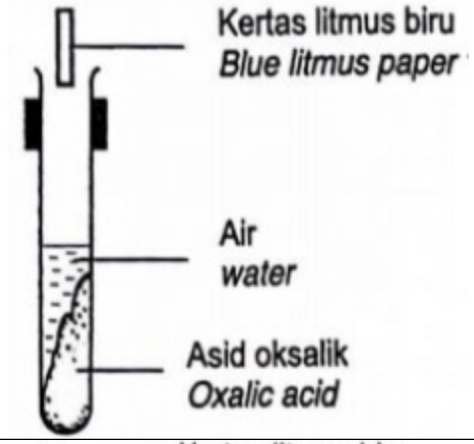
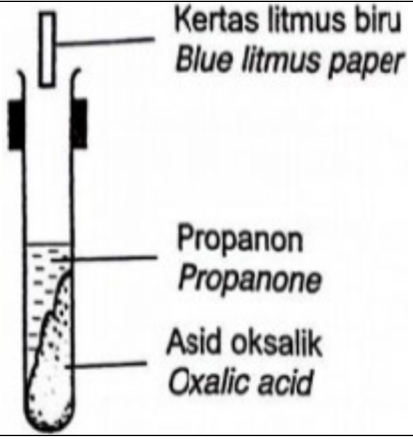
Berdasarkan Jadual 10, pilih dua unsur berbeza yang boleh membentuk sebatian P. Terangkan pembentukan sebatian P dan lukis susunan elektron untuk menunjukkan ikatan kimia yang terbentuk.
Based on Table 10, choose two different elements that can form compound P. Explain the formation of compound P and draw the electron arrangement to show the chemical bond formed.

[9M]

(b) Unsur V boleh bertindak balas dengan gas klorin berlebihan membentuk sebatian V klorida. Tulis persamaan kimia bagi tindak balas yang berlaku. Seterusnya, tentukan jisim sebatian yang terbentuk jika 4.8g unsur V digunakan dalam tindak balas itu.
Element V can react with excess chlorine gas to form compound, V chloride. Write chemical equation for the reaction occurs. Next, determine the mass of compound formed if 4.8g element V is used in the reaction.
[Jisim atom relative/ *Relative atomic mass* : V =24 , Cl = 35.5]

[5M]

[2024 Johor Muar-05] (a) Rajah 5 menunjukkan susunan radas yang digunakan dalam eksperimen untuk mengkaji sifat keasidan asid oksalik.
Diagram 5 shows the apparatus set up used in experiment to study the acidic properties of an oxalic acid.

Eksperimen Experiment	Susunan radas Apparatus set-up	Pemerhatian Observation
I		Kertas litmus biru bertukar merah Blue litmus paper turns red
II		Tiada perubahan No change

(i) Nyatakan maksud asid./*State the meaning of acid.*

.....

..... [1M]

(ii) Terangkan perbezaan bagi pemerhatian antara Eksperimen I dengan Eksperimen II.
Explain the differences in the observation between Experiment I and Experiment II.

.....

..... [1M]

(b) Asid A adalah asid monoprotik. Asid A yang telah dicelup dengan pH meter telah memberi bacaan pH 1.
Acid A is a monoprotic acid. Acid A that has been dipped with a pH meter has been giving a pH 1 reading.

(i) Cadangkan asid A/ *Suggest acid A*

..... [1M]

(ii) 25 cm^3 asid A melengkapkan peneutralan 50 cm^3 0.5 mol/dm^3 larutan natrium hidroksida, NaOH. Dengan menggunakan asid A yang dinamakan di 5(b)(i), tulis persamaan kimia seimbang bagi tindak balas peneutralan itu. Seterusnya tentukan kepekatan asid A.
25 cm^3 of acid A completely neutralises 50 cm^3 of 0.5 mol/dm^3 sodium hydroxide solution, NaOH. By using the named of acid A at 5(b)(i), write a balanced chemical equation for the neutralisation reaction.
Next, determine the concentration of acid A.

.....

[3M]

(c) Rajah 5.1 menunjukkan Sarah telah disengat oleh seekor lebah di lengannya semasa berada dikawasan rumahnya.
Diagram 5.1 shows Sarah was stung by a bee on her arm while in her home area.

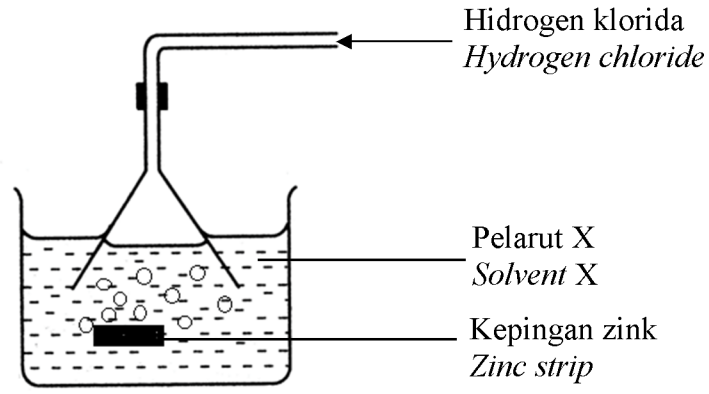
Cadangkan apakah bahan yang ada di rumah Sarah yang boleh digunakan untuk rawatan awal. Wajarkan penggunaan bahan tersebut.
Suggest what materials Sarah has at home that can be used for intial treatment. Justify the use of the material.

.....

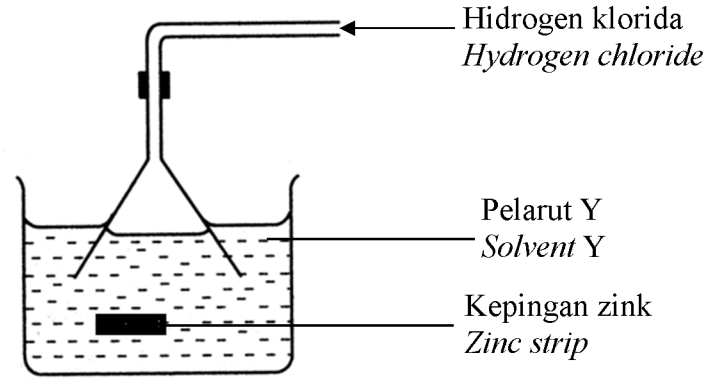
.....

..... [2M]

[2024-Johor Batu Pahat-05] (a) Rajah 5.1 menunjukkan susunan radas bagi eksperimen untuk mengkaji sifat hidrogen klorida di dalam dua pelarut berlainan.
Diagram 5.1 shows the apparatus set-up of an experiment to study the properties of hydrogen chloride in two different solvents.



Set I / *Set* I



Set II / *Set* II

(i) Apakah yang dimaksudkan dengan asid?/ *What is meant by acid?*

.....

..... [1M]

(ii) Terangkan pemerhatian bagi Set I dan Set II.
Explain the observations for Set I and Set II.

.....

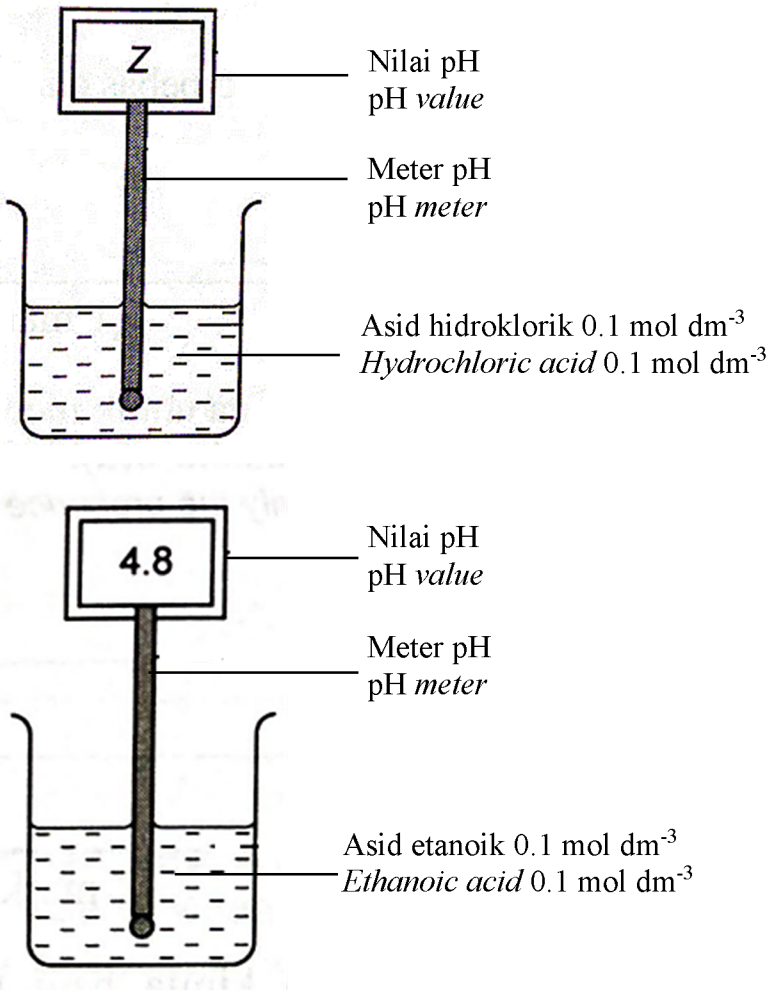
.....

..... [2M]

(iii) Tulis persamaan kimia bagi tindak balas berlaku dalam Set I.
Write a chemical equation for the reaction that occurs in Set I.

..... [2M]

(b) Rajah 5.2 menunjukkan nilai pH bagi dua jenis asid.
Diagram 5.2 shows the pH value of two types of acid.



Nilai pH bagi Z lebih rendah daripada nilai pH bagi asid etanoik.
The pH value of Z is lower than the pH value of ethanoic acid.

(i) Hitung nilai Z./ *Calculate the value of Z.*

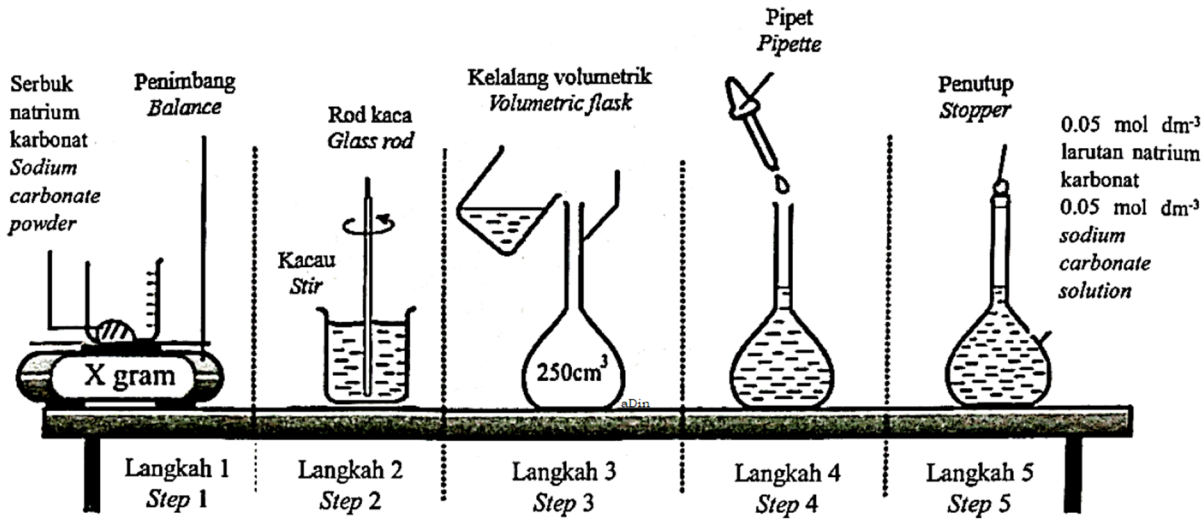
[1M]

(ii) Terangkan mengapa nilai pH asid hidroklorik lebih rendah berbanding dengan nilai pH asid etanoik.
Explain why the pH value of hydrochloric acid is lower compared to the pH value of ethanoic acid.

.....

..... [2M]

[2024-Sarawak-Set02-05] Azmi menyediakan 250 cm^3 larutan piawai menggunakan natrium karbonat, Na_2CO_3 0.05 mol dm^{-3} seperti yang ditunjukkan dalam Rajah 6.1
Azmi prepared 250 cm^3 standard solution using sodium carbonate, Na_2CO_3 0.05 mol dm^{-3} as shown in Diagram 6.1



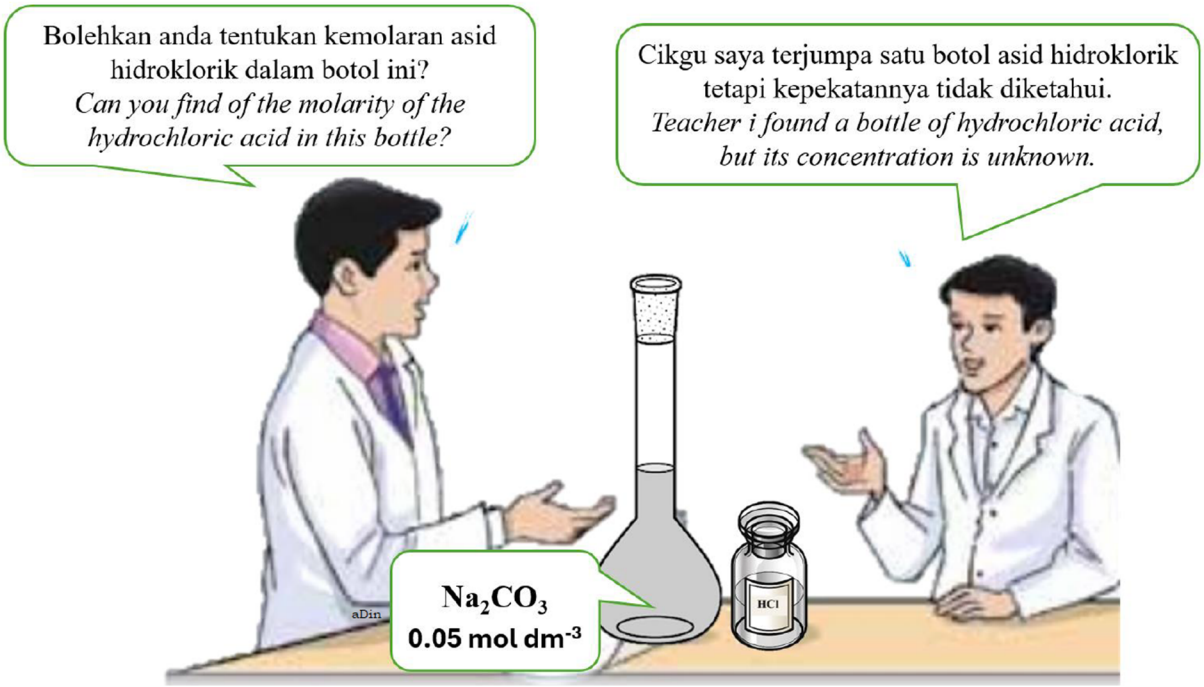
(a) (i) Apakah yang dimaksudkan dengan larutan piawai?
What is meant by standard solution?

..... [1M]

(ii) Berdasarkan Rajah 9.1, hitung jisim X natrium karbonat.
[Jisim relatif natrium karbonat = 106]
Based on Diagram 9.1, calculate the mass X of sodium carbonate.
[Relative mass of sodium carbonate = 106]

[2M]

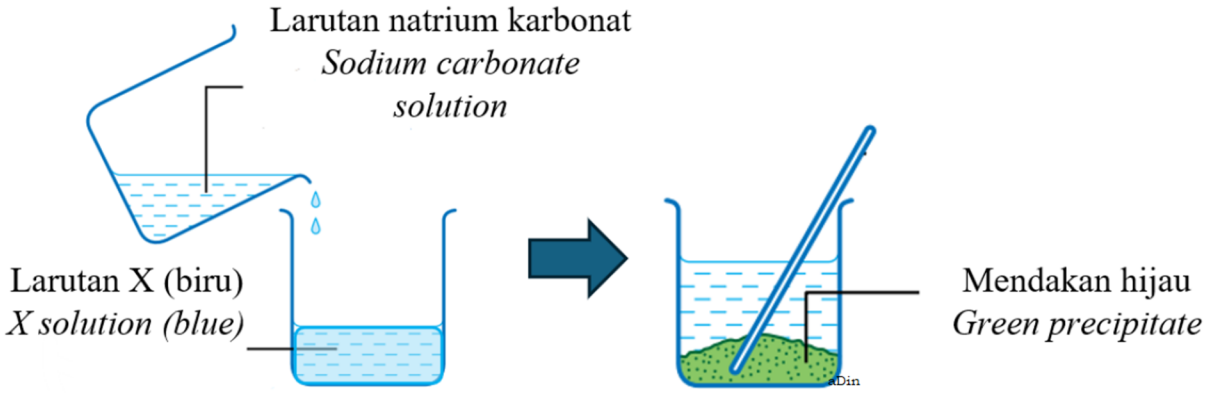
(b) Rajah 6.2 menunjukkan perbualan antara Azmi dengan cikgunya.
Diagram 6.2 shows the conversation between Azmi and his teacher.



Lukiskan satu gambar rajah berlabel bagi susunan radas yang boleh digunakan oleh Azmi untuk menentukan kemolaran asid hidroklorik dengan menggunakan larutan piawai yang telah disediakan dalam 7(a).
Draw a labelled diagram for the apparatus set-up that can be used by Azmi to find out the molarity of hydrochloric acid by using the standard solution prepared in 7 (a).

[2M]

(c) Rajah 6.3 menunjukkan pemerhatian apabila larutan natrium karbonat ditambah kepada larutan X yang berwarna biru.
Diagram 6.3 shows the observation when sodium carbonate solution is added to blue coloured X solution.



Cadangkan larutan X dan mendakan hijau.
Suggest solution X and green precipitate.

.....

..... [2M]

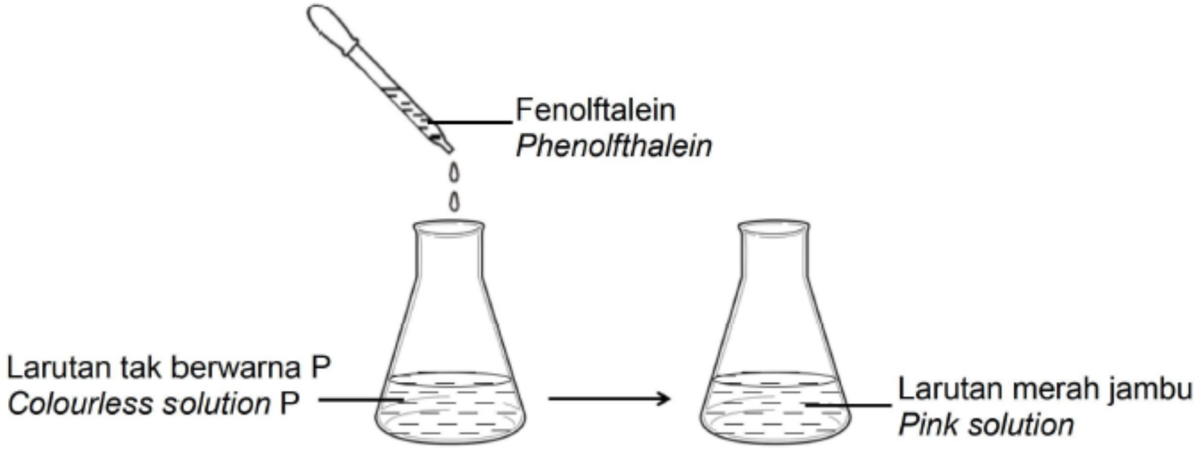
(d) Azmi diberi satu tugasan untuk menyediakan 250 cm^3 larutan piawai natrium hidroksida dengan kepekatan 0.05 mol dm^{-3}. Azmi bercadang untuk menggunakan kaedah yang ditunjukkan dalam Rajah 6.1 untuk menyediakan larutan piawai tersebut. Pada pandangan anda, adakah keputusan Azmi betul? Terangkan
Azmi is given a task to prepare 250 cm^3 standard solution of sodium hydroxide with concentration of 0.05 mol dm^{-3}. Azmi plans to use the method shown in Diagram 6.1 in preparing sodium hydroxide solution.
In your opinion, do you think Azmi's decision correct? Explain

.....

.....

..... [3M]

[2024 Kelantan-04] Rajah 4 menunjukkan pemerhatian apabila satu larutan P berkepekatan 1.0 mol dm^{-3} dititiskan dengan beberapa titis penunjuk fenolftalein.
Diagram 4 shows the observation when a P solution with concentration 1.0 mol dm^{-3} is dripped with a few drops of phenolphthalein indicator.



(a) (i) Berdasarkan Rajah 4, nyatakan fungsi fenolftalein?
Based on Diagram 4, state the function of phenolphthalein?

..... [1M]

(ii) Namakan ion yang menyebabkan warna fenolftalein menjadi merah jambu.
Name the ion that causes phenolphthalein to turn pink.

..... [1M]

(b) Keasidan atau kealkalian sesuatu larutan boleh ditentukan berdasarkan nilai pH.
The acidity or alkalinity of a solution can be determined based on the pH value.

(i) Nyatakan julat bagi skala pH
State the range of pH value

..... [1M]

(ii) Tentukan nilai pH bagi larutan P
Determine the pH value for solution P

[2M]

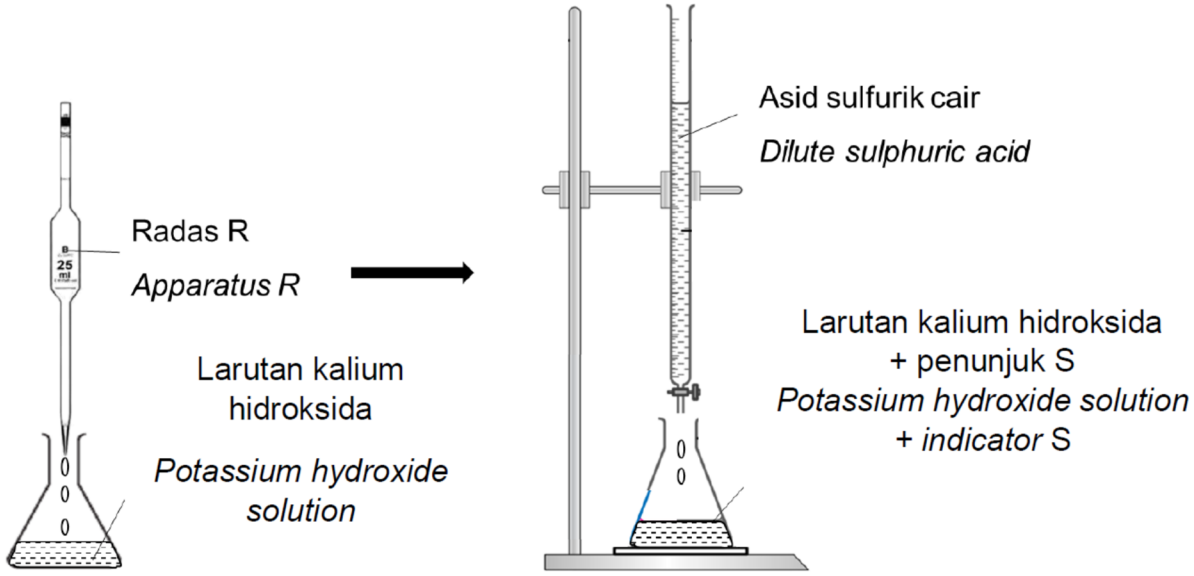
(c) Cadangkan satu kaedah untuk menukarkan kembali larutan yang berwarna merah jambu dalam Rajah 4 menjadi larutan tak berwarna. Terangkan jawapan anda.
Suggest a method to convert the pink solution in Diagram 4 back to a colourless solution. Explain your answer.

.....

.....

..... [2M]

[2024-Melaka-08] Rajah 7 menunjukkan gambar rajah susunan radas pentitratan antara larutan kalium hidroksida dan asid sulfurik cair dengan menggunakan penunjuk S.
Diagram 7 shows the apparatus set-up of titration between potassium hydroxide solution and dilute sulphuric acid using indicator S.



(a) Berdasarkan Rajah 7,
Based on Diagram 7,

(i) nyatakan nama bagi radas R./ *state the name of apparatus R.*

..... [1M]

(ii) Cadangkan satu penunjuk S./ *Suggest one indicator S.*

..... [2M]

(b) Dalam eksperimen ini, 10.00 cm^3 asid sulfurik cair diperlukan untuk meneutralkan dengan lengkap 25.0 cm^3 larutan kalium hidroksida 1.0 mol dm^{-3}. Hitung kemolaran asid sulfurik cair.
In this experiment, 10.00 cm^3 dilute sulphuric acid is needed to neutralize completely 25.0 cm^3 of 1.0 mol dm^{-3} potassium hydroxide solution.
Calculate the molarity of the dilute sulphuric acid.

[4M]

(c) Jadual 3 menunjukkan asid etanoik, CH_3COOH yang berada dalam tiga keadaan berbeza dan pemerhatian yang diperolehi apabila diuji dengan kertas litmus biru.
Table 3 shows ethanoic acid, CH_3COOH in three different states and the observations that obtained when it is tested with blue litmus paper.

Eksperimen *Experiment*	Keadaan asid etanoik *State of ethanoic acid*	Pemerhatian *Observation*
I	Asid etanoik dalam air *Ethanoic acid in water*	Kertas litmus biru bertukar merah *Blue litmus paper turns red*
II	Asid etanoik dalam propanon *Ethanoic acid in propanone*	Tiada perubahan *No change*

Bandingkan perbezaan pemerhatian dalam eksperimen I dan eksperimen II.
Compare the differences in observation in experiments I and II.

.....

..... [2M]

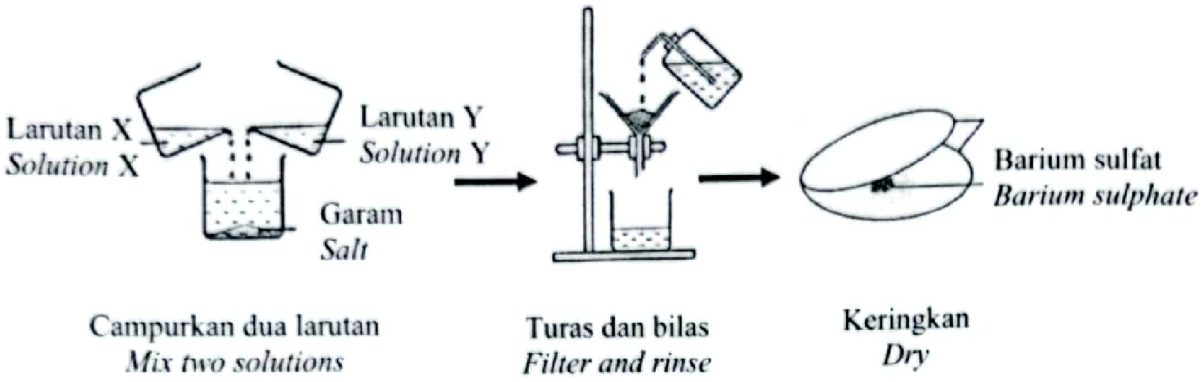
(d) Huraikan secara ringkas bagaimana garam yang terhasil dalam Rajah 7 dapat dihablurkan.
Describe briefly how salt formed in Diagram 7 can be crystallised.

.....

.....

..... [2M]

[2024 Perak – Set 1-08] (a) Rajah 6 menunjukkan kaedah penyediaan garam barium sulfat.
Diagram 6 shows the method of preparing barium sulphate salt



Berdasarkan Rajah 6,/ *Based on Diagram 6,*

(i) Namakan jenis tindak balas ini./ *Name the type of reaction.*

..... [1M]

(ii) Cadangkan larutan X dan Y yang digunakan di dalam tindak balas tersebut. *Suggest solution X and Y used in the reaction.*

Larutan/ *Solution* X : .....

Larutan/ *Solution* Y : ..... [2M]

(iii) Tuliskan persamaan kimia untuk tindak balas tersebut.
Write the chemical equation for the reaction.

..... [2M]

(b) Satu eksperimen dijalankan untuk membina persamaan ion bagi pembentukan plumbum(II) iodida menggunakan kaedah perubahan berterusan.

• Isi padu tetap 5.00 cm^3 larutan plumbum(II) nitrat, $Pb(NO_3)_2$ 0.5 mol dm^{-3} diisikan ke dalam setiap 8 tabung uji yang sama saiz.

• lsi padu yang berbeza larutan kalium iodida. K1 1.0 mol dm^{-3} ditambahkan ke dalam setiap tabung uji.

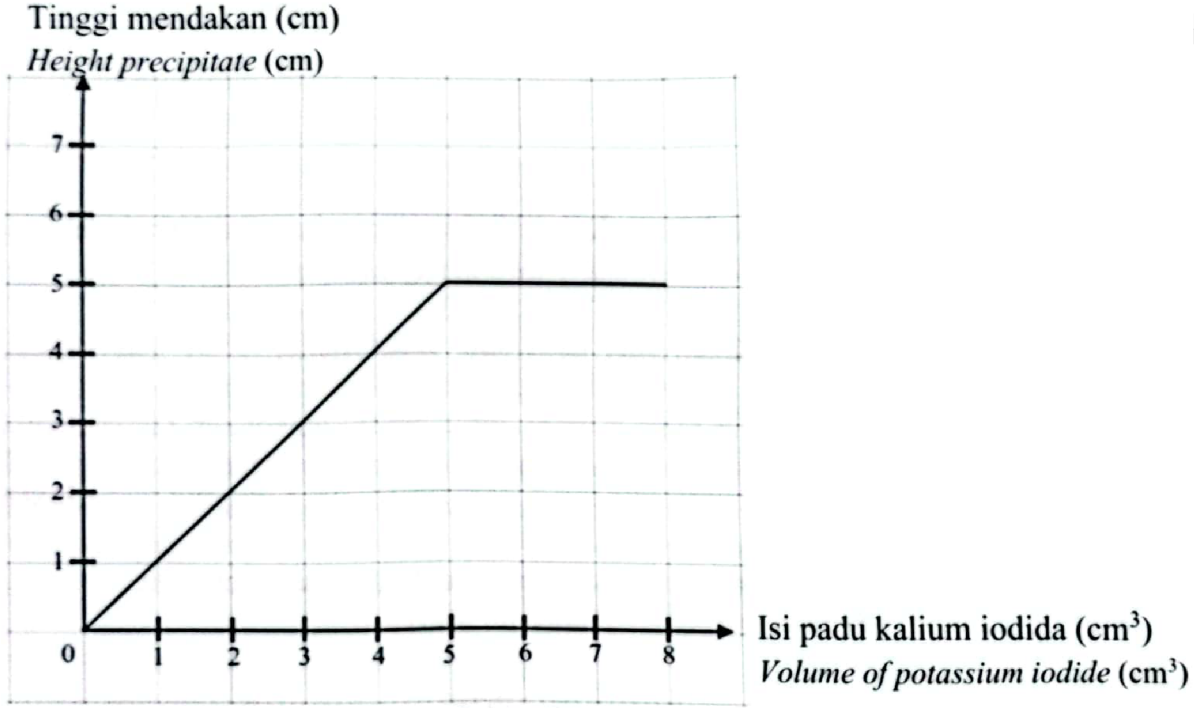
• Tinggi mendakan kuning plumbum(II) iodida yang terbentuk dalam setiap tabung uji diukur dan direkod. Satu graf tinggi mendakan melawan isi padu kalium iodida diplot.

An experiment is carried out to construct an ionic equation for the formation of lead(II) iodide by using continuous variation method.

• A fixed volume of 5.00 cm^3 of 0.5 mol dm^{-3} lead(II) nitrate, $Pb(NO_3)_2$ solution is placed into each of the 8 test tube of the same size.

• Different volumes of 1.0 mol dm^{-3} potassium iodide solution. KI is added into each test tube.

• The height of the yellow precipitate, lead(II) iodide formed in each test tube is measured and recorded. A graph of height of precipitate against volume of potassium iodide is plotted.



Rajah / Diagram 1

Berdasarkan Rajah 7,
Based on Diagram 7,

(i) Hitung bilangan mol ion iodida yang bertindak balas dengan 1 mol ion plumbum(II).
Calculate the number of mole of iodide ion that reacts with 1 mole of lead(II) ion.

[3M]

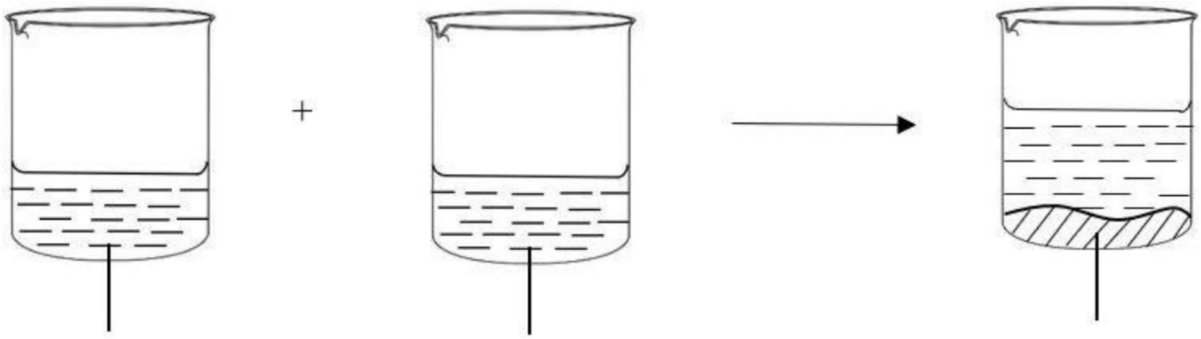
(ii) Berdasarkan jawapan di 8(6)(i), bina persamaan ion bagi pembentukan plumbum(II) iodida.
Based on the answer in 8(6)(i), construct an ionic equation for the formation of lead(II) iodide.

..... [1M]

(iii) Terangkan mengapa kelapan-lapan tabung uji yang digunakan adalah bersaiz sama.
Explain why the eight test tubes used are the same size.

..... [1M]

[2024 Perlis-06] Rajah 6 menunjukkan tindak balas menggunakan dua jenis garam terlarutkan untuk menghasilkan sejenis garam tak terlarutkan.
Diagram 6 shows the reaction using two types of soluble salts to form a type of insoluble salt.



(a) (i) Nyatakan nama tindak balas bagi menyediakan garam tak terlarutkan itu.
State the name of reaction to prepare the insoluble salt.

..... [1M]

(ii) Berdasarkan Rajah 6, kenal pasti Pepejal X.
Based on the Diagram 6, identify Solid X.

..... [1M]

(b) (i) Tulis persamaan kimia bagi tindak balas antara argentum nitrat dan natrium karbonat.
Write the chemical equation for the reaction between silver nitrate and sodium carbonate.

..... [2M]

(ii) Hitungkan bilangan mol ion argentum, dalam 20 cm^3 larutan argentum nitrat, 0.5 mol dm^{-3} dan seterusnya tentukan jisim Pepejal X yang terbentuk.
Calculate the number of moles of silver ions, in 20 cm^3 of silver nitrate solution, 0.5 mol dm^{-3} and then determine the mass of Solid X formed.
[Jisim molar Pepejal X/ *Molar mass of Solid X* = 276 g mol^{-1}]

[2M]

(c) Huraikan secara ringkas bagaimana untuk menyediakan hablur garam daripada Pepejal X.
Briefly describe how to prepare salt crystals from Solid X.

.....

.....

..... [3M]

[2024 JUJ Set1-04] Persamaan kimia di bawah menunjukkan satu tindak balas untuk menghasilkan garam tidak terlarutkan.
Chemical equation below shows a reaction to produce insoluble salt.

$$Pb(NO_3)_2 + 2KI \rightarrow PbI_2 + 2KNO_3$$

(a) Nyatakan nama dan warna mendakan yang terhasil.
State the name the salt and state the colour of precipitate formed.

(i) Nama mendakan : .....
Name of the precipitate

(ii) Warna mendakan : ..... [2M]
Colour of precipitate

(b) Nyatakan satu maklumat kualitatif dan satu maklumat kuantitatif yang boleh diperoleh daripada persamaan kimia di atas.
State one qualitative and one quantitative information that can be obtained from the above chemical equation.

(i) Kualitatif/ *Qualitative*

.....

..... [1M]

(ii) Kuantitatif / *Quantitative*

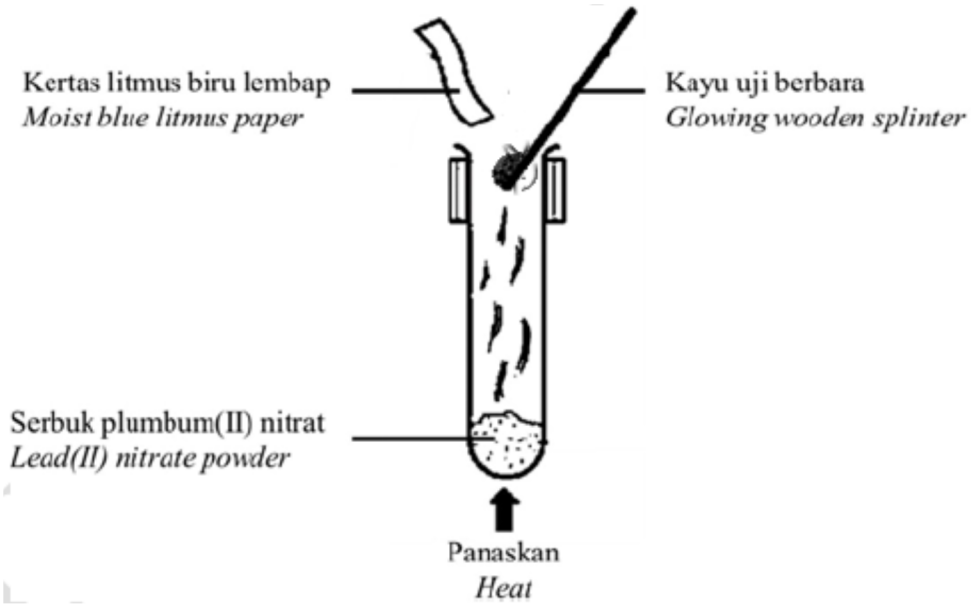
.....

..... [1M]

(c) Hitung jisim mendakan yang terbentuk jika 5 cm^3 $Pb(NO_3)_2$ 1.0 mol dm^{-3} bertindak balas dengan KI yang berlebihan.
Calculate the mass of precipitate formed if 5 cm^3 of 1.0 mol dm^{-3} $Pb(NO_3)_2$ reacts with excess KI .
[Jisim atom relatif / Relative atomic mass: Pb= 207, I=127]

[3M]

[2024 JUJ Set2-07] Rajah 7.1 menunjukkan susunan radas bagi pemanasan serbuk plumbum(II) nitrat,$Pb(NO_3)_2$. Gas perang yang terbebas daripada eksperimen ini menukarkan warna kertas litmus biru lembap kepada merah.
Diagram 7.1 shows the apparatus set-up for the heating of lead(II) nitrate, $Pb(NO_3)_2$ powder. The brown gas released from this experiment changed the moist blue litmus paper to red.



(a) Apakah fungsi kayu uji berbara?
What is the function of glowing wooden splinter?

..... [1M]

(b) Nyatakan nama gas perang yang terbebas.
State the name of the brown gas released.

..... [1M]

(c) Tuliskan persamaan kimia bagi tindak balas ini.
Write a chemical equation for this reaction.

..... [2M]

(d) Jika 33.1g garam plumbum(II) nitrat, $Pb(NO_3)_2$ digunakan dalam eksperimen ini, hitung bilangan mol garam itu.
If 33.1g lead(II) nitrate, $Pb(NO_3)_2$ salt is used in this experiment, calculate the number of mol of the salt.
[Jisim atom relative/ *Relative atomic mass* : Pb=207, N=14, O=16]

[1M]

(e) Kenal pasti kation yang hadir dalam plumbum(II) nitrat, $Pb(NO_3)_2$ dan huraikan satu ujian kimia untuk mengesahkan kation itu.
Identify the cation present in the lead(II) nitrate, $Pb(NO_3)_2$ and describe a chemical test to verify the cation.

.....

.....

..... [3M]

(f) Ahmad terkena sengatan tebuan di tangannya semasa di sekolah. Sengatan tebuan adalah bersifat alkali.
Ahmad is stung by a wasp on his hand at school. The sting of the wasp is alkaline.

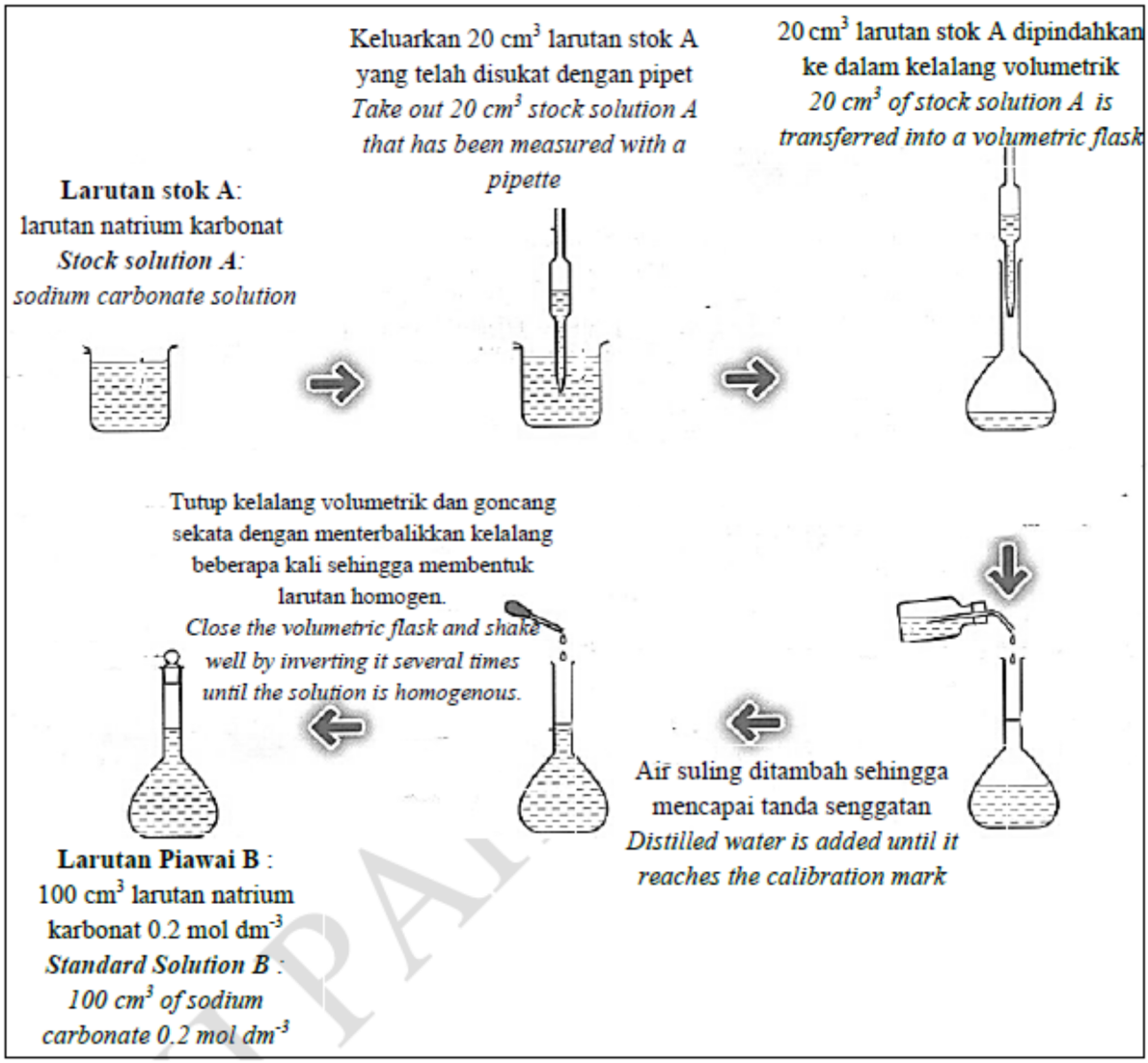
Berdasarkan Rajah 7.2, pilih bahan yang paling sesuai bagi merawat tangan Ahmad tanpa menyebabkan kecederaan lanjutan. Wajarkan pilihan anda.
Based on Diagram 7.2, choose the most suitable substance to treat Ahmad's hand without causing further injury. Justify your answer.

.....

..... [2M]

Esei

[2024 JUJ Set1-10] Rajah 10.1 menunjukkan penyediaan larutan piawai B daripada larutan stok A.
The diagram 10.1 shows the preparation of standard solution B from the stock solution A.



(a) (i) Nyatakan kaedah penyediaan larutan piawai B dalam Rajah 10.1 di atas. Terangkan mengapa natrium hidroksida tidak sesuai disediakan melalui kaedah di atas.
State the method of preparing standard solution B in Diagram 10.1 above. Explain why sodium hydroxide is not suitable to be prepared through the above method.

[2M]

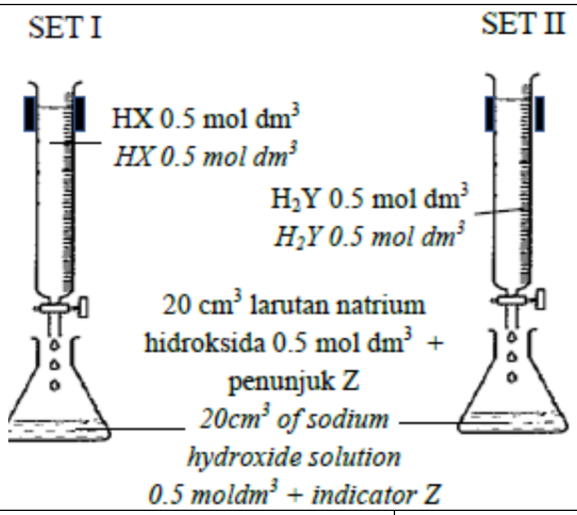
(ii) Hitung kemolaran larutan stok A yang diperlukan untuk menyediakan larutan piawai B iaitu 100 cm^3 larutan natrium karbonat 0.2 mol dm^{-3}. Hitung jisim pepejal natrium karbonat yang digunakan untuk menyediakan larutan stok A.
Calculate the molarity of a standard solution A required to prepare standard solution B which is 100 cm^3 of sodium carbonate solution, 0.2 mol dm^{-3}. Calculate the mass of solid sodium carbonate used to prepare the stock solution A.
[Jisim Atom Relatif / Relative Atomic Mass; C= 12, O= 16, Na= 23]

[4M]

(iii) Larutan piawai natrium karbonat yang disediakan bertindak balas dengan asid nitrik. Tuliskan persamaan kimia bagi tindak balas tersebut.
The prepared sodium carbonate standard solution reacts with nitric acid. Write the chemical equation for the reaction.

[2M]

(b) Rajah 10.2 menunjukkan susunan radas suatu eksperimen peneutralan yang dijalankan oleh sekumpulan murid untuk membandingkan isi padu dua jenis asid kuat yang berlainan. Isi padu asid HX dan H_2Y telah digunakan untuk meneutralkan 20 cm^3 larutan natrium hidroksida 0.5 mol dm^{-3}
Diagram 10.2 shows the apparatus set-up of a neutralisation experiments carried out by a group of students to compare the volume of two different types of strong acids. HX and H_2Y acids have been used to neutralize 20cm^3 of sodium hydroxide solution 0.5 mol dm^{-3}.

<table>
<tr><td>Susunan radas
Set up of apparatus</td><td colspan="2"> 
</td></tr>
<tr><td>Isi padu asid yang digunakan untuk meneutralkan Natrium hidroksida, cm^3
Volume of acid used to neutralize sodium hydroxide, cm^3</td><td>2V</td><td>V</td></tr>
</table>

Rajah 10.2 / Diagram 10.2

Berdasarkan Rajah 10.2,/ *Based on Diagram 10.2,*

(i) Cadangkan asid HX, asid H_2Y dan penunjuk Z. Nyatakan perubahan warna larutan di dalam kelalang kon apabila ditambah dengan penunjuk Z.
Suggest HX acid, H_2Y acid and Z indicator. State the colour change of the solution in the conical flask when Z indicator is added.

[4M]

(ii) Hitung nilai V dan terangkan perbezaan isipadu asid bagi set I dan set II.
Calculate the value of V and explain the difference in acid volume for set I and set II.

[6M]

(c) Rajah 10.3 menunjukkan Amir telah terkena senggatan lebah apabila sedang membersihkan halaman rumahnya.
Diagram 10.3 shows Amir was stung by a bee while cleaning his yard.

Sebagai seorang pelajar kimia, Amir telah menggunakan ubat gigi untuk mengurangkan kesakitannya sebelum mendapat rawatan di hospital. Wajarkan tindakan Amir.
As a chemistry student, Amir had used toothpaste to ease his pain before getting treatment at the hospital. Justify Amir's action.

[2M]

[2024 Johor Muar-11] (a) Rajah 11.1 menunjukkan ubat gigi yang digunakan untuk menjaga kesihatan gigi.
Diagram 11.1 shows the toothpaste used to take care of dental health.

(i) Apakah maksud peneutralan?/ *What is the meaning of neutralisation?*
[1M]

(ii) Bagaimana ubat gigi dalam Rajah 11.1 dapat membantu untuk menjaga kesihatan gigi?
How can the toothpaste in Diagram 11.1 help to take care of dental health?
[2M]

(b) Rajah 11.2 menunjukkan pepejal natrium hidroksida.
Diagram 11.2 shows sodium hydroxide pellet.

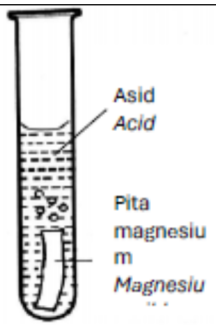
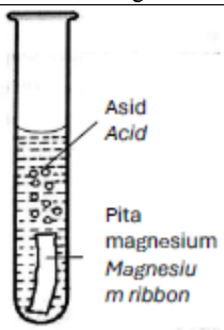
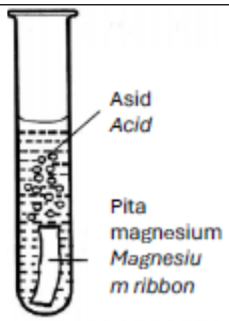
Suatu sampel pepejal natrium hidroksida, NaOH dilarutkan dalam air suling untuk menyediakan 100 cm^3 larutan berkepekatan 0.5 mol dm^{-3} dengan nilai pH 13.7. Hitungkan jisim natrium hidroksida yang perlu digunakan.

Kemudian, larutan tersebut dicairkan bagi menghasilkan larutan baharu berkepekatan 0.1 mol dm^{-3} dengan nilai pH 13. Hitung isi padu air suling yang perlu ditambah ke dalam larutan tersebut.
[Jisim atom relatif: H = 1, O = 16, Na = 23]

A sample of solid sodium hydroxide, NaOH is dissolved in distilled water to prepare 100 cm^3 of 0.5 mol dm^{-3} solution with pH value of 13.7. Calculate the mass of sodium hydroxide dissolved.

Then, the solution is diluted to produce a new solution with a concentration of 0.1mol dm^{-3} with a pH value of 13. Calculate the volume of distilled water that needs to be added to the solution.
[Relative atomic mass: H = 1, O = 16, Na = 23]
[4M]

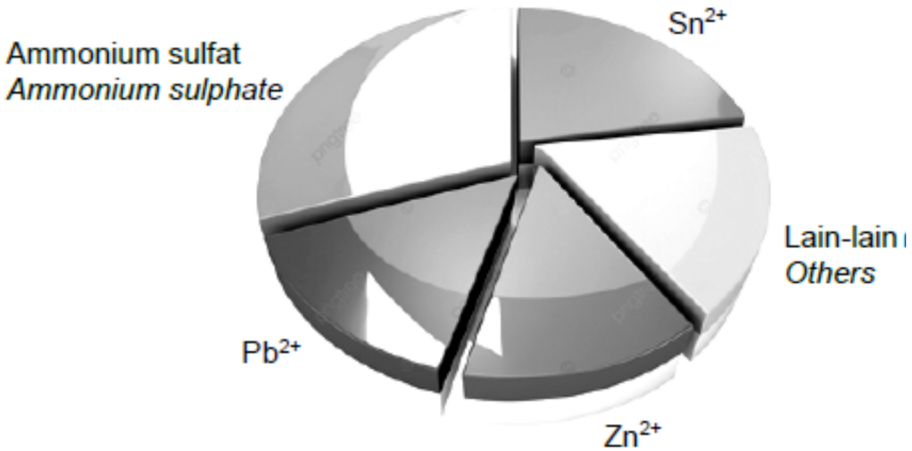
(c) Tiga keping pita magnesium yang berukuran 3 cm telah dimasukkan ke dalam tiga jenis asid berlainan yang berkepekatan 1.0 mol dm^{-3}. Jadual 4 menunjukkan keputusan eksperimen.
Three pieces of 3 cm magnesium ribbon were inserted into three different types of acid with a concentration of 1.0 mol dm^{-3}. Table 4 shows the experimental results.

Asid/ *Acid*	P	Q	R
Pemerhatian *Observation*			
Masa untuk tindak balas selesai (min) *Time taken for the reaction to complete (min)*	11.0	3.0	1.5

Pada pendapat anda, mengapa terdapat perbezaan pemerhatian bagi tindak balas di atas? Berikan contoh yang sesuai bagi asid P dan R.
In your opinion, why there are differences in the above observations for the reactions? Give suitable examples of acids P and R.

[5 markah / marks]

(d) Rajah 11.3 menunjukkan carta pai jenis mineral dan kandungannya dalam air lombong bijih timah T.
Diagram 11.3 shows a pie chart of type of mineral and its content in the water of tin mines T.



T adalah lombong bijih timah yang telah berhenti beroperasi. T terletak berhampiran kawasan pertanian. Air daripada lombong ini berbau sengit dan tidak selamat untuk diminum kerana mengandungi logam berat dan baja daripada kawasan pertanian akibat daripada proses larut lesap serta membentuk enapan.
T is a tin mine that has ceased to operate. T is located near an agricultural area. Water from this mine is smells pungent and not safe to drink because it contains heavy metals and fertilizer from agricultural areas as a result of leaching and sediment is formed.

Pada pendapat anda, mengapakah air tersebut berbau sengit dan apakah nama bahan yang terkandung di dalam enapan tersebut? Bagaimanakah anda ingin membuktikan bahawa air tersebut mengandungi ion-ion yang membentuk sebatian seperti yang anda nyatakan di dalam enapan dan dalam bahan yang menyebabkan air berbau busuk?
In your opinion, why is the water smells pungent and what is the name of the substance contained in the sediment? How do you want to prove that the water contains the ions that form the compound you specify in the sediment and in the substance that cause the water to stink?

[8M]

[2024 Johor Pasir Gudang-11] (a) Jadual 7 menunjukkan dua jenis asid monoprotik yang mempunyai kepekatan yang sama dengan nilai pH yang berlainan
Table 7 shows two types of monoprotic acids that have the same concentration with different pH values.

Larutan/ *Solution*	Asid J/ *Acid J*	Asid K/ *Acid K*
Kepekatan/ *Concentration (mol dm^{-3})*	0.1	0.1
Nilai pH/ *pH value*	2	5

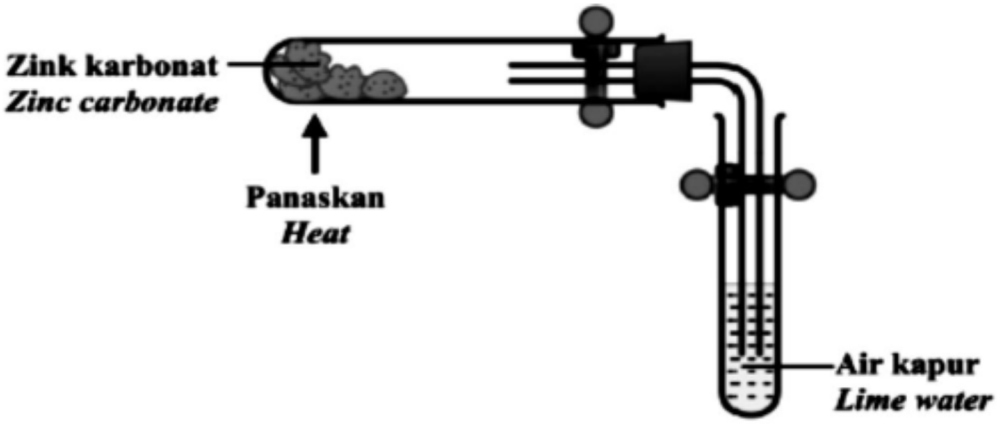
(i) Apakah maksud asid kuat?/ *What is the meaning of strong acid?*

[1M]

(ii) Cadangkan asid J dan asid K. Terangkan mengapa kedua-dua larutan ini mempunyai nilai pH yang berbeza.
Suggest acid J and acid K. Explain why these two solutions have different pH values.

[6M]

(b) Rajah 10.1 menunjukkan susunan radas bagi pemanasan serbuk zink karbonat pemanasan zink karbonat membebaskan gas yang mengeruhkan air kapur.
Diagram 10.1 shows the apparatus set up for the heating of zinc carbonate powder. The heating of zinc carbonate releases a gas that turned lime water chalky.



(i) Nyatakan dua pemerhatian dalam eksperimen ini.
State two observation for this experiment.

[2M

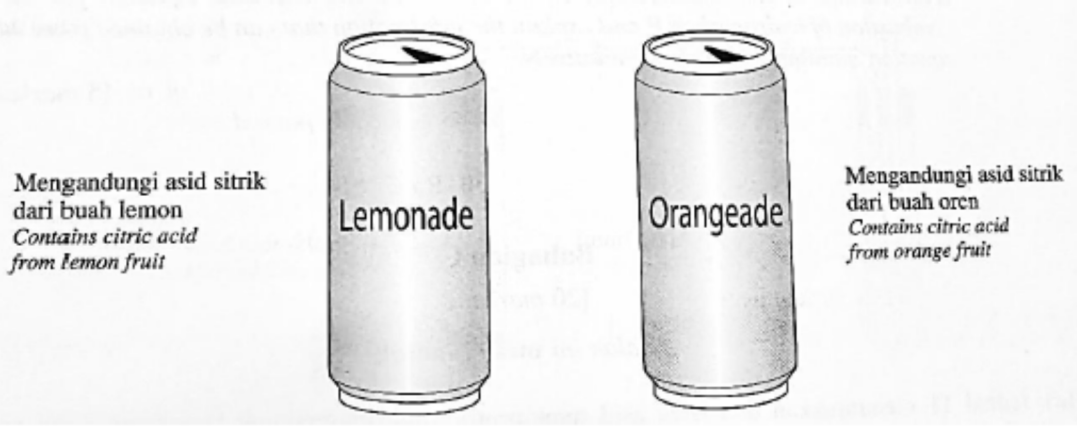
(ii) Tuliskan persamaan kimia yang seimbang bagi tindak balas itu.
Write the balanced chemical equation for the reaction.

[1M]

(iii) 25.0 g serbuk zink karbonat dipanaskan dalam eksperimen ini. Hitung isi padu gas yang dibebaskan pada keadaan bilik.
[Jisim atom relatif : Zn = 65 ; C = 12 ; O = 16 ; 1 mol gas menempati 24 dm^3 pada keadaan bilik]
25.0 g zinc carbonate powder is heated in the experiment. Calculate the volume of gas released.
[Relative atomic mass : Zn = 65 ; C = 12 ; O = 16 ; 1 mol of gas occupies 24 dm^3 at room condition]

[3M]

(c) Sebuah syarikat air minuman tempatan telah memasarkan dua jenis air berperisa lemon dan oren,yang mengandungi asid sitrik seperti yang ditunjukkan dalam Rajah 10.2 di bawah.Asid sitrik ialah sejenis asid yang boleh didapati dalam buah-buahan sitrus seperti lemon dan oren.
A beverage company has marketed two different types of flavoured drinks, lemonade and orange that contain citric acid as shown in diagram 10.2. Citric acid is a type of acid that can be found in citrus fruits such as lemons and oranges



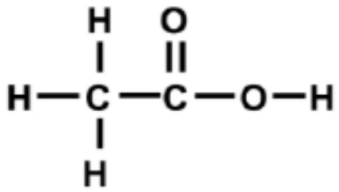
(i) Ramalkan kekonduksian elektrik bagi air minuman dalam Rajah 10.2. Jelaskan jawapan kamu.
Predict the electrical conductivity of the drinks in Diagram 10.2. Explain your answer.

[2M]

(ii) Dengan menggunakan alat radas di makmal dan cadangkan bahan kimia yang sesuai, rancang satu penyiasatan untuk menunjukkan air minuman mengandungi asid. Nyatakan kesimpulan yang dapat didapati daripada penyiasatan ini.
By using the laboratory apparatus and suggest a suitable chemical substance, plan an investigation to show the drinks contain acid. State the conclusion that could be obtained from the experiment.

[5M]

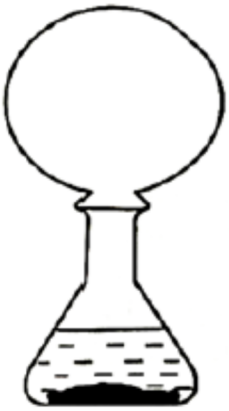
[2024 Johor Pasir Gudang-11] (a) Rajah 11. 1 menunjukkan formula struktur bagi asid etanoik.
Diagram 11.1 shows the structural formula of ethanoic acid.



(i) Nyatakan kebesan asid etanoik dan terangkan.
State the basicity of ethanoic acid and explain.

[2M]

(ii)

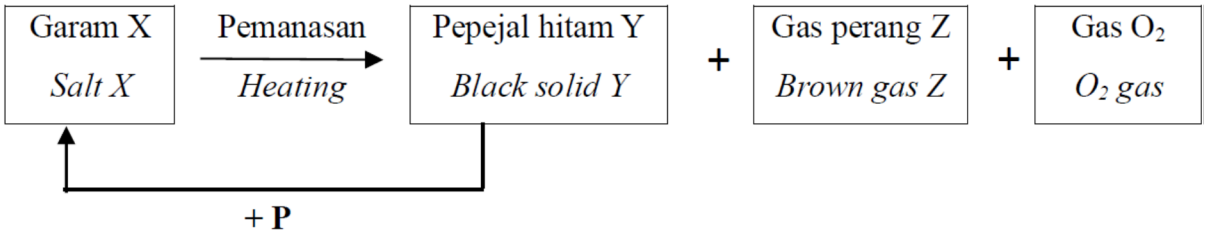
Eksperimen I / *Experiment* I	Eksperimen I / *Experiment* II
	
Asid etanoik glasial, CH_3COOH + Kalsium karbonat, $CaCO_3$ *Glacial ethanoic acid, CH_3COOH + calcium carbonate, $CaCO_3$*	Larutan asid etanoik, CH_3COOH + Kalsium karbonat, $CaCO_3$ *Ethanoic acid solution, CH_3COOH + Calcium carbonate, $CaCO_3$*

Rajah 11.2 / Diagram 11.2

Berdasarkan Rajah 11.2, terangkan perbezaan pemerhatian antara Eksperimen I dan II.
Based on Diagram 11.2, explain the differences in the observation between Experiment I and II.

[3M]

(b) Rajah 11.3 menunjukkan satu carta alir tindak balas yang berlaku ke atas garam X.
Diagram 11.3 shows a flow chart of reaction that occurs on salt X.



(i) Berdasarkan Rajah 11.3, garam X boleh disediakan daripada tindak balas antara pepejal hitam Y dengan bahan P.
Kenalpasti garam X, pepejal hitam Y, gas perang Z dan namakan bahan P.
Based on Diagram 11.3, salt X can be prepared by the reaction between black solid Y and substance P. Identify salt X, black solid Y, brown gas Z and name the substance P.

[4M]

(ii) 9.4g garam X dipanaskan dan menghasilkan bahan Y, gas Z dan gas oksigen. Tulis persamaan kimia bagi tindak balas tersebut dan kira isipadu gas Z yang terhasil pada keadaan bilik.
[Jisim molar X = 188 g mol^{-1} ; 1 mol gas menempati 24 dm^3 pada keadaan bilik]
9.4g of X salt is heated and produced substances Y, Z gas and oxygen gas. Write the chemical equation for the reaction and calculate the volume of Z gas produced at room temperature.
[Molar mass of X = 188 g mol^{-1} ; 1 mol of gas occupied 24 dm^3 at room condition]

[5M]

(c) Rajah 11.4 menunjukkan artikel mengenai penggunaan asid hidroklorik dalam proses perlombongan logam.
Diagram 11.4 shows an article about the usage of hydrochloric acid in the process of metal mining.

> Dalam perlombongan logam, asid hidroklorik digunakan untuk melarutkan mineral kuprum(II) oksida. Kuprum akan diekstrak daripada kuprum(II) klorida. Asid hidroklorik yang berlebihan perlu dirawat sebelum dilepaskan sebagai air sisa buangan kilang.
> *In metal mining, hydrochloric acid is used to leach copper (II) oxide minerals. Copper will be extracted from copper (II) chloride. Excess hydrochloric acid needs to be treated before it is discharged as the waste water from the factory.*

Rajah 11.4 / Diagram 11.4

Dengan menggunakan pengetahuan anda tentang sifat kimia asid, cadangkan bahan kimia yang digunakan untuk merawat sisa bahan buangan tersebut dan namakan tindak balas yang terlibat.
Tuliskan persamaan ion untuk mewakili tindak balas yang berlaku dan huraikan satu ujian kimia untuk mengesahkan ketidakhadiran asid di dalam air sisa buangan.
By using your knowledge on chemical properties of acid, suggest a chemical substance used to treat the waste and name the reaction involved.
Include an ionic equation to represent the reaction that occurred and describe a chemical test to verify the absence of acid in the waste water.

[6M]

[2024-Kedah-11] (a) Rajah 11.1 menunjukkan satu radas penting yang digunakan dalam penyediaan larutan piawai.
Diagram 11.1 shows the important apparatus used in preparing standard solution.

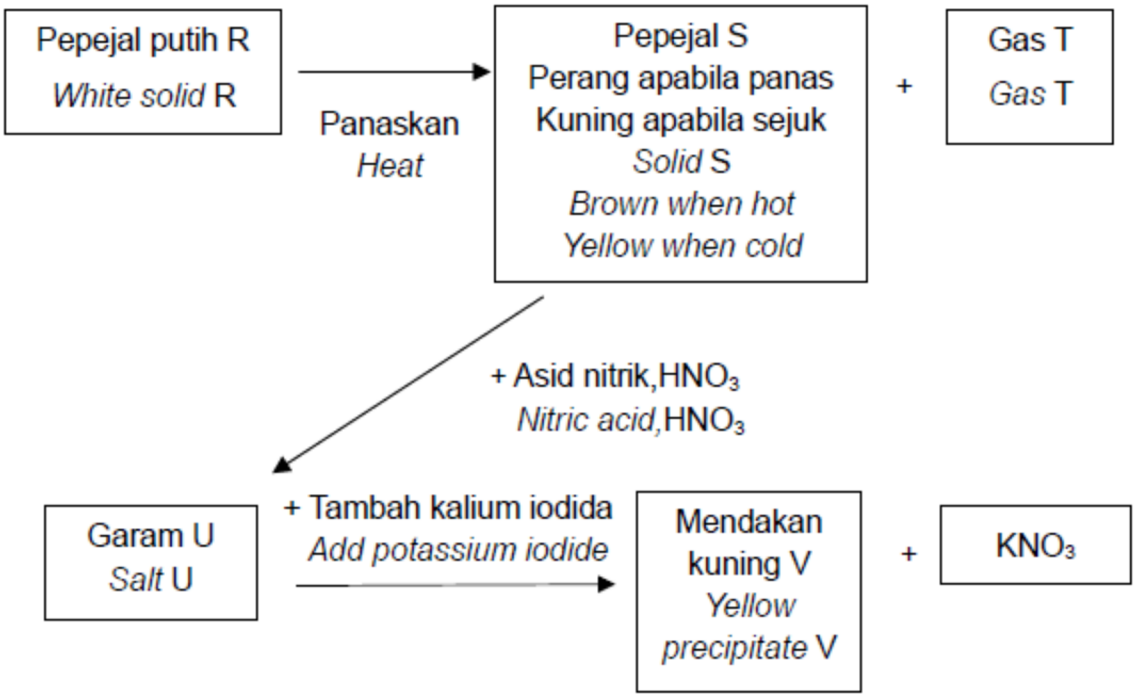
Nyatakan maksud larutan piawai. Nyatakan dua parameter yang mesti disukat dengan tepat apabila larutan piawai disediakan dengan menggunakan radas di atas.
State the meaning of standard solution. State two parameters that have to be measured accurately when preparing the standard solution by using the apparatus above.

[3M]

(b) Seorang murid ingin menyediakan 100 cm^3 larutan piawai natrium karbonat, Na_2CO_3 0.5 mol dm^{-3}. Kira jisim natrium karbonat, Na_2CO_3 yang diperlukan untuk menyediakan larutan piawai tersebut. Larutan piawai tersebut kemudiannya digunakan untuk menyediakan larutan natrium karbonat, Na_2CO_3 yang lebih cair melalui kaedah pencairan. Tentukan isi padu air suling yang perlu ditambah kepada 50 cm^3 larutan piawai itu supaya dapat menghasilkan larutan natrium karbonat, Na_2CO_3 0.2 mol dm^{-3}. [Jisim atom relatif : Na=23, O=16, C=12]
A student wants to prepare 100 cm^3 of 0.5 mol dm^{-3} standard solution of sodium carbonate, Na_2CO_3. Calculate the mass of sodium carbonate, Na_2CO_3 needed to prepare the standard solution. The standard solution is then used to prepare a dilute solution of sodium carbonate, Na2CO3 by using dilution method. Determine the volume of distilled water needed to add to 50 cm^3 of that standard solution so that 0.2 mol dm^{-3} sodium carbonate solution, Na_2CO_3 is produced. [Relative atomic mass : Na=23, O=16, C=12]

[4M]

(c) Rajah 11.2 di bawah menunjukkan satu carta alir bagi bagi menyediakan mendakan kuning V dari pepejal putih R.
Diagram 11.2 below shows a flow chart to prepare yellow precipitate V from white solid R.



Rajah 11.2 / Diagram 11.2

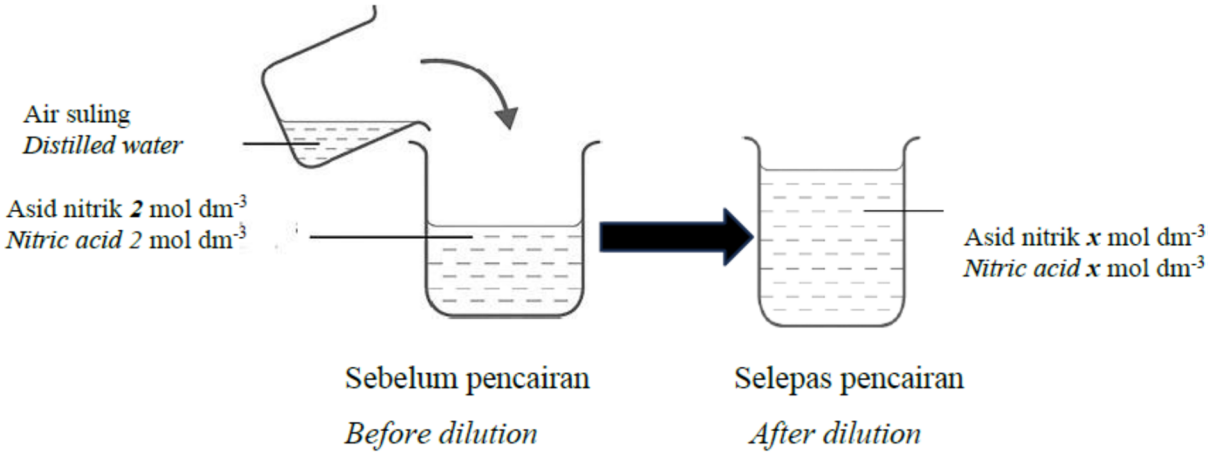
Pepejal S dan gas T adalah hasil tindakbalas apabila pepejal R dipanaskan. Gas T yang terhasil boleh mengeruhkan air kapur. Berdasarkan Rajah 11.2, kenal pasti pepejal putih R, pepejal S, gas T, garam U dan mendakan kuning V.
Solid S and gas T are the product when solid R is heated. Gas T produced can turns limewater chalky. Based on Diagram 11.2, identify white solid R, solid S, gas T, salt U and yellow precipitate V.

[5M]

(d) Farid mendapati tanaman jagung di ladangnya tidak subur. Pegawai pertanian mengesyorkan penggunaan baja ammonium nitrat untuk mengatasi masalah tersebut. Anda dikehendaki untuk menyediakan baja ammonium nitrat di dalam makmal. Dengan menggunakan bahan dan radas yang sesuai, rancangkan satu eksperimen untuk menyediakan baja tersebut.
Farid found out that the maze plants in his field were infertile. Agricultural officer recommend the use of ammonium nitrate fertilizer to solve the problem. You are required to prepare ammonium nitrate fertilizer in the laboratory. By using suitable material and apparatus, plan an experiment to prepare the fertilizer.

[8M]

[2024 Putrajaya-09] Rajah 7 menunjukkan 75 cm^3 asid nitrik 2.0 mol dm^{-3} yang dicairkan kepada x mol dm^{-3} apabila 25 cm^3 air suling ditambahkan.
Diagram 7 shows 75 cm^3 of 2.0 mol dm^{-3} nitric acid that is diluted to x mol dm^{-3} when 25 cm^3 distilled water is added.



(i) Definisikan asid. Nyatakan perubahan warna bagi kertas litmus bagi menunjukkan sifat asid.
Define acid. State the colour change for the litmus paper to show acidic properties.

[2M]

(ii) Kira nilai x. Banding dan terangkan nilai pH bagi x mol dm^{-3} asid nitrik dengan larutan asid oksalik dengan kepekatan yang sama.
Calculate the value of x. Compare and explain the pH value of x mol dm^{-3} of nitric acid with oxalic acid solution with the same concentration.

[4M]

(b) Dalam eksperimen yang lain, 25 cm^3 asid nitrik bertindak balas dengan 25 cm^3 larutan kalium hidroksida 0.01 mol dm^{-3}.
Tulis persamaan kimia seimbang bagi tindak balas tersebut dan tentukan kepekatan asid nitrik yang digunakan.
In another experiment, 25 cm^3 of nitric acid reacts with 25 cm^3 of 0.01 mol dm^{-3} potassium hydroxide solution.
Write a chemical equation for the reaction and determine the concentration of nitric acid used.

[4M]

(c) Jadual 4 menunjukkan persamaan perkataan bagi dua tindak balas melibatkan pepejal Z kepada logam oksida Y dan larutan X. Analisis ke atas larutan X dilakukan bagi mengenalpasti kation dan anionnya.
Table 4 shows the word equations for two reactions involving solid Z to metal oxide Y and solution X. Analysis on solution X is conducted to identify its cation and anion.

Tindak balas *Reaction*	Persamaan perkataan *Word equation*
I	Pepejal hijau Z → Logam oksida Y + Gas W *Green solid Z Metal oxide Y + Gas W*
II	Pepejal hijau Z + Asid nitrik → Larutan biru X + Gas W + Air *Green solid Z + Nitric acid → Blue solution X + Gas W + Water*

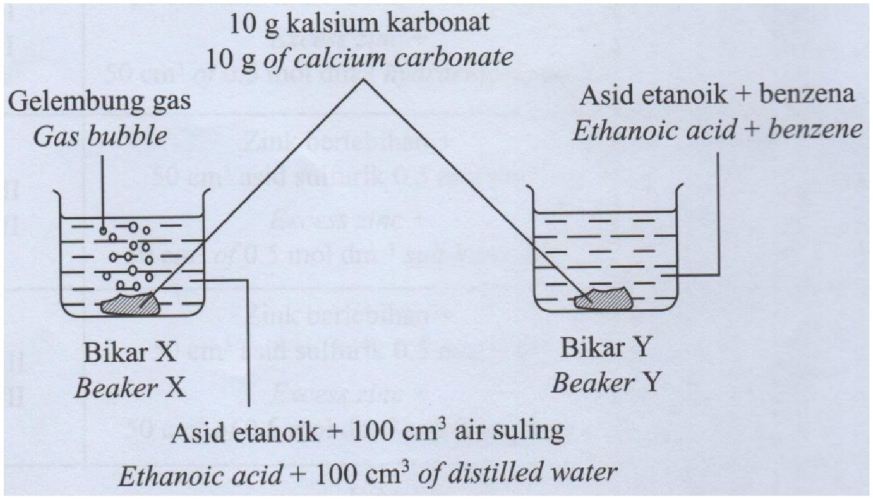
(i) Kenalpasti bahan W, X, Y dan Z./ *Identify substances W, X, Y and Z.*

[4M]

(ii) Huraikan ujian kimia untuk menentukan kehadiran kation dan anion dalam larutan X.
Describe chemical test to determine the presence of cation and anion in solution X.

[6M]

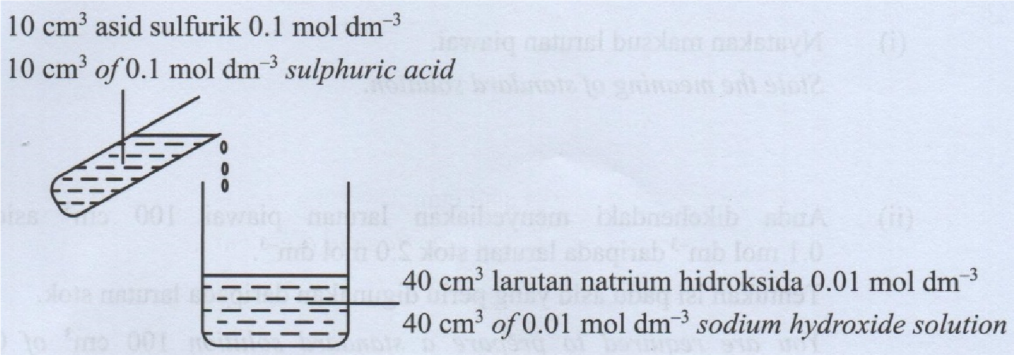
[2024-Selangor-Set2-11] Rajah 9.1 menunjukkan dua bikar berisi asid etanoik yang mengandungi kalsium karbonat.
Diagram 9.1 shows two beakers filled with ethanoic acid and contain calcium carbonate.



(a) Berdasarkan Rajah 9.1, terangkan perbezaan dalam pemerhatian daripada dua bikar tersebut.
Based on Diagram 9.1, explain the differences in the observations from the two beakers.

[4M]

(b) Rajah 9.2 menunjukkan dua larutan.
Diagram 9.2 shows two solutions.



Asid sulfurik dituangkan sepenuhnya ke dalam bikar yang mengandungi larutan natrium hidroksida.
Sulphuric acid was completely poured into the beaker containing sodium hydroxide solution.

(i) Dengan menggunakan pendekatan stoikiometri, tentukan larutan yang berlebihan.
Using stoichiometric approach, determine which solution is in excess.

[6M]

Terangkan satu cara untuk mengesahkan kehadiran larutan berlebihan yang dinyatakan di 11(b)(i).
Explain one way to verify the presence of excess solution stated in 11(b)(i),

[2M]

(c) Seorang murid hendak menyediakan satu larutan piawai untuk tujuan pentitratan.
A pupil wants to prepare a standard solution for the purpose of titration.

(i) Nyatakan maksud larutan piawai.
State the meaning of standard solution.

[1M]

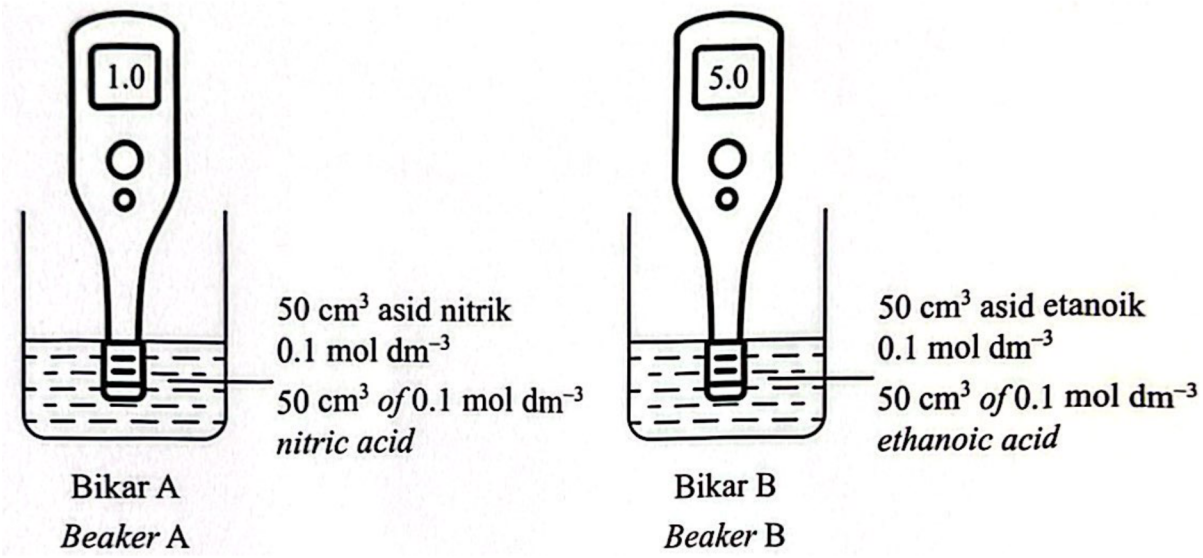
(ii) Anda dikehendaki menyediakan larutan piawai 100 cm^3 asid hidroklorik 0.1 mol dm^{-3} daripada larutan stok 2.0 mol dm^{-3}.
Tentukan isi padu asid yang perlu digunakan daripada larutan stok.
You are required to prepare a standard solution 100 cm^3 of 0.1 mol dm^{-3} hydrochloric acid from 2.0 mol dm^{-3} stock solution.
Determine the volume of acid to be taken from the stock solution.

[2M]

(iii) Huraikan langkah-langkah untuk menyediakan larutan piawai yang disebut di 11(c)(ii).
Describe the steps to prepare the standard solution mentioned in 11(c)(ii).

[5M]

[2024-Selangor-Set1-11] (a) Rajah 10.1 menunjukkan nilai pH larutan apabila seorang murid memasukkan meter pH ke dalam dua bikar yang mengandungi asid yang mempunyai kepekatan yang sama.
Diagram 10.1 shows the pH value of solution when a student dipped pH meter into two beakers containing acid of the same concentration.



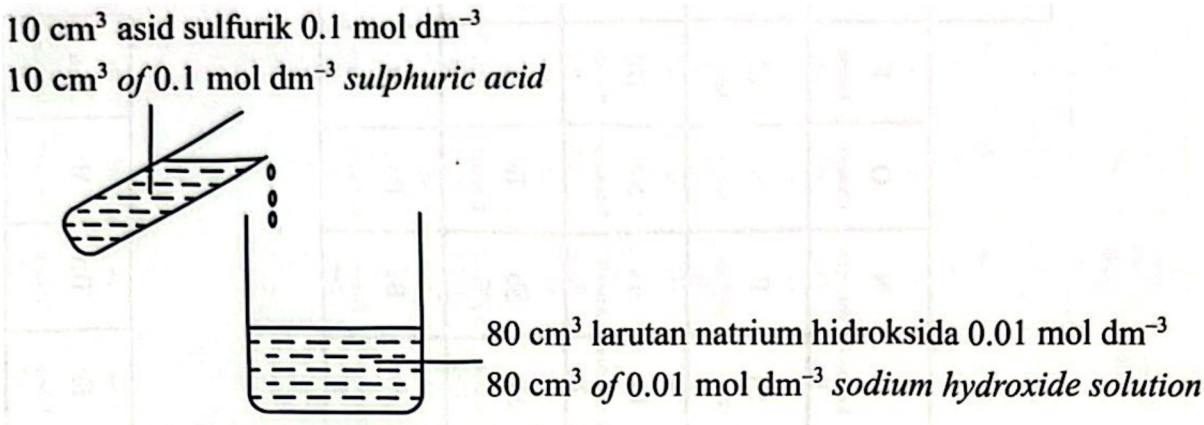
(i) Nyatakan maksud pH./ *State the meaning of pH.*

[1M]

(ii) Berdasarkan Rajah 10.1, terangkan mengapa nilai pH berbeza antara larutan dalam Bikar A dan Bikar B walaupun kepekatan asid adalah sama.
Based on Diagram 10.1, explain why the pH value of the solution in Beaker A and Beaker B are different despite having the same concentration of acid.

[4M]

(b) Rajah 10.2 menunjukkan dua larutan.
Diagram 10.2 shows two solutions.



Rajah 10.2
Diagram 10.2

Semua asid sulfurik dituangkan ke dalam bikar yang mengandungi larutan natrium hidroksida.
All sulphuric acid is poured into the beaker containing sodium hydroxide solution.

(i) Dengan menggunakan pendekatan stoikiometri, tentukan larutan yang berlebihan.
Using stoichiometric approach, determine which solution is in excess.

[6M]

(ii) Terangkan satu cara untuk mengesahkan kehadiran larutan berlebihan yang dinyatakan di 11(b)(i).
Explain one way to verify the presence of excess solution stated in 11(b)(i).

(c) Asid sulfurik boleh digunakan untuk menghasilkan garam kuprum(II) sulfat. Dengan menamakan satu bahan yang diperlukan untuk bertindak balas dengan asid sulfurik, huraikan langkah-langkah untuk menghasilkan garam kuprum(II) sulfat di makmal sekolah.
Sulphuric acid can be used to produce copper(II) sulphate salt. By naming a substance needed to react with sulphuric acid, describe the steps to produce copper(II) sulphate salt in school laboratory.

[7M]

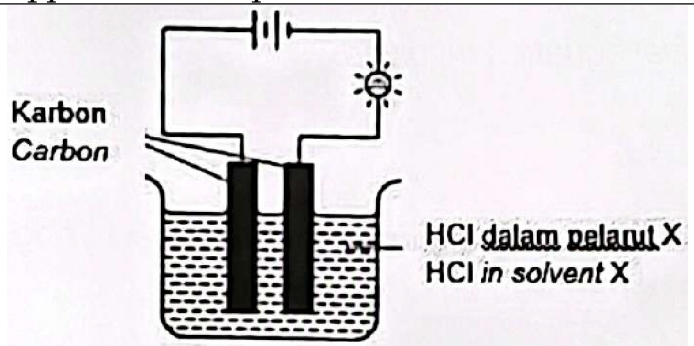
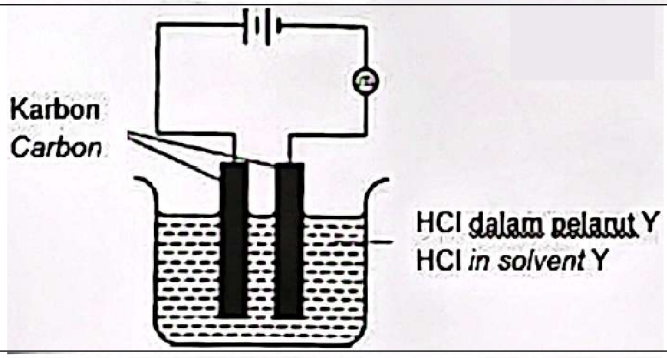
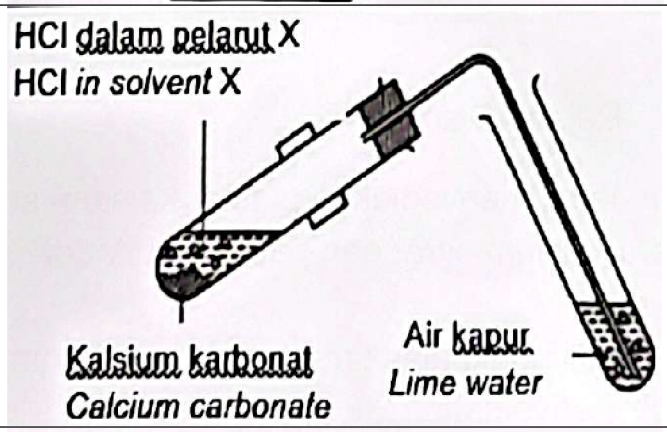
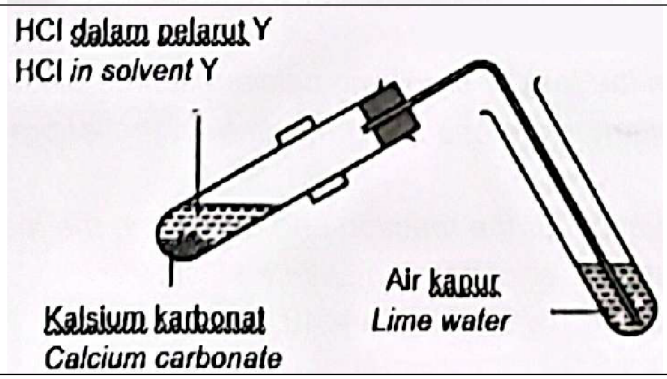
[2024 – Terengganu-09] (a) Jadual 9.1 menunjukkan nilai pH bagi ammonia dan natrium hidroksida dengan kepekatan yang sama.
Table 9.1 shows the pH values of ammonia and sodium hydroxide with the same concentration.

Alkali *Alkaline*	Kepekatan (mol dm^{-3}) *Concentration (mol dm^{-3})*	Nilai pH *pH value*
Ammonia *Ammonia*	1.0	10.0
Natrium hidroksida *Sodium hydroxide*	1.0	14.0

Terangkan mengapa nilai pH bagi kedua-dua alkali itu berbeza.
Explain why the pH values of the two alkalis are different.

[4M]

(b) Jadual 9.2 menunjukkan susunan radas dan pemerhatian bagi dua set eksperimen. Tujuan eksperimen ini ialah untuk mengkaji kekonduksian elektrik dan satu sifat asid apabila hidrogen klorida dilarutkan dalam pelarut X dan pelarut Y.
Table 9.2 shows the apparatus set-up and observations of two sets of experiment. The aim of the experiment is to study the electrical conductivity and one property of acid when hydrogen chloride is dissolved in solvent X and solvent Y.

Set	Susunan radas *Apparatus set-up*	Pemerhatian *Observation*
I		Mentol menyala *Bulb lights up*
		Mentol tidak menyala *Bulb does not light up*
II		Gas tak berwarna terbebas *Colourless gas releases* Air kapur menjadi keruh *Lime water turns Cloudy*
		Tiada perubahan *No change*

Jadual / Table 9.2

Berdasarkan Jadual 9.2./ *Based on Table 9.2,*

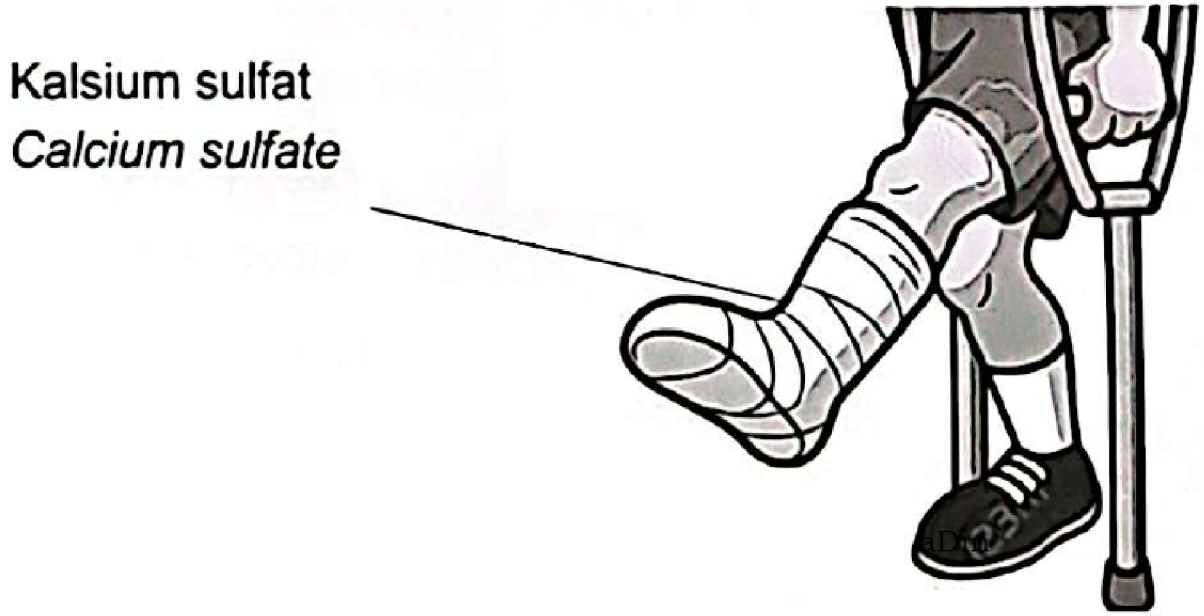
(i) Cadangkan pelarut X dan pelarut Y
Suggest solvent X and solvent Y

[2M]

(ii) Terangkan perbezaan dalam pemerhatian bagi kedua-dua set eksperimen. Tulis satu persamaan kimia yang terlibat.
Explain the differences in the observations for both sets of experiment. Write one chemical equation involved.

[8M]

(c) Rajah 9 menunjukkan plaster yang digunakan ke atas kaki yang patah
Diagram 9 shows a plaster applied on a broken leg.



Danish telah diberi tugasan untuk menyediakan plaster kalsium sulfat dengan menggunakan bahan seperti kalsium nitrat dan natrium sulfat di dalam makmal. Namakan tindak balas tersebut.
Tuliskan persamaan kimia bagi tindakbalas tersebut dan tentukan jisim kalsium nitrat yang diperlukan untuk menyediakan 2 kg plaster kalsium sulfat.
[Jisim atom relatif. O = 16, S = 32, Ca = 40, N=14]
Danish has been given the task of preparing calcium sulfate plaster by using materials such as calcium nitrate and sodium sulfate in the laboratory.
Name the reaction.
Write the chemical equation for the reaction and determine the mass of calcium nitrate required to prepare 2 kg of calcium sulfate plaster.
[Relative atomic mass: O = 16, S = 32, Ca = 40, N=14]

[2024 Negeri Sembilan-11] (a) Berikut merupakan contoh tiga garam sulfat yang boleh disediakan dalam makmal.
The following are three examples of sulphate salts that can be prepared in a laboratory.

- Kalium sulfat/ *Potassium sulphate*
- Barium sulfat/ *Barium sulphate*
- Kalsium sulfat/ *Calcium sulphate*

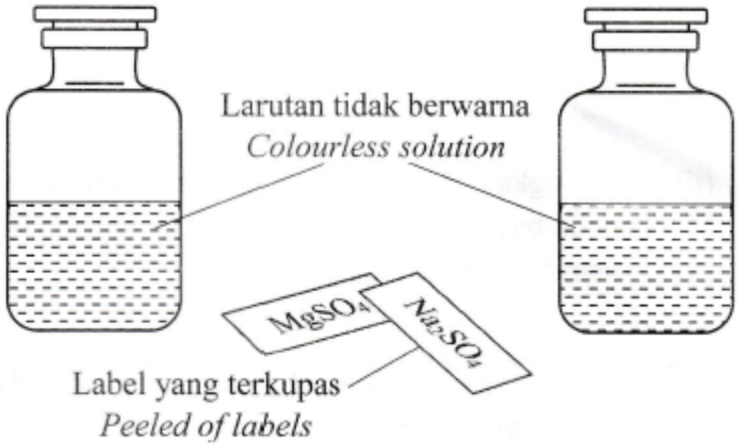
(i) Kelaskan contoh-contoh garam ini kepada garam terlarutkan dan garam tak terlarutkan.
Classify these examples of salts into soluble and insoluble salts.

[2M]

(ii) Nyatakan bahan-bahan tindak balas bagi penyediaan garam terlarutkan dalam 11(a)(i).
State the reactants for the preparation of the soluble salt in 11(a)(i).

[2M]

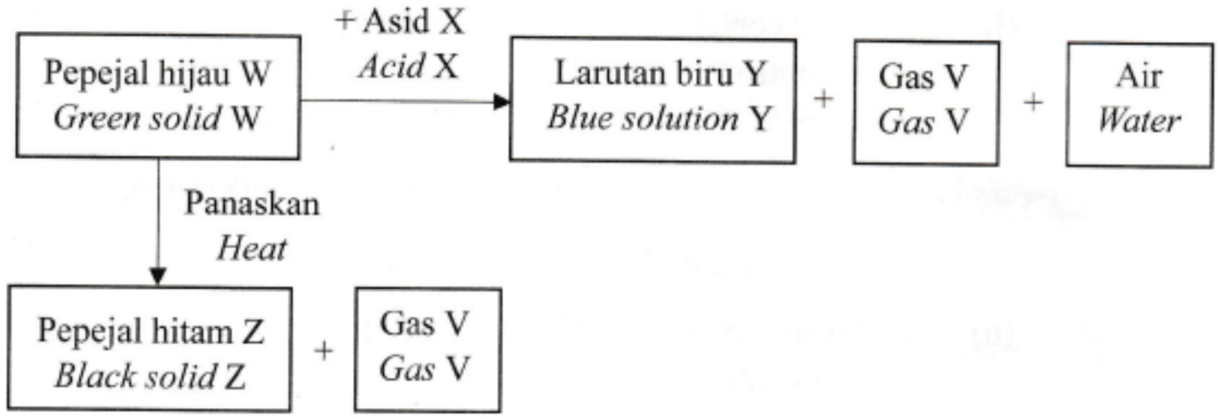
(b) Rajah 11.1 menunjukkan keadaan dua botol larutan di dalam sebuah makmal.
Diagram 11.1 shows the condition of two bottles of solution in a laboratory.



Seorang pembantu makmal ingin menampal semula label pada botol-botol ini. Beliau mengambil 2 cm^3 daripada setiap larutan dan menguji kedua-dua larutan dengan larutan ammonia. Wajarkan tindakan beliau.
A lab assistant wanted to paste the labels back to the bottles. He took 2 cm^3 from each solution and tested both solutions with ammonia solution. Justify his action.

[3M]

(c) Rajah 11.2 menunjukkan penukaran pepejal W kepada larutan Y dan pepejal Z.
Diagram 11.2 shows the conversion of solids to solution Y and solid Z.



Berdasarkan Rajah 11.2,/ *Based on Diagram 11.2,*

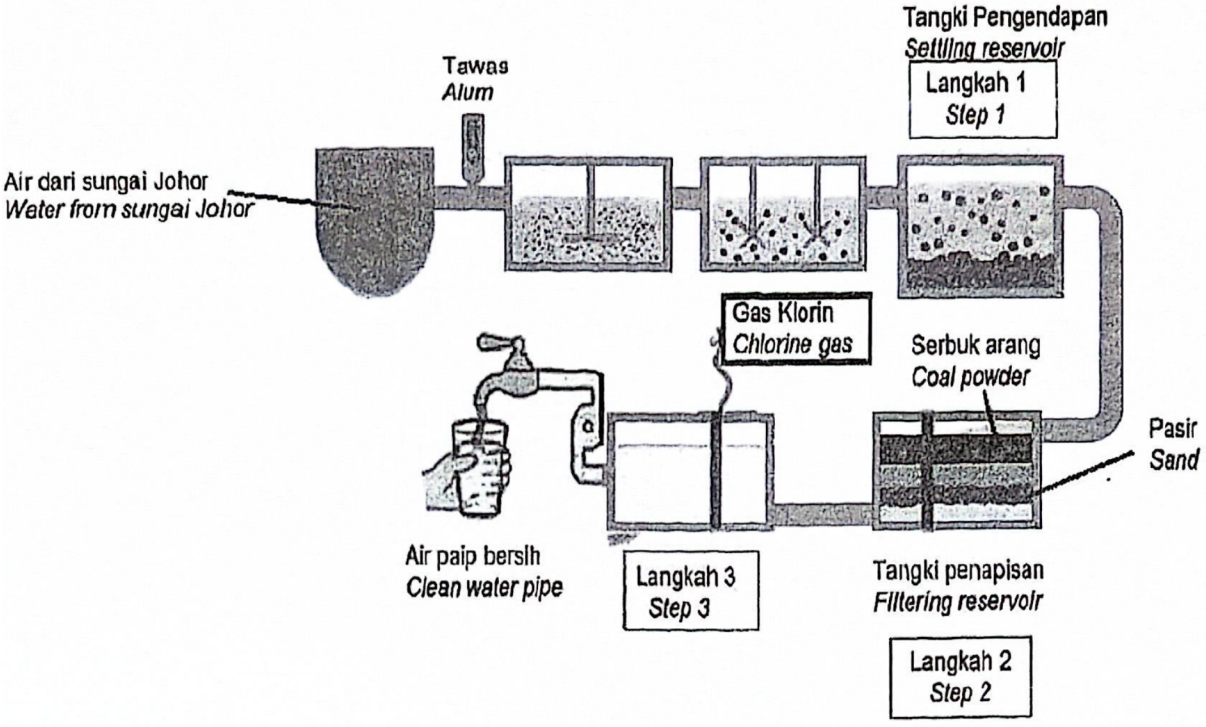
(i) Kenal pasti bahan V, bahan W dan bahan Z.
Identify substances V, W and Z.

[3M]

(ii) Cadangkan asid X untuk menyediakan larutan Y. Tulis persamaan kimia bagi tindak balas tersebut. Huraikan eksperimen makmal untuk menyediakan garam Y.
Suggest acid X to prepare solution Y. Write the chemical equation for the reaction. Describe a laboratory experiment to prepare salt Y.

[10M]

[2024 Johor-11] Rajah 11.1 menunjukkan proses rawatan air oleh Syarikat Air Prasarana.
Diagram 11.1 shows the water treatment process by Syarikat Air Prasarana



Berdasarkan Rajah 11.1,/ *Based on Diagram 11.1,*

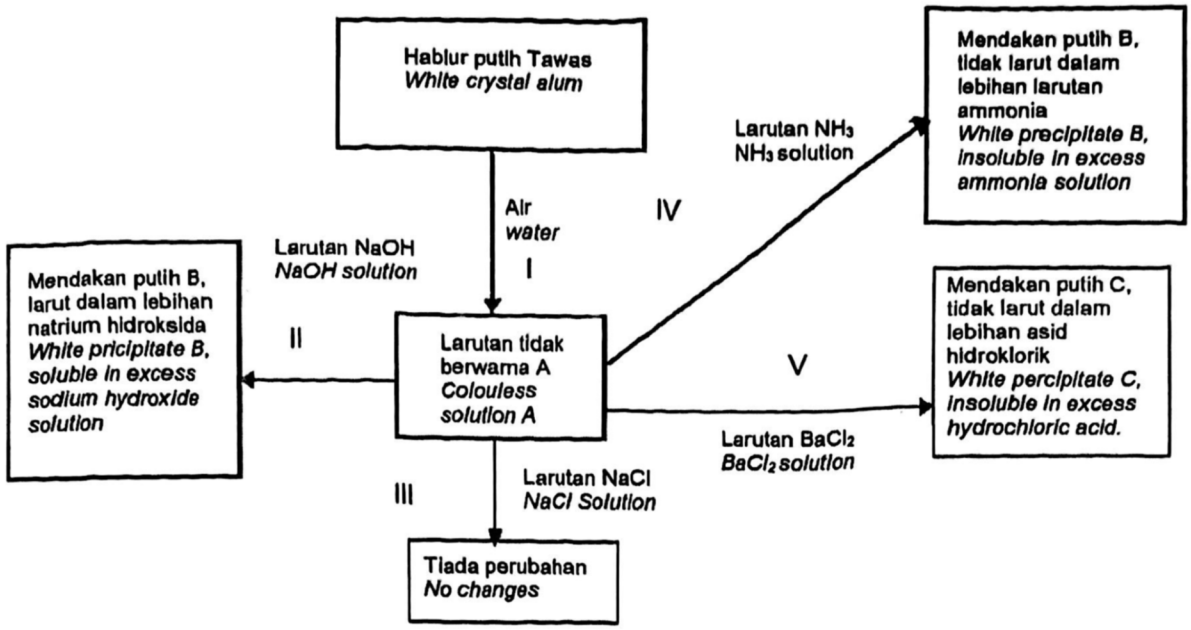
(a) Tawas yang digunakan dalam langkah 1 adalah sejenis garam.
Apakah maksud garam?
The alum used in Step 1 is a type of salt.
What is the meaning of salt?

[1M]

(b) Nyatakan hasil tindak balas apabila gas klorin dimasukkan ke dalam air dalam tangki pada langkah 3 dan apakah pemerhatian yang diperolehi apabila kertas litmus dicelupkan ke dalam hasil tindak balas tersebut.
State the result of the reaction when chlorine gas is added to the water in the tank in step 3 and what observations are obtained when litmus paper is dipped into the product of the reaction.

[2M]

(c) Rajah 11.2 menunjukkan carta alir keputusan ujian kimia terhadap tawas yang dijalankan di makmal kimia sekolah Cikgu Syam.
Diagram 11.2 shows the flow chart of the results of chemical tests on alum carried out in the chemistry laboratory of Cikgu Syam's school.



Berdasarkan Rajah 11.2,/ *Based on Diagram 11.2,*

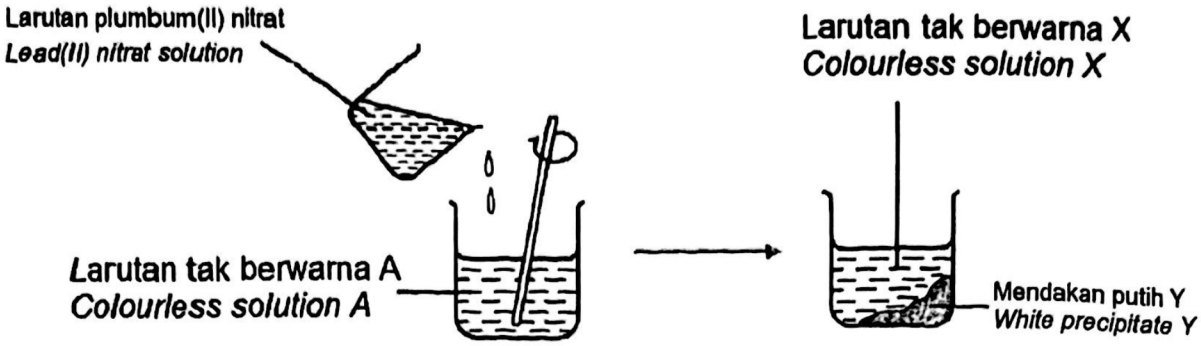
(i) Berdasarkan kepada Ujian I, II, III dan IV, namakan kation yang hadir dan namakan garam yang terdapat dalam tawas tersebut.
Based on Tests I, II, III and IV, name the cation present and name the salt found in the alum.

[2M]

(ii) Namakan B dan C dan nyatakan tujuan ujian III dilakukan serta tuliskan persamaan kimia bagi ujian II dan V.
Name B and C and state the purpose of test III and write the chemical equation for test II and V.

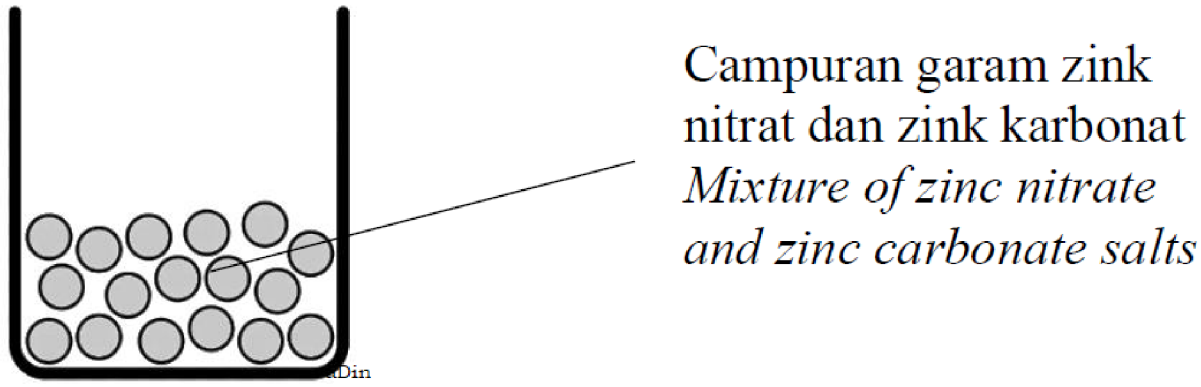
[7M]

(d) Rajah 11.3 menunjukkan pemerhatian yang diperoleh apabila larutan plumbum(II) nitrat ditambahkan ke dalam larutan A.
Diagram 11.3 shows the observation that obtained when lead(II) nitrate solution is added into solution A.



Dengan menggunakan pengetahuan kimia anda, huraikan cara untuk menghasilkan mendakan putih di dalam makmal dan tuliskan persamaan ion bagi pembentukan mendakan putih tersebut.
Using your knowledge of chemistry, describe how to produce a white precipitate in the laboratory and write the ionic equation for the formation of the white precipitate.
[8M]

[2024-Sarawak-Set01-11] (a) Rajah 8 menunjukkan satu bikar mengandungi campuran garam zink yang diberikan kepada peserta semasa pertandingan 'COOL SCIENCE CHALLENGE' dalam aktiviti Minggu Sains.
Diagram 8 shows a beaker contains a mixture of zinc salts that is given to participants during 'COOL SCIENCE CHALLENGE' competition in Science Week activity.



(i) Nyatakan keterlarutan bagi kedua-dua garam. Huraikan secara ringkas bagaimana kedua-dua garam dapat diasingkan
State the solubility of the two salts. Describe briefly how both salts can be separated.
[6M]

(ii) Banding dan bezakan kedua-dua garam apabila terurai oleh haba. Tulis persamaan kimia bagi tindak balas penguraian bagi kedua-dua garam tersebut,
Compare and contrast both salts when decomposed by heat. Write the chemical equation for the decomposition reaction for both salts.

[7M]

(b) Anda diberikan tiga bahan yang digunakan untuk menyediakan garam sulfat seperti yang ditunjukkan dalam Jadual 7.
You are given three substances used to prepare zinc sulphate as shown in Table 7.

Asid sulfurik, H_2SO_4, zink nitrat, $Zn(NO_3)_2$, natrium karbonat, Na_2CO_3
Sulphuric acid, H_2SO_4, zinc nitrate, $Zn(NO_3)_2$, sodium carbonate, Na_2CO_3

Jadual 7 / Table 7

Dengan menggunakan bahan-bahan dalam Jadual 7, huraikan bagaimana garam zinc sulfat dapat disediakan di dalam makmal.
By using the substances in Table 7, describe how to prepare zinc sulphate salt in the laboratory.

[7M]

[2024-Johor Batu Pahat-09] (a) Jadual 9.1 menunjukkan kesan pemanasan ke atas dua sebatian ion yang berbeza iaitu sebatian X dan Y. Sebatian-sebatian tersebut terdiri daripada kation yang sama. Pemanasan sebatian-sebatian tersebut menghasilkan pepejal yang berwarna kuning apabila panas dan bertukar putih apabila sejuk
Table 9.1 shows the effect of heat on two different ionic compounds which are compound X and Y. The compounds consist of the same cation.
Heating of the compounds produces yellow solid when hot and white solid when cold.

Sebatian/ *Compound*	Ujian Pengesahan Gas *Gas Confirmation Test*	Pemerhatian *Observation*
Sebatian X/ *Compound* X	Mengeruhkan air kapur *Turns lime water cloudy*	Gas tidak berwarna P terbebas / *Colourless gas* P *is released*
Sebatian Y/ *Compound Y*	Menyalakan kayu uji berbara *Rekindles the glowing wooden splinter*	Gas tidak berwarna Q terbebas. *Colourless gas* P *is released*
	Menukarkan kertas litmus biru ke merah *Change the blue litmus paper to red*	Gas berwarna perang R terbebas . *Brown gas R are released*

(i) Nyatakan nama bagi gas P, gas Q dan gas R yang dibebaskan dalam tindakbalas I dan II. Seterusnya namakan sebatian X dan sebatian Y
State the name of gas P, Q and R released in reaction I and II. Name compound X and compound Y

[5M]

(ii) Huraikan satu ujian kimia untuk menentusahkan kation yang hadir dalam sebatian Y
Describe a chemical test to confirm the presence of cation in compound Y

[4M]

(b) Seorang murid diberi tugasan untuk menyediakan larutan piawai menggunakan pepejal natrium hidroksida.
A student has been given the task of preparing a standard solution using solid sodium hydroxide.

(i) Apakah yang dimaksudkan dengan larutan piawai?
What is meant by a standard solution?

[1M]

(ii) Hitung jisim pepejal natrium hidroksida yang perlu dilarutkan dengan 500 cm^3 air suling untuk menghasilkan larutan piawai dengan kemolaran 1.0 mol dm^{-3} .[Jisim Atom Relatif: Na=23 , O=16 , H=1]
Calculate the mass of sodium hydroxide solid that need to be dissolved in 500 cm^3 of distilled water to produce an alkali standard solution with a concentration of 1.0 mol dm^{-3}[Relative Atomic Mass: Na=23 , O =16 , H =1]

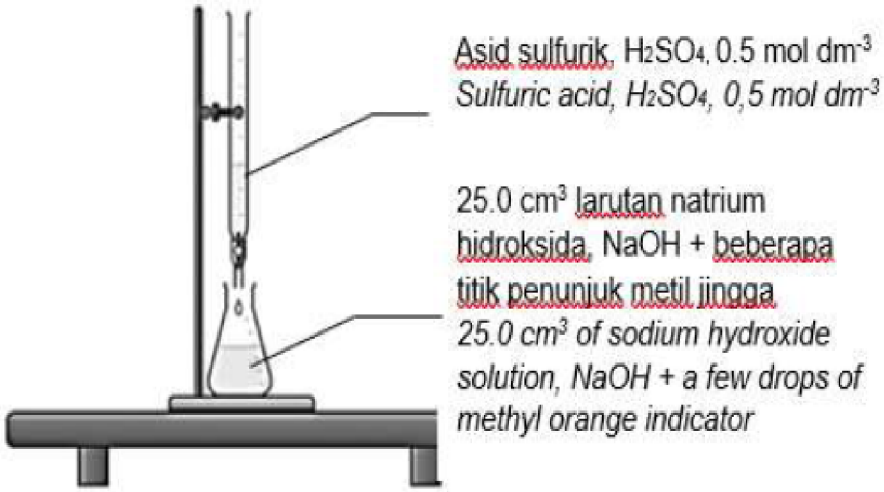
[2M]

(c) Murid tersebut diminta menyediakan 250 cm^3 larutan piawai natrium hidroksida 0.5 mol dm^{-3} daripada larutan stok natrium hidroksida 1.0 mol dm^{-3}.
The student was asked to prepare 250 cm^3 of standard solution of sodium hydroxide 0.5 mol dm^{-3} from a stock solution of sodium hydroxide 1.0 mol dm^{-3}.

Namakan kaedah untuk menyediakan larutan piawai tersebut.
Hitung isipadu larutan stok yang diperlukan untuk menyediakan larutan piawai tersebut.
Name the method to prepare the standard solution.
Calculate the volume of stock solution needed to prepare the standard solution.

[3M]

(d) Seterusnya murid tersebut dikehendaki menggunakan larutan piawai natrium hidroksida tersebut untuk menentukan kemolaran asid sulfurik dengan menggunakan susunan radas seperti Rajah 9.2
Next the student has been asked to use the standard solution of sodium hydroxide to determine molarity of sulphuric acid used the set up apparatus as shown in Diagram 9.2



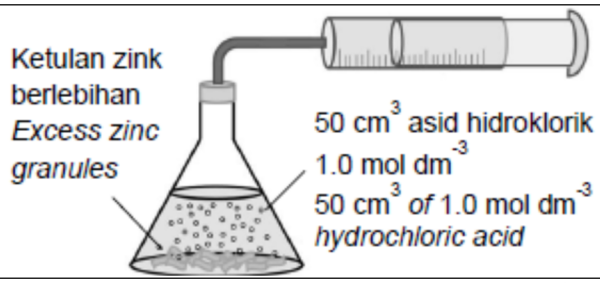
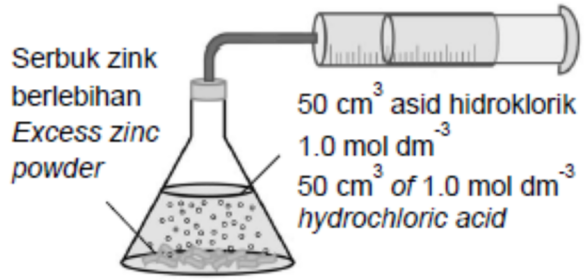
(i) Namakan kaedah yang ditunjukkan dalam rajah tersebut
Name the method used as shown in the diagram

[1M]

(ii) Tuliskan persamaan kimia bagi tindak balas di atas. Tentukan kemolaran larutan natrium hidroksida yang digunakan sekiranya 25 cm^3 asid sulfurik 0.5 mol dm^{-3} diperlukan untuk meneutralkan 25 cm^3 larutan natrium hidroksida.
Write the chemical equation for reaction above. Determine the molarity of sodium hydroxide solution used if 25 cm^3 of 0.5 mol dm^{-3} sulphuric acid needed to neutralised 25 cm^3 sodium hydroxide solution

[4M]

[2024-Melaka-06] Jadual 2 menunjukkan dua eksperimen yang dijalankan untuk mengkaji faktor yang mempengaruhi kadar tindak balas.
Table 2 shows two experiments carried out to study the factor that affects the rate of reaction.

Eksperimen *Experiment*	Susunan radas *Set-up of apparatus*	Masa yang diambil untuk mengumpul 60 cm^3 gas (s) *Time taken to collect 60 cm^3 gas (s)*
I		80
II		30

(a) Berikan satu faktor yang boleh mempengaruhi kadar tindak balas.
Give one factor that can affects the rate of reaction.

..... [1M]

(b) Berdasarkan Jadual 2, nyatakan satu sebab mengapa isipadu akhir gas yang diperolehi dalam eksperimen I dan eksperimen II adalah sama.
Based on Table 2, state one reason why the final volume of gas obtained in experiments I and II are the same.

..... [1M]

(c) (i) Hitung kadar tindak balas purata bagi :
Calculate the average rate of reaction for :

Eksperimen I *Experiment I*	Eksperimen II *Experiment II*

[2M]

(ii) Tuliskan persamaan kimia bagi eksperimen itu.
Write a chemical equation for the experiment.

..... [2M]

(iii) Bandingkan kadar tindak balas bagi Eksperimen I dan Eksperimen II. Terangkan jawapan anda.
Compare the rate of reaction between Experiment I and Experiment II. Explain your answer.

.....

.....

..... [3M]

[2024 JUJ Set1-06] Jadual 6 menunjukkan maklumat bagi dua set eksperimen yang dijalankan pada suhu bilik untuk menyiasat faktor yang mempengaruhi kadar tindak balas antara zink dan dua jenis asid kuat.
Table 6 shows the informations for two sets of experiment conducted at room temperature to investigate factor affecting the rate of reaction between zinc and two types of strong acids.

Eksperimen *Experiment*	Bahan *Materials*	Isi padu gas P terkumpul dalam 2 minit (cm^3) *Volume of gas P collected in 2 minutes (cm^3)*
I	50 cm^3 asid HQ 1.0 mol dm^{-3} + ketulan zink berlebihan *50 cm^3 of 1.0 mol dm^{-3} acid HQ + excess zinc granules*	15
II	50 cm^3 asid H_2R 1.0 mol dm^{-3} + ketulan zink berlebihan *50 cm^3 of 1.0 mol dm^{-3} acid H_2R + excess zinc granules*	30

(a) Nyatakan maksud kadar tindak balas.
State the meaning of rate of reaction.

.....

..... [1M]

(b) Nyatakan perubahan yang dapat diperhatikan untuk menentukan kadar tindak balas dalam eksperimen ini.
State the observable changes to determine the rate of reaction in this experiment.

..... [1M]

(c) Hitung kadar tindak balas purata bagi Eksperimen I.
Calculate the average rate of reaction for Experiment I.

[1M]

(d) Lakarkan graf bagi isi padu gas P melawan masa yang diperolehi daripada dua set eksperimen tersebut pada paksi yang sama.
Sketch the graph of the volume of gas P against time obtained from the two sets of experiments on the same axis.

[2M]

(e) Nyatakan faktor yang mempengaruhi kadar tindak balas dalam eksperimen itu.
State the factor that affects the rate of reaction in the experiment.

..... [1M]

(f) Kenal pasti gas P, asid Q dan asid R./ *Identify gas P, acid Q and acid R*

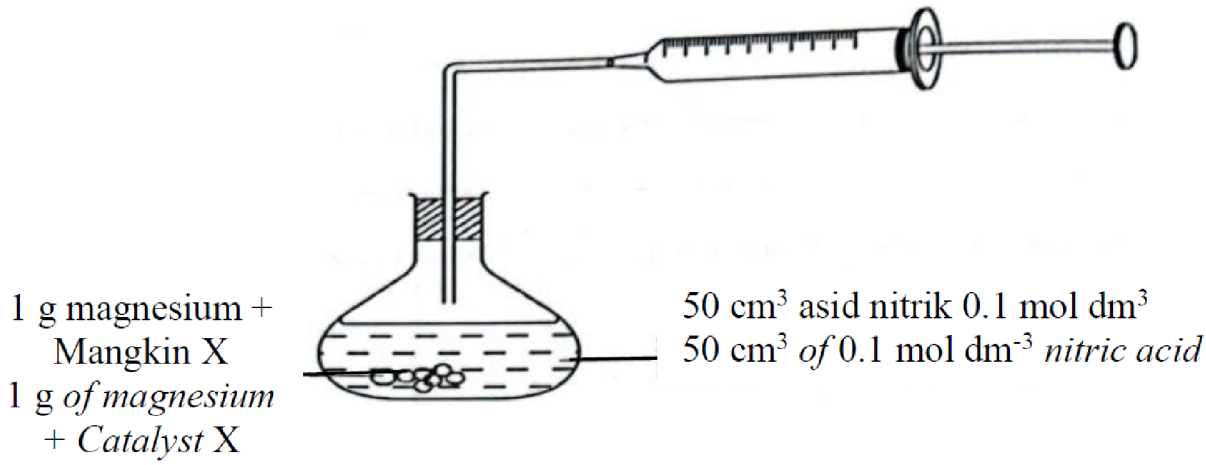
Gas P / *Gas* P : .....

Asid HQ / *Asid* HQ : .....

Asid H_2R / *Asid* H_2R : .....

[3M]

[2024-Sarawak-Set01-06] Rajah 5 menunjukkan susunan radas bagi satu eksperimen untuk mengkaji kadar tindak balas antara magnesium dan asid nitrik. Dalam eksperimen ini, 1.0 g magnesium ditambahkan kepada 50 cm^3 asid nitrik 0.1 mol dm^{-3}.
Diagram 5 shows the apparatus set-up for an experiment to study the rate of reaction between of magnesium and nitric acid. In this experiment, 1.0 g of magnesium is added to 50 cm^3 of 0.1 mol dm^{-3} nitric acid.



Jadual 4 menunjukkan isi padu gas yang terkumpul pada setiap sela masa 1 minit apabila mangkin X ditambah dalam eksperimen ini.
Table 4 shows the volume of gas collected at 1 minute interval when catalyst X is added in this experiment.

Masa (min) *Time (min)*	0.0	1.0	2.0	3.0	4.0	5.0
Isi padu gas (cm^3) *Volume of gas (cm^3)*	0.0	18.2	34.8	51.1	60.0	60.0

(a) (i) Apakah yang dimaksudkan dengan mangkin?
What is the meaning of catalyst?

.....

..... [1M]

(ii) Nyatakan nama bagi mangkin X yang boleh digunakan dalam eksperimen ini.
State the name of catalyst X that can be used in this experiment.

..... [1M]

(b) Tulis persamaan kimia bagi tindak balas dalam eksperimen ini.
Write the chemical equation for the reaction in this experiment.

..... [2M]

(c) Hitung/ *Calculate :*

(i) Bilangan mol magnesium yang digunakan.
The number of mole of magnesium used.

[1M]

(ii) Bilangan mol bagi asid nitrik./ *The number of mole of nitric acid.*

[1M]

(d) Berdasarkan jawapan di 6(c)(i) dan 6(c)(ii), namakan bahan tindak balas yang menentukan isi padu gas yang terbentuk pada akhir tindak balas itu.
Based on the answer in 6(c)(i) and 6(c)(ii), name the reactant which determines the volume of gas produced at the end of the reaction.

..... [1M]

(e) Dengan menggunakan teori perlanggaran, terangkan bagaimana faktor mangkin meningkatkan kadar tindak balas.
By using the collision theory, explain how the catalyst factor increases the rate of reaction.

.....

.....

..... [2M]

[2024 – Terengganu-05] (a) Jadual 5 menunjukkan maklumat bagi dua set eksperimen yang telah dijalankan untuk menyiasat faktor yang mempengaruhi kadar tindak balas.
Table 5 shows the information of two sets of experiments that were conducted to investigate the factor that affects the rate of reaction.

Set	Bahan tindak balas *Reactant*	Suhu (°C) *Temperature (°C)*
I	Serbuk magnesium berlebihan + 50 cm^3 asid nitrik 0.5 mol dm^{-3} *Excess magnesium powder + 50 cm^3 of 0.5 mol dm^{-3} of nitric acid*	40.0
II	Serbuk magnesium berlebihan + 50 cm^3 asid nitrik 0.5 mol dm^{-3} + larutan kuprum(II) sulfat *Excess magnesium powder + 50 cm^3 of 0.5 mol dm^{-3} of nitric acid + copper(II) sulphate solution*	40.0

Berdasarkan Jadual 5,/ *Based on Table 5,*

(i) Kenal pasti faktor yang mempengaruhi kadar tindak balas.
Identify the factor that affects the rate of reaction.

..... [1M]

(ii) Nyatakan satu kuantiti yang boleh diukur untuk menentukan kadar tindak balas.
State a quantity that can be measured to determine rate of reaction.

..... [1M]

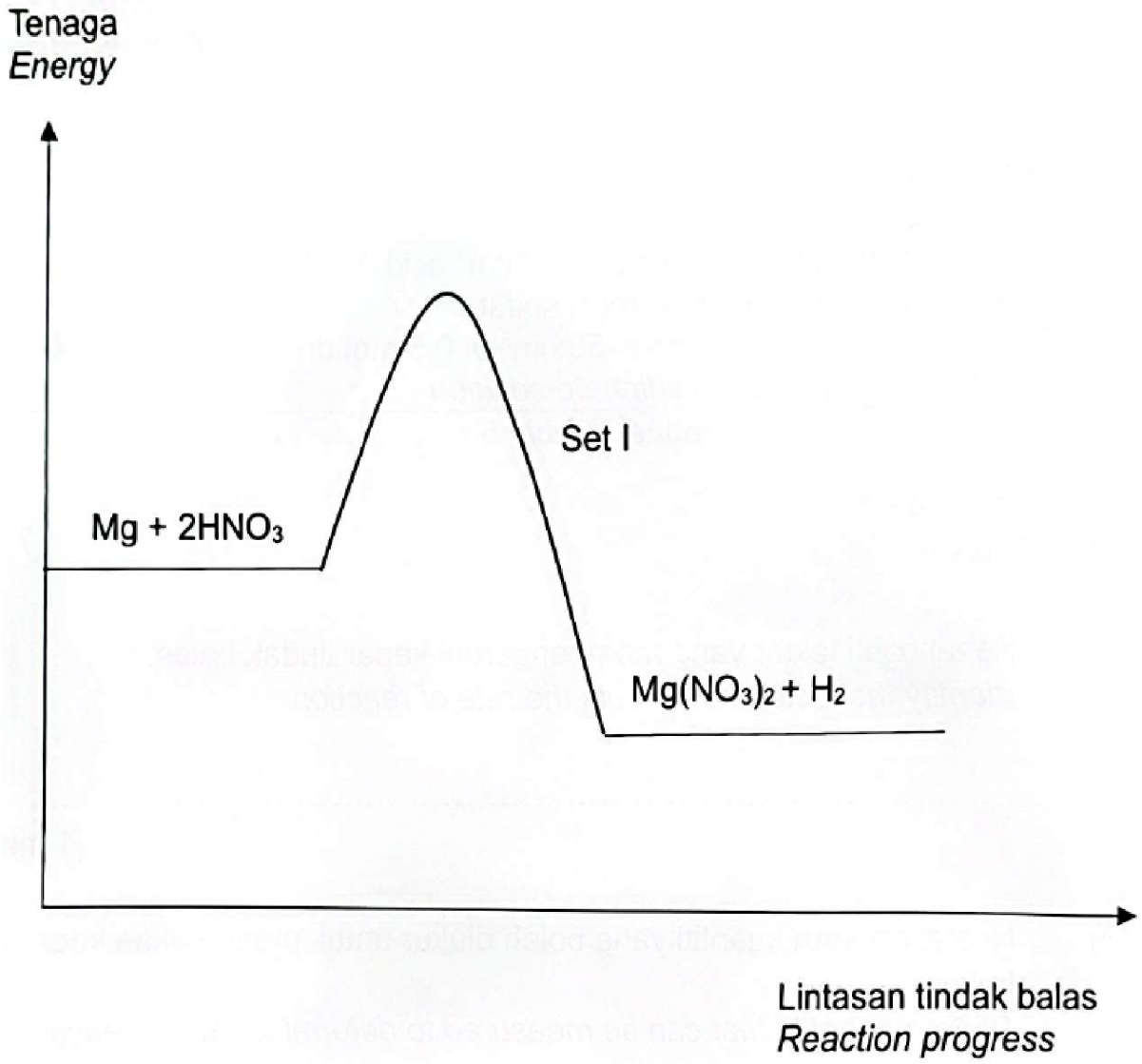
(iii) Berikut merupakan persamaan kimia bagi tindak balas dalam eksperimen tersebut.
The following is the chemical equation for the reaction in the experiment.

$$Mg + 2HNO_3 \rightarrow Mg(NO_3)_2 + H_2$$

Hitung jisim magnesium nitrat yang terhasil dalam Set I.
[Jisim atom relatif; Mg=24, N=14, O=16]
Calculate the mass of magnesium nitrate that produced in Set I.
[Relative atomic mass: Mg=24, N=14, O=16]

[3M]

(b) Berdasarkan maklumat pada Jadual 5, gambar rajah profil tenaga bagi Set I adalah seperti yang ditunjukkan dalam Rajah 5.
Based on the information in Table 5, energy profile diagram for Set I is shown as Diagram 5.

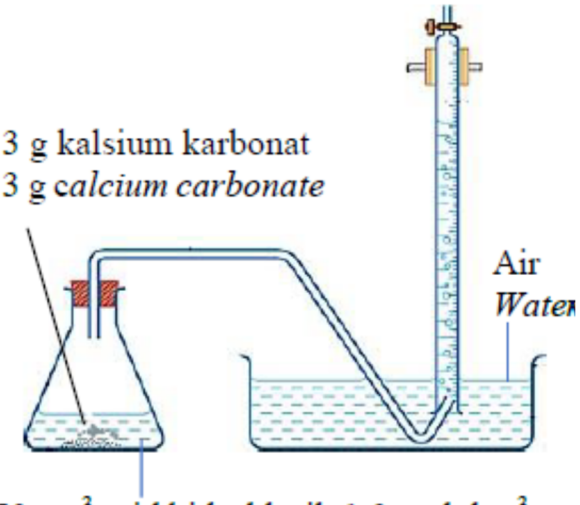
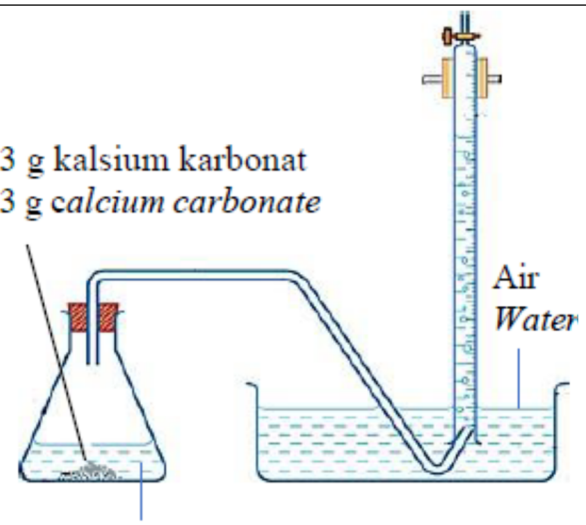


Rajah / Diagram 5

Berdasarkan Rajah 5, lukis profil tenaga untuk Set II dan tandakan tenaga pengaktifan bagi Set I sebagai Ea dan tenaga pengaktifan set II sebagai Ea'.
Based on Figure 5, draw the energy profile for Set II and mark the activation energy of Set I as Ea and the activation energy of Set II as Ea'.

[3M]

[2024 Putrajaya-08] Rajah 6.1 menunjukkan susunan radas dan pemerhatian bagi dua set eksperimen yang telah dijalankan di makmal.
Rajah 6.1 shows the apparatus set-up and the observations of two set of experiment that has been carried out in a laboratory.

Set *Set*	Susunan radas *Apparatus set up*	Suhu *Temperature*	Masa yang diambil untuk mengumpulkan 50 cm^3 gas CO_2 (s) *Time taken to collect50 cm^3 CO_2 gas (s)*
I		30	12.0
II		30	30.0

(a) Berdasarkan Rajah 6.1, kenalpasti faktor yang mempengaruhi kadar tindak balas.
Based on Diagram 6.1, identify the factor that affects the rate of reaction.

..... [1M]

(b) Nyatakan pemerhatian apabila gas karbon dioksida, CO_2 diuji menggunakan air kapur.
State the observation when carbon dioxide, CO_2 gas is tested by using limewater.

..... [1M]

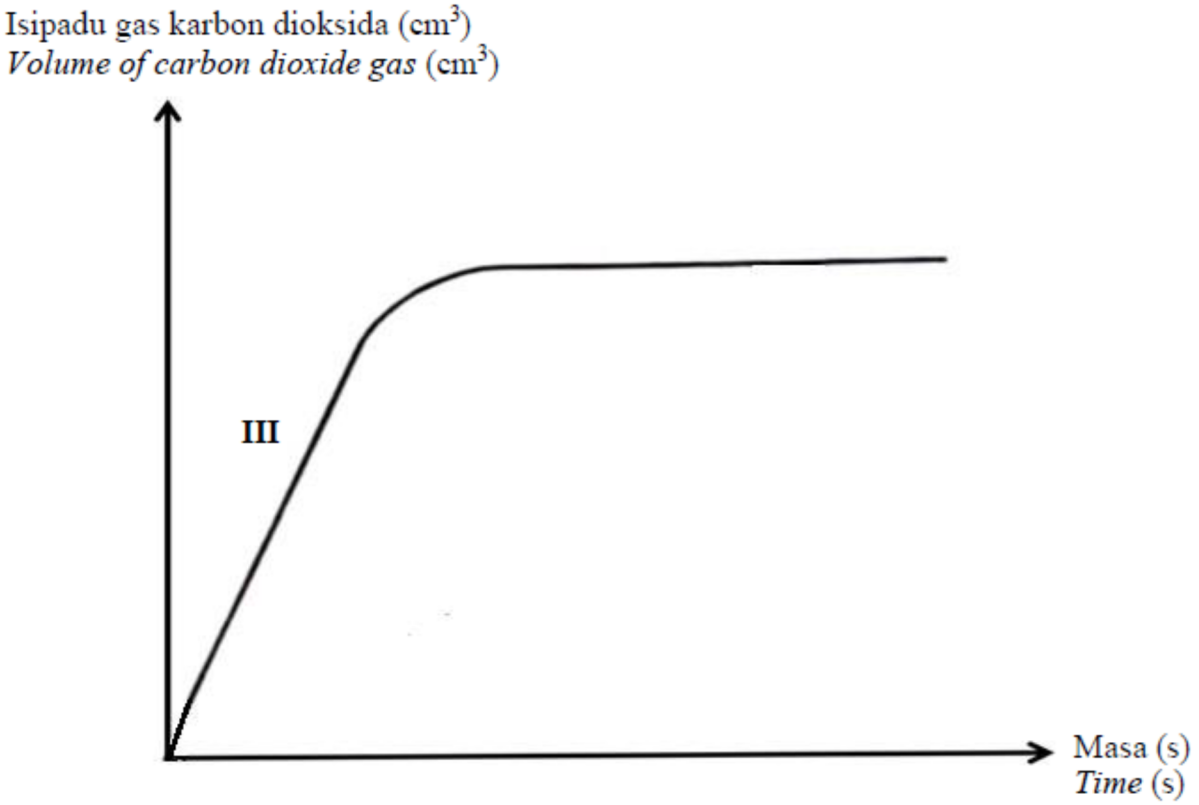
(c) Berikut merupakan persamaan kimia bagi tindak balas dalam eksperimen tersebut.
The following is the chemical equation for the reaction in the experiment.

$$CaCO_3 + 2HCl \; CaCl_2 + CO_2 + H_2O$$

Hitungkan jisim kalsium karbonat yang tidak bertindak balas dalam Set I.
[Jisim Molar bagi kasium karbonat, $CaCO_3$ = 100 g mol^{-1}]
Calculate the mass of calcium carbonate that not reacted in Set I. [Molar mass of calcium carbonate, $CaCO_3$ = 100 g mol^{-1}]

[4M]

(d) Rajah 6.2 menunjukkan lengkung III yang diperolehi dengan mengulangi eksperimen I dengan pepejal kalsium karbonat dihancurkan dan suhu ditingkatkan sebanyak dua kali ganda.
Berdasarkan maklumat pada diagram 6.1, lakarkan graf isipadu gas terbebas melawan masa untuk Set I dan Set II pada paksi yang sama.
Diagram 6.2 shows the curve III obtained by repeating the experiment I with solid calcium carbonate that is crushed and the temperature is doubled.
Based on the information in diagram 6.2, sketch a graph of the volume of gas released against time for Set I and Set II on the same axes.



[2M]

(e) En. Faizal dan keluarga berkelah di tepi air terjun. En. Faizal membawa bahan seperti ayam, arang dan pisau untuk menyediakan ayam bakar. Cadangkan satu kaedah yang boleh dilakukan oleh En. Faizal dan jelaskan bagaimana kaedah tersebut boleh membantu En Faizal memastikan ayam tersebut masak dengan cepat.
Mr. Faizal and his family had a picnic by the waterfall. Mr. Faizal bring materials such as chicken, charcoal and knife to prepare grilled chicken.
Suggest a method that can be done by Mr. Faizal and explain how the method can help Mr. Faizal ensure that the chicken cooks quickly.

.....

.....

..... [2M]

[2024-Kedah-05] Dua set eksperimen telah dijalankan untuk mengkaji faktor yang mempengaruhi kadar tindak balas. Jadual 5 menunjukkan masa yang diambil bagi mengumpul 40 cm^3 gas hidrogen.
Two sets of experiment are carried out to investigate the factor that affect the rate of reaction. Table 5 shows the time taken to collect 40 cm^3 of hydrogen gas.

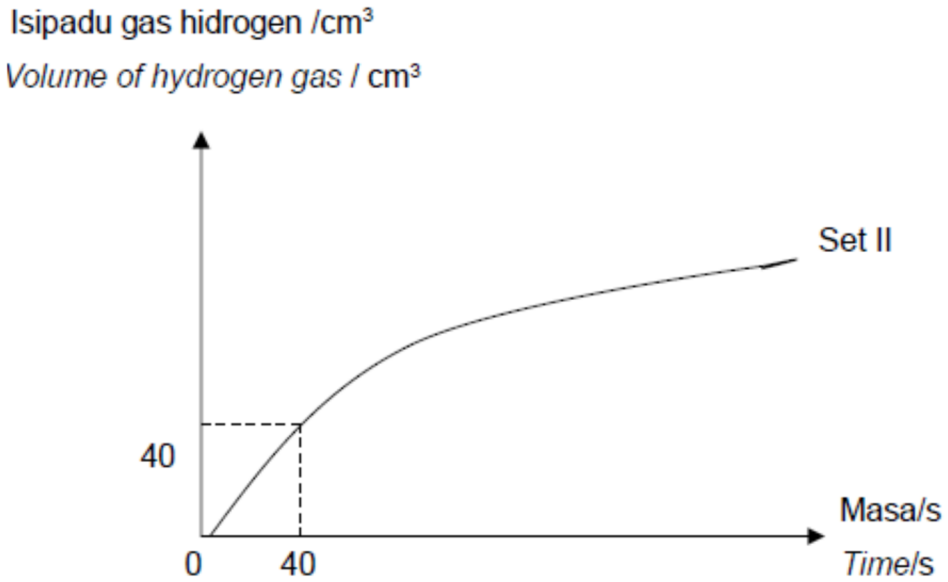
Set *set*	Bahan tindak balas *Reactants*	Masa yang diambil untuk mengumpul 40 cm^3 gas hydrogen (s) *Time taken to collect 40 cm^3 of hydrogen gas (s)*
I	Serbuk zink berlebihan + 25 cm^3 asid HX 0.2 mol dm^{-3} *Excess zinc powder +* *25 cm^3 of 0.2 mol dm^{-3} HX acid*	90
II	Serbuk zink berlebihan + 25 cm^3 asid H_2Y 0.2 mol dm^{-3} *Excess zinc powder +* *25 cm^3 of 0.2 mol dm^{-3} H_2Y acid*	40

Jadual 5 / Table 5

(a) Nyatakan perubahan lain yang boleh diukur selain daripada isi padu gas untuk menentuknn kadar tindak balas dalam eksperimen ini.
State another mensurable changes besides volume of gas to determine the rate of reaction in thin experiment

..... [1M]

(b) Rajah 5 menunjukkan graf isipadu gas hidrogen melavan masa bagi set II
Diagram 5 shows graph volume of hydrogen gas against time of set II



Lakar dan labelkan lengkung bagi Set I pada paksi yang sama dalam Rajah 5 apabila tindak balas telah lengkap.
Sketch and label the curve of Sot I on same axes in Diagram 5 when the reaction completed. [1M]

(c) (i) Tuliskan persamaan ion bagi eksperimen ini.
Write an ionic equation of this experiment.

..... [2M]

(ii) hitung kadar tindak balas bagi mengumpul 40 cm^3 gas dalam Set I dan Set II
Calculate the average of reaction to collect 40 cm^3 of gas in Set I dan Set II:

Set I	Set II

[2M]

(i) Bandingkan kadar tindak balas bagi Set I dan Set II. Terangkan.
Compare the rate of reaction of Set I and Set II. Explain.

.....

.....

..... [2M]

[2024 Johor Muar-08] Jadual 2 menunjukkan maklumat bagi eksperimen I, eksperimen II dan eksperimen III.
Table 2 shows the information of experiment I, experiment II and experiment III.

Eksperimen *Experiment*	Keadaan bahan tindak balas *Condition of reactants*	Masa yang di ambil untuk mengumpul 40 cm^3 gas (s) *Time taken to collect 40 cm^3 of gas (s)*
I	Ketulan zink berlebihan + 25 cm^3 asid hidroklorik 0.2 mol dm^{-3} Excess zinc granules + 25 cm^3 of 0.2 mol drn^{-3} hydrochloric acid	90
II	Serbuk zink berlebihan + 25 cm^3 asid hidroklorik 0.2 mol dm^{-3} Excess zinc powder + 25 cm^3 of 0.2 mol dm^{-3} hydrochloric acid	55

III	Serbuk zink berlebihan + 25 cm^3 asid hidroklorik 0.2 mol dm^{-3} + larutan kuprum(II) sulfat Excess zinc powder + 25 cm^3 of 0.2 mol dm^{-3} hydrochloric acid + copper(II) sulphate solution	30

Berdasarkan maklumat yang diberikan dalam Jadual 2:
Based on the information given in Table 2:

(a) Nyatakan maksud kadar tindak balas dalam eksperimen ini.
State the meaning of rate of reaction for this experiment.

..... [1M]

(b) (i) Eksperimen yang manakah menunjukkan kadar tindak balas paling tinggi?
Which experiment shows the highest rate of reaction?

..... [1M]

(ii) Hitung kadar tindak balas di b(i).
Calculate average rate of reaction in b(i).

[1M]

(c) Nyatakan faktor yang mempengaruhi kadar tindak balas bagi eksperimen II dan III.
State the factor that influence the rate of reaction for experiment III.

..... [1M]

(d) Tulis persamaan kimia bagi tindak balas antara zink dan asid hidroklorik.
Write the chemical equation for the reaction between zinc and hydrochloric acid.

..... [2M]

(e) Bandingkan kadar tindak balas bagi eksperimen I dan eksperimen II. Dengan menggunakan teori pelanggaran,terangkan jawapan anda.
Compare the rate of reaction for experiment I and experiment II. By using collision theory, explain your answer.

.....

.....

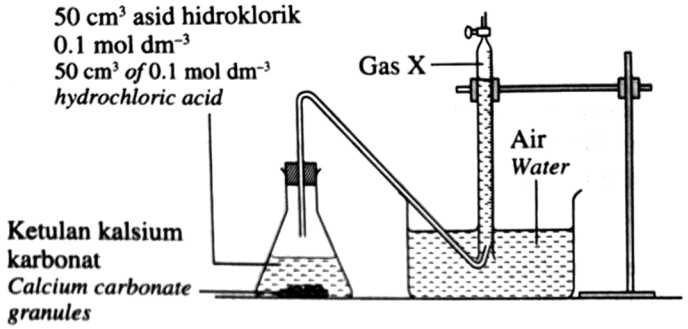
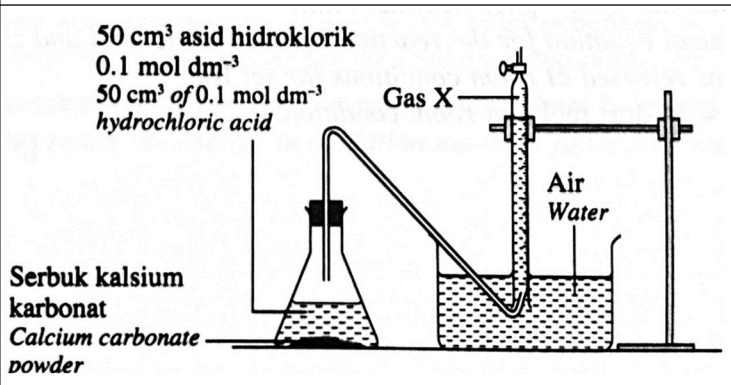
.....

.....

..... [4M]

Esei

[2024-Johor Batu Pahat-10] (a) Jadual 10.1 menunjukkan dua set eksperimen yang dijalankan oleh seorang murid untuk mengkaji faktor yang mempengaruhi kadar tindak balas antara asid hidroklorik dengan kalsium karbonat berlebihan
Table 10.1 shows two sets of experiments carried out by a student to study the factor that affects the rate of reaction between hydrochloric acid and excess calcium carbonate.

Set	**Susunan radas** ***Apparatus set up***	**Masa yang diambil untuk mengumpul 40 cm³ gas karbon dioksida (s)** ***Time taken to collect 40 cm³ of carbon dioxide gas*** **(s)**
I		50
II		20

(i) Nyatakan definisi bagi kadar tindak balas.
State the definition of the rate of reaction.

[1M]

(ii) Hitung kadar tindak balas purata dalam set I.
Calculate the average rate of reaction in set I.

[1M]

(iii) Berdasarkan maklumat dalam Jadual 10.1, bandingkan kadar tindak balas antara set I dengan set II. Terangkan jawapan anda menggunakan teori perlanggaran.
Based on the information in Table 10.1, compare the rate of reaction between set I and set II
Explain your answer by using the collision theory.

[5M]

(iv) Lakarkan graf isi padu gas karbon dioksida yang terkumpul melawan masa bagi eksperimen dalam set I dan set II pada paksi yang sama.
Sketch a graph of the volume of carbon dioxide gas collected against time for the experiments in set I and set II on the same axis.

[2M]

(b) Suatu eksperimen dijalankan untuk mengkaji kadar tindak balas antara zink dengan asid nitrik. Dalam eksperimen itu, ketulan zink berlebihan bertindak balas dengan 25 cm^3 asid nitrik bagi set III dan set IV. Jadual 10.2 menunjukkan keputusan yang diperolehi daripada eksperimen itu.
An experiment is carried out to study the rate of reaction between zinc and nitric acid. In the experiment, excess zinc granules react with 25 cm^3 of nitric acid for set III and set IV. Table 10.2 shows the results obtained from the experiment.

Set	Kepekatan asid nitrik *Concentration of nitric acid (mol dm^{-3})*	Suhu (°C) *Temperature* (°C)	Kadar tindak balas *Rate of reaction*
III	0.2	27	Rendah/ *Low*
IV	1.0	37	Tinggi/ *High*

(i) Berdasarkan maklumat dalam Jadual 10.2, nyatakan dua faktor yang mempengaruhi kadar tindak balas. Pilih satu daripada faktor itu dan terangkan jawapan anda menggunakan teori perlanggaran.
Based on the information in Table 10.2, state two factors that affect the rate of reaction. Choose one of the factors and explain your answer using the collision theory.

[6M]

(ii) Tulis persamaan kimia seimbang bagi tindak balas antara asid nitrik dengan zink. Hitung isi padu maksimum gas yang terbebas pada keadaan bilik bagi set III.
[Isi padu molar gas = 24 dm^3 mol^{-1} pada keadaan bilik]

Write a balanced chemical equation for the reaction between nitric acid and zinc. Calculate the maximum volume of gas released at room conditions for set III.[Molar volume of gas = 24 dm³ mol-1 at room conditions]

[5M]

[2024 Johor-10] Tiga eksperimen, I, II dan III dijalankan untuk mengkaji faktor-faktor yang mempengaruhi kadar tindak balas. Jadual 5 menunjukkan bahan tindak balas dan keadaan tindak balas yang terlibat.
Three experiments, I, II and III are carried out to investigate the factors affecting the rate of reaction. Table 5 shows the reactants and the conditions of reactions involved.

Eksperimen *Experiment*	Bahan tindak balas *Reactants*		Keadaan tindak balas *Condition of reaction*
I	Zink berlebihan *Excess zinc*	50 cm^3 asid hidroklorik 0.5 mol dm^{-3} *50 cm^3 of 0.5 mol dm^{-3} hydrochloric acid*	Suhu bilik *Room temperature*
II	Zink berlebihan *Excess zinc*	50 cm^3 asid sulfurik 0.5 mol dm^{-3} *50 cm^3 of 0.5 mol dm^{-3} sulphuric acid*	Suhu bilik *Room temperature*
III	Zink berlebihan *Excess zinc*	50 cm^3 asid sulfurik 0.5 mol dm^{-3} *50 cm^3 of 0.5 mol dm^{-3} sulphuric acid*	60°C

Berdasarkan Jadual 5,/ *Based on Table 5,*

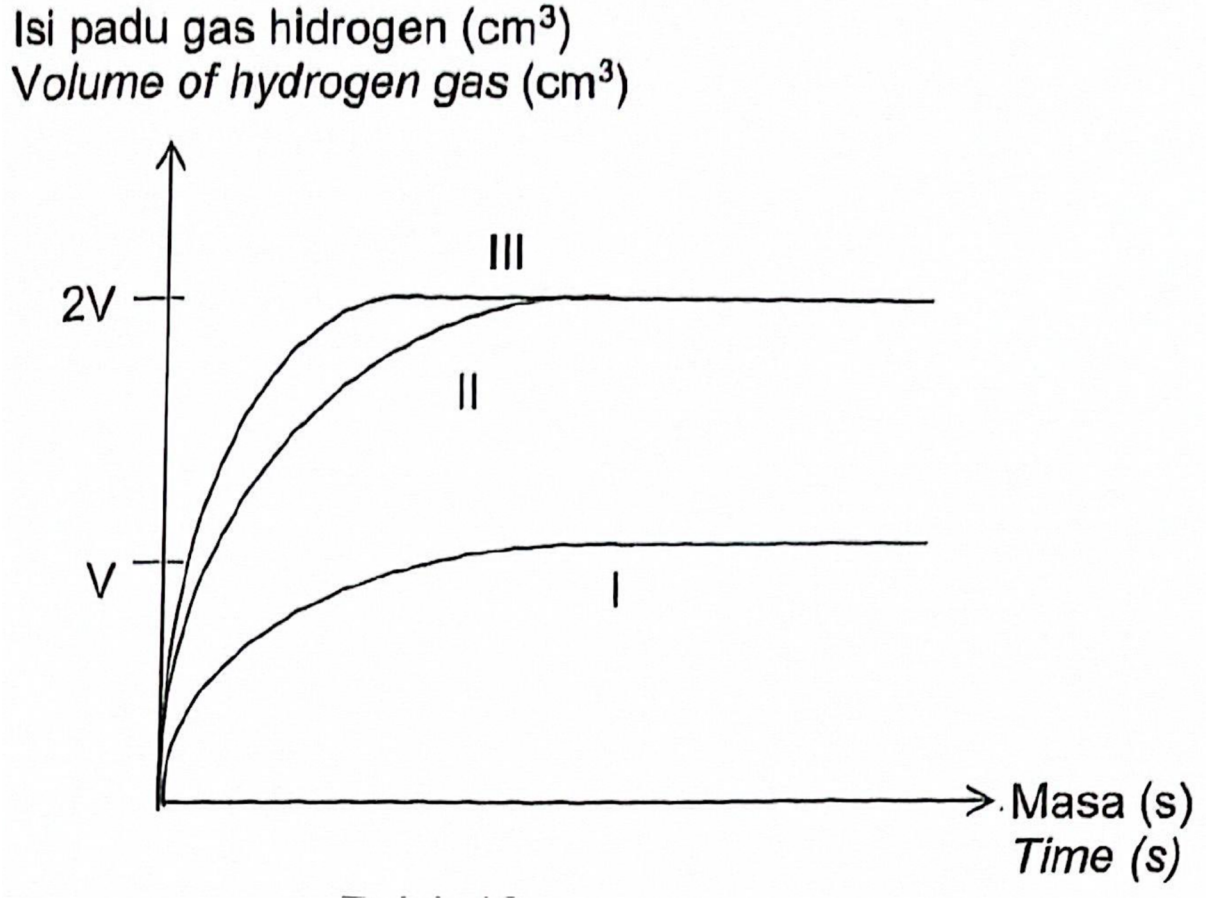
(a) nyatakan maksud kadar tindak balas dan jenis zarah bagi zink.
state the meaning of rate of reaction and types of particles of zinc.

[2M]

(b) tulis persamaan kimia bagi tindak balas dalam eksperimen I dan hitungkan jisim zink klorida yang terhasil.
write a chemical equation for the reaction in experiment I and calculate the mass of zinc chloride formed.
[Jisim atom relative/ *Relative atomic mass*: Zn = 65; Cl = 35.5]

[6M]

(c) Rajah 10 menunjukkan keputusan bagi eksperimen I, II dan III.
Diagram 10 shows the results of experiments I, II and III.



Berdasarkan Rajah 10, / *Based on the Diagram 10,*

(i) banding kadar tindak balas antara eksperimen I dan eksperimen II. Jelaskan jawapan anda menggunakan Teori Perlanggaran.
compare the rate of reaction between experiment I and experiment II. Explain your answer using the Collision Theory.

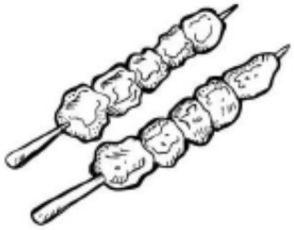
[5M]

(ii) cadangkan satu cara untuk memperoleh lengkungan III tanpa mengubah zink, asid atau suhu dalam eksperimen II. Jelaskan jawapan anda menggunakan Teori Perlanggaran.
suggest one way to obtain curve III without changing the zinc, acid or temperature in experiment II. Explain your answer using the Collision Theory.

[5M]

(iii) terangkan mengapa jumlah isi padu gas hidrogen yang dibebaskan dalam eksperimen II adalah dua kali ganda eksperimen I.
explain why the total volume of hydrogen gas released in experiment II is doubled that of experiment I.

[2024 Johor Pasir Gudang-10] (a) Rajah 9 menunjukkan daging yang dimasak mengikut menu yang berbeza, iaitu sate dan stik
Diagram 9 shows the meat that cooked with two different menu, satay and steak.

	
Sate/ *Satay*	Stik/ *Steak*

Berdasarkan Rajah 9, daging manakah yang masak dengan cepat?.
Apakah factor yang mempengaruhi tindak balas ini?.
Based on Diagram 9, which meat will cook faster?
What factor that affect this reaction?

[2M]

(b) Jadual 6 menunjukkan maklumat bagi tiga set eksperimen untuk menyiasat faktor- faktor yang mempengaruhi kadar tindak balas antara zink dengan asid sulfurik.
Table 6 shows the information for three sets of experiments to investigate the factors that affect the rate of reaction between zinc and sulphuric acid.

Set	Bahan tindak balas *Reactants*	Masa yang diambil untuk mengumpul 40 cm^3 gas hidrogen / s *Time taken to collect 40 cm^3 of hydrogen gas / s*
I	25 cm^3 asid sulfurik 0.2 mol dm^{-3} + serbuk zink berlebihan. *25 cm^3 of 0.2 mol dm^{-3} sulphuric acid + excess zinc powder*	33
II	25 cm^3 asid sulfurik 0.2 moldm^{-3} + ketulan zink berlebihan. *25 cm^3 of 0.2 mol dm^{-3} sulphuric acid + excess zinc granule*	45
III	25 cm^3 asid sulfurik 0.2mol dm^{-3} + serbuk zink berlebihan + larutan kuprum (II) sulfat *25 cm^3 of 0.2mol dm^{-3} sulphuric acid + excess zinc powder + copper (II) sulphate solution*	25

(i) Berikan maksud kadar tindak balas
State the meaning of rate of reaction

[1M]

(ii) Apakah fungsi larutan kuprum(II) sulfat dalam set III?
What is the function of copper(II) sulphate solution in set III?

[1M]

(iii) Tuliskan persamaan ion bagi tindak balas dalam Set I dan hitungkan kadar tindak balas dalam Set I dan Set II. Lukis gambarajah profil tenaga bagi tindak balas Set I dan Set III di dalam satu paksi tenaga yang sama. Tunjuk dan labelkan tenaga pengaktifan bagi Set I sebagai Ea dan Set III sebagai Ea' .
Write the ionic equation for the reaction in Set I and calculate the rate of reaction in Set I and Set II. Draw the energy profile diagram for Set I and Set III reactions on the same energy axis. Show and label the activation energy of Set I as Ea and Set III as Ea'.

[6M]

(iv) Dengan menggunakan Teori Pelanggaran, bandingkan kadar tindak balas antara :
Using the Collision Theory, compare the rate of reaction between :

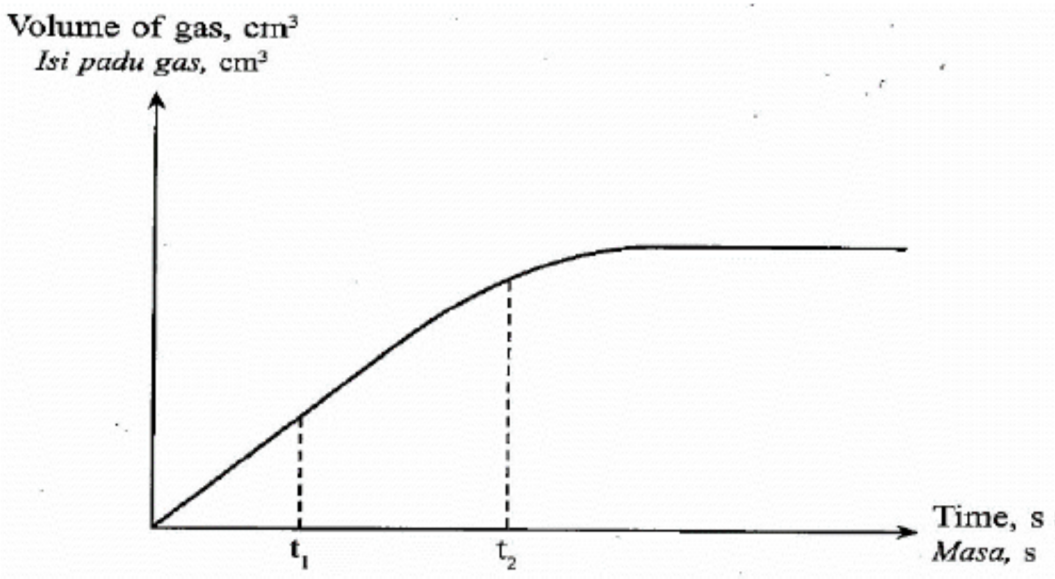
- Set I dan Set II/ *Set I and Set II*
- Set I dan Set III./ *Set I and Set III*

[10M]

[2024 Johor Pasir Gudang-10] (a) Aiman menjalankan eksperimen untuk mengkaji penguraian hidrogen peroksida. Dia merekodkan isi padu gas oksigen yang terbebas. Pada minit yang ke-5, dia menambahkan satu spatula serbuk hitam ke dalam larutan hidrogen peroksida. Serbuk hitam yang digunakan dapat meningkatkan kadar penguraian hidrogen peroksida. Kenalpasti serbuk hitam itu dan nyatakan fungsi serbuk hitam yang digunakan.
Aiman conducted an experiment to study the decomposition of hydrogen peroxide. He records the volume of oxygen gas released. At the 5th minute, he adds one spatula full of black powder into the hydrogen peroxide solution. Black powder used is able to increase the rate of decomposition of hydrogen peroxide. Identify the black powder and state the function of the black powder used

[2M]

(b) Rajah 10 menunjukkan graf isi padu gas melawan masa bagi tindak balas antara magnesium karbonat berlebihan dan asid hidroklorik.
Diagram 10 shows a graph of volume of gas against time for the reaction between excess magnesium carbonate and hydrochloric acid.



Rajah 10/ Diagram 10

Bandingkan kadar tindak balas pada t1 dan t2
Berdasarkan graf, terangkan jawapan anda.
Compare the rate of reaction at t1 and t2.
Based on the graph, explain your answer.

[3M]

(c) Tiga eksperimen dijalankan untuk mengkaji faktor yang mempengaruhi kadar tindak balas. Jadual 6 menunjukkan bahan tindak balas dan suhu asid hidroklorik yang digunakan
Three experiments are carried out to investigate the factors that affecting the rate of reaction. Table 6 shows the reactants and the temperature of hydrochloric acid used.

Eksperimen *Experiment*	Bahan tindak balas *Reactants*	Suhu asid hidroklorik (°C) *Temperature of hydrochloric acid (°C)*
I	Serpihan marmar berlebihan + 100 cm^3 asid hidroklorik 0.5 mol dm^{-3} *Excess marble chips + 100 cm^3 of 0.5 mol dm^{-3} hydrochloric acid*	30
II	Serpihan marmar berlebihan + 100 cm^3 asid hidroklorik 1.0 mol dm^{-3} *Excess marble chips + 100 cm^3 of 1.0 mol dm^{-3} hydrochloric acid*	30
III	Serpihan marmar berlebihan + 100 cm^3 asid hidroklorik 0.5 mol dm^{-3} *Excess marble chips + 100 cm^3 of 0.5 mol dm^{-3} hydrochloric acid*	50

Jadual 6/ *Table* 6

(i) Tulis persamaan kimia yang seimbang bagi tindak balas dalam eksperimen I. Hitungkan isi pada gas yang dibebaskan.
Write a balance chemical equation for the reaction in Experiment I. Calculate the volume of the gas released.
[Isi padu molar gas pada keadaan bilik = 24.0 dm^3 mol^{-1}]
[Molar volume of gas at room conditions = 24.0 dm^3 mol^{-1}]

[5M]

(ii) Bandingkan kadar tindak balas antara:
Compare the rate of reaction between:

Eskperimen I dan II Experiment I and II
Experiment I dan III Experiment I and III

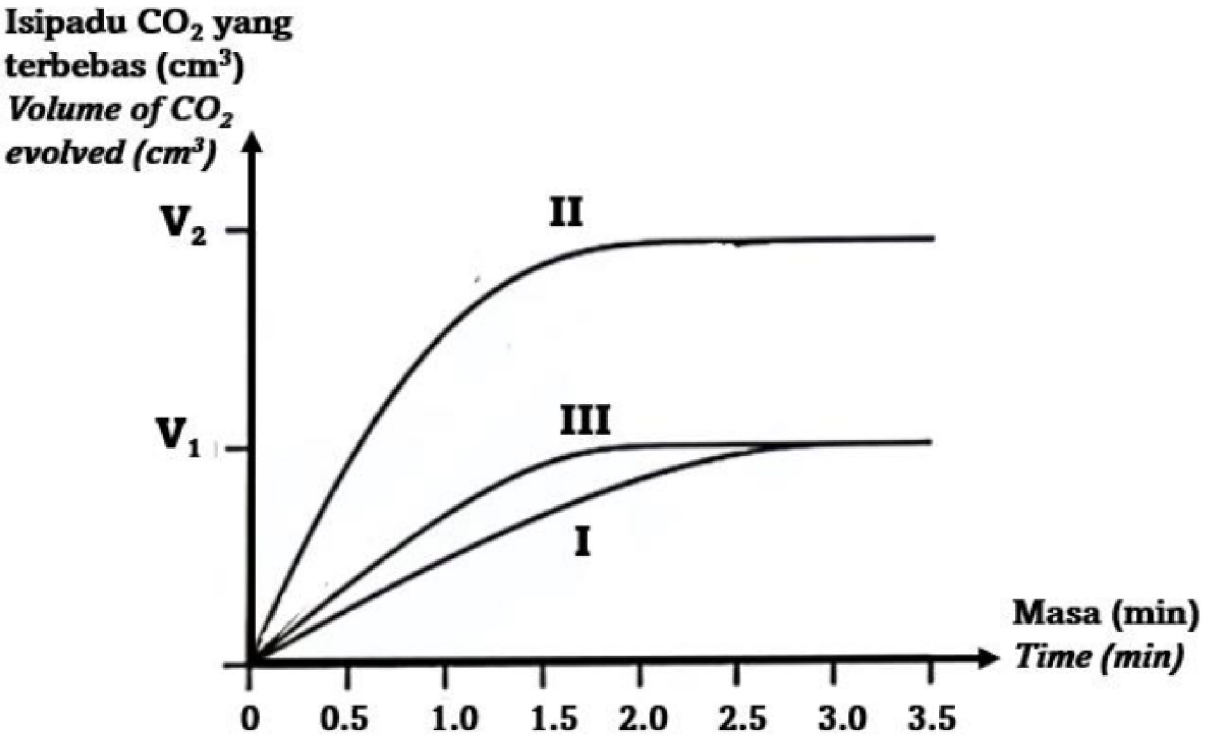
Terangkan jawapan anda dengan menggunakan Teori Perlanggaran
Explain your answer by using Collision Theory.

[10M]

[2024-Sarawak-Set02-11] (a) Satu tindak balas kimia cepat ialah proses menukarkan bahan tindak balas kepada hasil tindak balas yang lengkap dalam masa singkat manakala tindak balas perlahan mengambil masa yang panjang untuk lengkap.
Nyatakan definisi kadar tindak balas. Lakarkan graf perubahan kuantiti bahan tindak balas melawan masa bagi satu tindak balas cepat kemudian labelkannya sebagai "I". Pada paksi yang sama lakarkan satu lagi graf bagi tindak balas perlahan dan labelkannya sebagai "II".
A fast chemical reaction is a process of converting reactants into products that completes in a short time while slow reaction takes long to complete.
State the definition of rate of reaction. Sketch a graph of quantity of reactants against time for a fast reaction then label it as "I". On the same axis, sketch another graph for slow reaction and then label it using "II".

[3M]

(b) Dalam tiga eksperimen yang berasingan, asid nitrik ditambahkan ke dalam ketulan batu marmar berlebihan. Rajah 10.1 menunjukkan isi padu gas karbon dioksida terbebas dan masa yang diambil untuk isi padu gas mencapai maksimum dalam tiga eksperimen yang berasingan. Dalam ketiga-tiga eksperimen itu, isi padu asid nitrik yang digunakan adalah sama, manakala kepekatan atau suhu, atau kedua-dua kepekatan dan suhu asid nitrik diubah.
In three separate experiments, nitric acid is added to excess marble chips. Diagram 10.1 shows the volume of carbon dioxide gas evolved and the time taken for maximum volume of gas evolved in three separate experiments. In all three experiments, the volume of nitric acid used is the same. However, the concentration, or temperature, or both concentration and temperature of nitric acid are changed.



Rajah 10.1/ Diagram 10.1

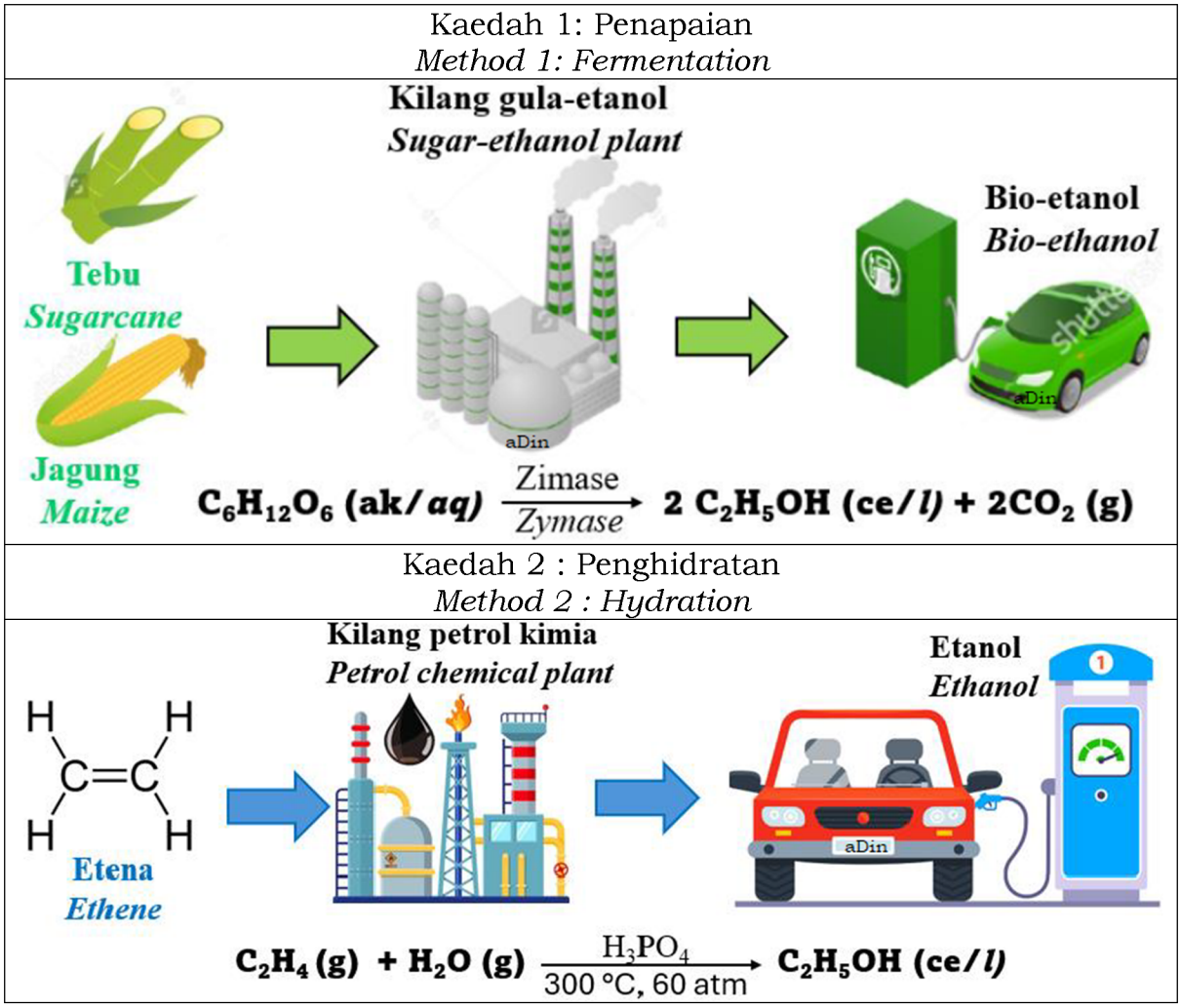
(i) Dalam Eksperimen I dan III, 100 cm^3 asid nitrik 0.5 mol dm^{-3} ditambahkan ke dalam batu marmar. Apakah faktor yang dimanipulasikan dalam kedua-dua eksperimen ini? Tuliskan persamaan kimia yang seimbang bagi Eksperimen I. Hitung isipadu gas, V1.
[Isipadu molar gas pada keadaan bilik = 24.0 dm^3 mol^{-1}]
In Experiment I and III, 100 cm^3 of nitric acid 0.5 mol dm^{-3} is added to marble chips. What is the factor being manipulated in these two experiments? Write a balanced chemical equation for the reaction in Experiment I. Calculate the volume of gas, V1.
[Molar volume of gas at room condition= 24.0 dm^3 mol^{-1}]

[5M]

(ii) Berdasarkan Rajah 10.1, huraikan bagaimana mendapatkan lengkungan II daripada eksperimen. Terangkan mengapa terdapat perbezaan kadar tindak awal antara Eksperimen I dan Eksperimen II. Terangkan jawapan anda dengan merujuk teori perlanggaran.
Based on Diagram 10.1, describe how to obtain curve II from the experiment. Explain why there are differences in the initial rate of reaction between Experiment I and Experiment II. Explain your answer using collision theory.

[4M]

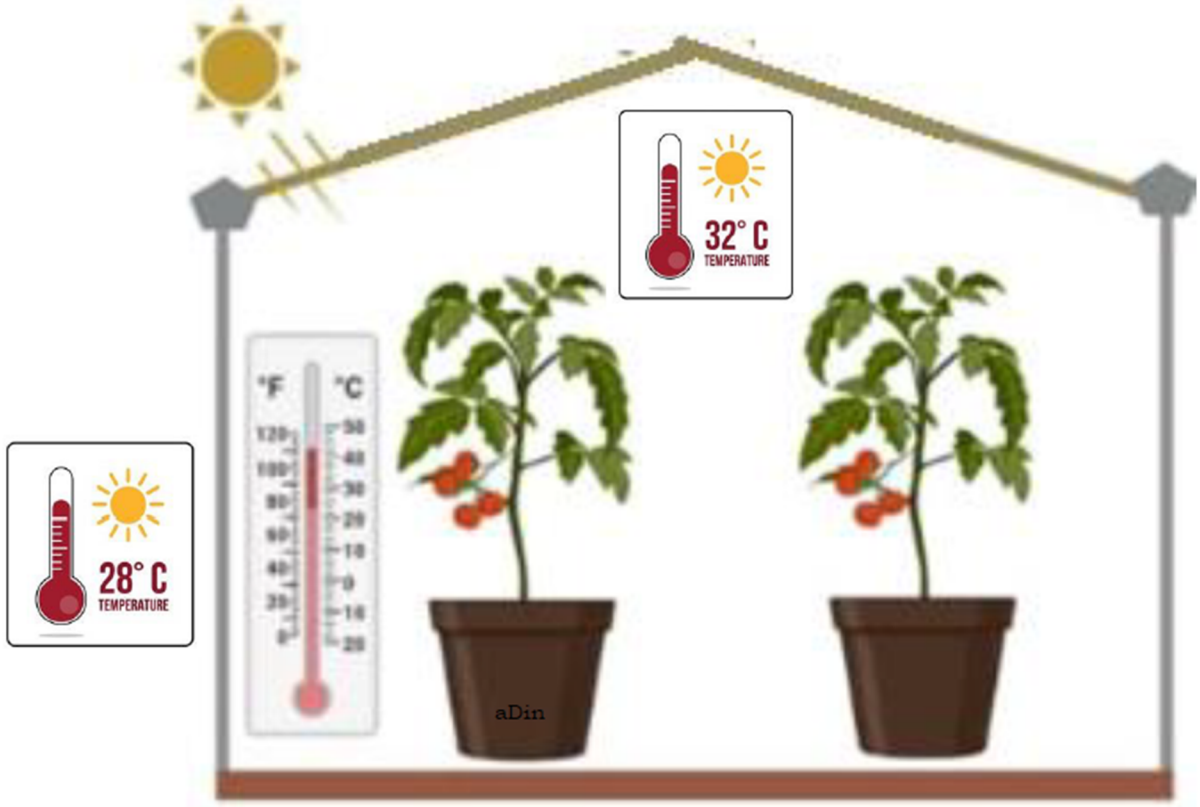
(c) Rajah 10.2 menunjukkan dua kaedah yang digunakan untuk menghasilkan bahan api etanol untuk kegunaan kenderaan secara besar-besaran.
Diagram 10.2 shows two methods that can be used in large scale production of ethanol fuel for vehicle use.



Anda ditugaskan untuk menilai kaedah yang lebih sesuai untuk menghasilkan etanol sebagai bahan api. Nyatakan pilihan anda berdasarkan Rajah 10.2 dan wajarkan jawapan anda.
You are assigned to evaluate which method is more suitable to produce ethanol as fuel. State your choice based on Diagram 10.2 and justify your answer.

[2M]

(d) Rajah 10.3 menunjukkan pokok tomato ditanam dalam rumah hijau untuk melindungi tanamannya daripada serangga perosak. Petani mengalami masalah semua buah tomatonya masak secara serentak pada musim panas. Masalah ini timbul apabila buah tomato hijau yang belum matang dirangsang oleh gas etilena, C^2H^4 yang terbebas daripada buah yang sudah matang.
Diagram 10.3 shows the tomato planted in greenhouse to protect the plants from pests. The farmer is facing a problem where all the tomatoes ripen simultaneously during summer. This problem arises when premature green tomatoes are stimulated by the ethylene gas, C^2H^4 releases from mature fruits.



Dengan menggunakan pengetahuan anda dalam kimia, cadangkan dua cara mengatasi masalah tersebut supaya petani dapat menuai buah tomato secara berkala. Terangkan jawapan anda.
By using your knowledge in chemistry, suggest two solutions to overcome the problem so that the farmer can harvest the tomato periodically. Explain your answer.

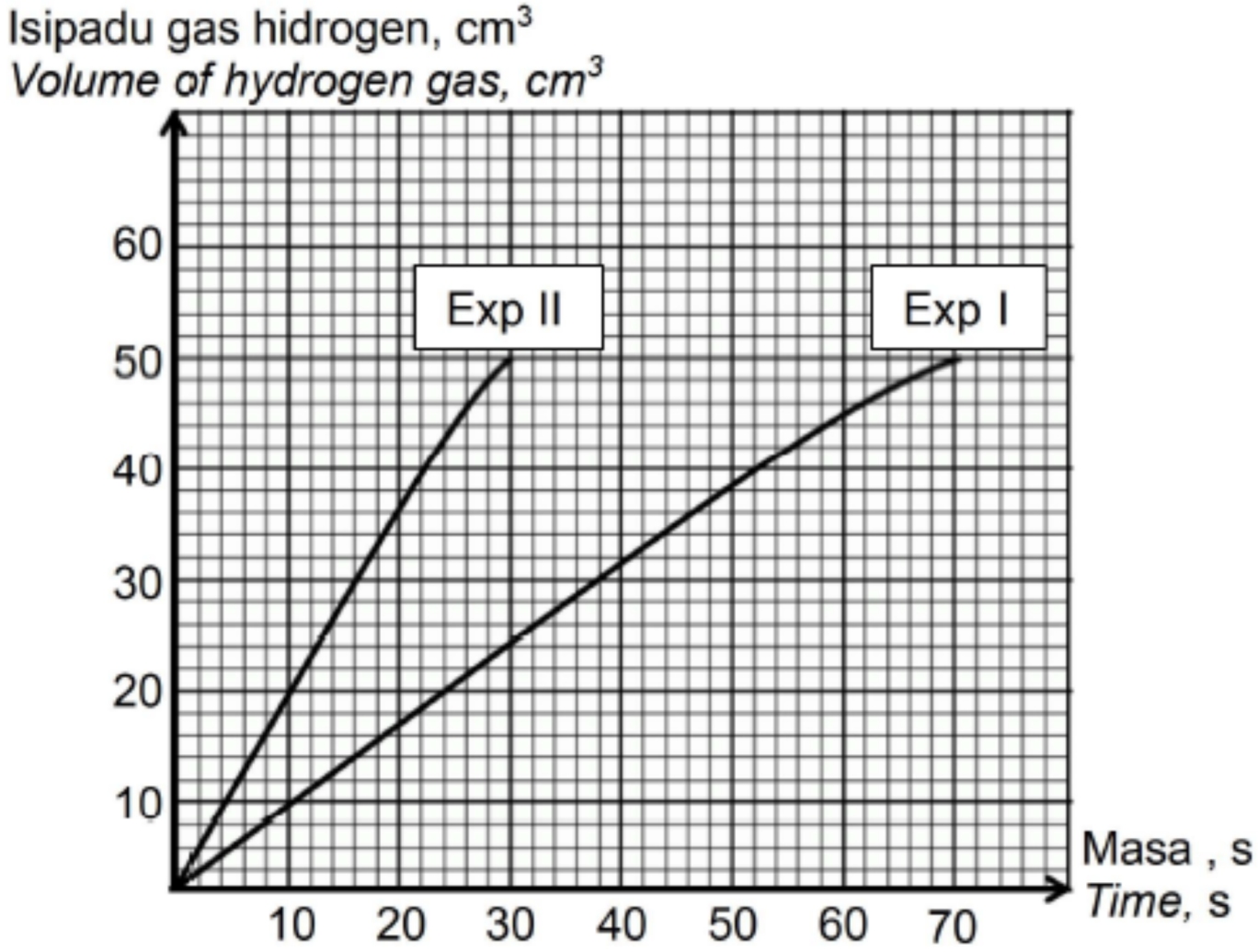
[6M]

[2024 Kelantan-09] Jadual 9.1 menunjukkan bahan tindak balas yang digunakan untuk mengkaji faktor yang mempengaruhi kadar tindak balas.
Table 9.1 shows the reactants used to study the factors that affect the rate of reaction.

Set Eksperimen *Set Experiment*	Bahan tindak balas *Reactants*
I	50 cm^3 asid hidroklorik 1.0 mol dm^{-3} + serbuk zink berlebihan *50 cm^3 of 1.0 mol dm^{-3} hydrochloric acid + excess of zink powder*
II	50 cm^3 asid hidroklorik 1.0 mol dm^{-3} + serbuk zink berlebihan + larutan kuprum (II) sulfat *50 cm^3 of 1.0 mol dm^{-3} hydrochloric acid + excess of zink powder + copper (II) sulphate solution*

Jadual 9.1 Table 9.1

Graf 9.2 menunjukkan sebahagian keputusan yang diperolehi dalam eksperimen tersebut.
Graph 9.2 shows some of the results obtained in the experiment.



Berdasarkan Jadual 9.1 dan Rajah 9.2
Based on Table 9.1 and Diagram 9.2

(a) (i) Apakah yang dimaksudkan dengan kadar tindak balas?
What is meant by rate of reaction?

[1M]

(ii) Dalam sesuatu tindak balas, perlanggaran berkesan antara zarah yang bertindak balas perlu berlaku agar tindak balas berlaku. Nyatakan dua keadaan yang diperlukan untuk memastikan perlanggaran berkesan berlaku.
In a reaction, effective collisions between the reacting particles must occur for the reaction to occur. State two conditions necessary for effective collision to occur.

[2M]

(iii) Lukiskan profil tenaga bagi tindak balas tersebut. Tunjukkan tenaga pengaktifan bagi eksperimen Set I dengan label Ea dan tenaga pengaktifan bagi eksperimen Set II dengan label Eb pada profil tenaga yang sama.
Draw the energy profile for the reaction. Show the activation energy for experiment Set I labeled Ea and the activation energy for experiment Set II labeled Eb on the same energy profile.

[3M]

(b)(i) Hitungkan kadar tindak balas purata bagi eksperimen Set I dan Set II.
Calculate the average rate of reaction for experiment Set I and Set II

[2M]

(ii) Bandingkan kadar tindak balas dalam eksperimen Set I dengan Set II. Terangkan jawapan anda berdasarkan teori perlanggaran.
Compare the reaction rates in Set I and Set II experiments. Explain your answer based on collision theory.

[5M]

(c) Eksperimen Set I di ulang dengan menggantikan asid hidroklorik dengan asid sulfurik pada isipadu dan kepekatan yang sama.
Experiment Set I was repeated by replacing hydrochloric acid with sulphuric acid at the same volume and concentration.

(i) Tuliskan persamaan kimia bagi tindak balas di (c) dan hitungkan isipadu gas hidrogen yang mungkin terbebas dalam tindak balas tersebut.
[Isipadu molar gas pada keadaan bilik = 24 dm^3 mol^{-1}]
Write the chemical equation for the reaction in (c) and calculate the volume of hydrogen gas that may be liberated in the reaction.
[Molar volume of gas at room temperature = 24 dm^3 mol^{-1}]

[5M]

(ii) Bandingkan kadar tindak balas antara eksperimen dalam (c) dengan eksperimen Set I. Terangkan jawapan anda.
Compare the rate of reaction between the experiment in (c) with the Set I experiment. Explain your answer.

[2M]

[2024 Perak – Set 1-10] (a) Maklumat berikut menunjukkan dua situasi untuk melarutkan garam di dalam air.
The following, information slums two situations to dissolve salt in water.

Situasi 1 : Garam halus lebih mudah larut di dalam air panas berbanding dengan air sejuk.
Situation 1 : Fine salt is easier to dissolve in hot water compared to cold water.

Situasi II : Garam halus lebih mudah larut berbanding garam kasar di dalam air sejuk.
Situation II : Fine salt is easier to dissolve compared to coarse salt in cold water.

Berdasarkan situasi tersebut. nyatakan dua faktor yang terlibat. Dengan memilih salah satu situasi, jelaskan bagaimana faktor tersebut mempengaruhi keterlarutan garam.
Based on the situations, state the two factors involved. By choosing one of the situations, explain how the factor affects the solubility' of salt.

[4M]

(b) Jadual 7 menunjukkan tiga set eksperimen yang dijalankan untuk mengkaji kadar tindak balas antara zink dengan asid nitrik.
Table 7 shows three sets of experiment that are carried out to study the rate of reaction between zinc and nitric acid

Set	Italian tindak balas *Reactants*	Suhu (°C) *Temperature* (°C)
I	9 g serbuk zink + 25 cm^3 asid nitrik 0.2 mol dm^{-3} *9 g zinc powder + 25 cm^3 of 0.2 mol dm^{-3} nitric acid*	30
II	9 g serbuk zink + 25 cm^3 asid nitrik 0.2 mol dm^{-3} *9 g zinc powder + 25 cm^3 of 0.2 mol dm^{-3} nitric acid*	50
III	9 g serbuk zink + 25 cm^{-3} asid nitrik 0.2 mol dm^{-3} + larutan kuprum(II) sulfat *9 g zinc powder + 25 cm^3 of 0.2 mol dm^{-3} nitric acid + copper(II) sulphate solution*	30

(i) Tuliskan persamaan kimia bagi tindak balas antara zink dan asid nitrik. Hitung isi padu maksimum gas yang terbebas dalam Set I.
[Jisim atom relatif : Zn = 65; Isi padu molar gas = 24 dm^3 mol^{-1} pada keadaan bilik]
Write the chemical equation for the reaction between zinc and nitric acid. Calculate the maximum volume of gas produced in Set I.
[Relative atomic mass : Zn = 65; Molar volume of gas = 24 dm^3 mol^{-1} at room condition]

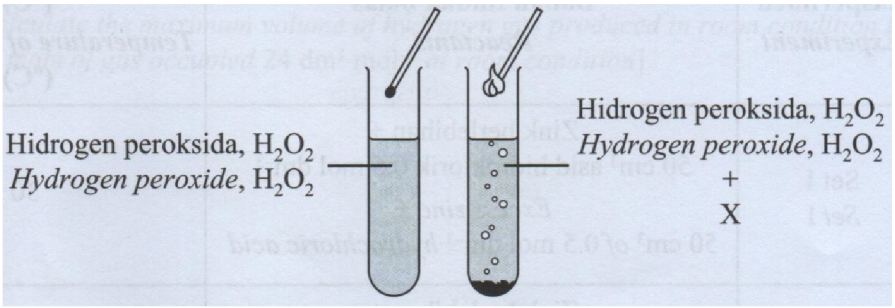
[6M]

(ii) Bandingkan kadar tindak balas bagi:/ *Compare the rate of reaction for:*
• Set I dan Set II/ *Set I and Set II*
• Set I dan Set III/ *Set I and Set III*

Terangkan jawapan anda berdasarkan Teori Pelanggaran.
Explain your answer based on Collision Theory.

[10M]

[2024-Selangor-Set0?-10] Rajah 8 menunjukkan eksperimen mengkaji penguraian hidrogen peroksida, H_2O_2. Satu spatula serbuk X telah ditambahkan ke dalam larutan hidrogen peroksida. Serbuk X yang digunakan dapat meningkatkan kadar penguraian hidrogen peroksida.
Diagram 8 shows the experiment to study the decomposition of hydrogen peroxide, H_2O_2. One spatula of powder X is added into the hydrogen peroxide *solution. Powder X is used to increase the rate of decomposition of hydrogen peroxide.*



(a) (i) Berdasarkan eksperimen ini, apakah maksud kadar tindak balas?
Based on the experiment, what is the definition for rate of reaction?

[1M]

(ii) Kenal pasti serbuk X dan nyatakan fungsinya.
Identify powder X and state its function.

[2M]

(iii) Tuliskan persamaan kimia bagi tindak balas penguraian hidrogen peroksida.
Write the chemical equation for the reaction of decomposition of hydrogen peroxide.

[2M]

(b) Jadual 6 menunjukkan tiga eksperimen yang dijalankan untuk mengkaji faktor-faktor yang mempengaruhi kadar tindak balas.
Table 6 shows three experiments that are carried out to investigate the factors affecting ran of reaction.

Eksperimen *Experiment*	Bahan tindak balas *Reactants*	Suhu campuran (°C) *Temperature of the mixture (°C)*
Set I *Set* I	Zink berlebihan + 50 cm^3 asid hidroklorik 0.5 mol dm^{-3} *Excess zinc + 50 cm^3 of 0.5 mol dm^{-3} hydrochloric acid*	30
Set II *Set* II	Zink berlebihan + 50 cm^3 asid sulfurik 0.5 mol dm^{-3} *Excess zinc + 50 cm^3 of 0.5 mol dm^{-3} sulphuric acid*	30
Set III *Set* III	Zink berlebihan + 50 cm^3 asid sulfurik 0.5 mol dm^{-3} *Excess zinc + 50 cm^3 of 0.5 mol dm^{-3} sulphuric acid*	50

Berdasarkan maklumat dalam Jadual 6, banding kadar tindak balas antara
Based on the information in Table 6, compare the rate of reaction between

(i) Set I dan Set II/ *Set I and Set II*
(ii) Set II dan Set III/ *Set II and Set III*

Dengan menggunakan teori perlanggaran, terangkan jawapan anda.
By using the collision theory, explain your answers.

[10M]

(c) Tulis persamaan kimia yang seimbang bagi tindak balas antara asid hidroklorik dengan zink berlebihan.
Hitung isi padu maksimum gas hidrogen yang terhasil pada keadaan bilik dalam Set 1.
[1 mol gas menempati 24 dm^3 mol^{-1} pada keadaan bilik]
Write a balanced chemical equation for the reaction between hydrochloric acid and excess zinc.
Calculate the maximum volume of hydrogen gas produced in room condition in Set I.
[1 mole of gas occupied 24 dm^3 mol^{-1} at room condition]

[5M]

[2024-Selangor-Set1-10] Jadual 6 menunjukkan maklumat bagi tiga set eksperimen untuk menyiasat faktor-faktor yang mempengaruhi kadar tindak balas antara zink berlebihan dengan 50 cm^3 asid hidroklorik 1.0 mol dm^{-3}.
Table 6 shows the information for three sets of experiments to investigate factors affecting the rate of reaction between excess zinc and 50 cm^3 of 1.0 mol dm^{-3} hydrochloric acid.

Set *Set*	Bahan tindak balas *Reactants*	Suhu campuran (°C) *Temperature of the mixture (°C)*	Masa yang diambil untuk mengumpul 30 cm^3 gas hidrogen (s) Time taken to collect 30 cm^3 hydrogen gas (s)
I	Zink berlebihan + 50 cm^3 asid hidroklorik 1.0 mol dm^{-3} *Excess zinc + 50 cm^3 of 1.0 mol dm^{-3} hydrochloric acid*	40	56
II	Zink berlebihan + 50 cm^3 asid hidroklorik 1.0 mol dm^{-3} + larutan X *Excess zinc + 50 cm^3 of 1.0 mol dm-3 hydrochloric acid + solution X*	40	42
III	Zink berlebihan + 50 cm^3 asid hidroklorik 1.0 mol dm^{-3} *Excess zinc + 50 cm^3 of 1.0 mol dm^{-3} hydrochloric acid*	50	35

Jadual 6
Table 6

Berdasarkan Jadual 6, jawab soalan-soalan berikut.
Based on Table 6, atmver the following questions.

(a) (i) Apakah maksud kadar tindak balas?
What is the meaning of rate of reaction?

[1M]

(ii) Namakan larutan X dan nyatakan fungsinya.
Name the solution X and its function.

[2M]

(iii) Tuliskan persamaan kimia bagi tindak balas antara zink berlebihan dan asid hidroklorik.
Write the chemical equation for the reaction between excess zinc and hydrochloric acid.

[2M]

(b) Lakarkan graf isi padu gas melawan masa bagi Set I dan Set II.
Sketch the graphs of volume of gas against time for Set I and Set II.

[3M]

(c) Hitung kadar tindak balas purata yang dihasilkan dalam
Calculate the average rate of reaction produced in

(i) Set I
(ii) Set II

[2M]

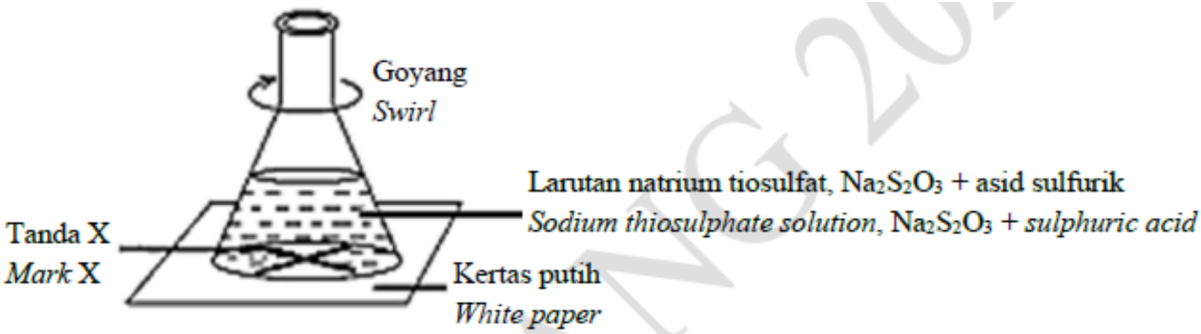
(d) Berdasarkan maklumat dalam Jadual 6, banding kadar tindak balas antara
Based on the information in Table 6, compare the rate of reaction between

(i) Set I dan Set II/ *Set I and Set II*
(ii) Set I dan Set III/ *Set I and Set III*

Dengan menggunakan teori perlanggaran, terangkan jawapan anda.
By using the collision theory, explain your answers.

[10M]

[2024 JUJ Set2-11] (a) Rajah 11.1 menunjukkan susunan radas yang mengkaji kadar tindak balas di antara larutan natrium tiosulfat, $Na_2S_2O_3$ dan asid sulfurik yang menghasilkan mendakan kuning. Keputusan Eksperimen I dan Eksperimen II telah direkodkan dalam Jadual 11.
Diagram 11.1 shows the apparatus set up to study the rate of reaction between sodium thiosulphate solution, $Na_2S_2O_3$ and sulphuric acid that produced yellow precipitate. The result of Experiment I and Experiment II were recorded in Table 11.



Eksperimen *Experiment*	Bahan tindak balas *Reactants*	Masa yang diambil untuk tanda 'X' hilang dari penglihatan (s) *Time taken for the 'X' mark disappear from view (s)*
I	50.0 cm^3 larutan natrium tiosulfat + 5.0 cm^3 asid sulfurik 1.0 mol dm^{-3} *50.0 cm^3 sodium thiosulphate solution + 5.0 cm^3 of 1.0 mol dm^{-3} sulphuric acid*	40
II	50.0 cm^3 larutan natrium tiosulfat + 5.0 cm^3 asid sulfuric 1.0 mol dm^{-3} *50.0 cm^3 sodium thiosulphate solution + 5.0 cm^3 of 1.0 mol dm^{-3} sulphuric acid*	20

(i) Nyatakan nama bagi mendakan kuning yang terhasil dan kenal pasti dua faktor yang boleh mempengaruhi masa yang diambil untuk tanda 'X' hilang dari penglihatan.
State the name of yellow precipitate formed and identify two factors that can affected the time taken for the 'X' mark disappear from view.

[3M]

(ii) Tuliskan persamaan ion bagi tindak balas di atas dan hitungkan kadar tindak balas bagi Eksperimen I dan Eksperimen II. Bandingkan kadar tindak balas di antara Eksperimen I dan Eksperimen II dengan memilih salah satu faktor yang dinyatakan di (a)(i) berdasarkan Teori Pelanggaran.
Write the ionic equation for the reaction above and calculate the rate of reaction for Experiment I and Experiment II. Compare the rate of reaction between Experiment I and Experiment II by using any one factor that stated in (a)(i) based on collision theory.

[9M]

(b) Rajah 11.2 menunjukkan bahan tindak balas yang digunakan untuk menghasilkan gas hidrogen.
Diagram 11.2 shows the reactants which is used to produce hydrogen gas.

• 5.0 g ketulan zink
5.0 g zinc granule

• 50.0 cm^3 asid hidroklorik 0.5 mol dm^{-3}
50.0 cm^3 of 0.5 mol dm^{-3} hydrochloric acid

Rajah 11.2/ Diagram 11.2

Kadar tindak balas di antara dua bahan ini dapat ditingkatkan dengan menambahkan bahan Q yang tidak mempengaruhi hasil tindak balas. Cadangkan bahan Q dan huraikan eksperimen bagaimana bahan Q dapat memberi kesan kepada kadar tindak balas di antara ketulan zink dan asid hidroklorik dalam makmal.
Rate of reaction between these two substances can be increased by adding substance Q that does not affect the product formed. Suggest substance Q and describe the experiment how substance Q affected the rate of reaction between zinc granule and hydrochloric acid in the laboratory.

[8M]

[2024 Negeri Sembilan-09] (a) Jadual 9 menunjukkan tiga set eksperimen yang dijalankan untuk mengkaji faktor-faktor yang mempengaruhi kadar tindak balas antara zink dengan asid hidroklorik.
Table 9 shows three sets of experiment carried out to investigate the factors that affect the rate of reaction between zinc and hydrochloric acid.

Eksperimen Experiment	Bahan tindak balas Reactants
I	Serbuk zink berlebihan + 25 cm^3 asid hidroklorik 0.5 mol dm^{-3} *Excess zinc powder + 25 cm^3 of 0.5 mol dm^{-3} hydrochloric acid*
II	Serbuk zink berlebihan + 25 cm^3 asid hidroklorik 1.0 mol dm^{-3} *Excess zinc powder + 25 cm^3 of 1.0 mol dm^{-3} hydrochloric acid*
III	Serbuk zink berlebihan + 25 cm^3 asid hidroklorik 1.0 mol dm^{-3} + 10 cm^3 larutan kuprum(II) sulfat 1.0 mol dm^{-3} *Excess zinc powder + 25 cm^3 of 1.0 mol dm^{-3} hydrochloric acid + 10 cm^3 1.0 mol dm^{-3} copper(II) sulphate solution*

Jadual 9
Table 9

(i) Berdasarkan eksperimen tersebut, nyatakan maksud kadar tindak balas.
Based on the experiment, state the meaning of rate of reaction.

[1M]

(ii) Tuliskan persamaan kimia bagi tindak balas yang berlaku antara zink dan asid hidroklorik dalam Eksperimen I. Hitung isi padu gas yang dibebaskan bagi eksperimen tersebut. Eksperimen ini mengambil masa 2 minit untuk melengkapkan tindak balas. Hitung kadar tindak balas purata dengan unit $cm^3\ s^{-1}$ bagi tindak balas ini.
[1 mol gas menempati isi padu 24.0 dm^3 pada keadaan bilik]
Write the chemical equation for the reaction that occurred between zinc and hydrochloric acid in Experiment I. Calculate the volume of gas released for the experiment. The experiment took 2 minutes to complete the reaction. Calculate the average rate of reaction in $cm^3\ s^{-1}$ for this reaction.
[1 mol of gas occupies the volume of 24.0 dm^3 at room condition]

[6M]

(iii) Pada paksi yang sama, lakarkan graf isi padu gas melawan masa bagi Eksperimen I, Eksperimen II dan Eksperimen III.
On the same axis, sketch the graph of gas volume against time for Experiment I, II and III.

[4M]

(iv) Bandingkan kadar tindak balas antara Eksperimen II dan Eksperimen III. Jelaskan jawapan anda berdasarkan Teori Perlanggaran.
Compare the rate of reaction between Experiment II and III.
Explain your answer based on Collision Theory.

[M]

(b) Tablet antasid digunakan untuk merawat gastrik. Doktor menasihatkan pesakit mengunyah tetapi bukan menelan. Berikan alasan.
Antasid tablets are used to treat gastric. Doctors advise patients to chew instead of swallowing. Give the reason.

[3M]

[2024 Perlis-09] Elisa menjalankan satu eksperimen untuk mengkaji kadar penguraian hidrogen peroksida, H_2O_2 di dalam makmal. Elisa menggunakan satu spatula serbuk hitam sebagai mangkin bagi eksperimen tersebut. Elisa mendapati gas yang terkumpul dapat menyalakan kayu uji berbara. Elisa merekodkan gas terkumpul seperti Jadual 3.
Elisa conducted an experiment to study the rate of decomposition of hydrogen peroxide, H_2O_2 in the laboratory. Elisa used a spatula of black powder as a catalyst for the experiment. Elisa found that the accumulated gas could ignite a glowing wooden splinter. Elisa records the accumulated gas as in Table 3.

Masa Time (s)	0	30	60	90	120	150	180	210	240	270	300	330	360
Bacaan buret Burette reading (cm^3)	50	36	28	22	17	13	9	7	8	3	2	1	0
Isipadu gas Volume of gas (cm^3)													

(a) (i) Namakan gas yang terbentuk dan kemungkinan mangkin yang digunakan.
Name gas produced and probably catalyst used.

[2M]

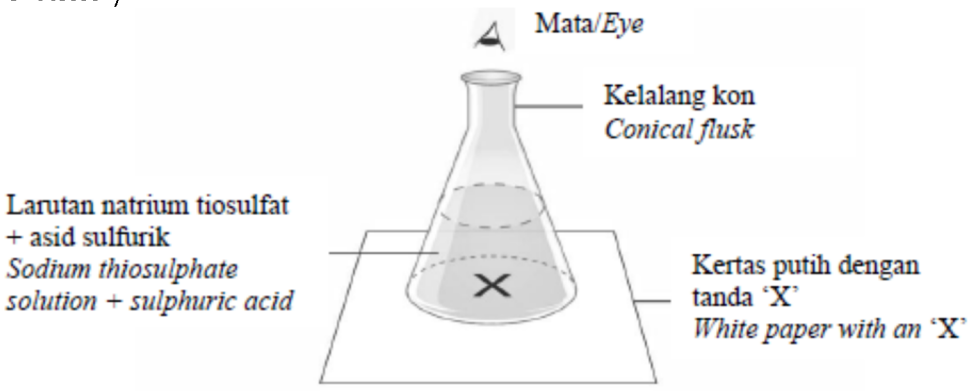
(ii) Lengkapkan Jadual 3 dengan mengisi ruang isipadu gas. Plot graf isipadu gas melawan masa yang diambil dan hitung kadar tindak balas purata :
- keseluruhan tindak balas.
- dalam minit ke lima.

Complete Table 3 by filling the space volume of gas. Plot a graph of the volume of gas against time taken and calculate the average rate of reaction :
- overall reaction.
- in fifth minute

[8M]

(b) (i) Ekhwan menjalankan dua aktiviti kadar tindak balas untuk mengkaji faktor suhu.
Berikut merupakan dapatan setelah dua aktiviti tersebut :
Ekhwan carried out two activities regarding rates of reaction to study the factor of temperature. Here are the findings after the two activities :

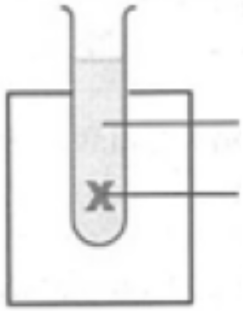
Situasi/ *Situation A*



Keputusan eksperimen :
Result of experiment :

Suhu *Temperature (°C)*	15.0	25.0	35.0	45.0	55.0	65.0
Masa untuk tanda 'X' tidak kelihatan *Time taken for mark 'X' invisible (s)*	270.0	100.0	50.0	27.0	10.0	7.0

Situasi/ *Situation* B



Susu + enzim
Milk + enzyme

Kertas putih dengan tanda 'X' dan diletakkan di belakang tabung didih
White paper with an 'X' and placed behind the boiling tube

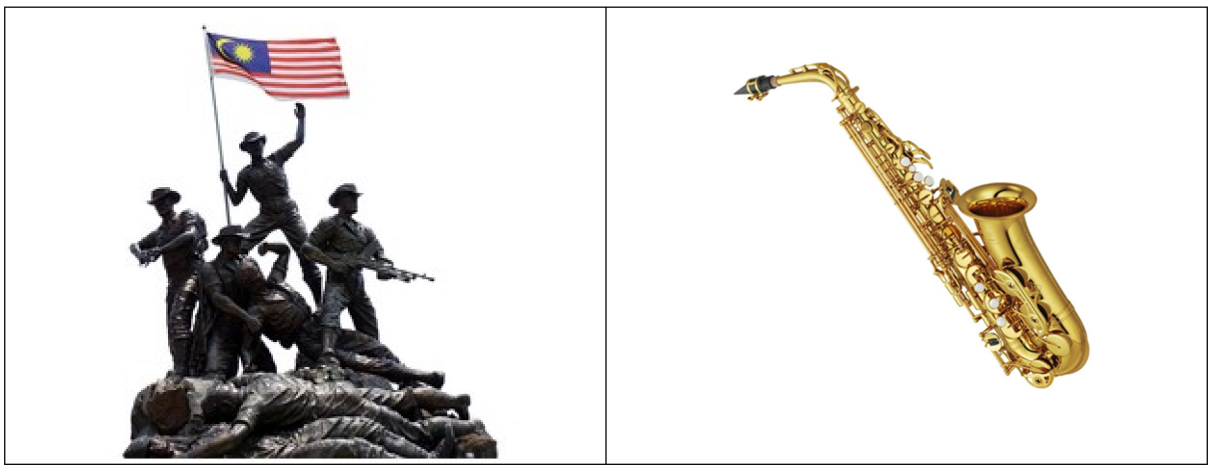
Keputusan eksperimen :
Result of experiment :

Suhu *Temperature* (°C)	15.0	25.0	35.0	45.0	55.0	65.0
Masa untuk tanda 'X' tidak kelihatan *Time taken for mark 'X' invisible* (s)	360.0	240.0	120.0	180.0	300.0	500.0

Terangkan perbezaan yang berlaku pada situasi A dan situasi B berdasarkan teori perlanggaran dan pengetahuan kimia anda.
Explain the difference that occurs at situation A and situation B based on collision's theory and your chemistry knowledge.

[10M]

[2024-Johor Batu Pahat-01] Rajah 1 menunjukkan sebuah Tugu Negara dan saksofon.
Diagram 1 shows The National Monument and a saxophone.



(a) Apakah maksud aloi?/ *What is the meaning of alloy?*

..... [1M]

(b) Tugu Negara diperbuat daripada aloi Y manakala saksofon diperbuat daripada aloi Z. Kedua-dua jenis aloi menggunakan logam kuprum sebagai unsur utama.
The National Monument is made of alloy Y while saxophone is made of alloy Z. Both alloys use copper metal as the main element.

(i) Kenal pasti aloi Z./ *Identify alloy Z.*

..... [1M]

(ii) Nyatakan satu unsur lain dalam aloi Y. *State one other element in alloy Y.*

..... [1M]

(c) Apakah kelebihan Tugu Negara dan saksofon dihasilkan daripada aloi, bukan logam tulennya?
What are the advantages of The National Monument and the saxophone are produced by alloy, not its pure metal?

.....

..... [2M]

[2024 Negeri Sembilan-05] (a) Jadual 1.1 menunjukkan komposisi dan kegunaan tiga jenis aloi.
Table 1.1 shows the composition and uses of three types of alloy.

Jenis aloi *Type of alloy*	Komposisi Composition
Keluli nirkarat *Stainless steel*	73% ferum, 18% kromium, 8% nikel dan 1% karbon *73% iron, 18% chromium, 8% nickel and 1% carbon*
Loyang *Brass*	70% kuprum dan 30% logam R *70% copper and 30% metal R*
Duralumin *Duralumin*	93% aluminium, 3% kuprum 3% magnesium dan 1% mangan *93% aluminium, 3% copper, 3% magnesium and 1% manganese*

Berdasarkan Jadual 1.1,/ Based on Table 1.1,

(i) Namakan logam R./ *Name metal R.*

..... [1M]

(ii) Nyatakan satu kegunaan keluli nirkarat.
State one use of stainless steel.

..... [1M]

(iii) Cadangkan aloi yang manakah sesuai untuk pembuatan basikal lumba. Berikan alasan anda.
Suggest the type of alloy that is suitable to be used to manufacture the racing bicycle. Give your reason.

.....

..... [2M]

(b) Jadual 1.2 menunjukkan keputusan bagi satu eksperimen mengkaji kekerasan aloi dan logam tulen.
Table 1.2 shows the result of an experiment to study the hardness of alloy and pure metal.

Jenis blok *Block type*	Diameter lekuk (cm) *Diameter of the dent (cm)*
Bahan X *Material X*	0.8
Bahan Y *Material Y*	0.5

Berdasarkan diameter lekuk yang terhasil, bahan yang manakah sesuai untuk membina sebuah jambatan. Terangkan jawapan anda.
Based on the diameter of dents, which material is suitable to build a bridge. Explain your answer.

.....

..... [2M]

(c) Bahan komposit merupakan bahan yang terdiri daripada gabungan dua atau lebih bahan yang bukan homogen iaitu bahan matriks dan bahan pengukuh. Ali memakai cermin mata kerana rabun jauh. Dia berasa sakit mata apabila terdedah kepada cahaya matahari. Nyatakan satu bahan komposit yang boleh membantu Ali untuk mengatasi masalah ini. Terangkan jawapan anda.
A composite material is a material made from combining two or more non-homogeneous substances, that is matrix substance and strengthening substance. Ali wears glasses because he is farsighted. He felt pain in his eyes when exposed to sunlight. State a composite material that can help to overcome the problem. Explain your answer.

.....

.....

..... [2M]

[2024 Johor-05] Rajah 5 menunjukkan peralatan yang digunakan untuk membasuh pinggan mangkuk di dapur dan diperbuat daripada aloi Y.
Diagram 5 shows the utensils used for washing dishes in the kitchen and made of alloy Y.

(a) Apakah maksud aloi?/ *What is the meaning of alloy?*

..... [1M]

(b) Unsur utama bagi Y ialah ferum. Namakan unsur yang ditambahkan untuk membentuk Y.
The main element of Y is iron. Name element which is added to form Y?

..... [1M]

(c) Lukis susunan atom di dalam aloi Y./ *Draw atomic structure in alloy Y.*

[2M]

(d) Azizul merupakan seorang pelumba basikal. Dia menghadapi masalah untuk menang sekiranya basikal yang digunakannya berat.Cadangkan apa yang perlu dilakukan pada basikalnya agar dapat memenangi pertandingan lumba basikal?
Azizul is a cyclist. He had trouble winning if the bike he was using was heavy. Suggest what needs to be done to his bike to win the bike race?

.....

.....

.....

..... [2M]

(d) Maklumat di bawah berkaitan tentang aloi gangsa dan aloi loyang.
The information below relates to bronze alloys and brass alloys.

• Gangsa terdiri daripada 90% kuprum dan 10% stanum.
Bronze consists of 90%copper and 10% tin.

• Loyang terdiri daripada 70% kuprum dan 30 % zink.
Brass consists of 70% copper and 10% Zinc.

Berdasarkan maklumat di atas, terangkan perbezaan kandungan serta sifat bagi kedua-dua aloi.
Based on the information above, explain the differences in the content and properties of the two alloys.

.....

.....

.....

..... [2M]

[2024 Johor Muar-01] Rajah 1 menunjukkan satu pingat yang diperbuat daripada gangsa.
Diagram 1 shows a medal made of bronze.

(a) Namakan unsur yang ditambah kepada kuprum untuk membentuk gangsa.
Name the element added to copper to form bronze.

..... [1M]

(b) Lukis susunan atom dalam gangsa.
Draw the arrangement of atoms in bronze.

[2M]

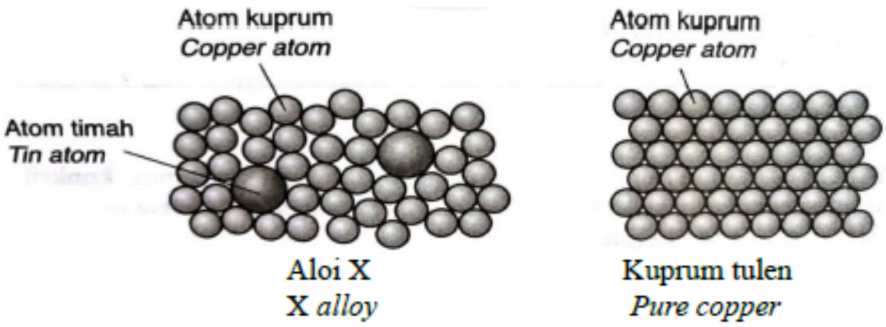
(c) Mengapakah gangsa adalah lebih sesuai untuk membuat pingat berbanding dengan kuprum?
Why is bronze more suitable for making medals compared to copper?

..... [1M]

(d) Namakan satu aloi lain bagi kuprum./ *Name one other alloy of copper.*

..... [1M]

[2024 Johor Pasir Gudang-05] Rajah 5 menunjukkan susunan atom dalam aloi X dan kuprum tulen.
Diagram 5 shows the arrangement of atoms in alloy X and pure copper.



(a) Nyatakan maksud aloi./ *State the meaning of alloy.*

.....

..... [1M]

(b) Apakah sifat bagi aloi X?/ *What is the characteristic of X alloy?*

..... [1M]

(c) Berdasarkan Rajah 5.1, pilih bahan yang sesuai untuk membuat pedang. Terangkan mengapa bahan tersebut sesuai dari segi susunan atom.
Based on Diagram 5.1, choose material that is suitable to make swords. Explain why it is suitable in terms of the arrangement of atoms.

.....

.....

.....

..... [4M]

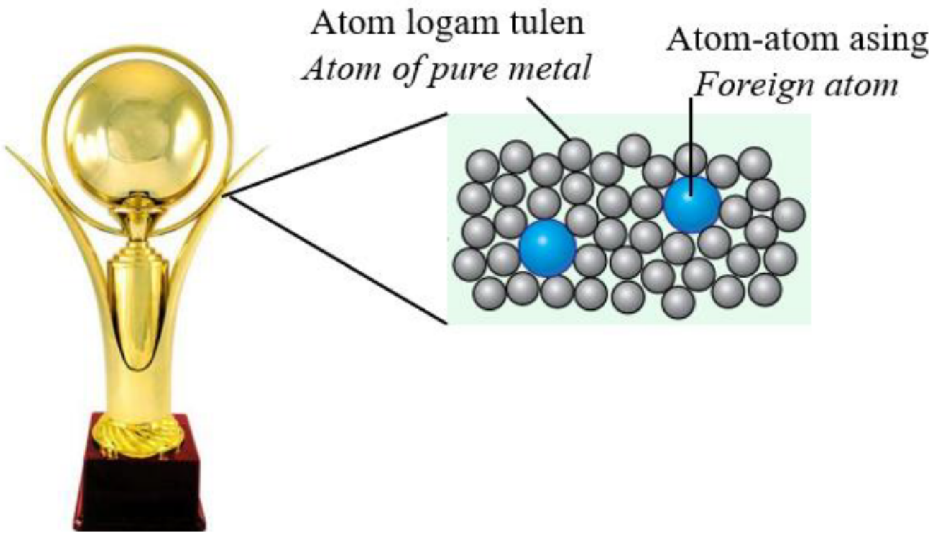
(d) Lengkapkan Jadual 2 untuk menunjukkan perbezaan antara aloi X dengan kuprum tulen.
Complete Table 2 to show the differences between alloy X and pure copper.

Perbezaan *Differences*	Aloi X *X alloy*	Kuprum tulen *Pure copper*
Saiz atom *Size of atoms*		
Susunan atom *Arrangement of atoms*		

Jadual 2 / *Table 2*

[2M]

[2024-Sarawak-Set02-01] Rajah 1 menunjukkan sebuah piala aloi buatan Loyang dan susunan zarah dalam aloi loyang.
Diagram 1 shows a brass made alloy trophy and the arrangement of particles in the brass alloy.



(a) Apakah yang dimaksudkan dengan aloi?/ *What is meant by alloy?*

..... [1M]

(b) Berdasarkan Rajah 1,/ *Based on Diagram 1,*

(i) Aloi loyang dibina daripada gabungan logam tulen dan logam asing. Nyatakan nama bagi
Brass alloy is built from the mixture of pure metal and foreign metal. State the name for

Logam tulen/ *Pure metal* : .....

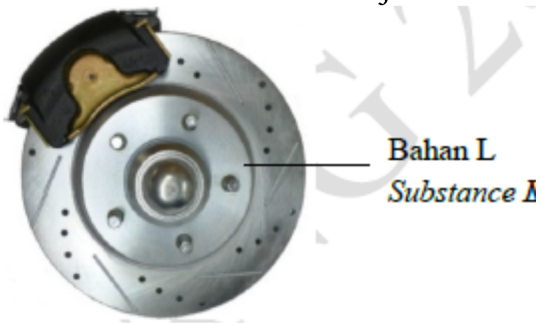
Logam asing *Foreign metal* : ..... [2M]

(ii) Terangkan mengapa aloi Loyang dipilih sebagai bahan buatan piala tetapi bukan logam tulennya.
Explain why brass is chosen as material to make the trophy instead of its pure metal.

.....

..... [2M]

[2024 JUJ Set1-08] (a) Rajah 8.1 menunjukkan cakera brek yang diperbuat daripada bahan L.
Diagram 8.1 shows shows a brake disc made of material L.



(i) Nyatakan nama bahan L./ *State the name of substance L.*

..... [1M]

(ii) Mengapakah bahan L sesuai digunakan untuk membuat alat dalam Rajah 8.1?
Why is substance L suitable for making the tool in Diagram 8.1?

..... [1M]

(b) Linda diminta oleh ibunya untuk memanaskan semula lauk yang telah diisi ke dalam sebuah bekas kaca dan disimpan dalam peti sejuk. Linda mengeluarkan bekas tersebut dan terus memanaskannya di atas dapur. Semasa pemanasan, didapati bekas itu retak dengan tiba-tiba.
Cadangkan jenis kaca yang lebih sesuai digunakan untuk menggantikan bekas makanan tersebut supaya tidak retak dengan tiba-tiba semasa pemanasan. Berikan satu sebab.
Linda was asked by her mother to reheat the dish that had been filled in a glass container and kept in the refrigerator. Linda took out the container and directly heat it on the stove. During heating, it was found that the container crack suddenly. Suggest the type of glass that is more suitable to be used to replace the food container so that it does not crack suddenly during heating. Give one reason.

.....

.....

..... [2M]

[2024 Johor Pasir Gudang-05] (a) Jadual 2 menunjukkan bahan buatan dalam industri.
Table 2 shows the manufactured substances in industry.

Jenis *Types*	Contoh *Examples*	Komponen *Components*
Kaca *Glass*	X	Silika *Silica*
Seramik termaju *Advanced ceramics*	Cakera pemotong *Cutting disc*	Silikon karbida *Silicon carbide*
Bahan komposit *Composite materials*	Gentian optik *Optical fibre*	Plastik, gentian kaca *Plastic, glass fibre*

Namakan jenis kaca X./ *Name the type of glass X.*

..... [1M]

(b) Nyatakan dua sifat seramik termaju.
State two properties of advanced ceramics.

.....

.....

..... [2M]

(c) Gentian optik telah menggantikan wayar kuprum bagi penghantaran maklumat dan data.
Optical fibre has replaced copper wire in the transmission of information and data.

(i) Bagaimanakah gentian optik menghantar maklumat dan data?
How does optical fibres transmit information and data?

..... [1M]

(ii) Bandingkan penggunaan gentian optik dan wayar kuprum untuk membina rangkaian penyiaran TV kabel berdefinisi tinggi.
Compare the usage of optical fibres and copper wires in high definition cable TV network.

.....

.....

.....

..... [2M]

(d) Ketulenan aloi emas diukur dalam unit karat (K). Emas 24 K merupakan emas tulen tanpa campuran logam lain manakala emas 18 K merupakan campuran yang terdiri daripada 18 bahagian emas dengan 6 bahagian logam kuprum mengikut jisim.
Hitungkan peratus komposisi mengikut jisim dalam 24 g emas 18 K
The purity of gold is measured in carats (K). 24 carat gold is pure gold without the addition of any other metal whereas 18 K gold is a mixture comprising of 18 units by mass of gold with 6 units by mass of copper.
Calculate the composition percentage by mass in 24 g of 18 K gold.

[2M]

[2024-Sarawak-Set01-03] Rajah 2 menunjukkan tiga contoh bahan buatan dalam industri.
Diagram 2 shows three examples of manufactured substances in industry.

P

Q

R

(a) (i) P diperbuat daripada duralumin. Kuprum adalah salah satu unsur dalam duralumin. Namakan satu unsur lain dalam duralumin.
P is made of from duralumin. Copper is one of the elements in duralumin.
Name one other element in duralumin.

..... [1M]

(ii) Nyatakan perbezaan dari segi kekerasan antara duralumin dan logam tulennya.
State the difference in hardness between duralumin and its pure metal.

..... [1M]

(b) (i) Q dan R adalah dua jenis seramik. Apakah jenis seramik R?
Q and R are two types of ceramics. What is the type of ceramic R?

..... [1M]

(ii) Nyatakan satu persamaan antara seramik Q dan R.
State one similarity between ceramic Q and R.

..... [1M]

(c) Jadual 2 menunjukkan maklumat tentang dua jenis kaca X dan Y.
Table 2 shows the information of two types of glasses X and Y.

Jenis kaca *Type of glass*	Komposisi *Composition*	Kegunaan *Uses*
X	Silika, natrium karbonat, kalsium karbonat *Silica, sodium carbonate, calcium carbonate*	Tingkap kaca *Window glass*
Y	Silika, argentum klorida, kalsium karbonat *Silica, silver chloride, calcium carbonate*	Tingkap kaca *Window glass*

Encik Ali ingin memasang tingkap kaca di rumahnya yang dapat menghalang sinar ultraungu. Antara kaca X dan Y, kaca jenis manakah yang akan Encik Ali pilih? Berikan alasan anda.
Mr Ali wish to install a glass window at his house that is able to prevent the ultraviolet rays. Between glass X and Y, which type of glass will Mr Ali chose? Give your reason.

.....

..... [2M]

[2024-Melaka-02] (a) Jadual 1 adalah dua pasang cermin mata yang dibuat daripada dua jenis kaca berbeza.
Table 1 shows two pairs of spectacles made from two different type of glasses.

Kaca *Glass*	Maklumat *Information*
A	- Dibuat daripada kaca silika terlakur *Made from fused silica glass* - Kekal lutsinar apabila terdedah kepada matahari *Remains transparent when exposed to sunlight*

B	- Dibuat daripada kaca fotokromik *Made from photochromic glass* - Bertukar gelap apabila terdedah kepada matahari *Turns dark when exposed to sunlight*

(i) Nyatakan dua bahan pengukuhan yang digunakan dalam kaca fotokromik.
State two strengthening substances used in photochromic glass.

.....

..... [2M]

(ii) Nyatakan kelebihan kaca fotokromik tersebut.
State the advantage of the photochromic glass.

..... [1M]

(b) Rajah 2 menunjukkan kereta api Maglev. Kereta api jenis elektrik ini boleh mencapai kelajuan sehingga 581 km/j.
Diagram 2 shows a Maglev train. This type of electric train can reach speeds of up to 581 km/h.

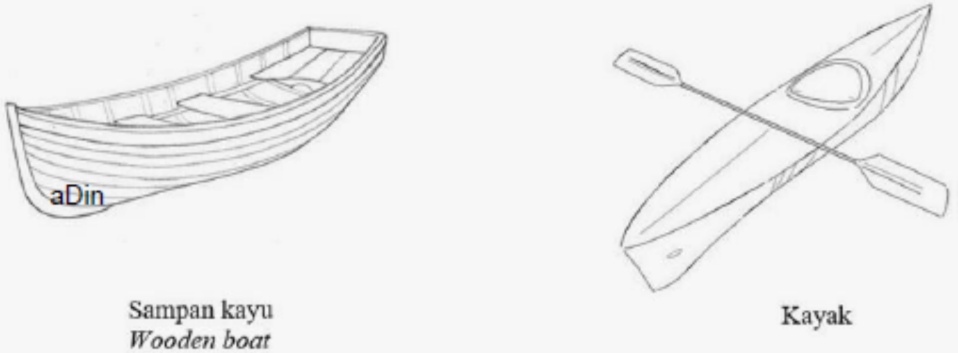
(i) Nyatakan aloi yang digunakan dalam kereta api ini.
State the alloy used in this train.

..... [1M]

(ii) Mengapakah aloi di 2(b)(i) sesuai digunakan?
Why alloy in 2(b)(i) is suitable to use?

..... [1M]

[2024 Perlis-07] Rajah 7 menunjukkan sebuah sampan kayu dan kayak. Kedua-duanya diperbuat menggunakan bahan komposit.
The diagram 7 shows a wooden boat and a kayak. Both are made using composite materials.



(b) (i) Bahan komposit terdiri daripada gabungan bahan matriks dan bahan pengukuhan. Apakah fungsi bahan matriks?
Composite materials consist of a combination of matrix substance and strengthening substance. What is the function of matrix substances?

..... [1M]

(ii) Namakan bahan komposit yang sesuai untuk pembuatan kayak.
Name a suitable composite material for making kayaks.

..... [1M]

(b) Radas kaca makmal seperti bikar dan kelalang diperbuat daripada kaca borosilikat kerana sifat rintangannya terhadap haba.
Laboratory glassware such as beakers and flasks are made of borosilicate glass because of its heat resistance properties.

Satu sampel kaca borosilikat mempunyai komposisi silika 80%, boron oksida 15% dan aluminium oksida 5%. Hitungkan jisim setiap komponen di dalam sampel kaca borosilikat dengan jisim 1.0 kg.
A sample of borosilicate glass has a composition of 80% silica, 15% boron oxide and 5% aluminum oxide. Calculate the mass of each component in a sample of borosilicate glass with a mass of 1.0 kg.

[3M]

(c) Berikut adalah perbualan dua orang pelajar tingkatan 5 Sains Tulen.
The following is a conversation between two students from form 5 Pure Science.

Sebagai seorang pelajar yang mempelajari ilmu kimia, bagaimana anda boleh membantu Adam bagi menerangkan mengapa makanan yang panas tidak sesuai dihidangkan dalam bekas kaca plumbum.
As a student studying chemistry, how can you help Adam to explain why hot food should not be served in lead glass containers.

.....

.....

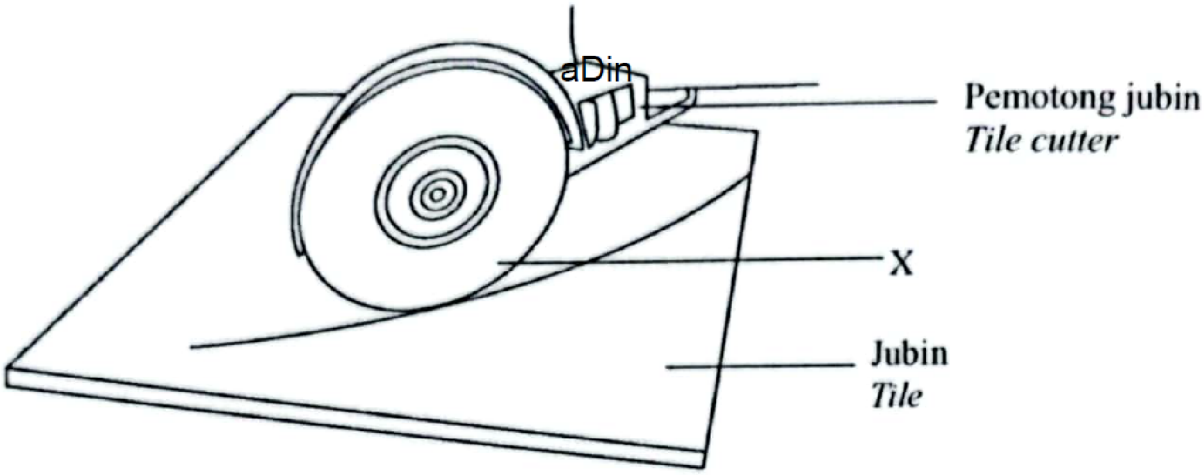
..... [2M]

(d) Kanta cermin mata Elly diperbuat daripada jenis kaca plumbum. Elly dapati ianya bersilau terutama ketika berada di bawah sinaran matahari. Elly ingin menukar kepada kanta cermin jenis lain. Pada penilaian anda, apakah jenis cermin kaca yang perlu Elly pilih bagi mengatasi masalah yang dihadapi. Cadangkan kelebihan daripada cermin kaca yang dipilih.
The lenses of Elly glasses are made of a type of lead glass. Elly found that it was glare especially when under the sun. Elly wants to change to another type of mirror lens. In your opinion, what type of glass mirror should Elly choose to overcome the problems faced. Suggest the advantages of the selected glass mirror.

.....

..... [2M]

[2024 Perak – Set 1-04] (a) Rajah 2.1 menunjukkan satu alat yang lazim digunakan oleh pekerja binaan untuk memotong jubin.
Diagram 2.1 shows a tool that is normally used by construction worker to cut tiles.



(i) Nyatakan jenis seramik yang digunakan untuk menghasilkan jubin.
State the type of ceramic used to make tiles.

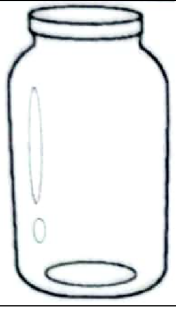
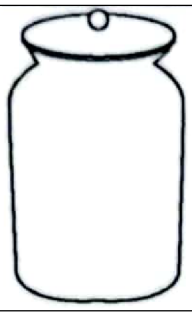
..... [1M]

(ii) Berdasarkan Rajah 2.1, namakan X dan nyatakan sifat X yang membolehkan ia digunakan untuk memotong jubin.
Based on Diagram 2.1, name X and the state the property ofX that makes it be used as tiles cutter.

.....

..... [2M]

(b) Maya ingin memilih bekas yang sesuai untuk menyimpan jeruk buah. Rajah 2.2 menunjukkan bekas yang boleh digunakan untuk tujuan itu.
Mava wants to choose a suitable container to keep fruit pickles. Diagram 2.2 shows the containers that can be used for that purpose.

	
Jar kaca/ *Glass jar*	Jar seramik/ *Ceramic jar*

(i) Bekas manakah yang lebih sesuai? Wajarkan jawapan anda.
Which container is more suitable? Justify your answer.

.....

.....

..... [3M]

(ii) Nyatakan satu kekurangan bekas tersebut, berdasarkan jawapan anda di 4(6)(i).
State one disadvantage of the container, based on your answer in 4(i)(i).

..... [1M]

[2024 Putrajaya-02] Rajah 1 menunjukkan contoh bahan aloi, kaca, dan seramik yang digunakan dalam kehidupan seharian.
Diagram 1 shows example of alloy, glass, and ceramic materials used in daily life.

		
Periuk kaca/ *Glass pot*	Tembikar *Pottery*	Duit syiling/ *Coins*

(a) (i) Nyatakan komponen utama bagi kaca.
State the main component of glass.

..... [1M]

(ii) Cadangkan satu jenis kaca yang sesuai digunakan untuk membuat peralatan memasak.
Suggest one type of glass that is suitable to be used to make cooking utensils.

..... [1M]

(b) Berdasarkan Rajah 1, nyatakan satu persamaan dan satu perbezaan sifat-sifat fizikal bagi kaca dan seramik.
Based on Diagram 1, state one similarity and one difference in physical properties of glass and ceramic.

(i) Persamaan/ *Similarity:*

..... [1M]

(ii) Perbezaan/ *Difference:*

..... [1M]

(c) Duit syiling merupakan salah satu contoh kegunaan aloi. Nyatakan satu kelebihan menggunakan aloi dalam pembuatan duit syiling berbanding logam tulen?
Coin is an example of the uses of alloy. State one advantage of using alloy in coin production compared to pure metal?

..... [1M]

[2024-Selangor-Set2-05] (a) Rajah 3.1 menunjukkan satu pingat yang diperbuat daripada gangsa.
Diagram 3.1 shows a medal made from bronze.

Berdasarkan Rajah 3.1,/ *Based on Diagram 3.1,*

(i) apakah maksud aloi?/ *what is the meaning of alloy?*

..... [1M]

(ii) nyatakan logam utama yang ada dalam gangsa.
state the main metal present in bronze.

..... [1M]

(iii) bandingkan kekerasan antara logam utama yang dinyatakan dalam 5(a)(ii) dan gangsa. Terangkan jawapan anda.
compare the hardness between the main metal stated in 5(a)(ii) and bronze. Explain your answer.

.....

.....

..... [3M]

(b) Rajah 3.2 menunjukkan satu lampu hiasan yang digantung pada siling.
Diagram 3.2 shows a chandelier.

(i) Namakan jenis kaca yang sesuai digunakan untuk menghasilkan lampu hiasan ini.
Name the suitable type of glass to make this chandelier.

..... [1M]

(ii) Nyatakan dua sifat jenis kaca yang dinyatakan di 5(b)(i).
State two properties of the type of glass mentioned in 5(b)(i).

.....

..... [2M]

[2024-Selangor-Set1-05] (a) Rajah 4 menunjukkan sejenis seramik yang digunakan dalam pcmbuatan kctuhar tandoori.
Diagram 4 shows a type of ceramic that is used to make a tandoori furnace.

Berdasarkan Rajah 4,/ *Based on Diagram 4,*

(i) nyatakan bahan utama dalam seramik.
state the main material in ceramic.

..... [1M]

(ii) nyatakan satu sifat seramik./ *state one property of ceramic.*

..... [1M]

(iii) nyatakan satu jenis seramik yang lain./ *state another type of ceramics.*

..... [1M]

(iv) nyatakan satu kegunaan seramik yang dinyatakan di 5(a)(iii).
state one use of the ceramic stated in 5(a)(iii).

..... [1M]

(b) Rajah 5 menunjukkan reka bentuk kereta yang diperbuat daripada sejenis bahan komposit iaitu polimer bertetulang serat karbon (CFRP) di mana bahan matriks ialah resin polimer manakala bahan Z ialah serat karbon.
Diagram 5 shows the design of a car made from a type of composite material which is carbon fibre reinforced polymer (CFRP) where the matrix substance is polymer resin and substance Z is carbon fibre.

(i) Kenal pasti bahan Z./ *Identify substance Z.*

..... [1M]

(ii) Jadual 2 menunjukkan tiga jenis bahan komposit dan komponennya.
Table 2 shows three types of composite materials and their components.

Bahan komposit Composite material	Komponen Component
P	Konkrit dan keluli *Concrete and steel*
Kaca fotokromik *Photochromic glass*	Kaca, kuprum(I) klorida dan Q Glass, *copper(I) chloride and Q*
R	Itrium(III) karbonat, barium karbonat, kuprum(II) karbonat dan oksigen *Yttrium(III) carbonate, barium carbonate, copper(II) carbonate and oxygen*

Berdasarkan Jadual 2, kenal pasti bahan komposit P, R dan bahan Q.
Based on Table 2, identify the composite materials P, R and substance Q.

P : .....

R : .....

Q : ..... [3M]

[2024 JUJ Set2-06] (a) Rajah 6.1 menunjukkan perbincangan di antara sekumpulan murid mengenai kaca X.
Diagram 6.1 shows the discussion between a group of students about glass X.

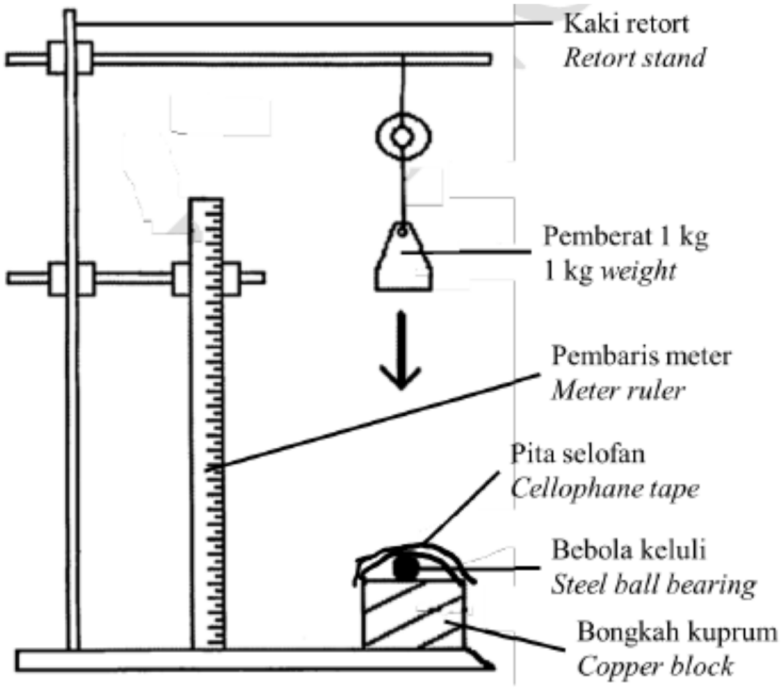
(i) Nyatakan nama komponen utama yang digunakan dalam pembuatan kaca.
State the name of the main component that is used in the manufactured of glass.

..... [1M]

(ii) Berdasarkan perbualan di atas, kenal pasti jenis kaca X.
Based on the conversation above, identify the type of glass X.

..... [1M]

(b) Rajah 6.2 menunjukkan susunan radas untuk mengkaji kekerasan logam tulen dan aloinya.
Diagram 6.2 shows the apparatus set-up to investigate the hardness of pure metal and its alloy.



Pemberat 1 kg dijatuhkan dari ketinggian 50 cm ke atas bebola keluli dan diameter lekuk yang terhasil pada bongkah kuprum diukur. Eksperimen diulang dengan menggantikan bongkah kuprum dengan bongkah gangsa. Jadual 6.1 menunjukkan keputusan eksperimen itu.
A weight of 1 kg is dropped at 50 cm height onto a ball bearing and the diameter of the dent produced on the copper block is measured. The experiment is repeated by replacing the copper block with bronze block. Table 6.1 shows the result of the experiment.

Jenis bongkah *Type of block*	Diameter lekuk (cm) *Diameter of dent (cm)*
Bongkah kuprum *Copper block*	0.5
Bongkah gangsa *Bronze block*	0.2

(i) Berdasarkan Jadual 6.1, terangkan perbezaan pemerhatian dari segi kekerasan bagi bongkah kuprum dan bongkah gangsa.
Based on Table 6.1, explain the difference in the observation in terms of hardness of copper and bronze blocks.

.....

.....

..... [3M]

(ii) Lukis susunan atom dalam bongkah gangsa itu.
Draw the arrangement of atom of bronze block.

[2M]

(iii) Kira jisim stanum dalam 250 g bongkah gangsa sekiranya bongkah yang digunakan mempunyai ketulenan 85%.
Calculate the mass of tin in 250 g bronze block if the block used has 85% purity.

[2M]

Esei

[2024-Kedah-10ab] (a) Rajah 10.1 menunjukkan contoh kegunaan seramik.
Diagram 10.1 shows an example of the use of ceramics.

Produk/ *Product* A

Produk/ *Product* B

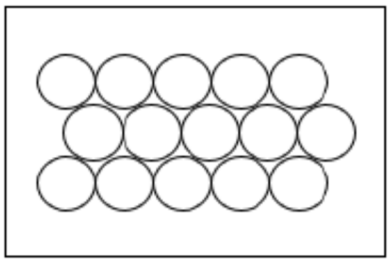
(i) Berikan satu sifat asas seramik bagi Produk A. Nyatakan jenis seramik bagi Produk B.
Give a basic property of ceramics to produce Product A. State the type of ceramic for Produk B.

[2M]

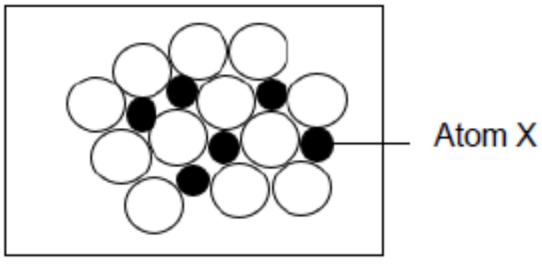
(ii) Seramik digunakan dalam bidang perubatan secara meluas. Berikan satu contoh dan kegunaannya.
Ceramics are widely used in medical field. Give an example and its use.

[2M]

(b) Rajah 10.2 menunjukkan susunan atom dalam dua jenis bahan, A dan B. Bahan B lebih sesuai daripada bahan A untuk membuat badan kereta.
Diagram 10.2 shows the arrangement of atoms in two types of materials, A and B. Material B is more suitable than material A to make body of car.



Bahan A / *Material* A



Bahan B / *Material* B

Nyatakan nama bagi bahan B dan atom X. Berdasarkan susunan atom, terangkan mengapa bahan B lebih sesuai untuk membuat badan kereta.
State the name of material B and atom X. Based on atomic arrangement, explain why material B is more suitable to make body of car.

[5M]

[2024 Kelantan-11] (a) Rajah 11.1 menunjukkan pingat emas dan komposisinya. Pingat emas ini dibuat sebagai hadiah kepada pemenang sukan Olimpik di Paris.
Diagram 11.1 showing the gold medal and its composition. This gold medal was made as a gift to the winners of the Olympic Games in Paris.

Berat Pingat Emas : 529 g
Mass of Gold Medal

Komposisi/ *Composition*

Emas/ *Gold* : 6 g

Ferum/ *Iron* : 18 g

Argentum/ *Silver* : 505 g

(i) Apakah istilah yang sesuai untuk mengambarkan bahan yang terdiri dari gabungan dua atau lebih unsur seperti pingat emas dalam Rajah 11.1
What is the appropriate term to describe a substance that consists of a combination of two or more elements such as gold medal in Diagram 11.1

[1M]

(ii) Berdasarkan Rajah 11.1, terangkan mengapa pingat emas diperbuat daripada campuran unsur-unsur lain bersama emas.
Based on Figure 11.1, explain why gold medals are made from a mixture of other elements along with gold.

[3M]