Chem Quest

2024

TINGKATAN 4

Jom A+ Kimia

SPM 2023

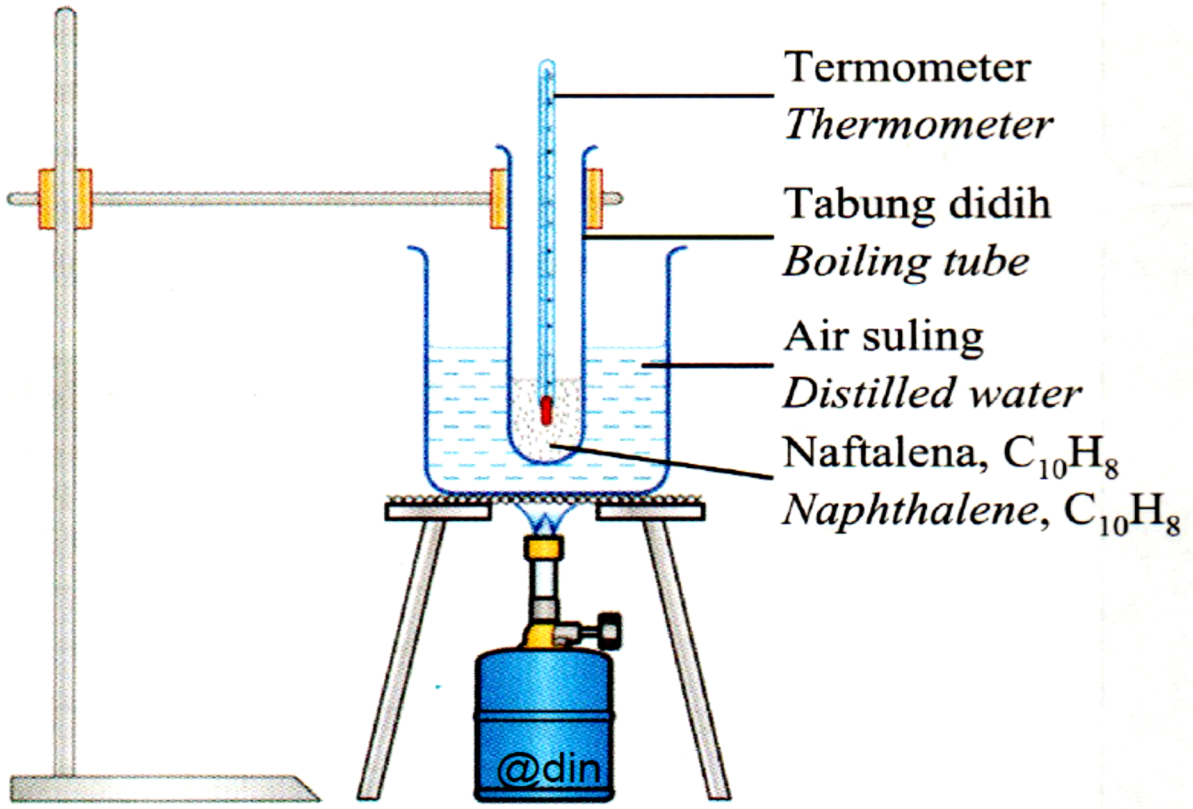
PERCUMA - TIDAK DIJUAL

[Johor – JB – Tangkak – Skudai]
[Kedah – Kelantan – Negeri Sembilan]
[Pahang – Perlis – Putrajaya – SBP]
[Selangor-Set 1&2 – Terengganu MPP3]
[JUJ-Set 1&2 – Melaka – MRSM = 17Set]

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

Bab 2 Jiirim dan Struktur Atom

[2023-Selangor-Set02-01] Rajah 1.1 menunjukkan susunan radas untuk menentukan takat lebur naftalena, $C_{10}H_8$.
Diagram 1.1 shows the apparatus set-up to determine the melting point of naphthalene, $C_{10}H_8$.



(a) Apakah yang dimaksudkan dengan takat lebur?
What is the meaning of melting point?

.....

..... [1M]

(b) Apakah jenis zarah yang terdapat dalam naftalena, $C_{10}H_8$?
What type of particle is found in naphthalene, $C_{10}H_8$?

..... [1M]

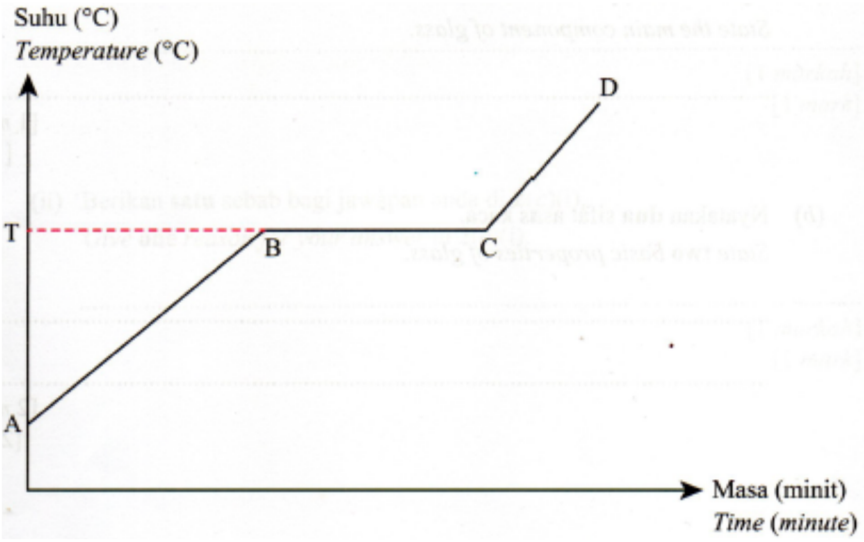
(c) Apakah keadaan fizikal bagi naftalena pada suhu bilik?
What is the physical state of naphthalene at room temperature?

..... [1M]

(d) Apakah tujuan menggunakan kukus air dalam eksperimen ini?
What is the purpose of using water bath in this experiment?

..... [1M]

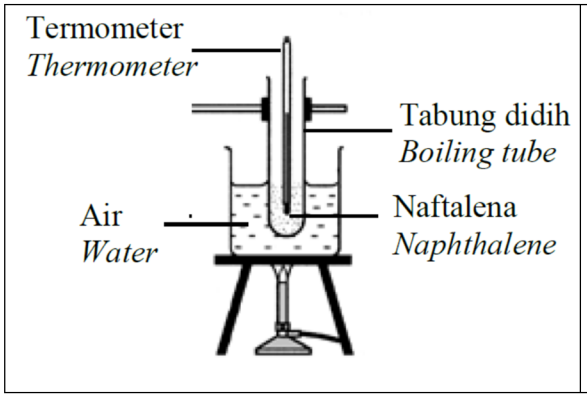
(e) Keputusan eksperimen telah direkodkan dan Rajah 1.2 menunjukkan graf suhu melawan masa bagi eksperimen ini.
Experiment result had been recorded and Diagram 1.2 shows the graph of temperature against time for this experiment.



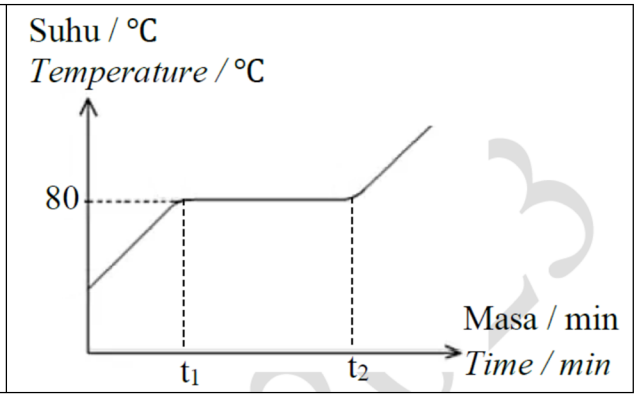
Terangkan mengapa tidak terdapat perubahan suhu dari B ke C.
Explain why there is no change in temperature from B to C.

..... [1M]

[2023-JUJ-Set01-02] Rajah 2.1 menunjukkan susunan radas pemanasan naftalena, $C_{10}H_8$ dan Rajah 2.2 menunjukkan lengkung pemanasan yang diperolehi.
Diagram 2.1 shows the apparatus set-up for the heating of naphthalene, $C_{10}H_8$ and Diagram 2.2 shows the heating curve obtained.



Rajah 2.1/ Diagram 2.1



Rajah 2.2/ Diagram 2.2

(a) Nyatakan jenis zarah dalam naftalena.
State the type of particles in naphthalene.

..... [1M]

(b) Terangkan mengapa suhu menjadi malar pada t_1 hingga t_2.
Explain why the temperature becomes constant from t_1 to t_2.

.....

.....

..... [2M]

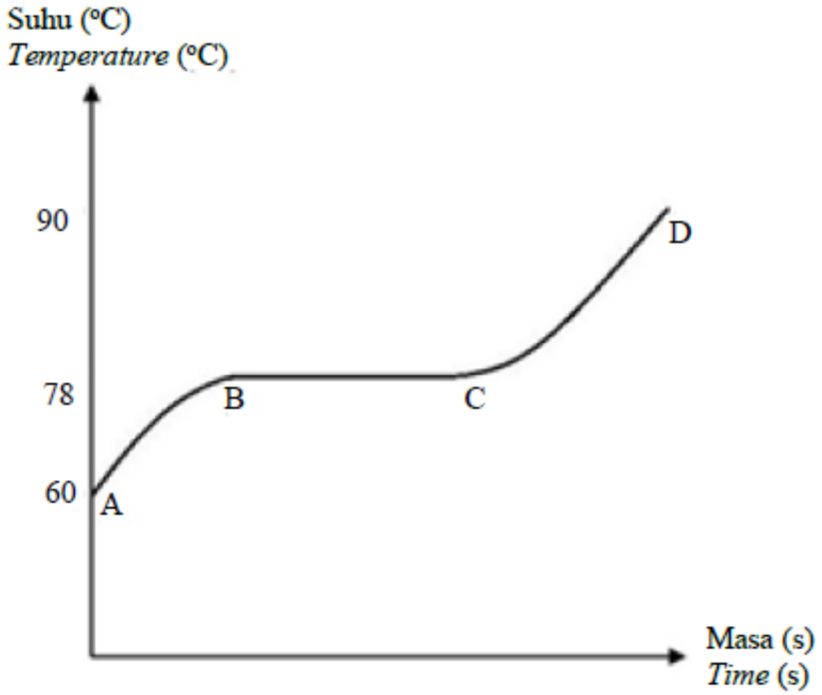
(c) Semasa pemanasan naftalena, mengapakah naftalena tidak dipanaskan secara langsung dengan menggunakan penunu Bunsen?
During the heating of naphthalene, why is naphthalene is not heated directly using Bunsen burner?

..... [1M]

(d) Cadangkan bahan lain yang boleh menggantikan naftalena dalam eksperimen ini.
Suggest other substance that can replace naphthalene in this experiment.

..... [1M]

[2023-MRSM-02] Rajah 2 menunjukkan graf suhu melawan masa bagi pemanasan bahan pepejal Z untuk menentukan takat lebur.
Diagram 2 shows the graph of temperature against time for the heating of solid substance Z to determine the melting point.



Rajah 2/ Diagram 2

(a) Apakah yang dimaksudkan dengan takat lebur?
What is meant by melting point?

.....

..... [1M]

(b) Apakah takat lebur bagi bahan Z?
What is the melting point of substance Z?

..... [1M]

(c) Lukiskan susunan zarah bahan Z dari titik A hingga B.
Draw the arrangement of particles of substance Z from point A to B.

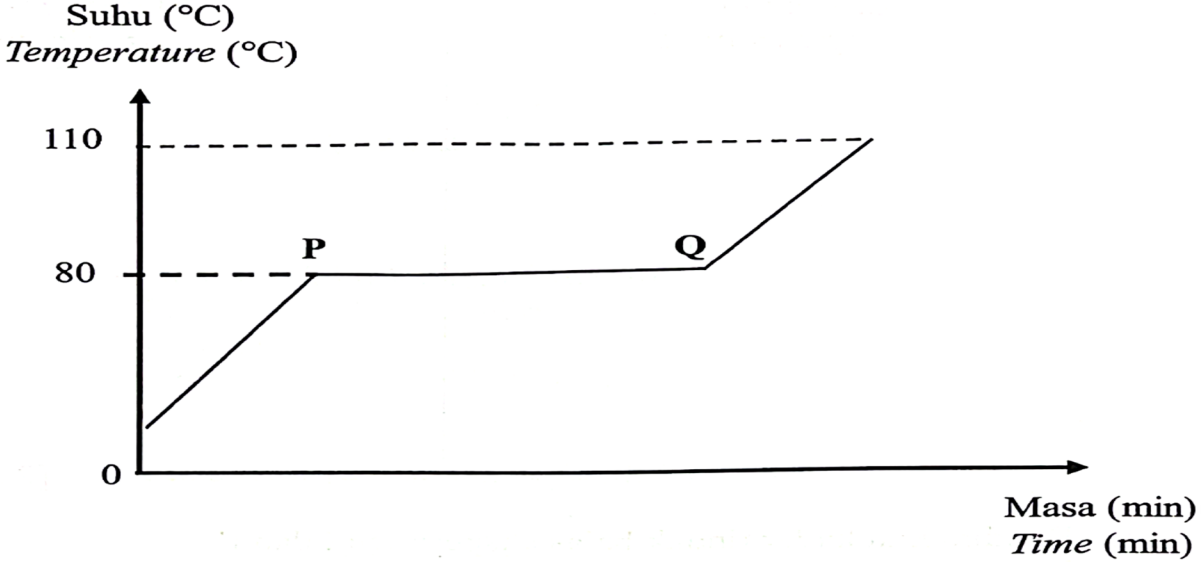
[1M]

(d) Suhu pada titik B hingga C adalah tetap. Jelaskan mengapa?
The temperature at B to C is constant. Explain why?

.....

..... [2M]

[2023-NegeriSembilan-07] (a) Rajah 6.1 menunjukkan graf suhu melawan masa bagi pemanasan naftalena, $C_{10}H_8$.
Diagram 6.1 shows a graph of temperature against time for heating of naphthalene, $C_{10}H_8$.



(i) Apakah jenis zarah bagi naftalena?
What is the type of particle for naphthalene?

..... [1M]

(ii) Berdasarkan Rajah 6.1, tentukan takat lebur bagi naftalena.
Based on Diagram 6.1, determine the melting point of naphthalene.

..... [1M]

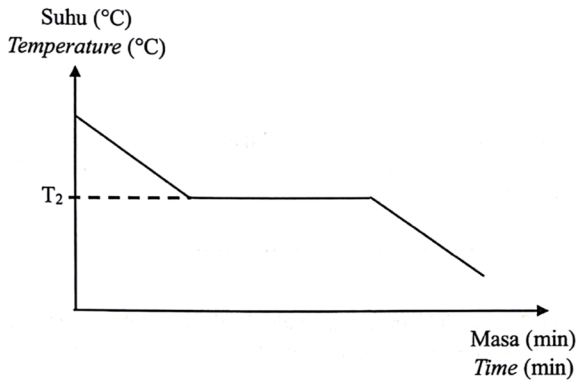
(iii) Terangkan mengapa tiada peningkatan suhu berlaku dari P ke Q.
Explain why there is no increase in temperature from P to Q.

.....

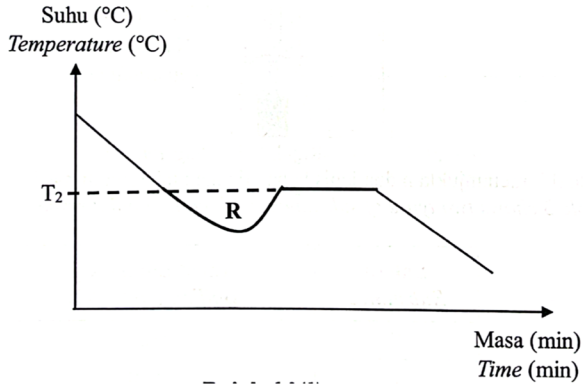
.....

..... [2M]

(b) Rajah 6.2(a) dan Rajah 6.2(b) menunjukkan graf lengkung penyejukan bagi naftalena yang diplotkan oleh dua murid yang berbeza.
Diagram 6.2(a) and Diagram 6.2(b) shows graphs of cooling curves of naphthalene plotted by two different students.



Rajah/ Diagram 6.2(a)



Rajah/ Diagram 6.2(b)

(i) Nyatakan perbezaan yang ketara bagi kedua-dua graf tersebut dan terangkan mengapa.
State a significant difference between the two graphs and explain why.

.....

..... [2M]

(c) Berdasarkan Rajah 6.2(b),/ *Based on Diagram 6.2(b),*

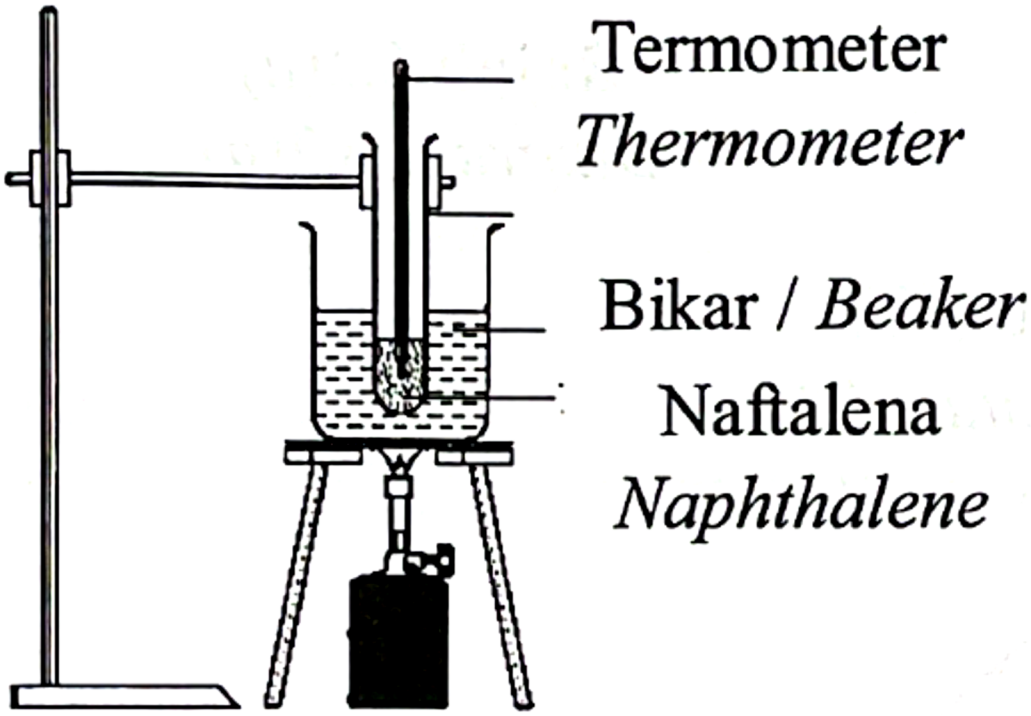
(i) Nyatakan fenomena yang berlaku di R.
State the phenomenon that occur at R.

..... [1M]

(ii) Terangkan bagaimana untuk mengatasi keadaan yang dinyatakan di c(i) dan mendapatkan lengkung seperti Rajah 6.2(a).
Explain how to overcome the condition stated in c(i) and obtain a curve like Diagram 6.2(a).

..... [1M]

(d) Rajah 6.3 menunjukkan susunan radas bagi menentukan takat lebur naftalena.
Diagram 6.3 shows apparatus set-up to determine the melting point of naphthalene.



Jadual 3 menunjukkan dua jenis bahan dengan takat didih masing-masing.
Table 3 shows two types of substances with boiling point respectively.

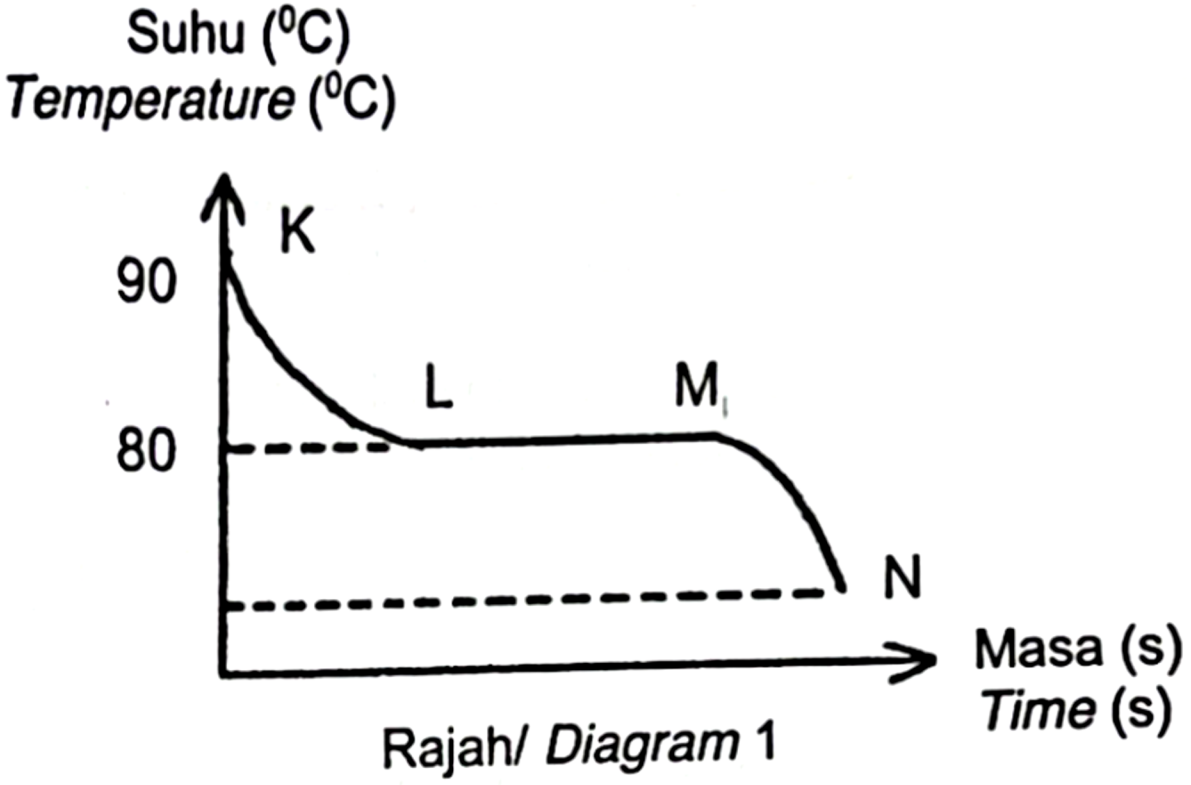
Bahan/ Substance	Takat didih/*Boiling point* (°C)
X	78.5
Y	100.0

Berdasarkan Jadual 3, bahan manakah yang sesuai diletakkan di dalam bikar? Berikan satu alasan.
Based on Table 3, which substance is suitable to be placed in the beaker? Give one reason.

.....

..... [2M]

[2023-TerengganuMPP3-01] Asetamida merupakan sebatian organik dengan formula kimia, CH_3CONH_2. Rajah 1 menunjukkan graf suhu melawan masa bagi penyejukan asetamida.
Acetamide is an organic compound with chemical formula, CH_3CONH_2. Diagram 1 shows a graph of temperature against time for cooling of acetamide.



Rajah/ *Diagram* 1

(a) Nyatakan jenis zarah bagi asetamida.
State the type of particle of acetamide.

..... [1M]

(b) (i) Apakah takat beku asetamida?/ *What is freezing point of acetamide'?*

..... [1M]

(ii) Nyatakan keadaan jirim pada KL./*State the state of matter at KL.*

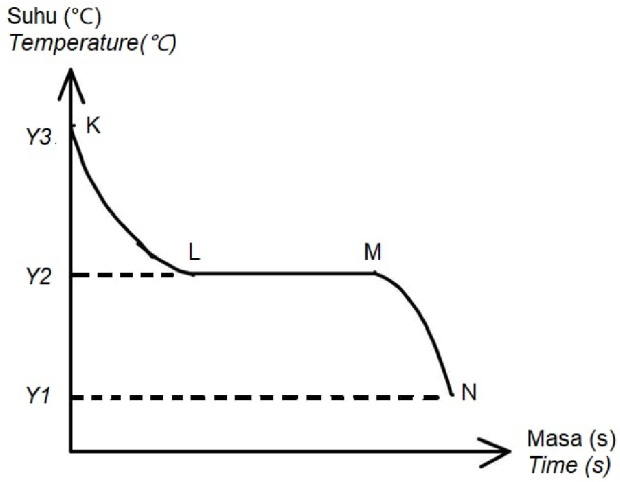
..... [1M]

(c) Terangkan mengapa suhu tidak berubah pada LM.
Explain why the temperature remain constant at LM.

.....

..... [2M]

[2023-JohorSkudai-02] Rajah 2 menunjukkan graf suhu melawan masa bagi penyejukkan naftalena.
Diagram 2 shows a graph of temperature against time for the cooling of naphthalene.



Rajah 2/ *Diagram 2*

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

(a) (i) Apakah maksud takat beku?/ *What is the meaning of freezing point?*

..... [1M]

(ii) Berapakah takat beku bagi naftalena?
What is the freezing point of naphthalene?

..... [1M]

(iii) Mengapakah suhu dari L ke M tidak berubah?
Why the temperature from L to M remains unchanged?

.....

..... [1M]

(b) (i) Keadaan zarah pada M ke N adalah pepejal. Lukiskan susunan zarah itu.
The state of particles at M to N is solid. Draw the arrangement of particles.

[1M]

(ii) Nyatakan jenis zarah bagi naftalena.
State the type of particles of naphthalene.

..... [1M]

[2023-SBP-01] Aluminium digunakan dalam pembungkusan makanan.
Aluminium is used in food packaging.

(a) Nyatakan keadaan fizik aluminium pada suhu bilik.
State the physical state of aluminium at room temperature.

..... [1M]

(b) Tuliskan simbol bagi aluminium./ *Write the symbol of aluminium.*

..... [1M]

(c) Bilangan proton dan bilangan neutron bagi atom aluminium masing-masing ialah 13 dan 14.
The number of protons and the number of neutrons of aluminium atom are 13 and 14 respectively.

(i) Apakah terma yang digunakan untuk 'jumlah bilangan proton dan neutron dalam nukleus sesuatu atom'?
What is term used for 'the total number of proton and neutron in a nucleus of an atom'?

..... [1M]

(ii) Lukis susunan elektron bagi ion aluminium.
Draw the electron arrangement of aluminium ion.

[2M]

[2023-JUJ-Set02-04] Rajah 4.1 menunjukkan perwakilan piawai bagi unsur P, Q dan R. Huruf yang digunakan adalah bukan simbol sebenar unsur itu.
Diagram 4.1 shows the standard representation of elements P, Q and R. The letters used are not the actual symbols of the elements.

12 6	P		14 7	Q		14 6	R

Rajah 4.1 / Diagram 4.1

(a) Nyatakan maksud isotop./ *State the meaning of isotopes.*

.....

..... [1M]

(b) (i) Berdasarkan Rajah 4.1, unsur yang manakah merupakan isotop?
Based on Diagram 4.1, which elements are isotopes?

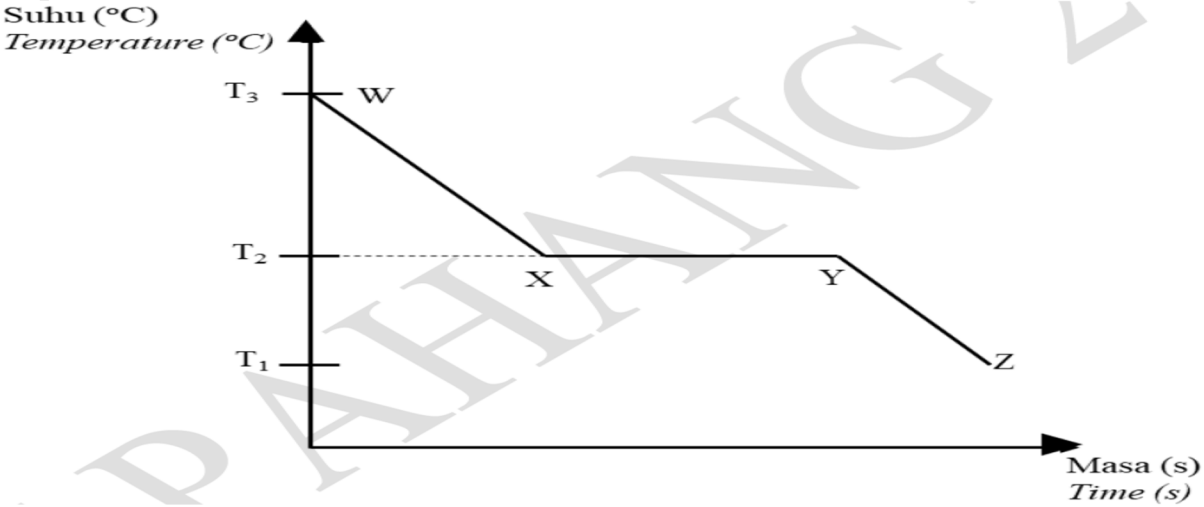
..... [1M]

(ii) Berdasarkan jawapan di (b)(i), tentukan bilangan elektron dan bilangan neutron bagi setiap unsur yang dinyatakan.
Based on answer in (b)(i), determine the number of electrons and neutrons for each of the elements stated.

.....

..... [2M]

(c) Rajah 4.2 menunjukkan graf suhu melawan masa apabila cecair naftalena disejukkan.
Diagram 4.2 shows the graph of temperature against time when liquid naphthalene is cooled.



Rajah 4.2 / *Diagram* 4.2

Berdasarkan kepada Rajah 4.2,/ *Based on Diagram 4.2,*

(i) mengapakah tidak terdapat perubahan suhu dari X ke Y?
why there is no change in temperature from X to Y?

.....

..... [1M]

(ii) lukiskan susunan zarah naftalena pada W dan Y.
draw the arrangement of particles of naphthalene at W and Y.

[2M]

[2023-Perlis-01] Jadual 1 menunjukkan nombor proton dan nombor nukleon dalam atom X, Y dan Z.
Table 1 shows the proton number and nucleon number of atoms X, Y and Z.

Atom *Atom*	Nombor proton *Proton number*	Nombor nukleon *Nucleon number*
X	11	24
Y	6	12
Z	6	14

Jadual 1/ *Table* 1

(a) (i) Apakah yang dimaksudkan dengan atom?
What is meant by atom?

..... [1M]

(ii) Namakan zarah subatom yang bercas negatif.
Name the negatively charged subatomic particles.

..... [1M]

(iii) Berikan satu kegunaan isotop natrium-24 dalam kehidupan harian.
Give one use of isotope sodium-24 in daily life.

..... [1M]

(b) Dengan merujuk Jadual 1, nyatakan atom yang mempunyai sifat kimia yang sama. Terangkan.
By referring to Table 1, state the atoms that have the same chemical properties. Explain.

.....

..... [2M]

[2023-JohorPPDTangkak-02] Jadual 1 menunjukkan perbandingan antara bilangan proton, bilangan neutron dan bilangan elektron bagi atom X dan ion X.
Table 1 shows a comparison between the number of protons, the number of neutrons and the number of electrons for X atoms and X ions.

Jenis zarah *Type of particle*	Atom X *Atom X*	Ion bagi X *Ion for X*
Bilangan proton *Number of proton*	12	12
Bilangan neutron *Number of neutron*	12	12
Bilangan elektron *Number of electron*	12	10

(a) (i) Apakah yang dimaksudkan dengan nombor proton?
What is meant by proton number?

..... [1M]

(ii) Nyatakan dua zarah sub atom yang terdapat dalam nukleus.
State two subatomic particles in the nucleus.

..... [2M]

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

..... [1M]

(ii) Tuliskan formula bagi ion X./ *Write the formula for ion X.*

..... [1M]

[2023 Johor Bahru-03] Jadual 3 menunjukkan bilangan proton dan bilangan neutron dalam atom K, L dan M.
Table 3 shows the number of protons and the number of neutrons in atoms K, L and M.

Atom *Atom*	Bilangan proton *Number of protons*	Bilangan neutron *Number of neutrons*
K	11	12
L	11	13
M	12	12

Jadual/ *Table* 3

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

..... [1M]

(b) Nyatakan kumpulan unsur L di dalam Jadual Berkala Unsur.
State the group of element L in the Periodic Table of Element.

..... [1M]

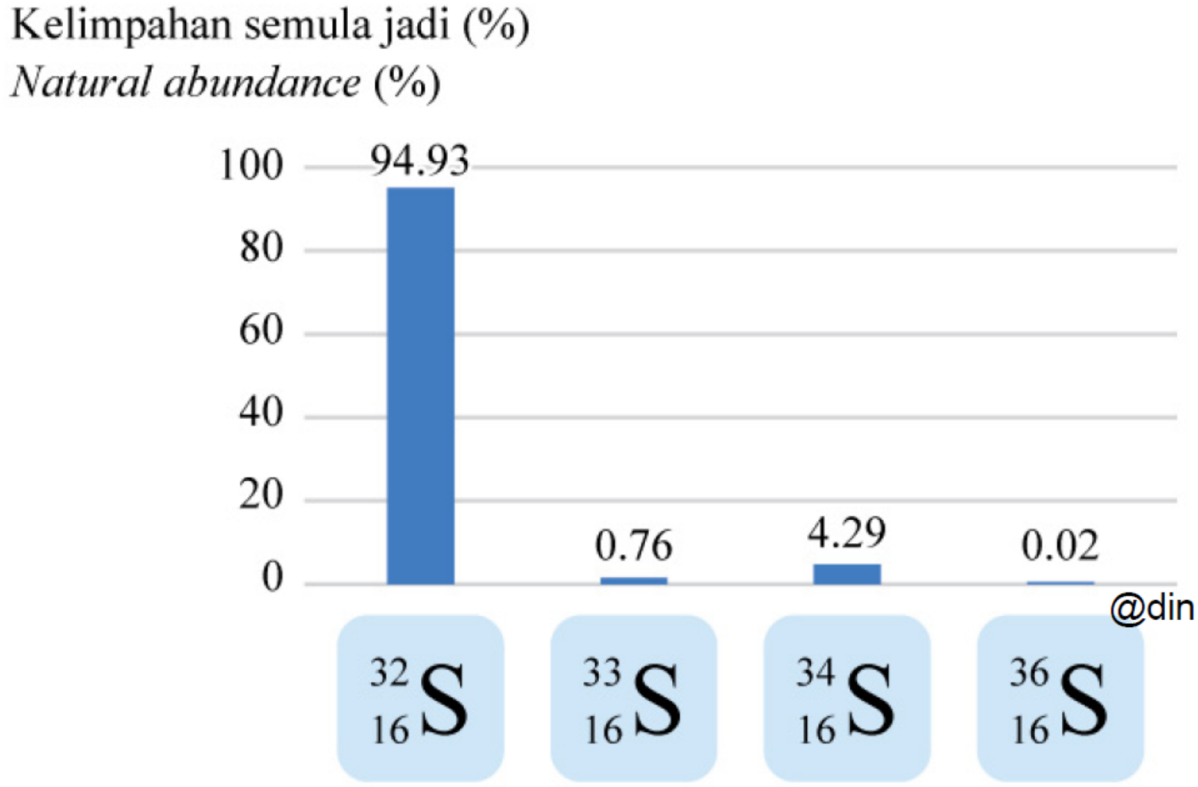
(c) Lukiskan susunan elektron bagi ion K.
Draw the electron arrangement for ion K.

[2M]

(d) Unsur M secara semula jadi wujud dalam bentuk tiga isotop, 79.0% ^{24}M, 10.0% ^{25}M dan 1I.0% ^{26}M. Hitungkan jisim atom relatif M.
Element M exists naturally in the form of three isotopes, 79.0% ^{24}M, 10.0% ^{25}M and 11.0% ^{26}M. Calculate the relative atomic mass of M.

[2M]

[2023-Selangor-Set01-01] Rajah 1 menunjukkan kelimpahan semula jadi bagi isotop-isotop sulfur, S.
Diagram 1 shows the natural abundance of isotopes of sulphur, S.



Rajah/ Diagram 1

(a) Apakah yang dimaksudkan dengan isotop?
What is meant by isotopes?

..... [1M]

(b) Nyatakan bilangan neutron bagi atom sulfur-33. ..... [1M]
State the number of neutrons for atom sulphur-33

(c) Lukis struktur atom bagi sulfur-34.
Draw the atomic structure of sulphur-34.

[2M]

(d) Nyatakan jisim atom relatif bagi sulfur. ..... [1M]
State the relative atomic mass of sulphur.

[2023-Selangor-Set02-03] Rajah 3 menunjukkan perwakilan piawai bagi isotop karbon.
Diagram 3 shows standard representation for carbon isotopes.

12 6	C		13 6	C		14 6	C

Rajah/ *Diagram* 3

(a) Ahli kimia menggunakan konsep 'jisim atom relatif' dengan membandingkan jisim atom sesuatu unsur dengan jisim atom unsur lain yang dipilih sebagai piawai. Isotop karbon yang manakah dipilih sebagai atom piawai?
Chemists use the concept of 'relative atomic mass' by comparing the mass of atom of an element with the mass of atom of another element that is chosen as the standard. Which carbon isotope was chosen as the standard atom?

..... [1M]

(b) Berikan sebab mengapa isotop karbon bagi jawapan anda di 3(a) dipilih sebagai atom piawai.
Give reason why the carbon isotope of your answer in 3(a) was chosen as standard atom.

..... [1M]

(c) Dalam proses penapaian, penguraian molekul glukosa, $C_6H_{12}O_6$ menghasilkan etanol dan karbon dioksida.
In fermentation process, decomposition of glucose molecules, $C_6H_{12}O_6$ produced ethanol and carbon dioxide.

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

..... [1M]

(ii) Hitungkan isi padu gas karbon dioksida yang dibebaskan sekiranya 2.5 dm^3 larutan glukosa 1.5 mol dm^{-3} digunakan dalam proses penapaian.
[Isi padu molar gas pada keadaan bilik ialah 24 dm^3 mol^{-1}]
Calculate the volume of carbon dioxide gas released if 2.5 dm^3 glucose solution 1.5 mol dm^3 is used in fermentation process.
[Molar volume of gas at room condition is 24 dm^3 mol^{-1}]

[3M]

[2023-Melaka-04a] (a) Jadual 2 menunjukkan bilangan proton dan bilangan neutron bagi atom-atom P, Q dan R.
Table 2 shows the number of protons and the number of neutrons for atoms P, Q and R.

Atom	Bilangan proton *Number of protons*	Bilangan neutron *Number of neutrons*
P	6	6
Q	6	8
R	11	12

(i) Apakah yang dimaksudkan dengan isotop?
What is meant by isotopes ?

..... [1M]

(ii) Pilih dua atom yang merupakan isotop.
Choose two atoms which are isotopes

..... [1M]

(iii) Nyatakan satu kegunaan isotop Q.
State one use of the Q isotope.

..... [1M]

[2023-Pahang-05-abc] Magnesium terdiri daripada tiga isotop. Rajah 5 menunjukkan perwakilan piawai untuk atom-atom magnesium.
Magnesium consist of three isotopes. Diagram 5 shows the standard representation for magnesium atoms.

$^{24}_{12}$	Mg		$^{25}_{12}$	Mg		$^{26}_{12}$	Mg

Rajah 5 / Diagram 5

(a) Apakah maksud isotop?/ *What is is the meaning of isotope?*

.....

..... [1M]

(b) Lukiskan struktur atom bagi magnesium, Mg-24.
Draw the atomic structure of magnesium, Mg-24

[2M]

(c) Magnesium wujud secara semula jadi sebagai tiga isotop, iaitu 79.0% ^{24}Mg, 10.0% ^{25}Mg dan 11.0% ^{26} Mg. Hitung jisim atom relatif magnesium.
Magnesium exist naturally as three isotopes, which are 79.0% of ^{24}Mg, 10.0% of ^{25}Mg and 11.0% of ^{26}Mg. Calculate the relative atomic mass of magnesium.

[2M]

[2023-Kelantan-04] Jadual 2 menunjukkan maklumat tentang isotop bagi atom-atom R.
Table 2 shows information about isotopes of atoms R.

Atom *Atom*	Bilangan proton *Number of proton*	Jisim atom relatif *Relative atomic mass*	Kelimpahan semulajadi, % *Natural abundance, %*
R-24	12	24	79.0
R-25	12	25	10.0
R-26	12	26	11.0

(a) Apakah yang dimaksudkan dengan isotop?
What is meant by isotope?

.....

..... [1M]

(b) Berdasarkan Jadual 2, hitungkan jisim atom relatif bagi R.
Based on Table 2, calculate relative atomic mass for R

[2M]

(c) (i) Atom-atom R mempunyai jisim atom relatif yang berbeza, namakan sub atom yang mempengaruhi perbezaan jisim atom relatif bagi atom-atom R.
The R atoms have different relative atomic masses, name the sub-atoms that affect the relative atomic mass difference of the R atoms.

..... [1M]

(ii) Lukiskan struktur atom bagi R-25
Draw the atomic structure for R-25

[2M]

(iii) Tuliskan perwakilan piawai bagi atom R-26
Write standard representation for atom R-26

..... [1M]

[2023-Kedah-02] Rajah 2 menunjukkan perwakilan piawai bagi tiga isotop atom karbon.
Diagram 2 shows the standard representation of the three isotopes of carbon atom.

Perwakilan piawai *Standard representation*		12 6	C		13 6	C		14 6	C

Rajah 2 / Diagram 2

(a) Takrifkan isotop./ *Define isotope.*

.....

..... [1M]

(b) Deduksikan satu maklumat yang boleh diperolehi daripada perwakilan piawai seperti yang ditunjukkan dalam Rajah 2.
Deduce one information that can be obtained from the standard representation as shown in Diagram 2.

..... [1M]

(c) Lukiskan struktur atom Karbon-12.
Draw the atomic structure of Carbon-12.

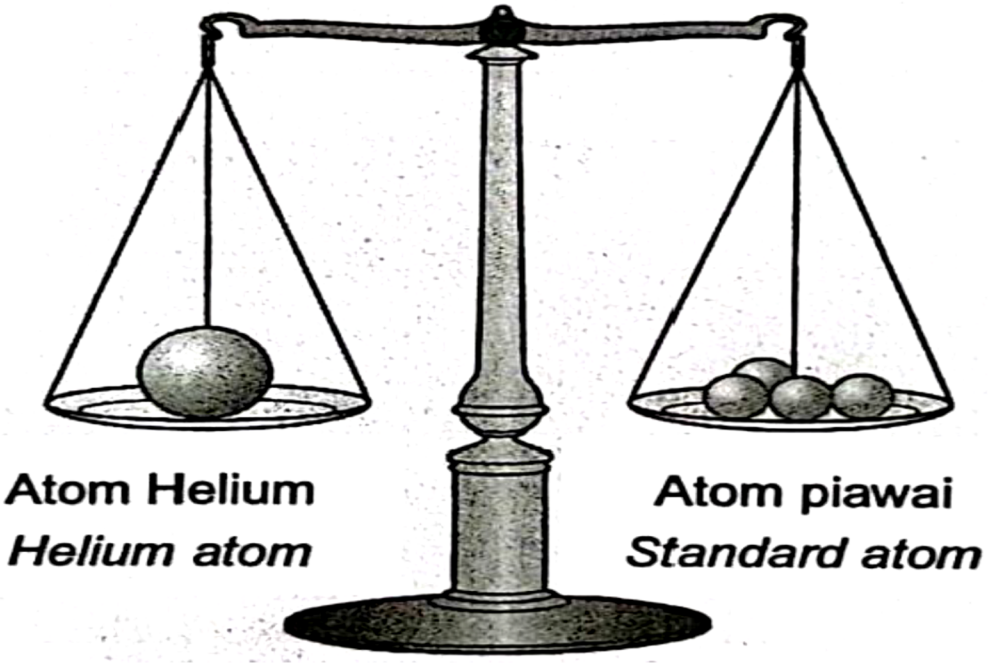
[2M]

(d) Nyatakan satu kegunaan isotop Karbon-14 dalam kehidupan seharian
Give one uses of Carbon-14 isotope in daily life.

..... [1M]

Bab 3 - Konsep Mol, Formula dan Persamaan Kimia

[2023-Kedah-01] Rajah 1 menunjukkan konsep jisim atom relatif dengan membandingkan jisim atom sesuatu unsur dengan jisim atom unsur lain yang dipilih sebagai atom piawai. Jisim atom Helium ialah 4. Hal ini bermakna jisim purata satu atom Helium adalah 4 kali 1/12 jisim atom piawai.
Diagram 1 shows concept of relative atomic mass by comparing the mass of atom of an element to the mass of atom of another element that is chosen as the standard atom. The relative atomic mass of Helium is 4. This means the average mass of one atom of Helium is 4 time the mass of 1/12 of standard atom.



Rajah 1 / Diagram 1

(a) Berdasarkan Rajah 1,/ *Based on Diagram 1*

(i) Definisikan jisim atom relative/ *Define the relative atomic mass*

..... [1M]

(ii) Namakan unsur yang digunakan sebagai atom piawai.
Name the element that is used as standard atom.

..... [1M]

(iii) Nyatakan satu sebab kenapa unsur yang dinyatakan di a (i) dipilih.
State one reason why the element stated in a (i) is chosen.

..... [1M]

(b) Persamaan kimia di bawah menunjukkan tindak balas antara suatu logam oksida dan asid.
Chemical equation below shows a reaction between metal oxide and acid.

$ZnO(p) + 2HNO_3\ (ak) \rightarrow Zn(NO_3)_2\ (ak) + H_2O\ (ce)$
$ZnO(s) + 2HNO_3\ (aq) \rightarrow Zn(NO_3)_2\ (aq) + H_2O\ (l)$

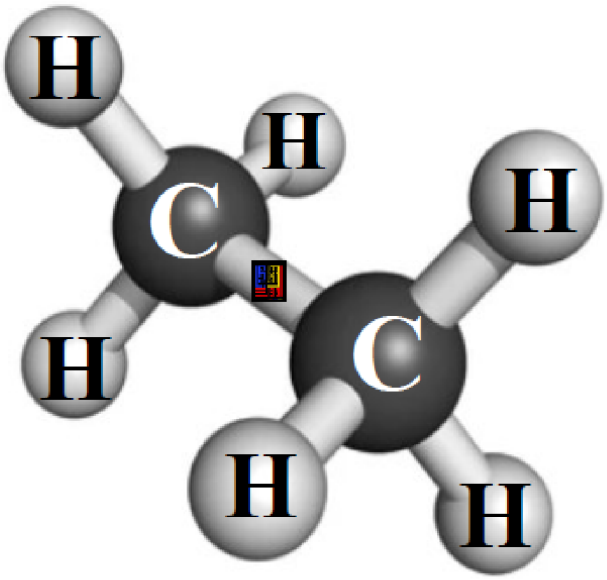
Nyatakan satu maklumat kualitatif dan satu maklumat kuantitatif yang boleh diperoleh daripada persamaan tersebut.
State one qualitative information and one quantitative information that can be obtained from the chemical equation.

.....

.....

..... [2M]

[2023-JUJ-Set01-04] Etana boleh diwakili dengan dua jenis formula kimia iaitu formula molekul dan formula empirik. Rajah 4 menunjukkan satu molekul etana.
Ethane can be represented by two types of chemical formulae which are molecular formula and empirical formula. Diagram 4 shows one molecule of ethane.



Rajah 4/Diagram 4

(a) (i) Apakah maksud formula kimia?
What is meant by chemical formula?

.....

..... [1M]

(ii) Nyatakan formula molekul dan formula empirik bagi etana.
State the molecular formula and empirical formula for ethane.

Formula molekul : .....
Molecular formula

Formula Empirik : .....
Empirical formula [2M]

(b) Persamaan di bawah menunjukkan penguraian garam magnesium nitrat apabila dipanaskan.
The equation below shows the decomposition of magnesium nitrate salt when heated.

$$2Mg(NO_3)_2 \rightarrow 2MgO + 4NO_2 + O_2$$

(i) Nyatakan satu pemerhatian daripada tindak balas ini.
State one observation from this reaction.

..... [1M]

(ii) Jika 7.4 g magnesium nitrat dipanaskan, hitungkan bilangan molekul oksigen terhasil.
[Jisim atom relatif: Mg = 24, O = 16, N = 14;
Pemalar Avogadro, NA= 6.02×10^{23} mol^{-1}]
If 7.4 g of magnesium nitrate is heated, calculate the number of oxygen molecules produced.
[Relative atomic mass: Mg = 24, O = 16, N = 14;
Avogadro constant, NA =6.02×10^{23} mol^{-1}]

[3M]

[2023-Melaka-04b] (b) Jadual 3 menunjukkan keputusan bagi satu eksperimen untuk menentukan formula empirik bagi kuprum oksida.
Table 3 shows the results for an experiment to determine the empirical formula of copper oxide.

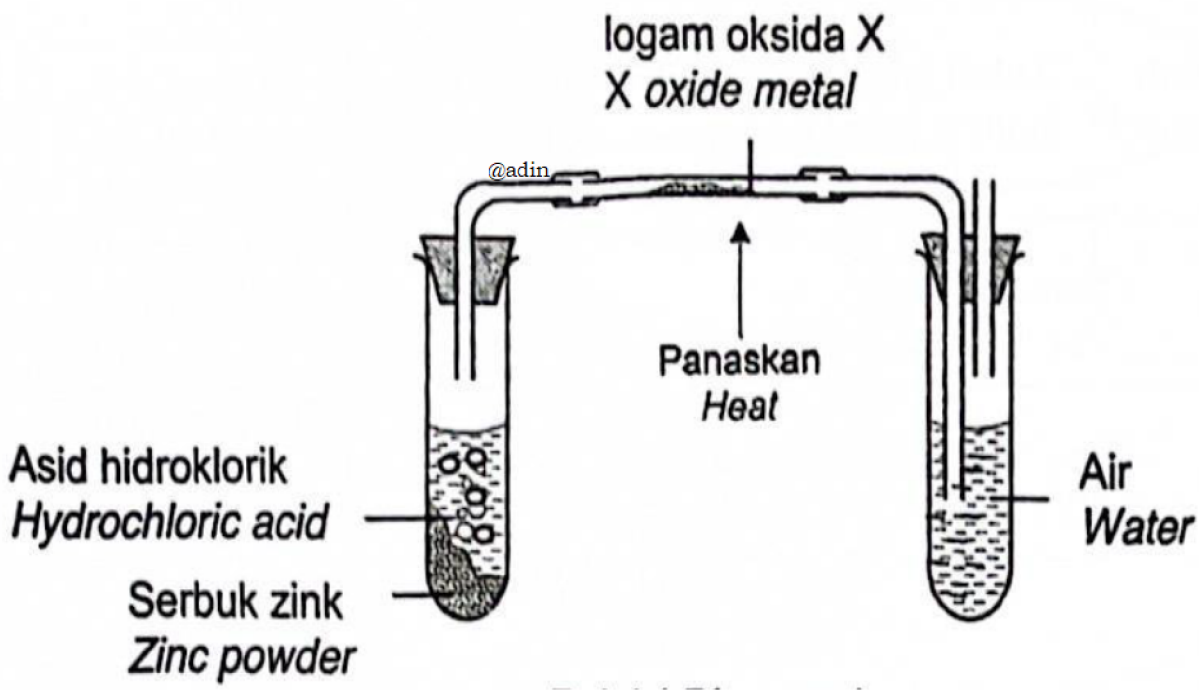
Deskripsi *Description*	Jisim (g) *Mass (g)*
Salur kaca *Glass tube*	43.46
Salur kaca + oksida kuprum *Glass tube + oxide of copper*	47.46
Salur kaca + logam kuprum *Glass tube + copper metal*	46.66

Jadual 3 / Table 3

Dengan menggunakan keputusan yang diperoleh, tentukan formula empirik bagi kuprum oksida.
Based on the result obtained, determine the empirical formula for copper oxide.
[Jisim atom relative/ Relative atomic mass :O - 16, Cu = 64]

[4M]

[2023-TerengganuMPP3-04] Rajah 4 menunjukkan susunan radas untuk menentukan formula empirik bagi suatu oksida logam X.
Diagram 4 shows the apparatus set-up to determine the empirical formula for an oxide of metal X.



Rajah/ *Diagram* 4

(a) Apakah yang dimaksudkan dengan formula empirik?
What is the meaning of empirical formula?

.....

..... [1M]

(b) Jadual 4 menunjukkan keputusan eksperimen itu.
Table 4 shows the result of the experiment.

Penerangan/ *Description*	Jisim/ *Mass* (g)
Jisim tiub kaca *Mass of glass tube*	10.21
Jisim tiub kaca + logam X oksida *Mass of glass tube + oxide of metal X*	16.46
Jisim tiub kaca + logam X *Mass of glass tube + metal X*	15.21

Jadual/ *Table* 4

(i) Berdasarkan Jadual 4, hitung formula empirik bagi X oksida.
[Jisim atom relatif: O= 16, X= 64]
Based on Table 4, calculate the empirical formula for the oxide of X.
[Relative atomic mass: O= 16, X= 64]

[3M]

(ii) Tulis persamaan kimia bagi tindak balas oksida X dalam tiub kaca.
Write the chemical equation for the reaction of oxide X in the glass tube.

..... [1M]

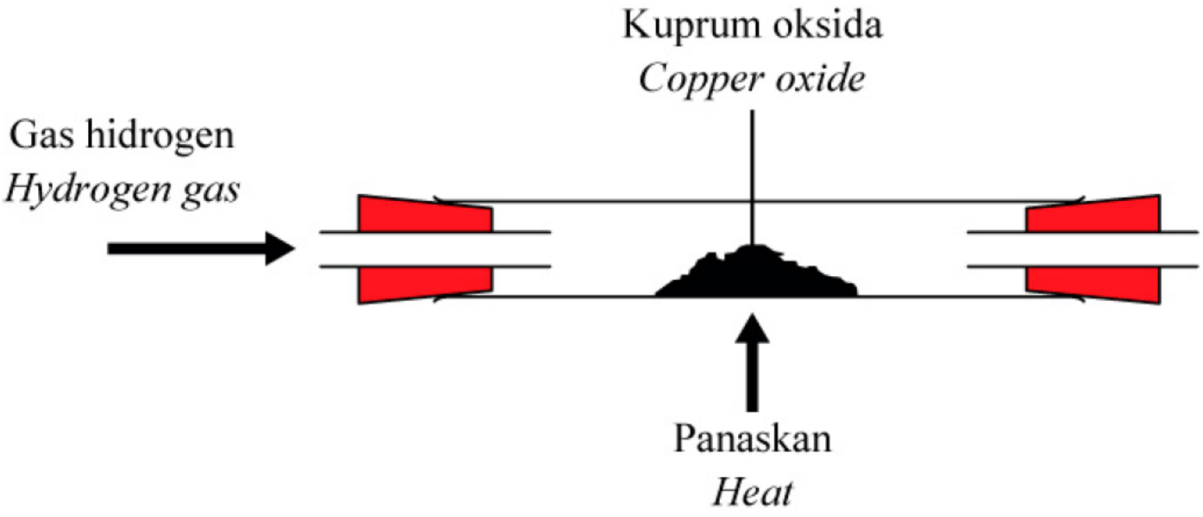
(iii) Tafsirkan persamaan kimia di 4(b)(ii) dari segi kualitatif dan kuantitatif.
Interpret the chemical equation in 4(b)(ii) in qualitative and quantitative terms.

.....

.....

..... [2M]

[2023-Selangor-Set01-03] Rajah 3 menunjukkan susunan radas untuk menentukan formula empirik bagi kuprum oksida.
Diagram 3 shows the set-up of apparatus to determine the empirical formula of copper oxide.



(a) Apakah maksud formula empirik?
What is the meaning of empirical formula?

.....

..... [1M]

(b) Keputusan eksperimen itu ditunjukkan seperti di bawah.
The result of the experiment is shown as below.

Jisim tabung pembakaran = 135.15 g
Mass of combustion tube = 135.15 g

Jisim tabung pembakaran + kuprum oksida = 151.15 g
Mass of combustion tube + copper oxide = 151.15 g

Jisim tabung pembakaran + kuprum = 147.95 g
Mass of combustion tube + copper = 147.95 g

Tentukan formula empirik bagi kuprum oksida.
Determine the empirical formula of copper oxide.
[Jisim atom relative/Relative atomic mass: O = 16, Cu = 64]

[4M]

(c) Formula empirik bagi magnesium oksida tidak boleh ditentukan dengan menggunakan kaedah yang sama. Terangkan pernyataan ini.
The empirical formula of magnesium oxide cannot be determined by using the same method. Explain this statement.

..... [1M]

[2023-JohorSkudai-04] (a) Jadual 1 menunjukkan formula empirik dan formula molekul bagi tiga sebatian.
Table 1 shows the empirical formulae and molecular formulae of three compounds.

Sebatian *Compound*	Formula empirik *Empirical formula*	Formula molekul *Molecular formula*
X	CH	C_6H_6
Y	C_2H_4O	
Z	$Cu(NO_3)_2$	$Cu(NO_3)_2$

Jadual/ Table 1

(i) Nyatakan maksud formula molekul.
State the meaning of molecular formula.

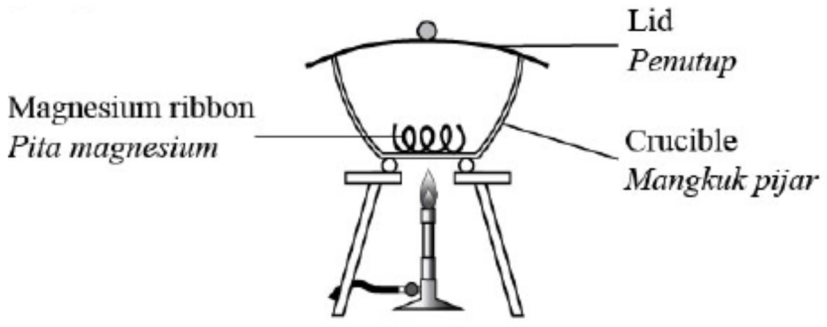
.....

..... [1M]

(ii) Jisim molekul relatif bagi sebatian Y ialah 88.
Tentukan formula molekul bagi sebatian Y
[Jisim atom relatif: C = 12, H = 1, O = 16]
Relative molecular mass of compound Y is 88.
Determine the molecular formula of compound Y.
[Relative atomic mass: C = 12, H = 1, O = 16]

[2M]

(b) Rajah 4 menunjukkan susunan radas untuk menentukan formula empirik satu sebatian.
Diagram 4 shows the set-up of the apparatus to determine the empirical formula of compound.



(i) Bagaimanakah dapat menentukan tindak balas antara magnesium dengan oksigen telah lengkap?
How to determine the reaction between magnesium with oxygen has completed?

..... [1M]

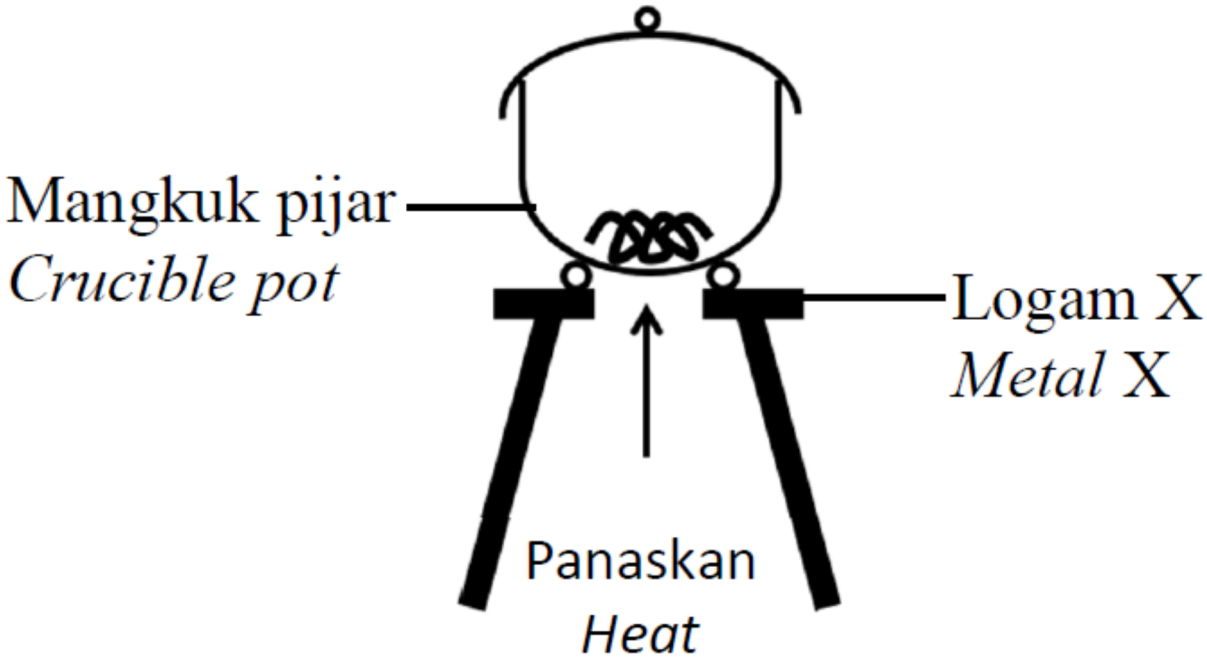
Mengapakah penutup mangkuk pijar perlu dibuka sekali sekali semasa eksperimen dijalankan?
Why does the lid of the crucible need to be opened once during the experiment?

..... [1M]

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

..... [2M]

[2023-JohorPPDTangkak-04] Formula empirik bagi logam oksida X dapat ditentukan menggunakan kaedah yang ditunjukkan dalam Rajah 3. Keputusan eksperimen ditunjukkan dalam Jadual 2.
The empirical formula for oxide of metal X can be determined using the method shown in Diagram 3. The result of the experiment is shown in Table 2.



Rajah 3/ Diagram 3

Penerangan/ *Description*	Jisim/ *Mass / g*
Jisim mangkuk pijar + penutup *Mass of crucible + lid*	24.0
Jisim mangkuk pijar + penutup + logam X *Mass of crucible + lid + metal X*	26.4
Jisim mangkuk pijar + penutup + oksida logam X *Mass of crucible + lid + oxide of metal X*	28.0

Jadual/ *Table 2*

(a) Nyatakan maksud formula empirik.
State the meaning of empirical formula.

.....

..... [1M]

(b) Cadangkan satu logam yang formula empiriknya sesuai ditentukan menggunakan kaedah yang ditunjukkan dalam Rajah 3.
Suggest a metal whose empirical formula is suitable to determine by using the method shown in Diagram 3.

..... [1M]

(c) Berdasarkan Jadual 2,/ *Based on Table 2,*

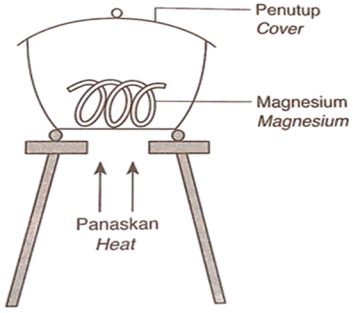
(i) Tentukan jisim oksigen dan jisim logam X yang terlibat.
Determine the mass of oxygen and the mass of metal X involved.

[2M]

(ii) Tentukan formula empirik bagi oksida logam X
Determine the empirical formula for metal oxide X.
[Jisim atom relatif /Relative atomic mass : X=24, O=16]

[3M]

[2023-Perlis-04] Rajah 3 menunjukkan susunan radas untuk menentukan formula empirik magnesium oksida.
Diagram 3 shows the apparatus set-up to determine the empirical formula of magnesium oxide.



Berdasarkan Rajah 3/ *Based on Diagram 3*

(a) Mengapakah pita magnesium dibersihkan dengan kertas pasir sebelum dipanaskan?
Why is the magnesium ribbon clean with sandpaper before heating?

..... [1M]

(b) (i) Asap putih terhasil. Namakan asap putih ini.
White fumes are produced. Name the white fumes.

..... [1M]

(ii) Semasa pemanasan, penutup dibuka sekali sekala. Terangkan mengapa.
During heating, the lid is opened occasionally. Explain why.

..... [1M]

(c) Jadual 3 menunjukkan keputusan eksperimen.
Table 3 shows the results of the experiment.

Mangkuk pijar + penutup *Crucible + lid*	26.6 g
Mangkuk pijar + penutup + pita magnesium *Crucible + lid + magnesium ribbon*	27.2 g
Mangkuk pijar + penutup + magnesium oksida *Crucible + lid + magnesium oxide*	27.6 g

Berdasarkan Jadual 3/ *Based on Table 3 :*

(i) Hitungkan jisim magnesium dan jisim oksigen yang telah bertindak balas.
Calculate the mass of magnesium and the mass of oxygen that have reacted.

Jisim magnesium : ..... g Jisim oksigen : ..... g
Mass of magnesium *Mass of oxygen*

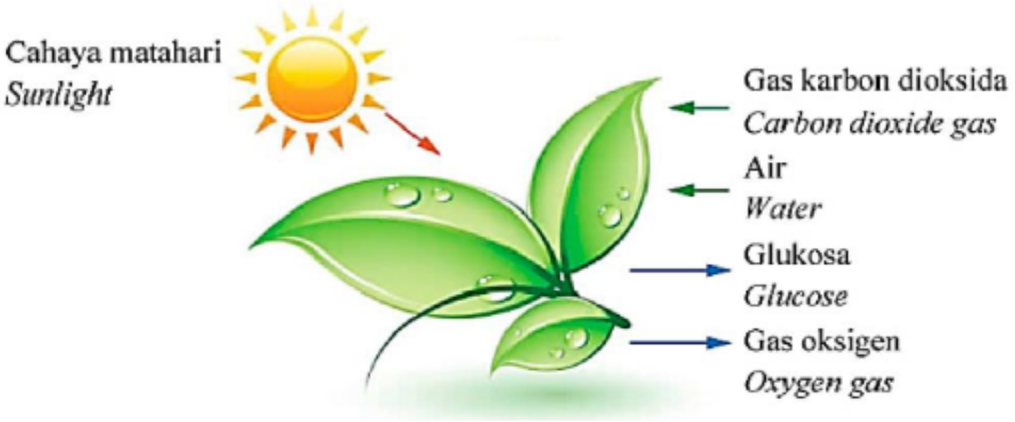
(ii) Hitungkan nisbah mol bagi atom magnesium kepada atom oksigen.
Calculate the mole ratio of magnesium atom to oxygen atom.
[Jisim atom relative/ *Relative atomic mass* : O = 16; Mg = 24]

[2M]

(iii) Tentukan formula empirik magnesium oksida.
Determine the empirical formula of magnesium oxide.

..... [1M]

[2023-Pahang-03] Rajah 3 menunjukkan proses fotosintesis untuk penghasilan glukosa, $C_6H_{12}O_6$ dalam tumbuhan hijau.
Diagram 3 shows the photosynthesis process for the production of glucose, $C_6H_{12}O_6$ in green plants.



Rajah 3 / *Diagram* 3

(a) Berikan maksud formula empirik./ *Give the definition of empirical formula.*

.....

..... [1M]

(b) Tulis formula empirik bagi glukosa.
Write the empirical formula for glucose.

..... [1M]

(c) Tulis persamaan kimia yang seimbang bagi proses fotosintesis.
Write a balanced chemical equation for the photosynthesis process.

..... [2M]

(d) Hitung peratus karbon mengikut jisim dalam satu molekul glukosa.
[Jisim atom relatif: H=1, C=12, O=16]
Calculate the percentage of carbon by mass in one glucose molecule.
[Relative atomic mass: H=1, C=12, O=16]

[2M]

[2023-MRSM-03] Persamaan kimia berikut menunjukkan tindak balas bagi menghasilkan suatu garam.

$2C_2H_5COOH(ak) + Na_2CO_3(p) \rightarrow 2C_2H_5COONa(ak) + CO_2(g) + H_2O(ce)$

The following chemical equation shows a reaction to produce a salt.

$2C_2H_5COOH(aq) + Na2CO_3(s) \rightarrow 2C_2H_5COONa(aq) + CO_2(g) + H_2O(l)$

(a) (i) Namakan garam yang terbentuk/ *Name the salt formed.*

..... [1M]

(ii) Berikan maklumat kualitatif dan kuantitatif yang dapat ditafsir daripada persamaan kimia itu.
Give the qualitative and quantitative information that can be interpreted from the chemical equation.

.....

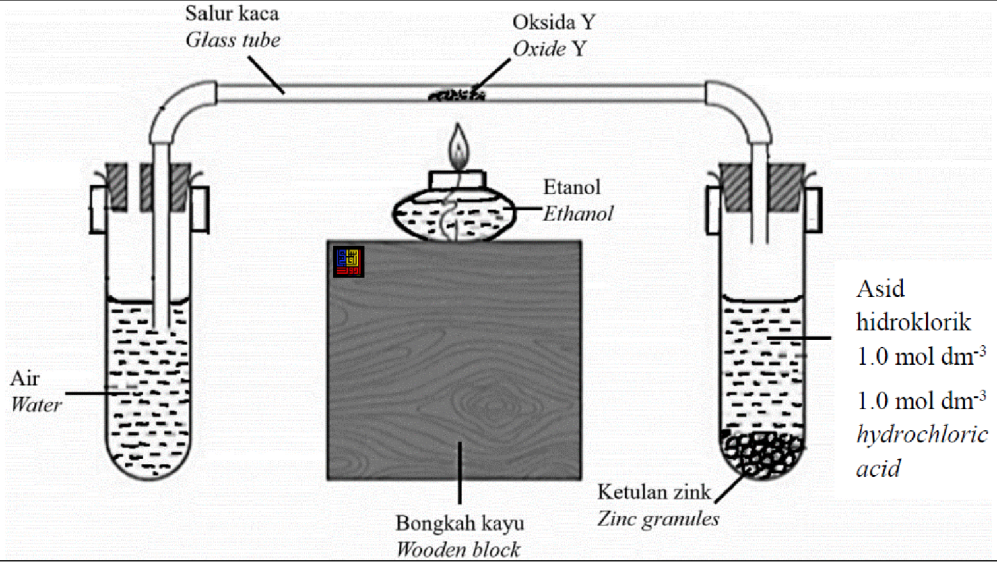
.....

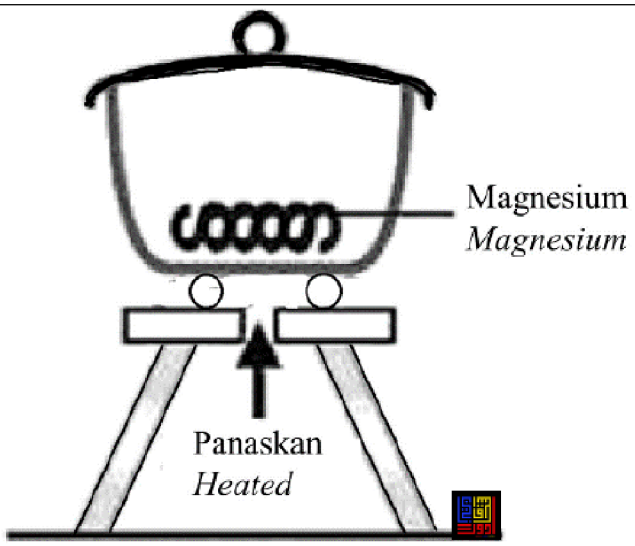
..... [2M]

(b) Hitungkan jumlah bilangan atom dalam gas karbon dioksida yang terhasil apabila 26.5 g natrium karbonat digunakan dalam tindak balas itu.
[Jisim atom relatif: H = 1; C = 12; O = 16, Na = 23
Pemalar Avogadro = 6.02 x 10^{23} mol^{-1}]
Calculate the total number of atoms in carbon dioxide gas produced when 26.5 g of sodium carbonate is used in the reaction.
[Relative atomic mass: H = 1; C = 12; O = 16, Na = 23
Avogadro constant = 6.02 x 10^{23} mol^{-1}]

[3M]]

[2023-JUJ-Set02-06] Rajah 6 menunjukkan dua set eksperimen untuk menentukan formula empirik oksida Y dan magnesium oksida.
Diagram 6 shows two sets of experiment to determine the empirical formulae for metal oxide Y and magnesium oxide.

Set	Susunan radas Apparatus set-up
I	

II	

Rajah 6 / Diagram 6

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

..... [1M]

(b) Cadangkan oksida Y dalam Set I./ *Suggest oxide Y in set I.*

..... [1M]

(c) Jadual 6 menunjukkan data yang diperoleh daripada eksperimen dalam Set II.
Table 6 shows the data obtained from experiment in Set II.

Penerangan/ *Description*	Jisim (g)/ *Mass(g)*
Jisim mangkuk pijar + penutup *Mass of crucible + lid*	24.60
Jisim mangkuk pijar + penutup + magnesium *Mass of crucible + lid + magnesium*	27.00
Jisim mangkuk pijar + penutup + magnesium oksida *Mass of crucible + lid + magnesium oxide*	28.60

Berdasarkan Jadual 6, tentukan formula empirik bagi magnesium oksida.
Based on Table 6, determine the empirical formula of magnesium oxide.

[4M]

(d) Bandingkan perbezaan tindak balas yang berlaku dalam Set I dan Set II. Terangkan.
Compare the differences in the reaction occurred in Set I and Set II. Explain.

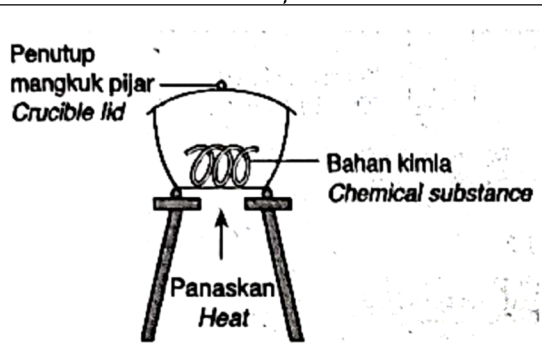
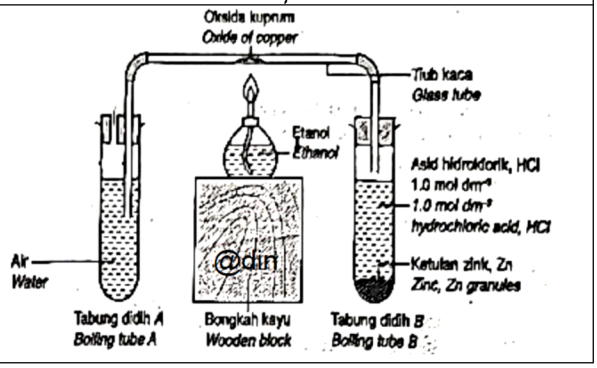
.....

.....

.....

..... [3M]

[2023 Johor Bahru-05] Rajah 5 menunjukkan dua kaedah untuk menentukan formula empirik suatu sebatian.
Diagram 5 shows two methods to determine the empirical formula of a compound.

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

Rajah/ *Diagram* 5

Berdasarkan Rajah 5,/ *Based on the Diagram 5,*

(a) apakah yang dimaksudkan dengan formula empirik?
what is meant with empirical formula?

..... [1M]

(b) Q berada di bawah hidrogen dalam siri kereaktifan.
Kaedah manakah yang sesuai digunakan untuk menentukan formula empirik oksida logam Q?
Q is below hydrogen in the reactivity series.
Which method is suitable to be used to determine the empirical formula of metal oxide Q?

..... [1M]

(c) berdasarkan Kaedah II, hitungkan formula empirik bagi oksida kuprum dengan menggunakan maklumat berikut.
based on Method II, calculate the empirical formula of oxide of copper using the following information.

Perkara/ *Item*	Jisim/ *Mass (g)*
Tiub kaca *Glass tube*	34.22
Tiub kaca + oksida kuprum sebelum pemanasan *Glass tube + oxide of copper before heating*	42.25
Tiub kaca + oksida kuprum selepas pemanasan *Glass tube + oxide of copper after heating*	40.64

[Jisim atom relative/ *Relative atomic mass: O = 16; Cu = 64]*

[3M]

(d) Nyatakan bilangan unit formula bagi 0.01 mol oksida kuprum.
State the number of formula units in 0.01 mol of copper oxide.
[Pemalar Avogadro/ [*Avogadro Constant,* NA = 6.02 x 10^{23} mol^{-1}]

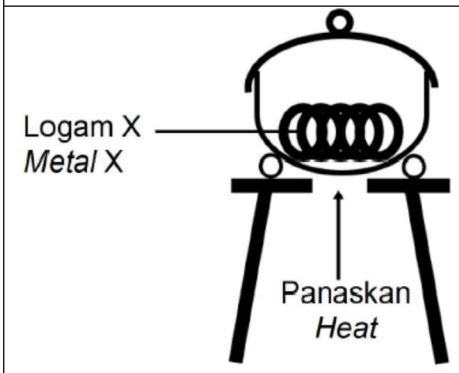
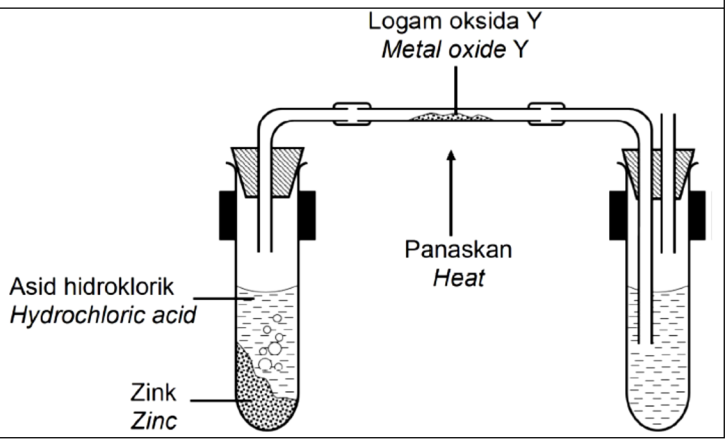
..... [1M]

(e). Bandingkan Kaedah I dan Kaedah II dalam penentuan formula empirik suatu sebatian.
Compare Method I and Method II in determining the empirical formula of a substance.

.....

..... [2M]

[2023-Kelantan-06] Rajah 5 menunjukkan dua kaedah digunakan untuk menentukan formula empirik bagi oksida logam X dan oksida logam Y.
Diagram 5 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 6, cadangkan kaedah yang manakah sesuai digunakan untuk menentukan formula empirik bagi
Based on Figure 6, suggest which method is suitable to use to determine the empirical formula for

Magnesium oksida : .....
Magnesium oxide

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

(c) Jadual 4 menunjukkan maklumat yang diperolehi dari satu eksperimen menggunakan Kaedah II dalam Rajah 6.
Table 4 shows the information obtained from an experiment using Method II in Diagram 6.

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 4/ *Table 4*

(i) Tentukan formula empirik bagi oksida Y
Determine the empirical formula for oxide Y
[Jisim atom relative/ R*elative atomic mass* : 0=16, Y=64]

[4M]

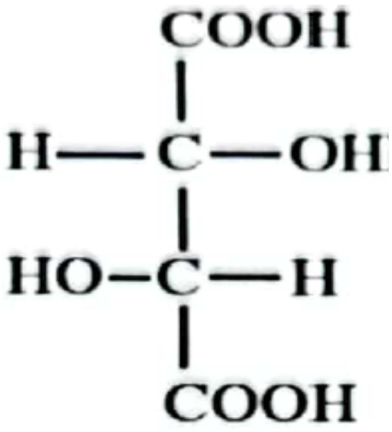
(ii) Gas hidrogen di alirkan selama 10 saat sebelum pemanasan dimulakan dan aliran gas diteruskan sehingga salur kaca berada pada suhu bilik setelah pemanasan dihentikan. Jelaskan mengapa.
Hydrogen gas is flowed for 10 seconds before heating is started and the gas flow is continued until the glass tube at room temperature after heating is stopped. Explain why

.....

.....

..... [2M]

[2023-SBP-03] (a) Asid tartarik dan serbuk penaik merupakan agen penaik dalam kek yang digunakan untuk meringankan dan melembutkan adunan dalam kek. Rajah 3 menunjukkan formula struktur bagi asid tartarik.
Tartaric acid and baking powder is raising agents in cakes that is used to lightens and softens the hatters in cakes. Diagram 3 shows the structural formula of tartaric acid.



Rajah/ *Diagram* 3

(i) Namakan unsur-unsur yang terdapat dalam molekul asid tartarik?
Name the elements found in tartaric acid molecule?

..... [1M]

(ii) Tulis formula molekul bagi asid tartarik.
Write the molecular formula of tartaric acid.

..... [1M]

(b) Dalam proses pembuatan kek, apabila adunan kek dipanaskan, serbuk penaik, $NaHCO_3$ terurai untuk menghasilkan natrium karbonat, gas karbon dioksida dan air.
In cake making process, when the cake batter is heated, baking powder, $NaHCO_3$ decomposes to form sodium carbonate, carbon dioxide gas and water.

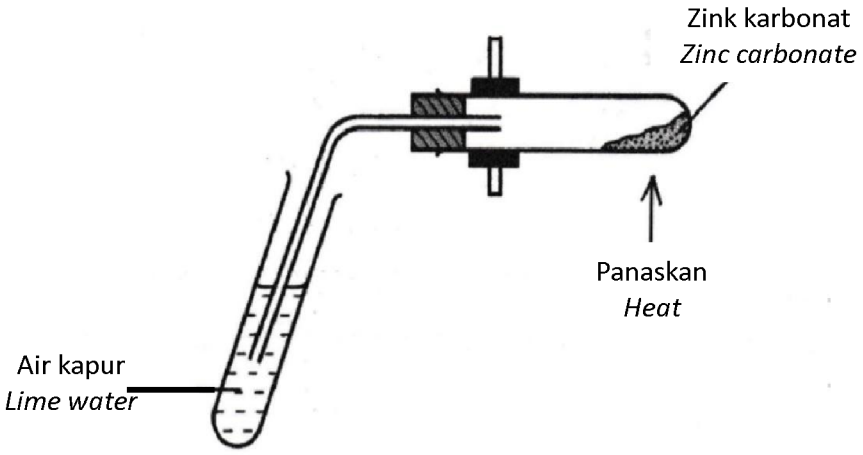
(i) Tulis persamaan kimia bagi tindak balas itu.
Write the chemical equation for the reaction.

..... [1M]
[2 markah / marks]

(ii) Hitungkan jisim serbuk penaik yang diperlukan untuk menghasilkan 0.03 mol gas karbon dioksida pada keadaan bilik untuk menaikkan adunan.
Calculate the mass of baking powder required to produce 0.03 mol of carbon dioxide gas at room conditions to rise the batter.
[Jisim atom relative/ Relative atomic mass: H = 1, C = 12, O = 16, Na= 23]

[2M]

[2023-Putrajaya-03] Rajah 3 menunjukkan proses pemanasan satu garam karbonat di dalam makmal.
Diagram 3 shows the heating process of one carbonate salt in the laboratory.



(a) Apakah fungsi air kapur dalam eksperimen dalam Rajah 3?
What is the function of lime water in the experiment in Diagram 3?

..... [1M]

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

..... [2M]

(c) Nyatakan maklumat kuantitatif yang boleh diperolehi daripada persamaan di (b).
State the quantitative information that can be obtained from the chemical equation in (b).

.....

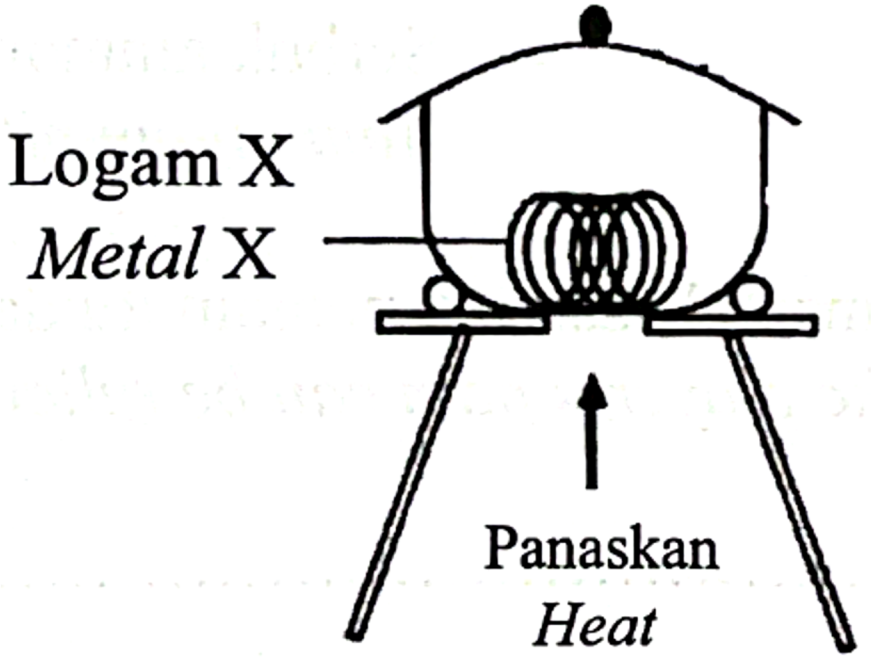
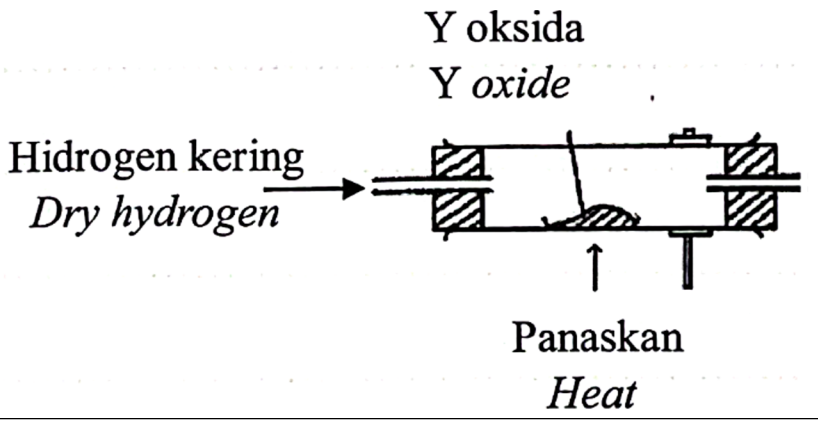
..... [1M]

(d) Hitungkan isi padu gas yang dibebaskan apabila 0.025 mol zink karbonat dipanaskan dengan kuat.
Calculate the volume of the gas released when 0.025 mol of zinc carbonate is heated strongly.
[Isi padu molar gas pada keadaan bilik = 24 dm^3 mol^{-1}]
[Molar volume of gas at room conditions = 24 dm^3 mol^{-1}]

[2M]

Esei/ *Essay*

[2023-NegeriSembilan-09] (a) Rajah 8.1 menunjukkan susunan radas bagi dua eksperimen untuk menentukan formula empirik bagi oksida logam.
Diagram 8.1 shows the apparatus set-up for two experiments to determine the empirical formulae of metal oxide.

Eksperimen *Experiment*	Susunan radas *Apparatus set*
I	
II	

Rajah 8.1/ Diagram 8.1

(i) Nyatakan maksud formula empirik dan formula molekul.
State the meaning of empirical formula and molecular formula.
[2 markah / 2 marks]

(ii) Formula empirik oksida X boleh ditentukan dengan Eksperimen I manakala oksida Y boleh ditentukan dengan Eksperimen II.
Cadangkan nama logam X dan logam Y. Terangkan perbezaan pemilihan kaedah untuk menentukan formula empirik bagi kedua-dua oksida itu.

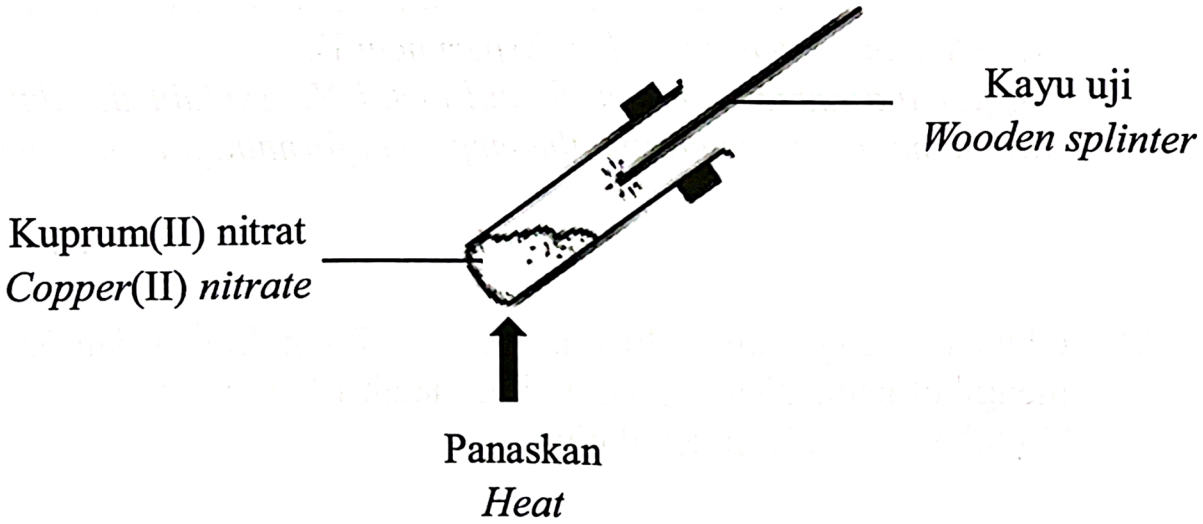
The empirical formula of oxide X can be determined by Experiment I while oxide Y can be determined by Experiment II.
Suggest the name of metal X and metal Y. Explain the difference in the chosen method to determine the empirical formula for the two oxides.

[6 markah / 6 marks]

(iii) Glukosa mengandungi 40% karbon, 6.67% hidrogen dan 53.33% oksigen mengikut jisim. Jisim molar glukosa ialah 180 g mol^{-1}.
Tentukan formula molekul glukosa.
Glucose contains 40% carbon, 6.67% hydrogen and53.33% oxygen by mass. The molar mass of glucose is 180 g mol^{-1}.
Determine the molecular formula of glucose.
[Jisim atom relatif/ Relative atomic mass: H=1;C=12;0=16]

[5 markah / 5 marks]

(b) Rajah 8.2 menunjukkan susunan radas bagi penguraian kuprum(II) nitrat apabila dipanaskan.
Diagram 8.2 shows the apparatus set-up for the decomposition of copper(II) nitrate when heated.



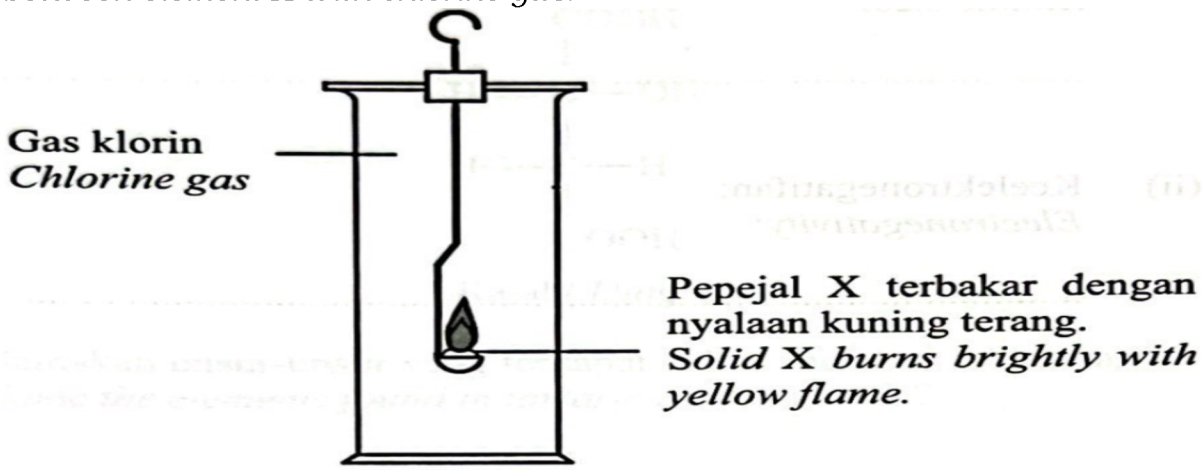
Rajah 8.2/ Diagram 8.2

Nyatakan tiga pemerhatian daripada eksperimen tersebut. Tuliskan persamaan kimia yang seimbang dan nyatakan maklumat kuantitatif dan maklumat kualitatif yang dapat disimpulkan daripada persamaan tersebut.
State three observations from the experiment. Write a balanced chemical equation and state the quantitative information and qualitative information that can be deduced from the equation.

[7 markah / 7 marks]

Bab 4 Jadual Berkala Unsur

[2023-SBP-02] Unsur X terletak dalam Kumpulan I dan Kala 3 dalam Jadual Berkala Unsur. Rajah 2 menunjukkan susunan radas bagi satu eksperimen untuk mengkaji tindak balas antara unsur X dengan gas klorin.
Element X is located in Group I and Period 3 in the Periotlie Table of Elements. Diagram 2 shows the apparatus set up for an experiment to study the reaction between element X with chlorine gas.



Rajah/ Diagram 2

(a) (i) Apakah maksud kumpulan?/ *What is meant by group?*

..... [1M]

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

..... [1M]

(iii) Apabila tindak balas telah lengkap, pepejal putih terbentuk.
Namakan pepejal putih itu.
When the reaction is complete, a white solid is formed. Name the white solid.

..... [1M]

(b) Nyatakan perubahan saiz atom dan keelektronegatifan bagi unsur-unsur yang terdapat dalam kala tersebut apabila merentasi kala dari kiri ke kanan.
State the changes in atomic size and electronegativity of the elements in that period when across the period from left to right.

(i) Saiz atom/ *Atomic size:*

..... [1M]

(ii) Keelektronegatifan/ *Electronegativity:*

..... [1M]

[2023-Kedah-03] Jadual 3 menunjukkan susunan elektron bagi atom unsur P, Q dan R. Huruf yang digunakan bukan simbol sebenar unsur tersebut.
Table 3 shows the electron arrangements of atoms of element P, Q and R. The letter used are not the actual symbols of the elements.

Atom / *Atom*	Susunan elektron / *Electron arrangement*
P	2.1
Q	
R	2.8.8.1

Jadual 3 / *Table* 3

(a) P, Q dan R terletak dalam kumpulan yang sama dalam Jadual Berkala unsur.
P, Q and R are located in the same group in the Periodic Table of elements.

(i) Nyatakan kumpulan bagi unsur-unsur tersebut.
State the group for the elements.

..... [1M]

(ii) Q terletak di antara P dan R dalam kumpulan yang sama. Tulis susunan elektron bagi ion Q.
Q is located between P and R in the same group. Write the electron arrangement for the ion of Q.

..... [1M]

(b) Diberi 0.1 mol unsur R bertindak balas dengan gas klorin secara berlebihan.
Given 0.1 mol of element R reacts with excess of chlorine gas.

(i) Tulis persamaan kimia untuk tindak balas yang terlibat.
Write a chemical equation for the reaction.

..... [2M]

(ii) Hitungkan jisim hasil yang terbentuk.
Calculate the mass of the product formed.
[Jisim atom relatif:/ Relative atomic mass: R=39, Chlorine = 35.5]

[2M]

[2023-NegeriSembilan-04] Rajah 4 menunjukkan satu kumpulan unsur.
Diagram 4 shows a group of elements.

19 9	F		35 17	Cl		80 35	Br		127 53	F
Fluorin *Fluorine*			Klorin *Chlorine*			Bromin *Bromine*			Iodin *Iodine*	

Rajah 4/ Diagram 4

(a) Nyatakan kumpulan bagi unsur-unsur ini dalam Jadual Berkala Unsur.
State the group of these elements in the Periodic Table of Elements.

..... [1M]

(b) Tulis susunan elektron bagi atom fluorin.
Write the electron arrangement for fluorine atom.

..... [1M]

(c) Atom bromin adalah lebih kecil daripada atom iodin.
Terangkan mengapa bromin lebih mudah membentuk ion 45egative berbanding iodin.
Bromine atom is smaller than iodine atom.
Explain why bromine forms a negative ion more easily than iodine.

.....

..... [2M]

(d) Klorin bertindak balas dengan natrium untuk membentuk satu sebatian.
Chlorine reacts with sodium to form a compound.

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

..... [2M]

(ii) Terangkan pembentukan ikatan bagi sebatian ini.
Explain the formation of bond for this compound.

..... [1M]

[2023-TerengganuMPP3-06] Jadual 6 menunjukkan maklumat unsur-unsur kala 3 di dalam Jadual Berkala Unsur.
Table 6 shows the information of the elements of period 3 in the Periodic Table of Elements.

Unsur *Element*	Na	Mg	Al	Si	P	S	Cl	Ar
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	2.8.8

Jadual/ *Table* 6

(a) Nyatakan maksud kala./ *State the meaning of period.*

.....

..... [1M]

(b) Jelaskan kenapa semua unsur yang terdapat dalam jadual 6 terletak pada kala yang sama.
Explain why all the elements in table 6 are located at the same period.

.....

..... [1M]

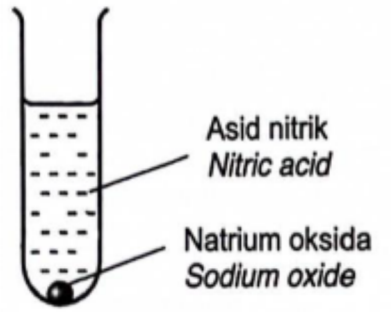
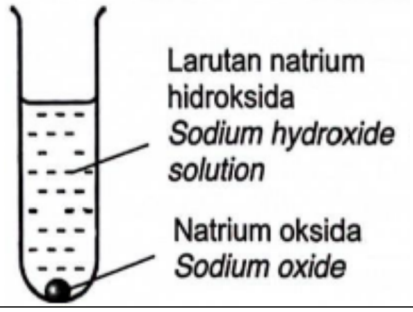
(c) Merujuk kepada perubahan jejari atom, terangkan mengapa keelektronegatifan bertambah apabila merentasi kala dari kiri ke kanan.
Referring to the change in atomic radius, explain why the electronegativity increases when across the period from left to right.

.....

.....

..... [2M]

(d) Rajah 6 menunjukkan dua set tindak balas melibatkan oksida unsur yang dimasukkan ke dalam dua larutan berbeza. Campuran larutan dikacau menggunakan rod kaca.
Diagram 6 shows two sets of reactions involving oxide of elements which is put into two different solutions. Both mixture of solutions are stirred with glass rod.

Set *Set*	Susunan radas *Set up apparatus*	Pemerhatian *Observation*
I		Pepejal putih larut menjadi larutan tidak berwarna *The white solid dissolves into colourless solution*
II		Tiada perubahan *No change*

Rajah/ *Diagram* 6

(i) Terangkan pemerhatian yang diperolehi seperti ditunjukkan dalam jadual 6.
Explain the observation obtained as shown in table 6.

.....

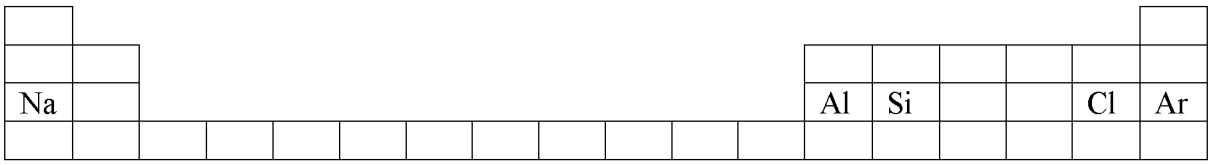
.....

..... [3M]

(ii) Tuliskan persamaan kimia bagi tindak balas yang berlaku dalam Set I.
Write the chemical equation for the reaction occurred in Set I.

..... [2M]

[2023-Putrajaya-06] Rajah 6.1 menunjukkan sebahagian daripada unsur bagi kala 3 dalam Jadual Berkala Unsur.
Diagram 6.1 shows a part of elements of Period 3 in the Periodic Table of Elements.



Rajah/ *Diagram* 6.1

(a) Berdasarkan Rajah 6.1,/ *Based on Diagram 6.1,*

(i) nyatakan unsur yang wujud sebagai monoatomik.
state the element which exist as monoatomic.

..... [1M]

(ii) susunkan semua unsur mengikut pertambahan saiz merentas kala 3.
arrange all the elements according to increase in size across period 3.

..... [1M]

(b) Wul ferum panas boleh bertindak balas dengan klorin untuk membentuk logam halida berwarna perang.
Hot iron wool can react with chlorine to form brown coloured metal halide.

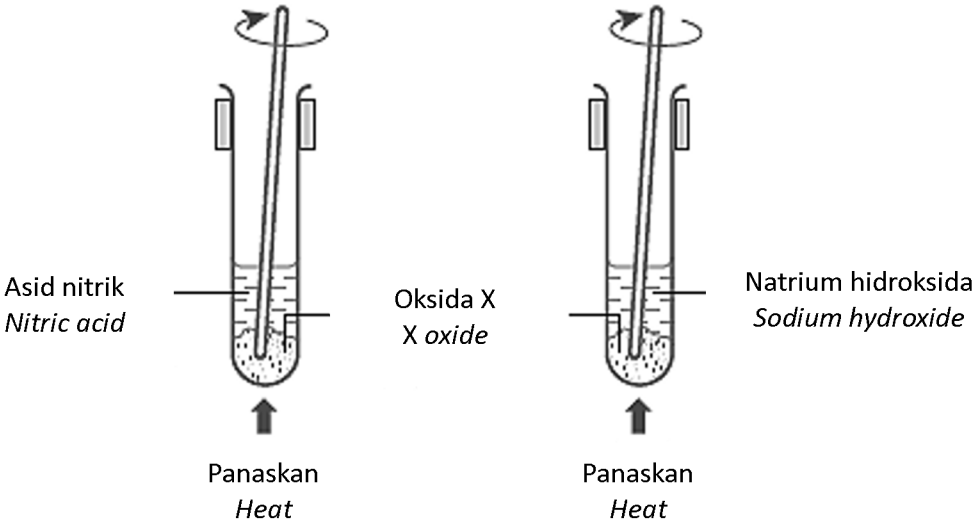
(i) Tuliskan persamaan kimia seimbang bagi tindak balas yang berlaku.
Write the chemical equation for the reaction occur.

..... [2M]

(ii) Kirakan jisim logam halida yang terbentuk apabila 0.3 mol klorin bertindak balas dengan wul besi panas.
Calculate the mass of metal halide formed when 0.3 mol of chlorine is reacted with hot iron wool.
[Jisim atom relative/ Relative atomic mass: Fe = 56, Cl = 35.5]

[2M]

(c) Dalam satu eksperimen yang lain, seorang murid menjalankan tindak balas antara pepejal oksida X dengan larutan natrium hidroksida dan larutan asid nitrik dalam dua tabung uji berlainan seperti ditunjukkan dalam Rajah 6.2.
In other experiment, a student undergoes reaction between solid oxide X with sodium hydroxide solution and nitric acid solution in two different test tubes as shows in Diagram 6.2.



Rajah/ Diagram 6.2

Jadual 6 menunjukkan keterlarutan oksida X di dalam kedua-dua larutan.
Table 6 shows the solubility of oxide X in both solutions.

Keterlarutan/ *Solubility*	
Dengan natrium hidroksida *With sodium hydroxide*	Dengan asid nitrik *With nitric acid*
Larut *Soluble*	Larut *Soluble*

Jadual/ Table 6

Berdasarkan unsur dalam Rajah 6.1, apakah unsur yang mungkin untuk X? Nyatakan sifat oksida X dan berikan satu sebab.
Based on the element in Diagram 6.1, what is the possible element for X? State the property of oxide X and give a reason.

Unsur X : .....
Element X

Sifat : .....
Property

Sebab : .....
Reason [3M]

[2023-Pahang-02] Jadual 2 menunjukkan maklumat sebahagian unsur yang terdapat dalam Kala 3 Jadual Berkala Unsur.

Table 2 shows information about some of the elements found in Period 3 of the Periodic Table of Elements.

Unsur *Element*	Natrium *Sodium*	Magnesium *Magnesium*	Aluminium *Aluminium*	Silikon *Silicon*	Klorin *Chlorine*
Nombor proton *Proton number*	11	12	13	14	17

Jadual 2 / *Table* 2

Berdasarkan Jadual 2,/ *Based on Table 2,*

(a) apakah maksud kala?/ *what is the meaning of period?*

..... [1M]

(b) nyatakan unsur yang wujud sebagai molekul dwiatom.
state the element that exists as diatomic molecule.

..... [1M]

(c) tuliskan susunan elektron bagi atom aluminium.
write the electron arrangement for aluminium atom.

..... [1M]

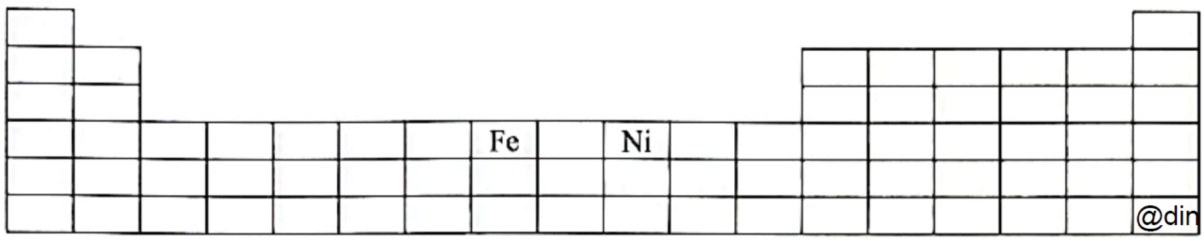
(d) terangkan mengapa saiz atom natrium lebih besar berbanding atom klorin.
explain why size of sodium atoms are larger than chlorine atoms.

.....

.....

..... [2M]

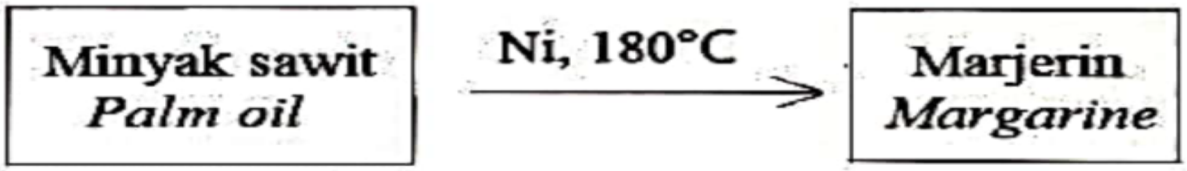
[2023 Johor Bahru-04] Rajah 4.1 menunjukkan sebahagian daripada Jadual Berkala Unsur.
Diagram 4.1 shows part of the Periodic Table of Elements.



(a) Apakah unsur peralihan?/ *What are transition elements?*

..... [1M]

(b) Rajah 4.2 menunjukkan suatu proses dalam industri.
Diagram 4.2 shows a process in industry.



Apakah fungsi nikel dalam proses itu?
What is the function of nickel in the process?

..... [1M]

(c) Ferum boleh bertindak balas dengan gas klorin untuk menghasilkan *suatu garam.*
Iron can react with chlorine gas to form a salt.

(i) Apakah warna garam tersebut?/ *What is the colour of the salt?*

..... [1M]

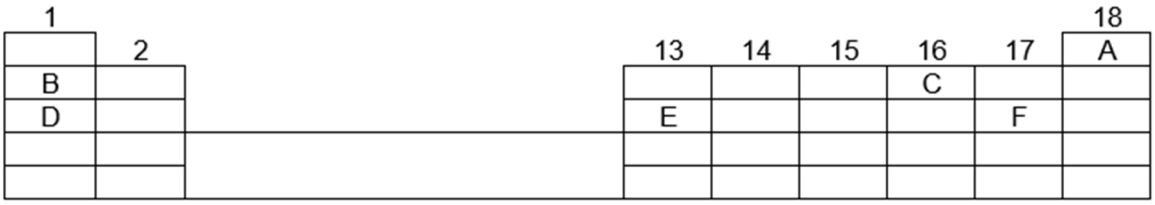
(ii) Tulis persamaan kimia bagi lindak balas ini.
Write the chemical equation for this reaction.

..... [2M]

(iii) 0.1 mol ferum bertindak balas dengan gas klorin. Hitung jisim garam yang dihasilkan.
0.1 mol of iron reacted with chlorine gas. Calculate the mass of salt formed.
[Jisim atom relative/ Relative atomic mass : Cl = 35.5; Fe = 56]

[2M]

[2023-Perlis-06] 6. Rajah 5 menunjukkan Jadual Berkala Unsur.
Diagram 5 shows the Periodic Table of Elements.



Rajah 5/ *Diagram 5*

(a) Nyatakan nama lain bagi Kumpulan 17.
State the other name of Group 17.

..... [1M]

(b) Berdasarkan Jadual Berkala Unsur dalam Rajah 5,
Based on the Periodic Table of Elements in Diagram 5,

Unsur manakah wujud sebagai gas monoatom pada suhu bilik. Berikan sebab bagi jawapan anda.
Which elements exist as monoatomic gas in room temperature. Give a reason for your answer.

.....

..... [2M]

(c) (i) Unsur D dan F bertindak balas membentuk satu sebatian. Tuliskan persamaan kimia bagi tindak balas tersebut.
Elements D and F react to form a compound.
Write a chemical reaction for the reaction.

.....

..... [2M]

(ii) Jika 0.1 mol unsur D bertindak balas dengan unsur F, kira jisim sebatian yang terbentuk pada (c)(i).
If 0.1 mole of element D reacts with element F, calculate the mass of compound form at (c)(i).
[Jisim atom relative/ Relative atomic mass : D = 23; F = 35]

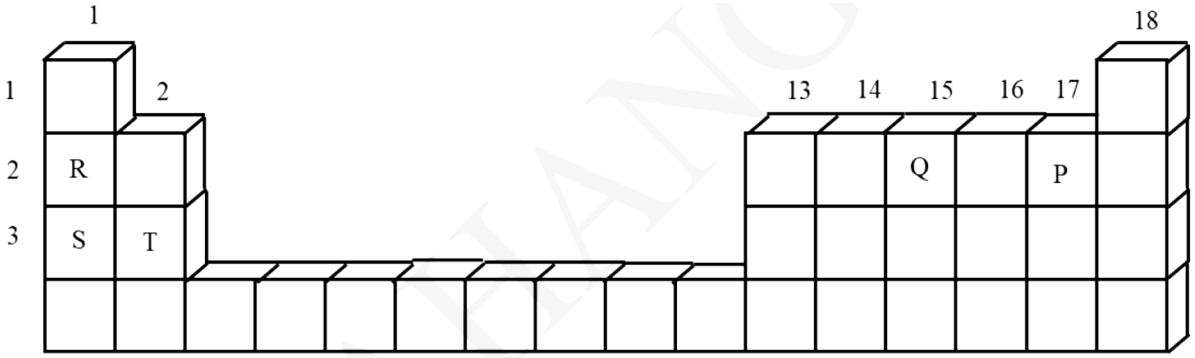
[2M]

(d) Unsur G berada lebih bawah dalam Kumpulan 1 di dalam Jadual Berkala Unsur berbanding unsur B dan D.
Ramalkan kereaktifan unsur G terhadap air. Terangkan.
Element G located lower in Group 1 in the Periodic Table of Elements compared to elements B and D.
Predict the reactivity of element G toward water. Explain.

.....

..... [2M]

[2023-JUJ-Set02-05] Rajah 5 menunjukkan sebahagian daripada Jadual Berkala Unsur. P, Q, R, S dan T bukan merupakan simbol sebenar unsur.
Diagram 5 shows part of the Periodic Table of Elements. P, Q, R, S and T are not the actual symbols of the elements.



(a) Berdasarkan kepada Rajah 5,/ *Based on Diagram 5,*

(i) 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]

(ii) nyatakan dua unsur yang dapat membentuk sebatian ion.
state two elements that can produce an ionic compound.

..... [1M]

(b) 1.2 g unsur T bertindak balas dengan gas oksigen berlebihan menghasilkan sebatian T oksida.
1.2 g of element T reacts with excess oxygen gas to produce T oxide compound.

(i) Tuliskan persamaan kimia apabila T bertindak balas dengan gas oksigen.
Write a chemical equation when T reacts with oxygen gas.

..... [2M]

(ii) Hitung jisim sebatian T oksida yang terbentuk.
Calculate the mass of T oxide formed.
[Jisim atom relative/Relative atomic mass : T = 24, O = 16]

[2M]

(c) Unsur R dan S mempunyai sifat kimia yang sama. Bandingkan kereaktifan kedua-dua unsur tersebut. Jelaskan jawapan anda.
Elements R and S have the same chemical properties. Compare the reactivity for both elements. Explain your answer.

.....

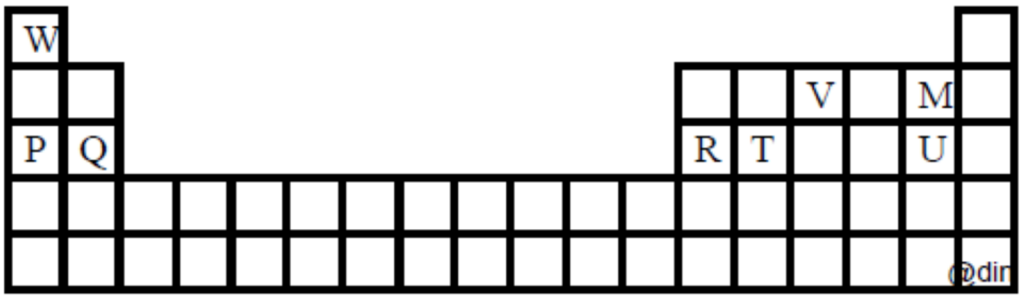
.....

.....

..... [2M]

Esei/ Essay

[2023-MRSM-10] Rajah 8.1 menunjukkan Jadual Berkala Unsur. Huruf-huruf yang digunakan tidak menunjukkan simbol sebenar bagi unsur-unsur tersebut.
Diagram 8.1 shows a Periodic Table of Elements. The letters used are not the actual symbols for the elements.



Rajah/ Diagram 8.1

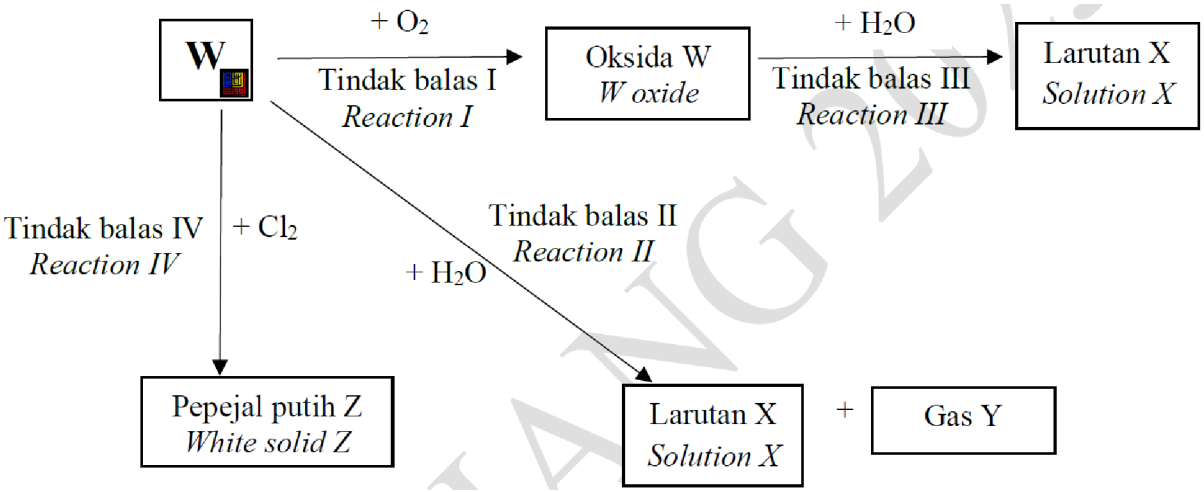
(a) Nyatakan maksud kumpulan dan tuliskan susunan elektron bagi atom U. Terangkan perbezaan saiz atom U dan atom Q.
State the meaning of the group and write the electron arrangement of atom U. Explain the difference in size of atom U and atom Q.

[5 markah]

(b) 30.6 g pepejal putih terhasil daripada tindak balas antara unsur R dengan oksigen. Tulis persamaan kimia bagi tindak balas dan hitung isipadu gas oksigen yang bertindak balas.
[Jisim atom relatif: O = 16, R = 27,
1 mol gas menempati 24 dm3 pada keadaan bilik]
30.6 g of white solid formed from the reaction between element R and oxygen. Write a chemical equation for the reaction and calculate the volume of oxygen reacted.
[Relative atomic mass: O = 16, R = 27,
1 mol of gas occupies 24 dm3 at room conditions]

[5 markah]

[2023-JUJ-Set01-10] Rajah 10 menunjukkan satu carta alir bagi beberapa tindak balas melibatkan unsur $^{23}_{11}W$.
Diagram 10 shows a flow chart for series of reaction involving element $^{23}_{11}W$.



Rajah 10 / Diagram 10

(a) Nyatakan nombor proton atom W dan tulis susunan elektron bagi atom W.
State the proton number of atom W and write the electron arrangement of atom W.

[2 markah/2 marks]

(b) Kenal pasti W, X, Y dan Z. Huraikan secara ringkas bagaimana untuk menguji gas Y dalam makmal.
Identify W, X, Y and Z. Describe briefly how to test gas Y in laboratory.

[6 markah/6 marks]

(c) 11.5 g unsur W terbakar dalam gas oksigen, O_2 seperti ditunjukkan dalam Tindak balas I. Tulis persamaan kimia bagi Tindak balas I dan hitung jisim oksida W yang terhasil.
11.5 g element W is burnt in oxygen gas, O_2 as shown in Reaction I. Write the chemical equation of Reaction I and calculate the mass of Y oxide formed.
[Jisim atom relatif/ Relative atomic mass: W = 23, O= 16]

[6 markah/6 marks]

(d) Berdasarkan Tindak balas II, nyatakan pemerhatian jika beberapa titis penunjuk fenolftalein ditambahkan ke dalam larutan X. Berikan satu sebab.
Based on Reaction II, state the observation when a few drops of phenolphthalein indicator is added into the solution X. Give a reason.

[2 markah/2 marks]

(e) Unsur T terletak di atas unsur W dalam Jadual Berkala Unsur. Bandingkan kereaktifan unsur T dan W terhadap oksigen. Terangkan jawapan anda.
Element T is located above element W in Periodic Table of Element. Compare the reactivity of element T and element W towards oxygen. Explain your answer.

[4 markah/4 marks]

Bab 5 - Ikatan Kimia

[2023-Selangor-Set01-04] Jadual 4 menunjukkan maklumat bagi unsur yang terdapat dalam Kala 3 Jadual Berkala Unsur.
Table 4 shows the information of the elements found in Period 3 of 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

Jadual 4/ *Table* 4

(a) Nyatakan unsur yang lengai. Terangkan jawapan anda.
State the element which is inert. Explain your answer.

.....

..... [2M]

(b) Terangkan mengapa saiz atom menjadi semakin kecil apabila merentasi kala dari natrium ke argon.
Explain why the atomic size becomes smaller when across the period from sodium to argon.

.....

..... [2M]

(c) Natrium dan klorin bertindak balas untuk membentuk suatu sebatian.
Sodium and chlorine react to form a compound.

(i) Lukis susunan elektron bagi sebatian yang terbentuk.
Draw the electron arrangement for the compound formed.

[2M]

(ii) Nyatakan satu sifat bagi sebatian yang terbentuk.
State one property for the compound formed.

..... [1M]

[2023-MRSM-04] Jadual 1 menunjukkan nombor proton bagi tiga atom X, Y dan Z. Huruf X, Y dan Z bukan symbol sebenar bagi atom-atom tersebut.
Table 1 shows the proton number of three atoms X, Y and Z. The letters X, Y and Z are not the actual symbol of the atoms.

Atom	X	Y	Z
Nombor proton/ *Proton number*	12	8	1

Jadual 1 /*Table 1*

(a) Atom X boleh membentuk kation untuk mencapai susunan elektron oktet yang stabil.
Atom X can form a cation to achieve a stable octet electron arrangement.

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

..... [1M]

(ii) Tuliskan formula bagi ion tersebut./ *Write the formula for the ion.*

..... [1M]

(b) Unsur X bertindak balas dengan unsur Y membentuk suatu sebatian. Lukiskan susunan elektron bagi sebatian yang terbentuk.
Element X react with element Y to form a compound.
Draw the electron arrangement of the compound formed.

[2M]

(c) Persamaan kimia berikut menunjukkan tindak balas di antara unsur Z dan unsur Y.
Chemical equation below shows a reaction between element Z and element Y.

$$\ldots\ldots Z_2 \quad + \quad Y_2 \quad \rightarrow \quad \ldots\ldots Z_2Y$$

(i) Seimbangkan persamaan kimia tersebut.
Balance the chemical equation. [1M]

(ii) Hitung jisim hasil tindak balas yang terbentuk apabila 0.05 mol unsur Z digunakan.
Calculate the mass of product formed when 0.05 mol of element Z is used.
[Jisim atom relative/ Relative atomic mass: Z=1, Y=16]

[2M]

[2023-Melak-03] Rajah 2 menunjukkan perwakilan piawai bagi atom kalium dan klorin. Atom kalium dan klorin dapat bertindak balas untuk membentuk satu ikatan kimia.
Diagram 2 shows the standard representative of atoms of potassium and chlorine. Potassium atom and chlorine atom could react to form a chemical bond.

39 19	K		35 17	Cl

Rajah 2 / Diagram 2

(a) Nyatakan tujuan pembentukan ikatan kimia.
State the purpose of formation of chemical bond.

..... [1M]

(b) Nyatakan jenis ikatan kimia yang terdapat dal am molekul klorin.
State the type of chemical bond found in a chlorine molecule.

..... [1M]

(c) Klorin bertindak balas dengan kalium untuk membentuk suatu sebatian.
Chlorine reacts with potassium to form a compound.

(i) Nyatakan jenis sebatian yang terbentuk.
State the type of compound formed.

..... [1M]

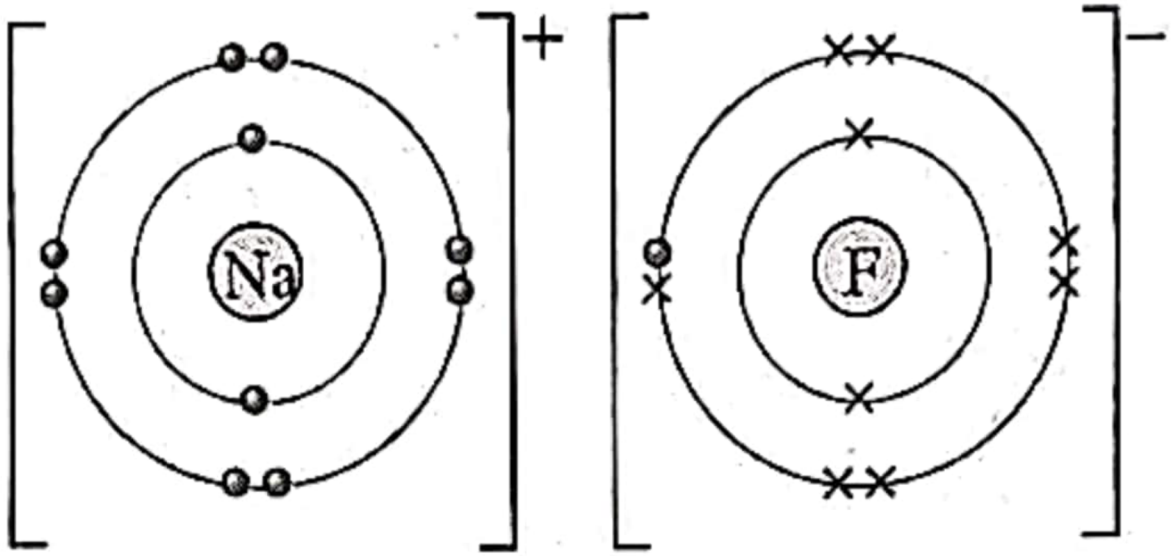
(ii) Lukis susunan elektron bagi pembentukan sebatian ini.
Draw the electron arrangement for the formation of this compound.

[2M]

(m) Terangkan mengapa larutan akueus sebatian yang terbentuk dapat mengalirkan arus elektrik.
Explain why aqueous solution of the compound formed can conduct electricity.

..... [1M]

[2023 Johor Bahru-01] Rajah 1 menunjukkan susunan elektron bagi satu sebatian.
Diagram 1 shows the electron arrangement for a compound.



Rajah 1/ *Diagram 1*

Berdasarkan Rajah 1,/ *Based on Diagram 1,*

(a) (i) nyatakan nama unsur yang diwakili oleh simbol Na.
state the name of element represented by the symbol Na.

..... [1M]

(ii) unsur di 1 (a)(i) terletak dalam Kumpulan 1. Apakah nama lain bagi Kumpulan 1?
element in 1 (a)(i) is located in Group 1. What is the other name for Group 1?

..... [1M]

(b) namakan daya tarikan yang kuat dalam sebatian ini yang menyebabkan takat lebur dan takat didih sebatian ini tinggi.
name the force of attraction in the compound that causes the melting and boiling point of the compound is high.

..... [1M]

(c) apakah jenis ikatan dalam sebatian ini?
what is the type of bond in this compound?

..... [1M]

(d) nyatakan nama sebatian ini./ *state the name of the compound.*

..... [1M]

[2023-Selangor-Set02-04] Jadual 4 menunjukkan susunan elektron unsur Kala 3 dalam Jadual Berkala Unsur.
Table 4 shows the electron arrangement of elements of Period 3 in the Periodic Table of Elements.

Unsur *Element*	Na	Mg	A1	Si	P	S	Cl
Susunan elektron *Electron arrangement*	2.8.1	2.8.2		2.8.4	2.8.5	2.8.6	2.8.7

Jadual 4/ *Table 4*

(a) Tuliskan susunan elektron dan nyatakan kumpulan bagi aluminium.
Write the electron arrangement and state the group of aluminium.

Susunan elektron : .....
Electron arrangement

Kumpulan : .....
Group [2M]

(b) Nyatakan unsur yang boleh membentuk oksida amfoterik.
State the element that can form an amphoteric oxide.

..... [1M]

(c) Natrium bertindak balas dengan klorin untuk membentuk sebatian ion.
Sodium reacts with chlorine to form an ionic compound.

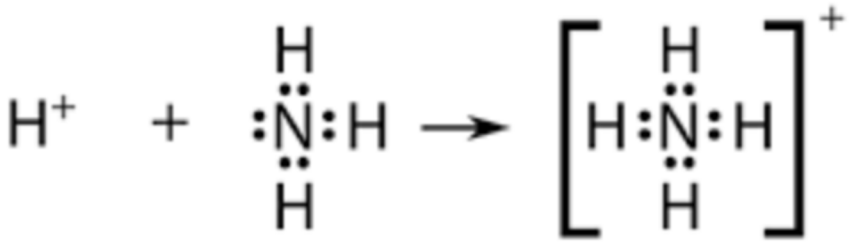
(i) Tulis persamaan kimia yang seimbang bagi tindak balas itu.
Write a balanced chemical equation for the reaction.

..... [2M]

(ii) Lukis susunan elektron bagi sebatian ion yang terbentuk.
Draw the electron arrangement of the ionic compound formed.

[2M]

[2023-Putrajaya-05] Rajah 5.1 menunjukkan struktur Lewis bagi pembentukan ion ammonium, NH_4^+.
Diagram 5.1 shows the Lewis structure for the formation of ammonium ion, NH_4^+.



(a) Berdasarkan Rajah 5.1/ *Based on Diagram 5.1,*

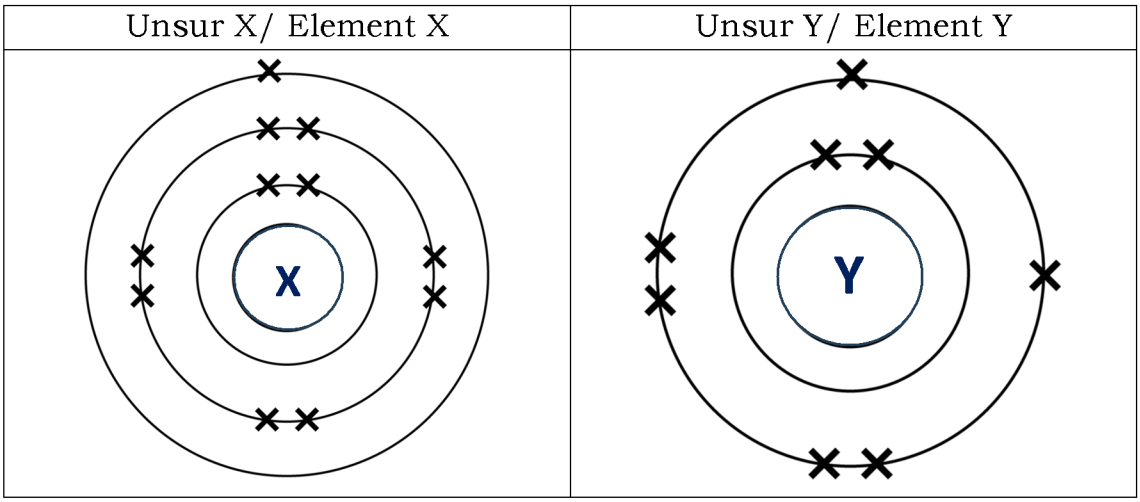
(i) tuliskan susunan elektron bagi atom nitrogen.
write the electron arrangement of nitrogen atom.

..... [1M]

(ii) nyatakan jenis pembentukan ikatan yang terlibat.
state the type of bond formation involved.

..... [1M]

(b) Rajah 5.2 menunjukkan susunan elektron bagi dua jenis unsur berlainan yang bertindak balas membentuk sebatian P.
Diagram 5.2 shows electron arrangement of two different elements that react to form compound P.



Rajah/ *Diagram* 5.2

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

..... [2M]

(ii) Kirakan jisim sebatian P yang terbentuk sekiranya 0.0125 mol gas Y digunakan dalam tindak balas itu.
Calculate the mass of compound P formed if 0.0125 mol of gas Y is used in the reaction. [Jisim atom relatif:/ [Relative atomic mass: X = 23, Y = 16]

[2M]

(c) Dalam satu tindak balas yang lain, unsur karbon bertindak balas dengan unsur Y membentuk sebatian Q yang wujud sebagai gas berbanding sebatian P yang wujud sebagai pepejal pada keadaan bilik. Terangkan perbezaan keadaan jirim sebatian P dan Q pada keadaan bilik ini.
In another reaction, element carbon reacted with element Y to form compound Q which exist as gas compared to compound P that exist as solid at room conditions. Explain the difference in the states of matter of compound P and Q at room conditions.

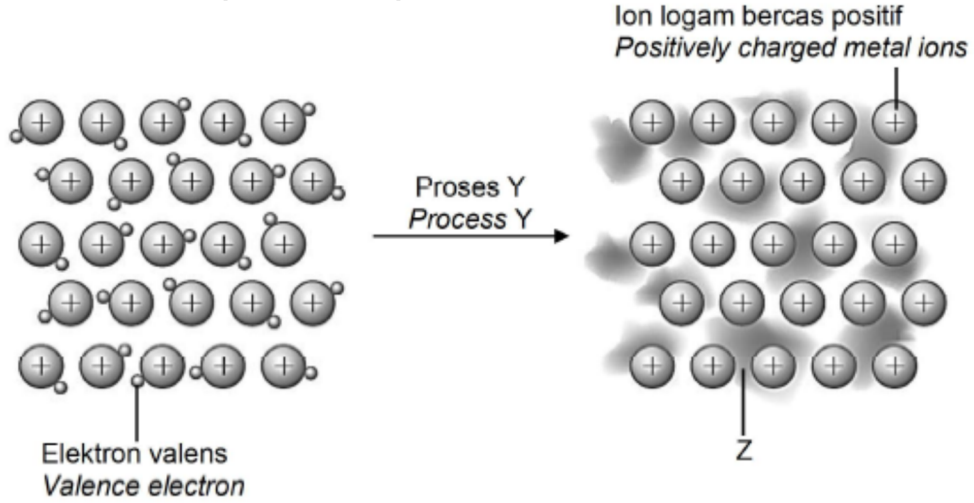
.....

.....

.....

..... [2M]

[2023-Kelantan-05] Rajah 4 menunjukkan pembentukan ikatan logam.
Diagram 4 shows the formation of metallic bond.



Rajah 4/ Diagram 4

(a) Namakan proses Y./ *Name the process Y*

..... [1M]

(b) Apakah yang diwakili oleh Z? / *What is represent by Z?*

..... [1M]

(c) Jadual 3 menunjukkan keputusan kekonduksian elektrik bagi bahan, P, Q dan R.
Table 3 shows the result of the electrical conductivity of substances P, Q and R.

Bahan *Substance*	Kekonduksian elektrik/ *Electric conductivity*	
	Pepejal/ *Solid*	Leburan/ *Molten*
P	Boleh/ *Can*	Boleh/ *Can*
Q	Tidak boleh/ *Cannot*	Boleh/ *Can*
R	Tidak boleh/ *Cannot*	Tidak boleh/ *Cannot*

(i) Cadangkan bahan P, Q dan R./*Suggest substances P, Q and R*

P : .....

Q : .....

R : ..... [3M]

(ii) Bahan P digunakan secara meluas dalam sistem pendawaian di rumah. Jelaskan bagaimana bahan P boleh mengkonduksikan elektrik.
Substance P are widely used in the wiring system in homes.
Explain how the substance P can conduct electricity.

.....

.....

..... [3M]

[2023-Kedah-06] Jadual 6 menunjukkan nombor proton bagi empat unsur yang diwakilkan sebagai simbol P, Q, R dan S.
Table 6 shows the proton number of four elements represented as symbols P, Q, R and S.

Unsur /*Element*	Nombor proton / *Proton number*
P	17
Q	12
R	8
S	3

(a)(i) Takrifkan ikatan logam./ *Define metallic bond.*

..... [1M]

(ii) Antara P, Q, R dan S, unsur yang manakah boleh membentuk ikatan logam?
Among P, Q, R and S, which element can form metallic bond?

..... [1M]

(iii) Terangkan bagaimana ikatan logam terbentuk bagi unsur yang dinyatakan di (a)(ii).
Explain how metallic bond is formed for the element mentioned in (a)(ii).

.....

.....

..... [2M]

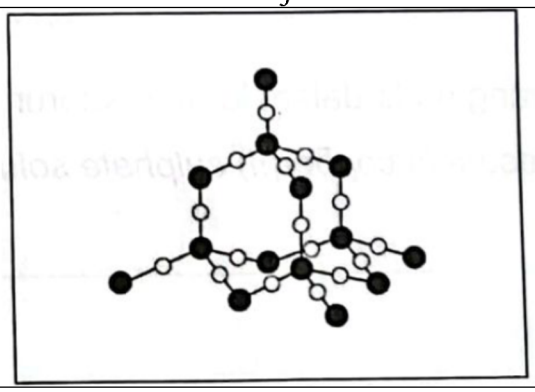
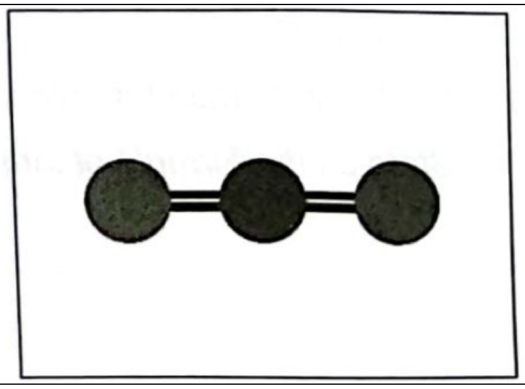
B.

Kapur tohor yang digunakan untuk merawat tanah yang berasid ialah sebatian ion yang terbentuk daripada unsur X dan oksigen.
Slaked lime which is used to treat acidic soil is an ionic compound that formed from X and oxygen element.

Lukiskan susunan elektron bagi kapur tohor.
Draw the electron arrangement of slaked lime
[Nombor proton / Proton number X = 20, Oxygen = 6]

[2M]

(c) Rajah 6 menunjukkan struktur molekul gergasi bagi silikon dioksida dan struktur molekul ringkas bagi karbon dioksida.
Diagram 6 shows the giant molecular structure of silicone dioxide and simple molecule structure of carbon dioxide.

	
Silikon dioksida/ *Silicon dioxide*	Karbon dioksida/ *Carbon dioxide*

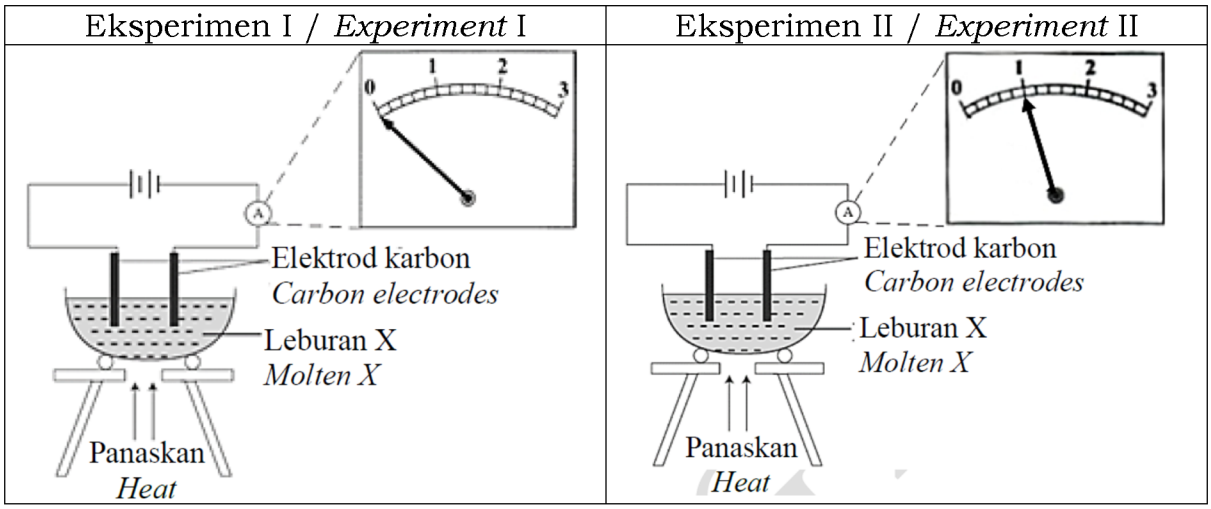
Bandingkan takat lebur dan takat didih bagi kedua struktur tersebut. Terangkan.
Compare the melting point and the boiling point of the two structures. Explain.

.....

.....

..... [3M]

[2023-JUJ-Set01-06] 6. Rajah 6.1 menunjukkan pemerhatian bagi eksperimen untuk mengkaji kekonduksian elektrik sebatian X dan sebatian Y dalam keadaan leburan.
Diagram 6.1 shows the observations for the experiment to study the electrical conductivity of compound X and compound Y in molten state.



Rajah 6.1/ *Diagram* 6.1

(a) (i) Nyatakan jenis sebatian bagi leburan X.
State the type of compound for molten X.

..... [1M]

(ii) Terangkan perbezaan pemerhatian bagi Eksperimen I dan Eksperimen II.
Explain the difference in observation of Experiment I and Experiment II.

.....

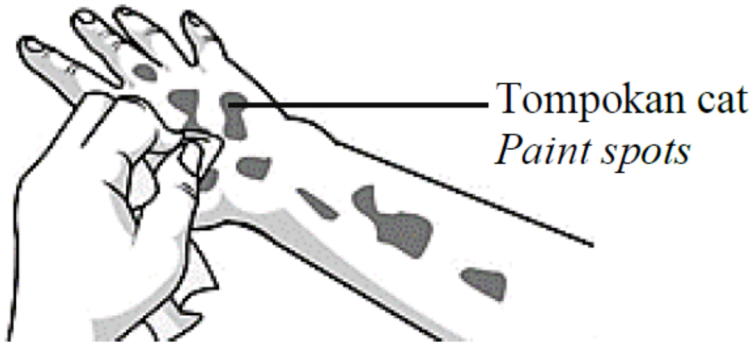
.....

.....

.....

..... [4M]

(b)



Rajah 6.2/*Diagram* 6.2

Tangan Suraj terkena cat semasa membantu bapanya mengecat rumah. Rajah 6.2 menunjukkan Suraj cuba mencuci tangannya menggunakan air tetapi tidak berjaya. Terangkan mengapa air tidak boleh menanggalkan cat di tangan Suraj. Cadangkan satu bahan yang boleh menggantikan air untuk membersihkan tangan Suraj.
Suraj's hand was smeared with paint while helping his father paint the house. Diagram 6.2 shows Suraj trying to wash his hands with water but cannot remove the paint. Explain why water cannot remove the paint on Suraj's hands. Suggest one substance that can replace water to remove the paint.

.....

.....

.....

..... [3M]

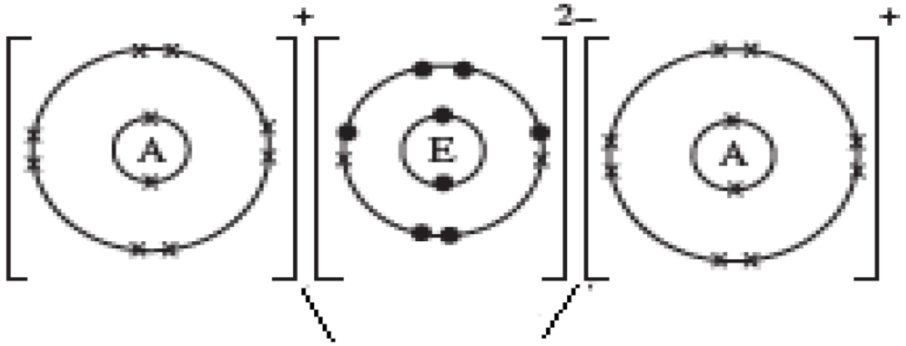
(c) .

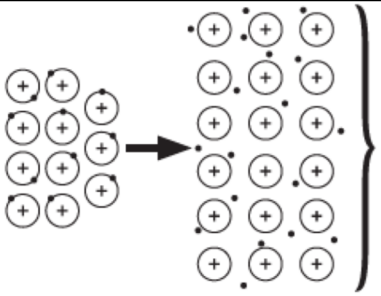
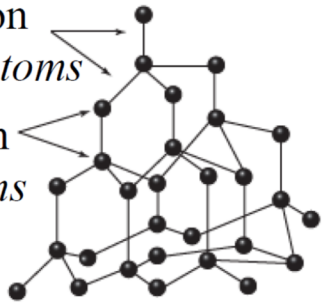
Sejenis ikatan kovalen yang mana pasangan elektron yang dikongsi berasal daripada satu atom sahaja.
A type of covalent bond where the electron pair that is shared comes from one atom only.

Berdasarkan kenyataan di atas, nyatakan jenis ikatan yang terlibat.
Based on the statement above, state the type of bond involved.

.....
[1 markah][1 mark]

[2023-Pahang-05-d] (d) Jadual 5 menunjukkan maklumat ikatan yang terdapat dalam bahan R, S dan T.
Table 5 shows the bond information found in substances R, S and T.

<table>
<tr><td>Bahan
Substances</td><td>Maklumat ikatan
Bond information</td></tr>
<tr><td>R</td><td> 

Daya elektrostatik yang kuat antara ion
Strong electrostatic force between ions</td></tr>
<tr><td>S</td><td> 
Daya elektrostatik kuat antara lautan elektron dan ion-ion logam
Strong electrostatic force between sea of electron and metal ions</td></tr>
<tr><td>T</td><td>Ikatan kovalen antara atom karbon
Covalent bond between carbon atoms
Atom karbon
Carbon atoms
  </td></tr>
</table>

Berdasarkan Jadual 5, pilih satu bahan yang boleh mengkonduksikan arus elektrik di dalam keadaan pepejal dan leburan. Terangkan bagaimana bahan ini boleh mengkonduksikan arus elektrik di dalam keadaan pepejal dan leburan.
Based on Table 5, choose one substance that can conduct electricity in the solid and molten states. Explain how this substance can conduct electricity in the solid and molten states.

.....

.....

.....

..... [3M]

[2023-TerengganuMPP3-03] Jadual 3 menunjukkan sifat fizik bagi sebatian M dan sebatian N.
Table 3 shows the physical properties of compound M and compound N.

Sebatian Compound	Takat lebur *Melting point (°C)*	Takat didih *Boiling point (°C)*	Kekonduksian elektrik *Electrical conductivity*	
			Pepejal *Solid*	Leburan *Molten*
M	714	1412	Tidak Boleh *Cannot*	Boleh *Can*
N	80	218	Tidak Boleh *Cannot*	Tidak Boleh *Cannot*

Jadual/ Table 3

(a) Berdasarkan Jadual 3,/ *Based on Table 3,*

(i) Apakah jenis ikatan yang terbentuk dalam sebatian M dan N.
What is the type of bond formed in compound M and N.

Sebatian M/ *Compound* M : .....

Sebatian N/ *Compound* N : ..... [2M]

(ii) Nyatakan jenis zarah bagi sebatian N.
State the type of particle of compound N.

..... [1M]

(b) Terangkan mengapa takat lebur bagi kedua-dua sebatian itu berbeza.
Explain why the melting point for both compounds are different.

.....

.....

..... [2M]

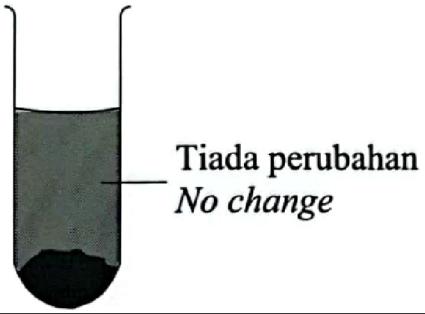
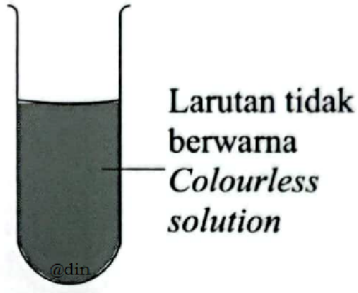
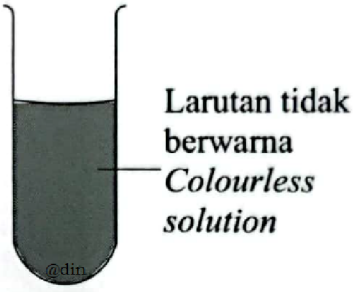
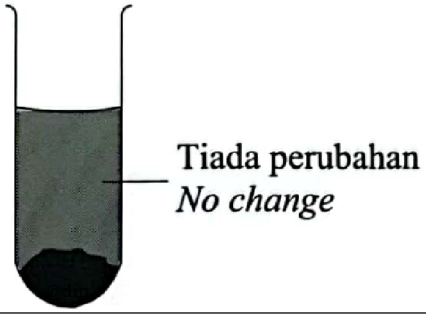
(c) Mengapa sebatian M boleh mengalirkan arus elektrik dalam keadaan leburan?
Why compound M can conduct electricity in molten state?

.....

..... [1M]

Esei/ Essay

[2023-SBP-11] (a) Satu sebatian terbentuk melalui ikatan kimia. Jadual II menunjukkan keputusan eksperimen untuk mengkaji sifat bagi sebatian X dan sebatian Y. Pepejal sebatian X dan sebatian Y ditambah ke dalam air dan propanon secara berasingan.
A compound is formed through chemical bond. Table II shows the result of an experiment to investigate the properties of compound X and Y. Solid of compound X and Y are added into water and propanone separately.

Sebatian *Compound*	Keterlarutan dalam air *Solubility in water*	Keterlarutan dalam propanon *Solubility in propanone*
X		
Y		

Jadual/ Table 11

(i) Apakah tujuan pembentukan ikatan kimia?
Berdasarkan Jadual 11, nyatakan jenis ikatan dalam sebatian X dan sebatian Y.
What is the purpose of chemical bondformation?
Based on Table 11, state the type of bond in compound X and Y.
[3 markah/ marks]

(ii) Cadangkan dua unsur berlainan yang boleh membentuk sebatian X dan sebatian Y. Lukiskan susunan electron bagi ikatan seperti sebatian X yang dicadangkan. Bagi ikatan seperti Y yang dicadangkan, huraikan pembentukan sebatian itu dan seterusnya tuliskan persamaan kimia yang seimbang.

Suggest two different elements that can form compound X and Y.
Draw the electron arrangement of the bond such as compound X that has been suggested. For the bond such as compound Y that has been suggested,

describe the formation of the bond and then write a balanced chemical equation.

[11 markah/ marks]

(b) Anda dibekalkan dengan sebatian-sebatian berikut.
You are supplied with the following compounds.

- Serbuk natrium oksida/*Sodium oxide powder,* Na_2O
- Serbuk glukosa/ *Glucose powder,* $C_6H_{12}O_6$
- Pepejal asid oksalik/ *Solid oxalic acid,* $C_2H_2O_4$

Huraikan satu eksperimen untuk mengkaji kekonduksian elektrik dalam keadaan akueus untuk semua bahan yang dibekalkan.
Describe an experiment to investigate the electrical conductivity in aqueous state for all the substances supplied.

[6 markah/ marks]

[2023-JohorSkudai-10] (a) Rajah 10.1 menunjukkan formula struktur ubat yang digunakan untuk melegakan sakit demam.
Diagram 10.1 shows the structural formula of the medicine used to relieve fever.pain.

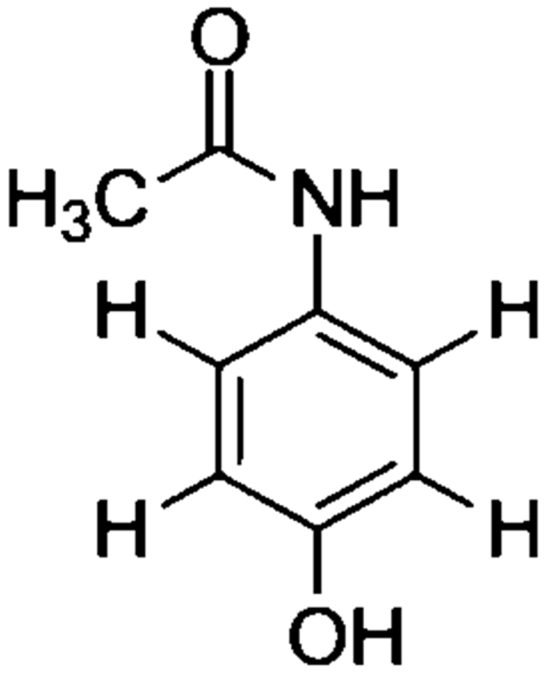


Diagram 10.1/ *Rajah 10.1*

Ubat tersebut dibuat daripada sebatian kimia parasetamol, $C_8H_9NO_2$
The medicine is made from a chemical compound paracetamol, $C_8H_9NO_2$

Berdasarkan rajah,/ *Based on diagram.*

(i) Ikatan yang terbentuk dalam parasetomol adalah kovalen. Apakah yang berlaku kepada elektron semasa pembentukkan ikatan tersebut?

The bonds formed in paracetomol are covalent. What happens to the electrons during the formation of the bond?

[1 markah] [1 mark]

(ii) Apakah yang dimaksudkan dengan ikatan ganda dua yang terdapat dalam sebatian ubat ini?
What is the meaning of the double bond found in this medicine compound?

[1 markah] [1 mark]

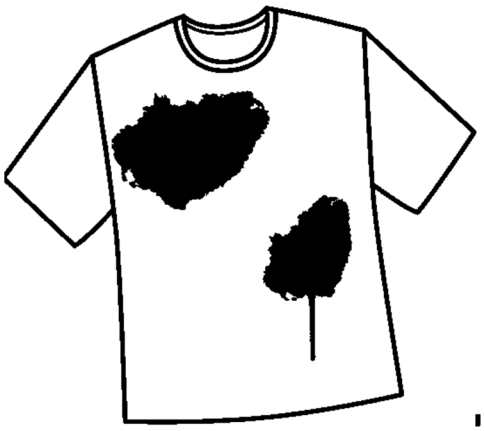
(iii) Nyatakan jenis ubat dan arahan penggunaanya.
State the type of medicine and its instructions for use.

[2 markah] [2marks]

(iii) Kirakan bilangan atom yang terdapat dalam 30.2g parasetamol, $C_8H_9NO_2$.
Calculate the number of atoms present in 30.2g of paracetamol, $C_8H_9NO_2$
[Jisim atom relative/ Relative atomic mass: C = 12, H = 1, N = 14, O = 16]
[Pemalar Avogadro/ Avogadro's constant = 6.02×10^{23}]

[3 markah][3 marks]

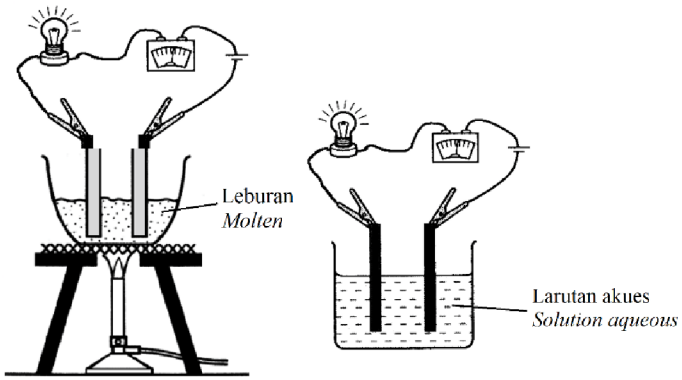
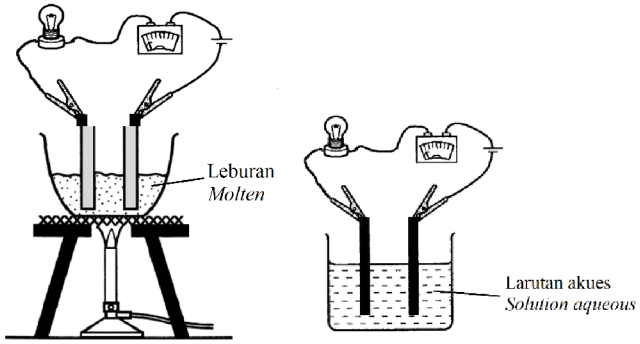
(b) (i) Rajah 10.2 menunjukkan keadaan baju Ali selepas mengecat pagar besi rumah rakannya supaya tidak berkarat.
Diagram 10.2 shows the state of Ali's shirt after painting the iron fence of his friend's house so that it does not rust.



Jika anda adalah rakan kepada Ali, bagaimanakah anda dapat memberi penyelesaian kepada masalah ini agar Ali tidak dimarahi oleh ibunya tentang keadaan bajunya?
If you are Ali's friend, how can you give a solution to this problem so that Ali is not scolded by his mother about the condition of his clothes?

[3 markah] [3 marks]

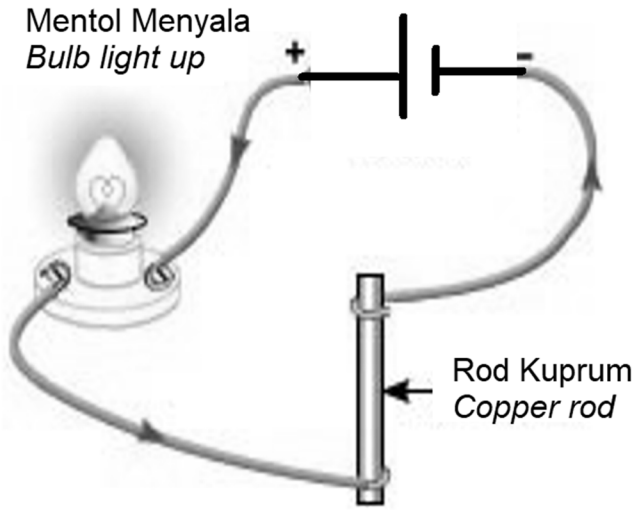
(c) Jadual 10 menunjukkan sifat-sifat sebatian W dan Z.
Table 10 shows the properties of compound W and Z.

Sebatian ***Compound***	**Pemerhatian pada bulb** ***Observation on bulb***
W Larut dalam air *Soluble in water*	
Z Larut dalam tetraklorometana *Soluble in tetrachloromethane*	

Jadual 10/ *Table 10*

Berdasarkan Jadual 7, nyatakan jenis sebatian W dan Z.
Terangkan perbezaan kekonduksian elektrik sebatian W dan Z.
Based on Table 7, state type of compound W and Z.
Explain the difference in electrical conductivity of compound W and Z.
[5 markah] [5marks]

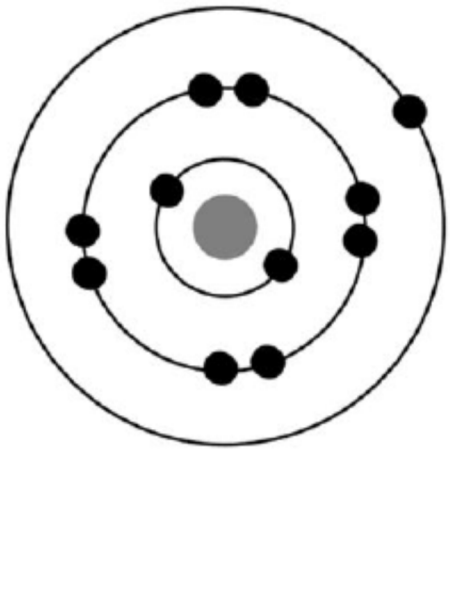
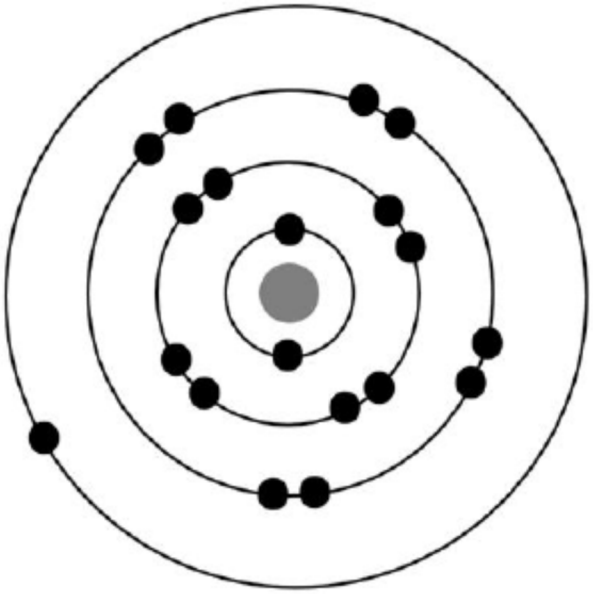
(d) Rajah 10.3 menunjukkan susunan alat radas eksperimen Jadual 10 yang telah diubahsuai bagi mengkaji kekonduksian elektrik satu logam.
Diagram 10.3 shows the arrangement of the experimental apparatus of table 10 that has been modified to study the electrical conductivity of a metal.



Rajah 10.3/ Diagram 10.3

Terangkan bagaimana logam kuprum dalam keadaan pepejal boleh mengkonduksikan elektrik?
Explain how copper metal in its solid state can conduct electricity?
[5 markah] [5marks]

[2023-JohorPPDTangkak-09] (a) Rajah 7.1 menunjukkan susunan elektron bagi atom unsur X dan unsur Y yang terletak dalam kumpulan yang sama dalam Jadual Berkala Unsur.
Diagram 7.1 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.

	
X	Y

Berdasarkan Rajah 7.1,/ *Based on Diagram 7.1,*

(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.

[2 markah/ 2 marks]

(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 usedin the reaction.
[Jisim atom relatif: O = 16, X = 23; Isi padu molar gas pada keadaan bilik = 24 dm^3 mol^{-1}]
[Relative atomic mass: O = 16, X = 23; Molar volume of gas at room condition = 24 dm^3 mol^{-1}]

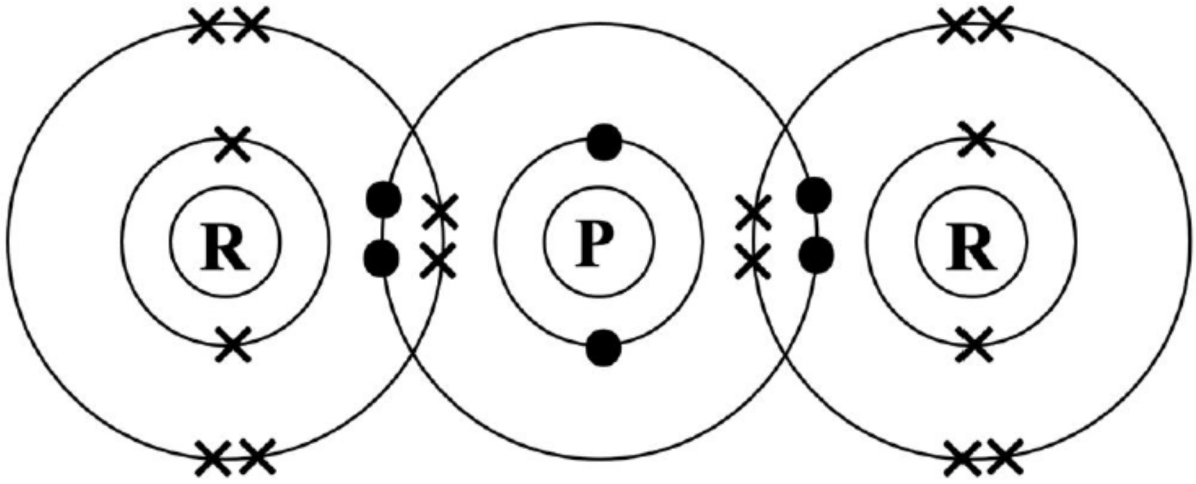
[5 markah/ 5 marks]

(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.

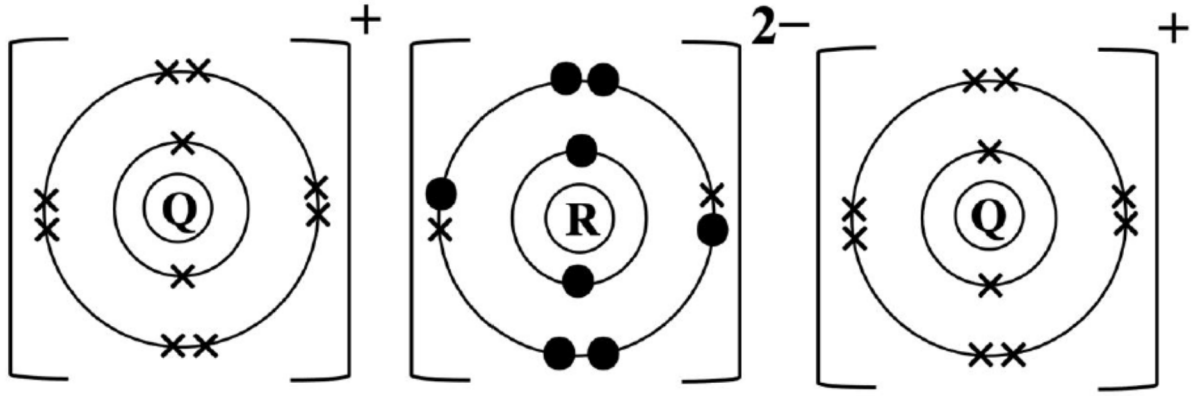
[3 markah/ 3 marks]

(b) Rajah 7.2 menunjukkan susunan elektron bagi sebatian A dan sebatian B.
Diagram 7.2 shows the electron arrangement of compound A and compound B.

Sebatian A/ *Compound* A



Sebatian B/ Compound B



Rajah 7.2/ Diagram 7.2

Berdasarkan Rajah 7.2,/ *Based on Diagram 7.2,*

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

[1 markah/ 1 mark]

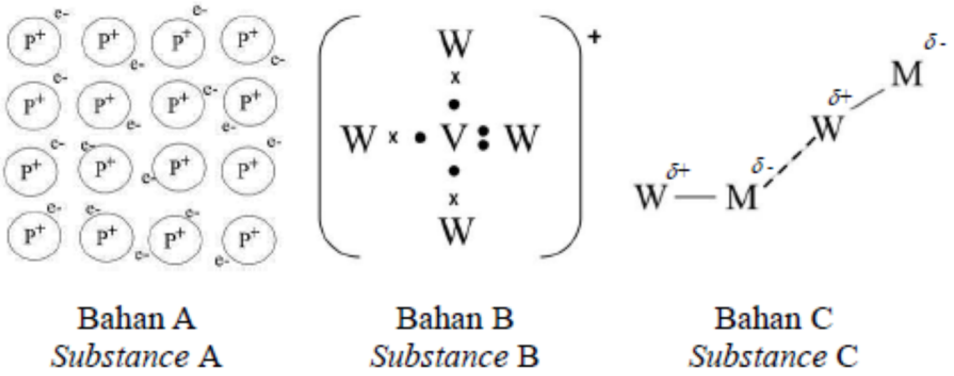
(ii) Unsur R bertindak balas dengan unsur P membentuk sebatian A manakala membentuk sebatian B apabila ia bertindak balas dengan unsur Q. Tentukan jenis ikatan yang terbentuk dalam sebatian A dan sebatian B. Terangkan pembentukan bagi salah satu sebatian sama ada sebatian A atau sebatian B.
Element R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

[7 markah/ 7 marks]

(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.

[2 markah/ 2 marks]

[2023-MRSM-10c] (c) Rajah 8.2 menunjukkan struktur bagi bahan A, B, dan C.
Diagram 8.2 shows a structure of substance A, B and C.



Rajah 8.2/ Diagram 8.2

Kenalpasti jenis ikatan kimia dalam bahan A, B dan C.
Bandingkan kekonduksian elektrik di antara bahan A dan bahan C.
Terangkan jawapan anda.
Identify the type of chemical bond in substance A, B and C.
Compare the electrical conductivity between substance A and substance C.
Explain your answer.

[6 markah]

(d) Jadual 4 menunjukkan ciri-ciri unsur Y yang boleh dihasilkan melalui proses elektrolisis.
Table 4 shows the characteristics of element Y that can be produced through an electrolysis.

□ Bertindak balas dengan air menghasilkan larutan yang menukarkan warna kertas litmus biru ke merah dan dilunturkan. *Reacts with water to produce solution that turns blue litmus paper to red and bleached.*
□ Boleh menukarkan warna hijau larutan ferum(II) sulfat ke perang. *Can change the green iron(II) sulphate solution to brown.*
□ Larut dalam 1,1,1-trikloroetana membentuk lapisan perang. *Dissolve in 1,1,1-trichloroethane to form a brown layer.*

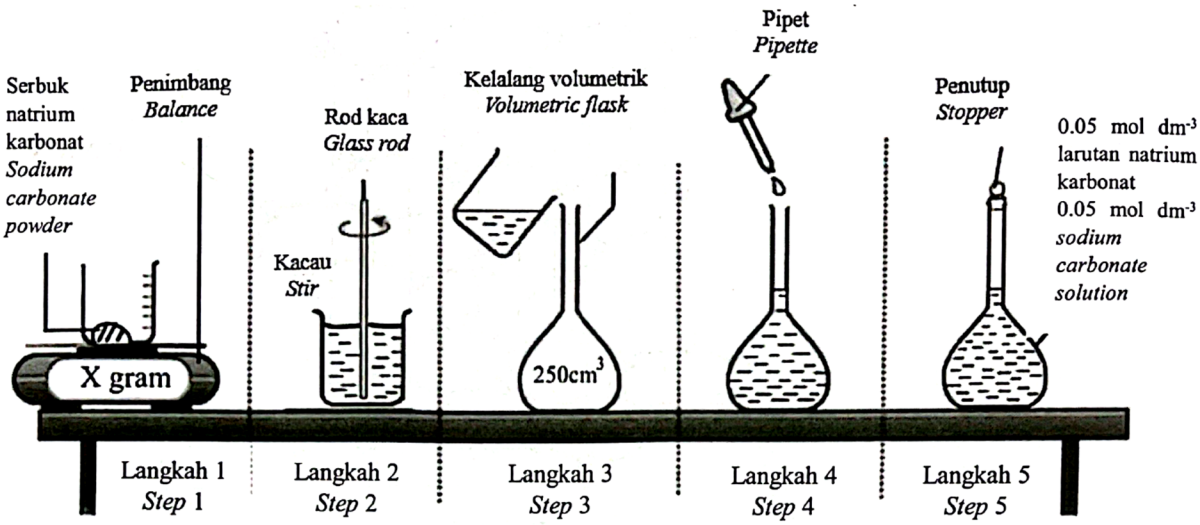
Jadual 4/ Table 4

Dengan menggunakan bahan dan radas yang sesuai, huraikan secara ringkas bagaimana unsur Y boleh dihasilkan di dalam makmal sekolah anda.
By using suitable materials and apparatus, describe briefly how element Y can be produced in your school laboratory.

[4 markah]

Bab 6 Asid, Bes dan Garam

[2023-NegeriSembilan-03] Rajah 3 menunjukkan langkah-langkah yang diambil bagi menyediakan satu larutan piawai natrium karbonat.
Diagram 3 shows the steps taken for preparing a standard solution of sodium carbonate.



Rajah 3/ Diagram 3

(a) Apakah maksud larutan piawai?
What is the meaning of standard solution?

.....

..... [1M]

(b) Berikan satu sebab mengapakah kaedah ini tidak sesuai digunakan bagi menyediakan larutan piawai natrium hidroksida.
Give one reason on why is this method not suitable to prepare standard solution of sodium hydroxide.

..... [1M]

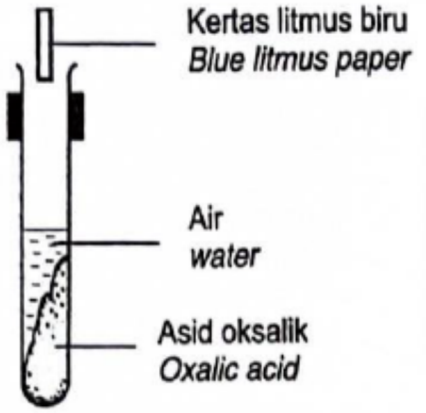
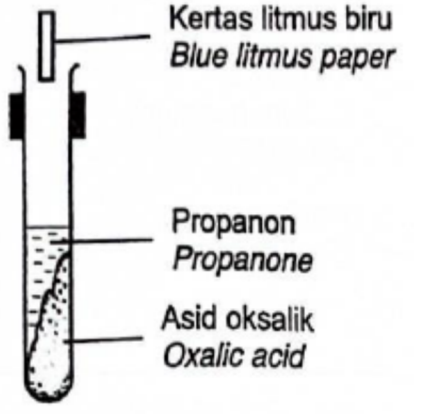
(c) Hitungkan nilai X dalam gram bagi serbuk natrium karbonat yang digunakan bagi menyediakan larutan piawai tersebut.
Calculate the value of X in gram for sodium carbonate powder used to prepare the standard solution.
[Jisim atom relative/ Relative atomic mass: C=12; 0=16; Na=23]

[2M]

(d) Tuliskan persamaan kimia seimbang jika pentitratan dilakukan dengan menggunakan larutan natrium karbonat dan asid hidroklorik.
Write a balanced chemical equation if titration is carried out using sodium carbonate solution and hydrochloric acid.

..... [2M]

[2023-TerengganuMPP3-07] (a) Rajah 7.1 menunjukkan susunan radas yang digunakan dalam eksperimen untuk mengkaji sifat keasidan asid oksalik.
Diagram 7.1 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) Namakan ion yang bertanggungjawab untuk menunjukkan sifat keasidan suatu asid.
Name the ion that is responsible to show the acidic properties of an acid.

..... [1M]

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

.....

.....

..... [2M]

(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 7(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 7(b)(i), write a balanced chemical equation for the neutralisation reaction. Next, determine the concentration of acid A.

.....

[3M]

(c) Rajah 7.2 menunjukkan Sarah telah disengat oleh seekor lebah di lengannya semasa berada di kawasan rumahnya.
Diagram 7.2 shows Sarah was stung by a bee on her arm while in her home area.

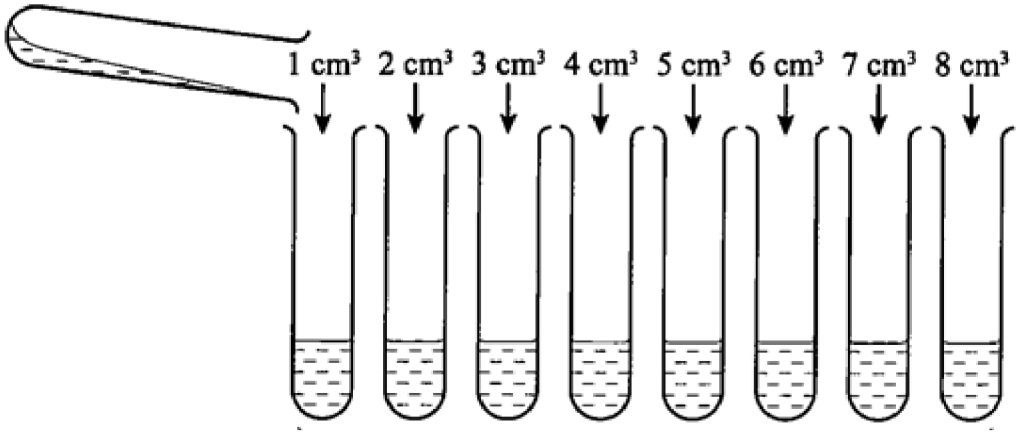
Cadangkan apakah bahan yang ada di rumah Sarah yang boleh digunakan untuk rawatan awal. Wajarkan penggunaan bahan tersebut.
Suggest what materials Sarah has at home that can be used for initial treatment. Justify the use of the material.

.....

.....

..... [2M]

[2023-JohorSkudai-05] Rajah 5 di bawah menunjukkan eksperimen yang telah dijalankan oleh Mee Ling di sekolahnya untuk membina persamaan ion garam yang tidak larut dengan menggunakan kaedah perubahan berterusan.
Diagram 5 below is the experiment carried out by Mee Ling in her school to construct ionic equation of insoluble salt by using continuous variation method.



Rajah 5/ Diagram 5

Berdasarkan maklumat di atas./ *Based on the information above.*

(a) Berikan maksud garam./ *Give the meaning of salt.*

.....

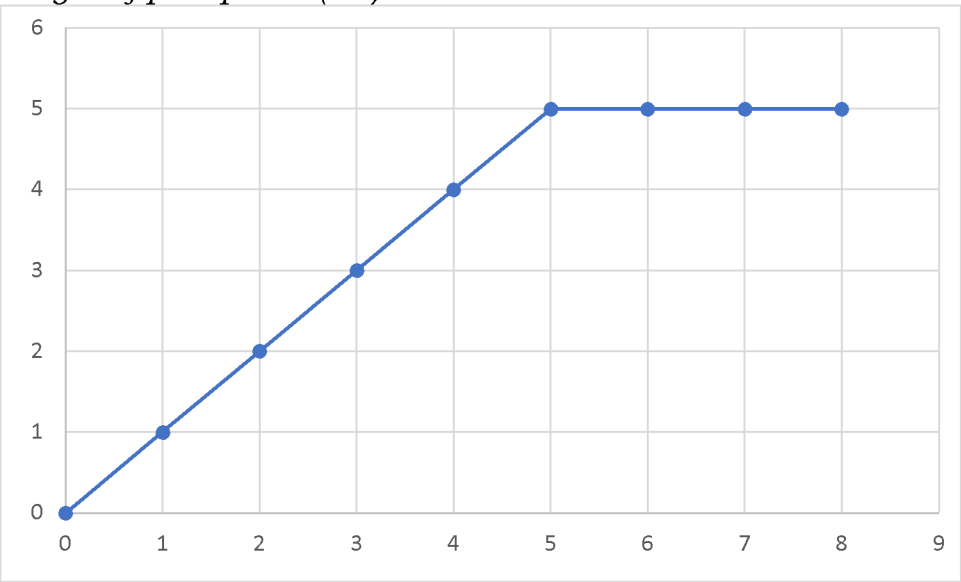
..... [1M]

(b) Kirakan bilangan mol 5 cm^3 dari 0.5 mol dm^{-3} larutan plumbum(II) nitrat.
Calculate the number of mol 5 cm^3 of 0.5 moldm^{-3} lead (II) nitrate solution.

[1M]

(c) Graf di bawah menunjukkan ketinggian mendakan melawan isipadu larutan kalium iodida yang telah dimasukkan.
Graph below show the height of precipitate against volume of potassium iodide solution that added.

Ketinggian mendakan (cm)
Height of precipitate (cm)



Isipadu larutan kalium iodida
Volume of potassium iodide solution(cm^3)

(i) Apakah isipadu larutan kalium iodide yang diperlukan untuk tindak balas yang lengkap Larutan plumbum(II) nitrat?
What is volume of potassium iodide solution needed for complete reaction with lead(II) nitrate solution?

..... [1M]

(i) Kirakan bilangan mol larutan kalium iodide yang telah bertindak balas dengan 0.5 mol dm^{-3} larutan plumbum(II) nitrat. Kemudian kirakan bilangan mol ion iodide, I- yang bertindak balas lengkap dengan 1 mol ion plumbum, Pb^{2+}
Calculate number of mole of potassium iodide that reacted with 0.5 mol dm^{-3} lead(II) nitrate solution. Then calculate number of mole iodide ion,I- that completely reacted with 1 mol lead ion, Pb^{2+}

[3M]

(e) State the one similarities and differences of lead(II) Iodide and lead(II) Chloride.
Nyatakan satu persamaan dan perbezaan plumbum(II) iodide dan plumbum(II) klorida.

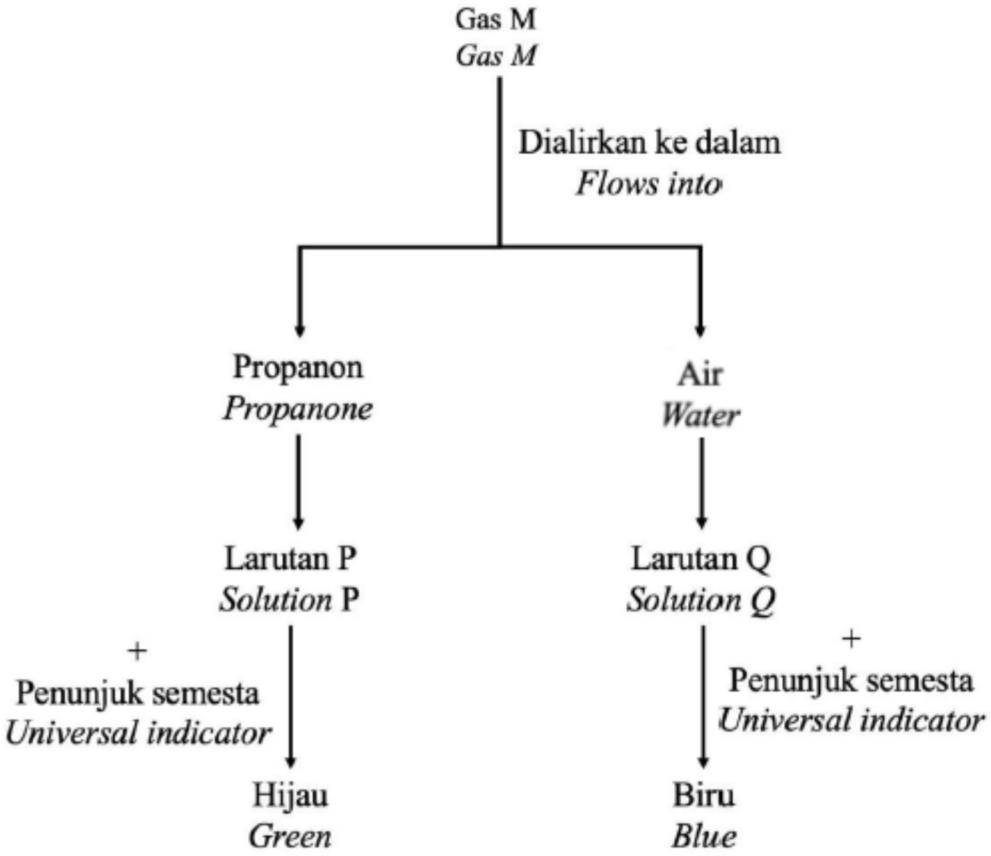
.....

.....

..... [2M]

Esei/ Essay

[2023-MRSM-11] (a) Rajah 9.1 menunjukkan carta alir untuk mengkaji sifat gas M.
Diagram 9.1 shows a flow chart to investigate the property of gas M.

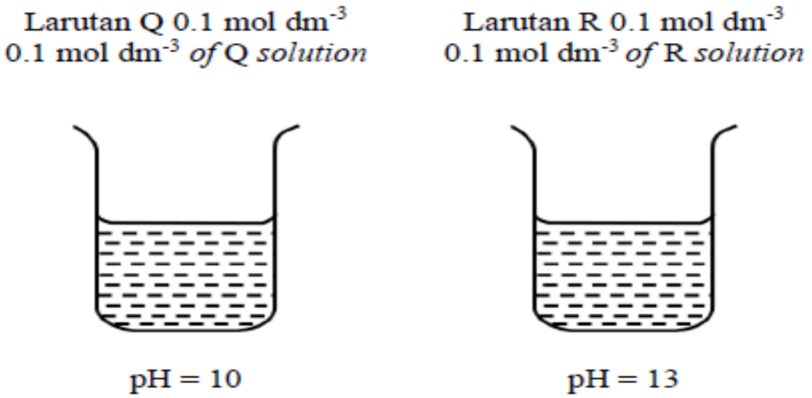


Rajah 9.1/ *Diagram* 9.1

Berdasarkan Rajah 9.1, terangkan perbezaan pemerhatian bagi larutan P dan larutan Q setelah dimasukkan penunjuk semesta.
Based on Diagram 9.1, explain the difference in the observation in solution P and solution Q after universal indicator was added.

[5 markah]

(b) Rajah 9.2 menunjukkan nilai pH bagi alkali Q dan R.
Diagram 9.2 shows the pH value of the alkali Q and R.



Rajah 9.2 /Diagram 9.2

Cadangkan nama bagi alkali Q dan R. Terangkan perbezaan antara nilai pH bagi kedua-dua alkali.
Suggest the name of Q and R alkali. Explain the difference of the pH value between the two alkalis.

[5 markah]

(c) Garam natrium sulfit, Na_2SO_3 ditambahkan ke dalam buah-buahan kering dan minuman sebagai bahan pengawet dalam industri makanan. Pengambilan bahan berkenaan dalam kuantiti yang banyak akan menyebabkan kesan kerengsaan kulit dan asma.
Sodium sulphite, Na_2SO_3 salt is added to dry food and beverages as food preservatives. Excessive intake will cause skin irritation and asthma.

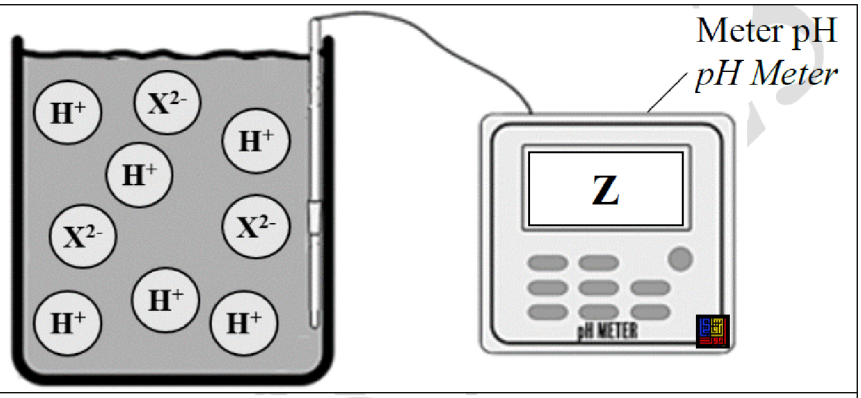
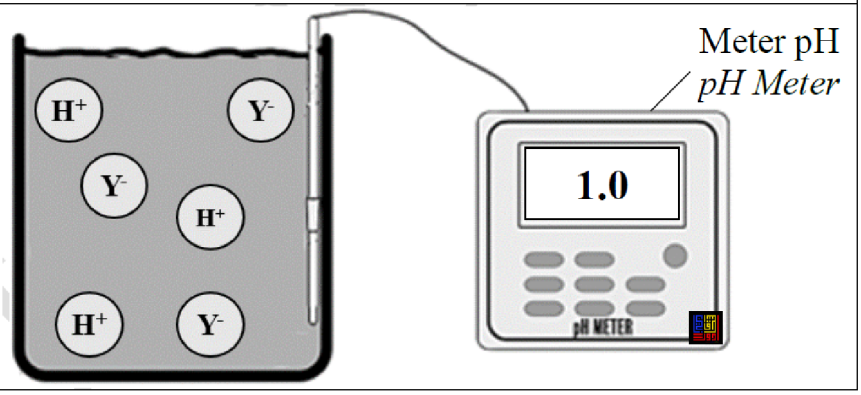
(i) Nyatakan maksud garam. Pada pendapat anda, adakah garam ini boleh digunakan secara meluas dalam industri makanan dan minuman? Wajarkan jawapan anda.
State the meaning of salt. In your opinion, should the salt be used widely in food and beverages industry? Justify your answer.

[4 markah]

(ii) Pemanasan garam natrium sulfit, Na_2SO_3 dalam medium berasid akan membebaskan sejenis gas yang menukarkan kertas litmus biru lembap kepada merah.
Dengan bantuan gambar rajah berlabel, huraikan kaedah yang boleh digunakan untuk menentukan identiti gas yang terbebas.
The heating of sodium sulphite, Na_2SO_3 in acidic medium will release a gas that change moist blue litmus paper to red .
With an aid of a label diagram, describe a method that can be used to confirm the identity of the gas released.

[6 markah]

[2023-JUJ-Set01-11] (a) Rajah 11.1 menunjukkan nilai pH bagi dua jenis asid, asid X dan asid Y di dalam bikar I dan bikar II. Kedua-dua asid mempunyai isipadu dan kepekatan yang sama.
Diagram 11.1 shows the pH value for two types of acids, Acid X and Acid Y in beaker I and beaker II. Both acids have same volume and concentration.

Asid X di dalam bikar I *Acid X in beaker I*	
Asid Y di dalam bikar II *Acid Y in beaker II*	

Rajah 11.1 / *Diagram* 11.1

(i) Apakah yang dimaksudkan dengan pH?
What is meant by pH?

[1 markah/1 mark]

(ii) Berdasarkan maklumat di dalam Rajah 11.1, tentukan kemolaran bagi asid Y. Nilai pH bagi asid X iaitu Z lebih rendah berbanding nilai pH asid Y, cadangkan nama bagi asid X dan terangkan perbezaan nilai pH bagi asid X dan asid Y.
Based on the information in Diagram 11.1, determine the molarity of acid Y. The pH value of acid X which is Z is lower than the pH value of acid Y, suggest the name of acid X and explain the difference in pH value for acid X and acid Y.

[5 markah/5 marks]

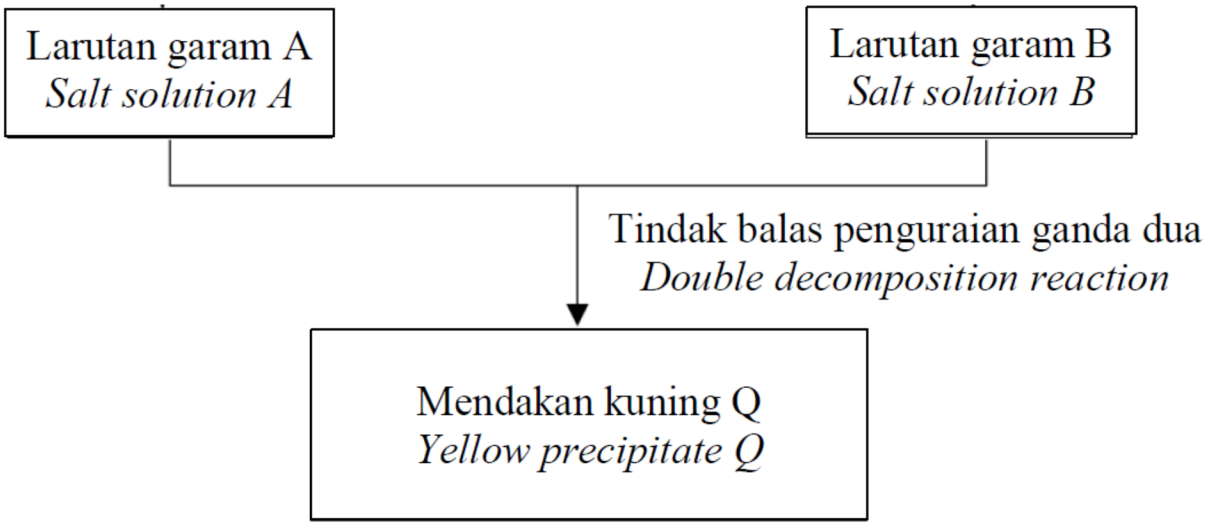
(iii) Cikgu Aini meminta kamu menyediakan 250 cm^3 larutan asid X dengan kepekatan 0.05 mol dm^{-3} untuk menjalankan satu eksperimen. Tentukan isipadu asid X yang perlu dipipetkan ke dalam kelalang volumetrik untuk menyediakan larutan tersebut.
Cikgu Aini asks you to prepare 250 cm^3 of acid X solution with a concentration of 0.05 mol dm^{-3} to conduct an experiment. Determine the volume of acid X that needs to be pipetted into the volumetric flask to prepare the solution.

[2 markah/2 marks]

Rajah 11.2 / Diagram 11.2

(b) Rajah 11.2 menunjukkan dua jenis baja. Pak Ali bercadang membeli baja untuk menyuburkan sayur-sayuran di kebunnya. Cadangkan kepada Pak Ali baja yang manakah lebih baik untuk dipilih dan jelaskan sebab mengapa Pak Ali perlu membeli baja tersebut.
[Jisim Atom Relatif: N=14, H= 1, S= 32, O= 16]
Diagram 11.2 shows two types of fertilizers. Pak Ali plans to buy fertilizer to fertilize the vegetables in his farm. Suggest to Pak Ali which fertilizer is better to be chosen and explain the reason why Pak Ali should buy that fertilizer.
[Relative Atomic Mass: N= 1, H= 1, S=32, O= 16]

[4 markah/4 marks]



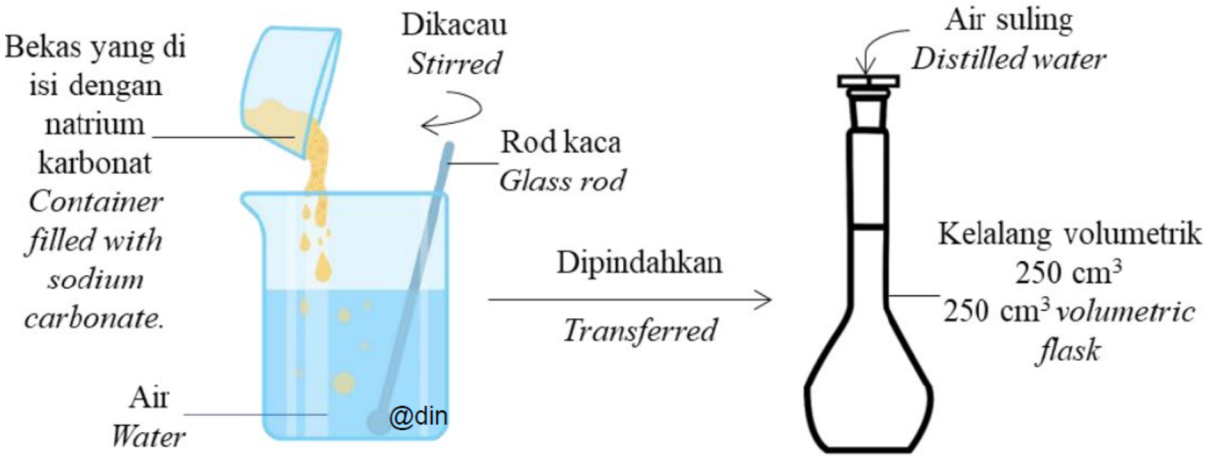
Rajah 11.3 / Diagram 11.3

(c) Rajah 11.3 menunjukkan pembentukan mendakan kuning Q daripada satu tindak balas penguraian ganda dua. Cadangkan mendakan kuning Q. Dengan menggunakan larutan garam A dan larutan garam B yang sesuai, huraikan bagaimana anda dapat menyediakan mendakan kuning Q di dalam makmal. Dalam huraian anda, sertakan persamaan ion bagi pembentukan mendakan kuning Q.

Diagram 11.3 shows the formation of yellow precipitate Q from a double decomposition reaction. Suggest yellow precipitate Q. Using the suitable salt solution A and salt solution B, describe how you could prepare the yellow precipitate Q in the laboratory. In your description, include the ionic equation for the formation of yellow precipitate Q.

[8 markah/8 marks]

[2023-Melaka-11] (a) Seorang pelajar meyediakan satu larutan piawai menggunakan natrium karbonat seperti yang ditunjukkan dalam Rajah 9.1.
A student prepared a standard solution using sodium carbonate as shown in Diagram 9.1



Rajah 9.1/ Diagram 9.1

Setelah natrium karbonat dilarutkan, pelajar itu memindahkan larutan yang terhasil ke dalam kelalang volumetrik. Bekas yang diisi natrium karbonat dan bikar itu dibilas beberapa kali dengan air suling dan dituang ke dalam kelalang volumetrik.
After the sodium carbonate is dissolved, the student transferred the solution into the volumetric flask. The container filled with sodium carbonate and the beaker is rinsed a few times with distilled water and poured into the volumetric flask.

(i) Apakah yang dimaksudkan dengan larutan piawai?
Mengapakah pelajar itu membilas bekas yang di isi dengan natrium karbonat dan bikar itu dengan air suling?
Kenalpasti anion yang terdapat dalam larutan piawai yang terhasil.
What is meant by standard solution?
Why did the student rinse the container filled with sodium carbonate and the beaker with distilled water?

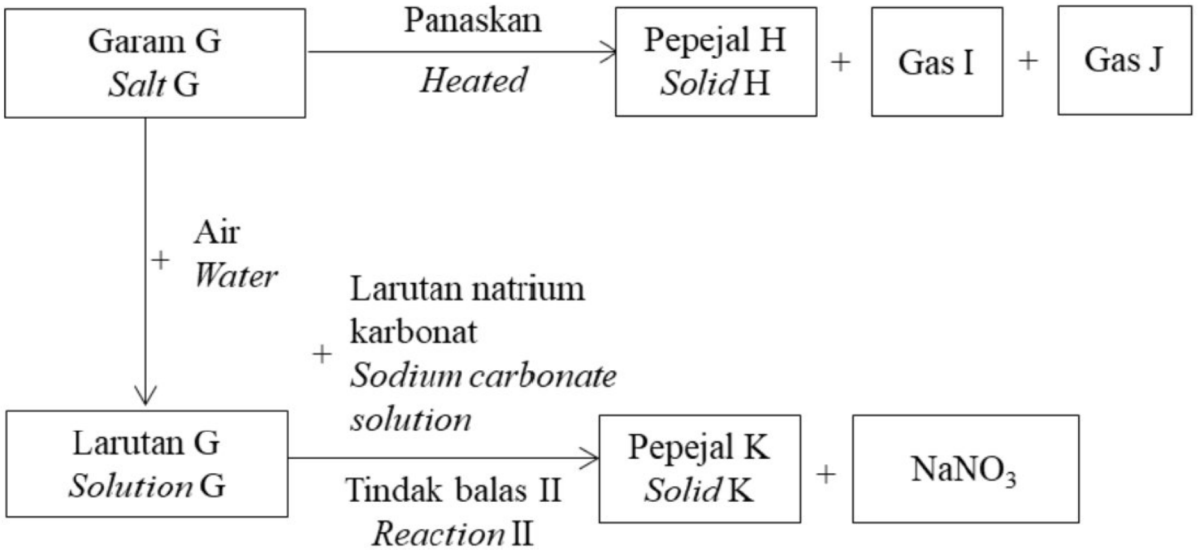
Identify the anion present in the standard solution formed.

[3 markah/ marks]

(ii) Berdasarkan Rajah 9.1, hitungkan kepekatan larutan piawai yang disediakan oleh pelajar itu sekiranya 53 g natrium karbonat dilarutkan dan dituang ke dalam kelalang volumetrik itu.
[Jisim relatif natrium karbonat = 106]
Based on Diagram 9.1, calculate the concentration of the standard solution prepared by the student if 53 g of sodium carbonate is dissolved and poured into the volumetric flask.
[Relative mass of sodium carbonate = 106]

[2 markah/ marks]

(iii) Rajah 9.2 menunjukkan satu carta alir bagi tindak balas yang berlaku apabila garam G dipanaskan. Larutan natrium karbonat dalam Rajah 9.1 telah digunakan dalam Tindak balas II untuk menghasilkan pepejal K.
Diagram 9.2 shows a flow chart for the reactions occurred when salt G is heated. Sodium carbonate solution in Diagram 9.1 is used for Reaction II to produce solid K.



Rajah 9.2 /Diagram 9.2

Pepejal H yang terhasil bertukar daripada perang ke kuning setelah disejukkan, dan gas I yang terbebas berwarna perang.
Berdasarkan Rajah 9.2, kenal pasti garam G, pepejal H, gas I, gas J dan pepejal K. Tuliskan persamaan kimia bagi T indak balas II.
Solid H produced turns from brown to yellow when cooled, and gas I released is brown in colour.
Based on Diagram 9.2 identify salt G, solid H, gas I, gas J, and solid K. Write the chemical equation for Reaction II.

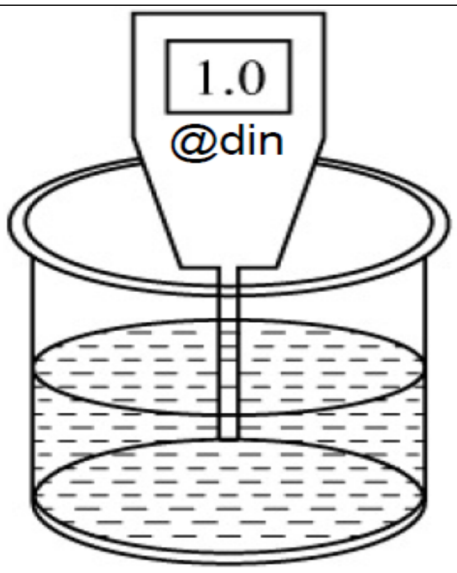
(b) Seorang pelajar telah mendapati natrium karbonat yang digunakannya telah tertumpah dan bercampur dengan X karbonat. Rajah 9.3 menunjukkan campuran yang terhasil.
A student found that the sodium carbonate that he used was spilled and mixed with X carbonate. Diagram 9.3 shows the mixture produced.

Rajah 9.3 / Diagram 9.3

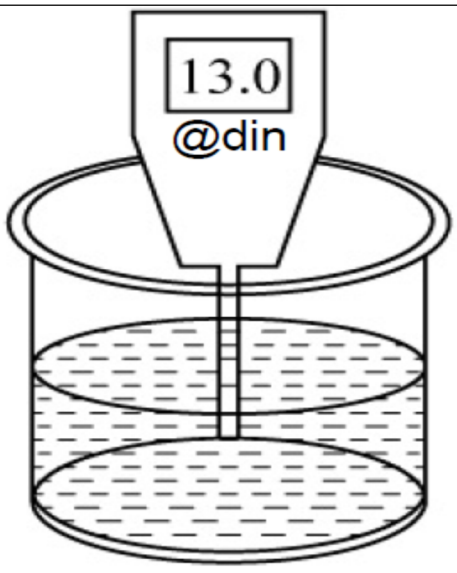
Huraikan kaedah yang boleh diambil oleh pelajar itu untuk mengasingkan kedua- dua garam karbonat itu. Huraikan juga bagaimana pelajar itu dapat mengesahkan kehadiran kation X di dalam garam itu.
Describe a method that could be taken by the student to separate the two carbonate salts. Describe also, how the student could verify the presence of cation X in the salt.

[8 markah/ marks]

[2023-Selangor-Set01-09] (a) Rajah 9.1 menunjukkan dua bikar yang mengandungi larutan X dan larutan Y 0.1 mol dm^{-3} dengan nilai pH masing-masing.
Diagram 9.1 shows two beakers containing 0.1 mol dm^{-3} solution X and solution Y with their respective pH values.



larutan X / *Solution X*



larutan Y / *Solution Y*

Rajah 9.1/ Diagram 9.1

(i) Terangkan perbezaan dalam nilai pH bagi larutan X dan larutan Y.
Explain the difference in the pi 1 value of solution X and solution Y.

[2 markah] [2 marks]

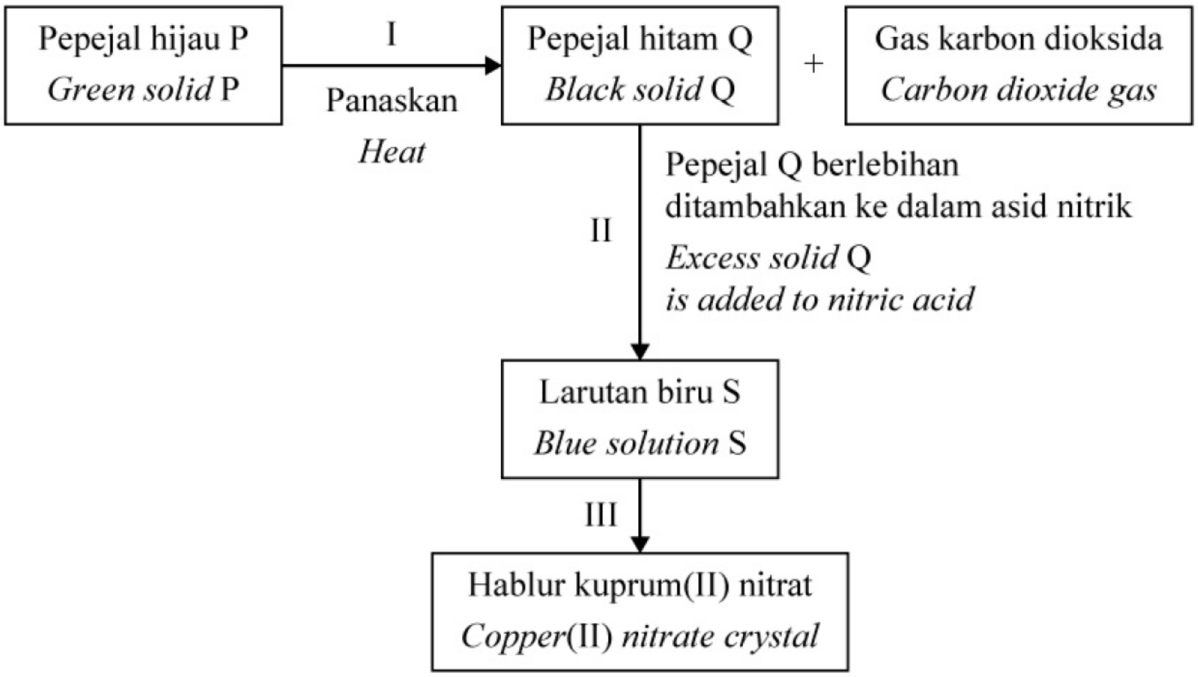
(ii) Berikan satu contoh yang sesuai bagi larutan X dan larutan Y.
Give one suitable example for both solution X and solution Y.

[2 markah] [2 marks]

(iii) Berdasarkan jawapan anda di 9(r/)(ii). nyatakan satu sifat kimia bagi larutan X dan larutan Y. Dalam jawapan anda, sertakan persamaan kimia yang terlibat.
Based on your answer in 9(a)(ii), state one chemical properties for both solution X and solution Y. In your answer, include the chemical equations involved.

[4 markah] [4 marks]

(b) Rajah 9.2 menunjukkan satu siri tindak balas untuk menyediakan hablur kuprum(II) nitrat.
Diagram 9.2 shows a series of reactions to prepare copper(II) nitrate crystal.



Rajah 9.2/ Diagram 9.2

(i) Namakan pepejal P dan Q.
Name solid P and Q.

[2 markah] [2 marks]

(ii) Lukis gambar rajah berlabel untuk menunjukkan susunan radas yang boleh digunakan untuk menghasilkan pepejal Q dan mengesahkan kehadiran gas karbon dioksida dalam langkah I.
Draw a labelled diagram to show the apparatus set-up that can be used to produce solid Q and confirm the presence of carbon dioxide gas in step I.

[2 markah] [2 marks]

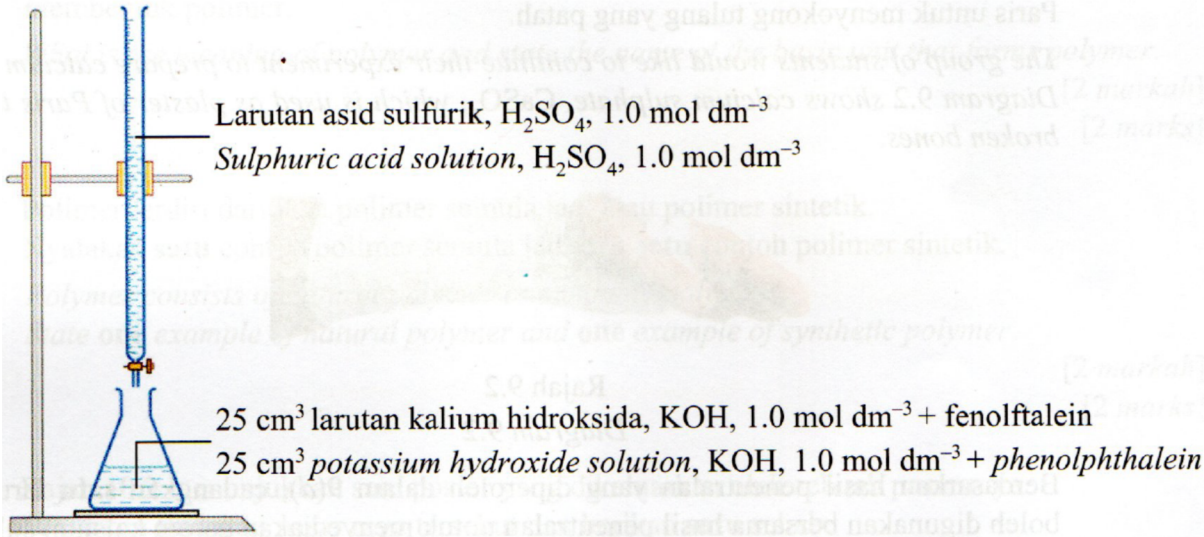
(iii) Tulis persamaan kimia seimbang bagi tindak balas apabila pepejal P dipanaskan.
Write a balanced chemical equation for the reaction when solid P is heated.
[2 markah] [2 marks]

(iv) Hitung isi padu gas karbon dioksida yang terbebas pada suhu bilik jika 0.3 mol pepejal P dipanaskan.
[Jisim molar P = 124 g mol^{-1}; 1 mol gas menempati 24 dm^3 pada keadaan bilik]
Calculate the volume of carbon dioxide gas released at room temperature if 0.3 mol of solid P is heated.
[Molar mass of P = 124 g mol^{-1}; 1 mol of gas occupies 24 dm^3 at room conditions]
[2 markah] [2 marks]

(v) Mengapakah pepejal Q berlebihan ditambah kepada asid nitrik yang dipanaskan dalam langkah II?
Why is excess solid Q added to the heated nitric acid in step II?
[1 markah] [1 mark]

(vi) Sebagai seorang pelajar kimia. terangkan bagaimana anda dapat menjalankan aktiviti langkah III.
As a chemistry student, explain how you would carry out activity of step III.
[3 markah] [3 marks]

[2023-Selangor-Set02-09] Rajah 9.1 menunjukkan susunan radas suatu eksperimen yang dijalankan oleh sekumpulan murid di makmal untuk menentukan takat akhir pentitratan antara asid sulfurik dan larutan kalium hidroksida.
Diagram 9.1 shows an experiment apparatus set-up which carried out by a group of students in laboratory to determine the end point of titration between sulphuric acid and potassium hydroxide solution.



Rajah 9.1/Diagram 9.1

Berdasarkan Rajah 9.1,/ *Based on Diagram 9.1,*

(a) nyatakan maksud takat akhir dan nama tindak balas.
state the meaning of end point and name of the reaction.

[2 markah] [2 marks]

(b) terangkan mengapa fenolftalein ditambahkan ke dalam larutan kalium hidroksida dalam eksperimen ini dan nyatakan perubahan warna campuran itu pada takat akhir.
explain why phenolphthalein is added into the potassium hydroxide solution in this experiment and state the colour change of the mixture at the end point.

[2 markah] [2 marks]

(c) Hitungkan nilai pH bagi larutan asid sulfurik.
Calculate the pH value for sulphuric acid solution.

[2 markah] [2 marks]

(d) Tuliskan persamaan kimia bagi tindak balas itu dan hitungkan isi padu asid sulfurik yang perlu ditambahkan ke dalam kelalang kon untuk mencapai takat akhir.
Write the chemical equation for the reaction and calculate the volume of sulphuric acid which has to be added into conical flask to achieve the end point.

[5 markah] [5 marks]

(e) Kumpulan murid tersebut ingin meneruskan eksperimen mereka untuk menyediakan kalsium sulfat. Rajah 9.2 menunjukkan kalsium sulfat. $CaSO_4$ digunakan sebagai plaster Paris untuk menyokong tulang yang patah.
The group of students would like to continue their experiment to prepare calcium sulphate. Diagram 9.2 shows calcium sulphate, $CaSO_4$, which is used as plaster of Paris to support broken bones.

Rajah 9.2/ *Diagram 9.2*

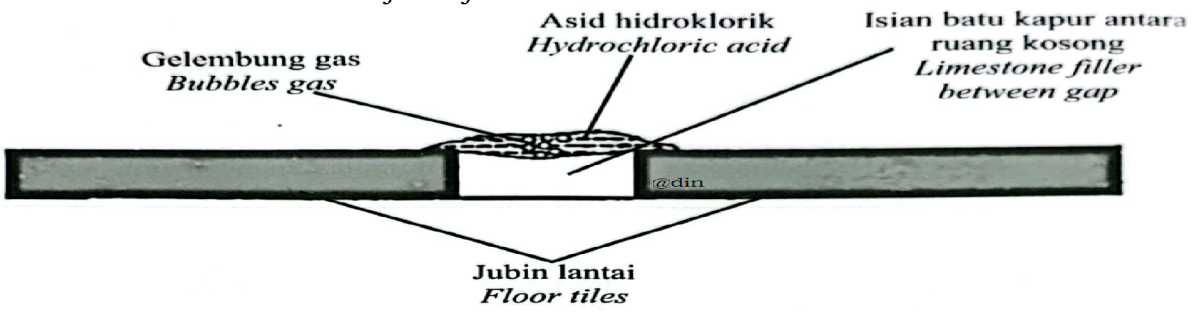
Berdasarkan hasil peneutralan yang diperoleh dalam 9(d), cadangkan satu larutan yang boleh digunakan bersama hasil peneutralan untuk menyediakan garam kalsium sulfat.

Based on the product from the neutralization in 9(d), suggest one solution which can be used together with the neutralisation product to prepare the calcium sulphate salt.

Huraikan secara ringkas langkah penyediaan kalsium sulfat di makmal.
Dalam huraian anda, sertakan:
Describe briefly the steps of preparation of calcium sulphate in laboratory.
In your description, include:

- Prosedur/ *Procedures*
- Pemerhatian/ *Observations*
- Persamaan ion/ *Ionic equation*

[2023-SBP-09] (a) Seorang murid secara tidak sengaja tertumpah asid hidroklorik di atas lantai makmal. Rajah 9.1 menunjukkan keadaan lantai tersebut.
A student accidently spilled hydrochloric acid on the laboratory floor. Diagram 9.1 shows the condition of the floor.



Rajah/ Diagram 9.1

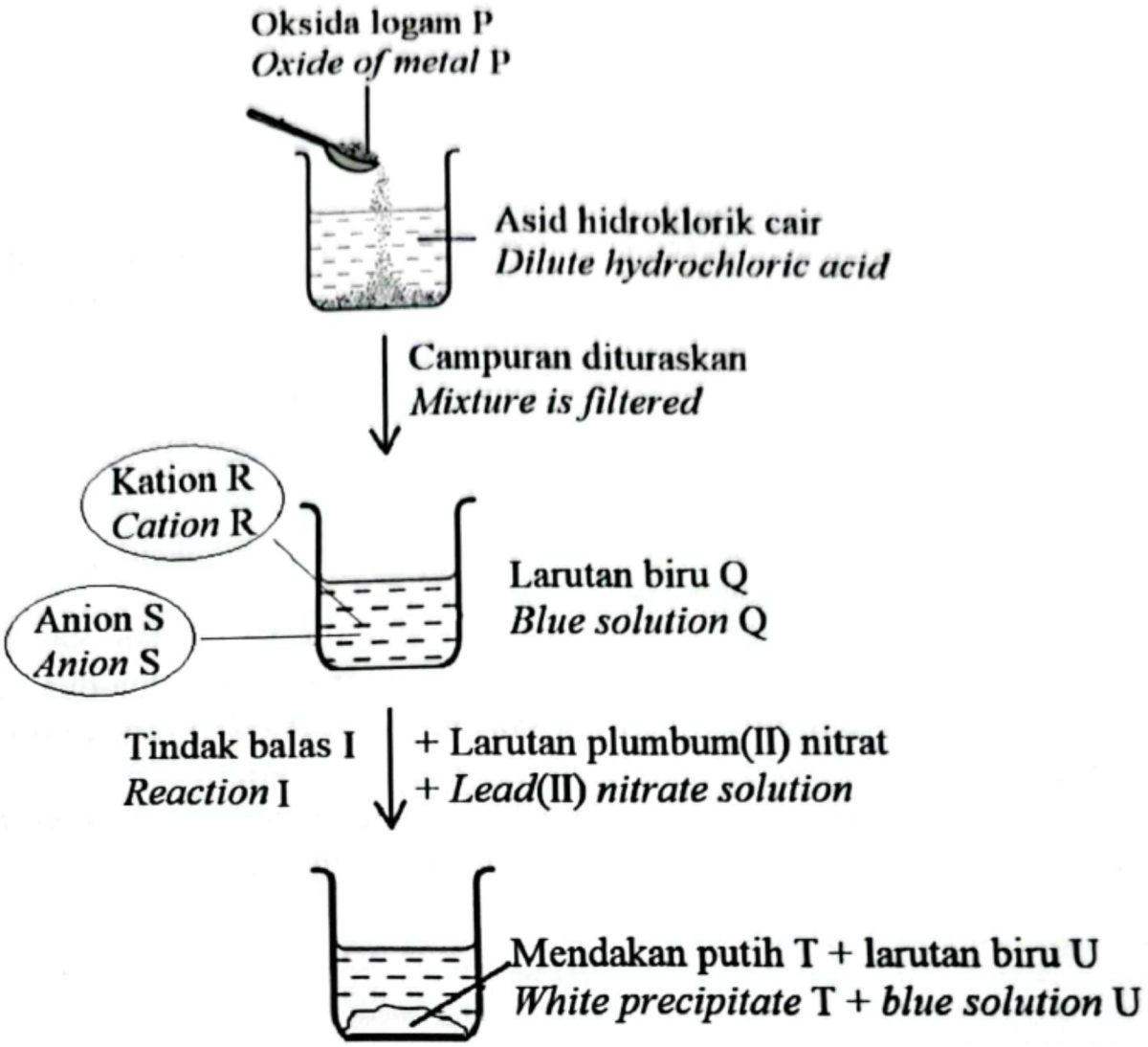
Nyatakan jenis asid bagi asid hidroklorik.
Berdasarkan Rajah 9.1, terangkan pemerhatian yang diperoleh.
State the type of acidfor hydrochloric acid.
Based on Diagram 9.1, explain the observation obtained.

[3 markah/ marks]

(b) Dalam satu eksperimen yang lain, 25 cm3 asid diprotik, H_2X bertindak balas dengan 50 cm^3 larutan kalium hidroksida 0.01 mol dm^{-3}.
Tuliskan persamaan kimia bagi tindak balas tersebut dan tentukan kepekatan dan nilai pH asid yang digunakan.
In another experiment, 25 cm^3 of diprotic acid, H_2X reacts with 50 cm^3 of 0.1 mol dm^{-3} potassium hydroxide solution. Write a chemical equation for the reaction and determine the concentration and pH value of the acid used.

[7 markah/ marks]

(c) Rajah 9.2 menunjukkan aliran tindak balas yang berlaku ke atas oksida logam P.
Diagram 9.2 shows a flow of reactions that occur on oxide of metal P.

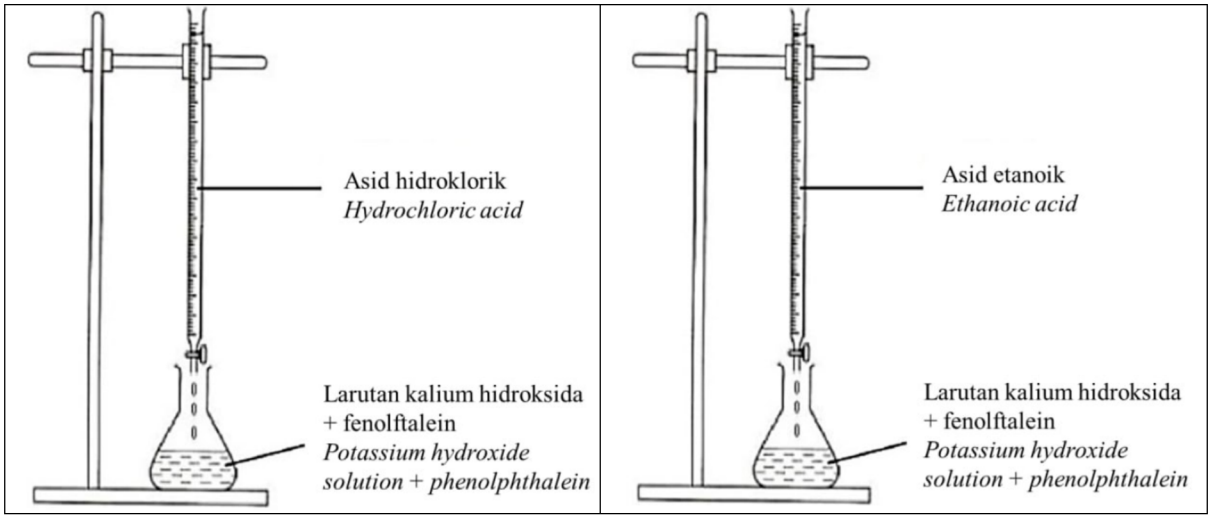


Rajah/ Diagram 9.2

Berdasarkan Rajah 9.2, kenal pasti nama tindak balas I, oksida logam P, mendakan putih T dan larutan biru U. Huraikan ujian kimia untuk mengesahkan anion S dan kation R.
Based on Diagram 9.2, identify name of reaction I, oxide metal P, white precipitate T and blue solution U.
Describe a chemical test to verify the anion S and cation R.

[10 markah/ marks]

[2023-JUJ-Set02-09] (a) Rajah 9.1 menunjukkan satu tindak balas peneutralan antara asid dan larutan kalium hidroksida untuk menentukan takat akhir peneutralan. Set A dan set B menggunakan jenis asid yang berbeza.
Diagram 9.1 shows a neutralisation reaction between acid and potassium hydroxide solution to determine the end point of neutralisation. Set A and set B use different types of acid.



Rajah 9.1 / *Diagram* 9.1

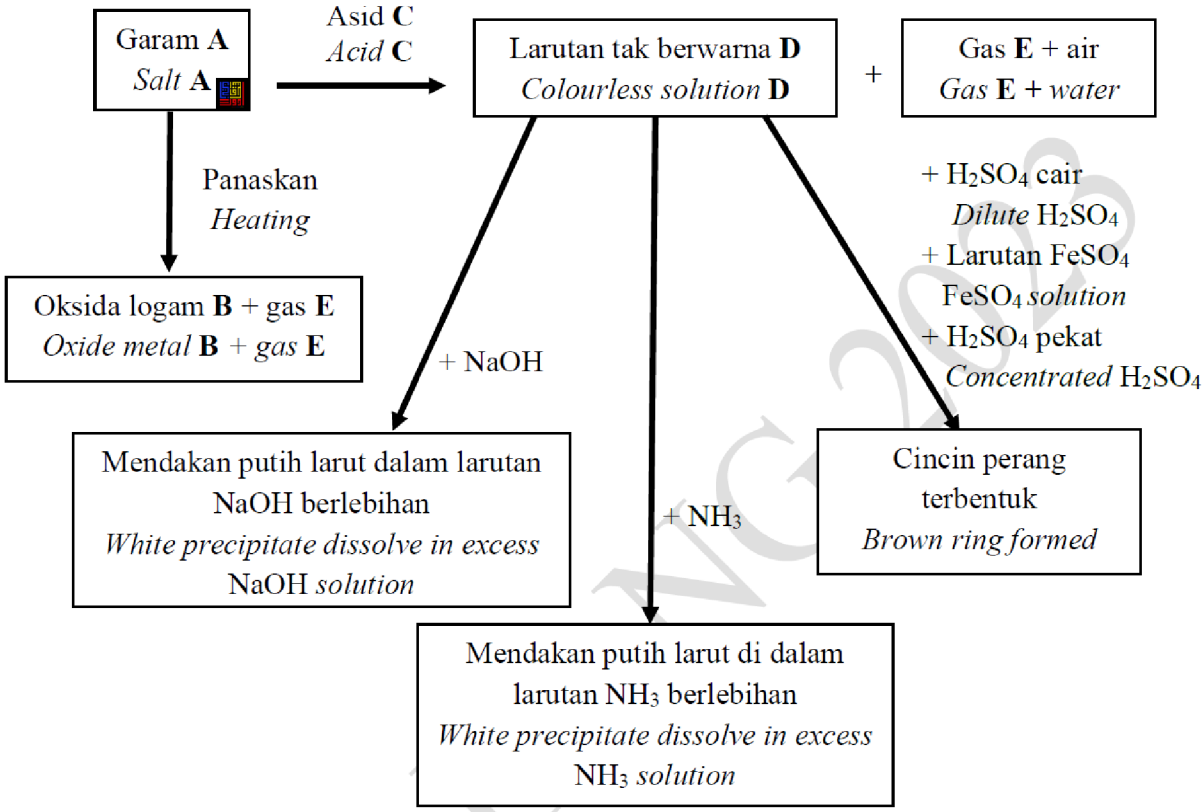
(i) Nyatakan maksud asid kuat dan perubahan warna fenolftalein apabila mencapai takat akhir peneutralan. Namakan asid lain yang sesuai untuk menggantikan asid hidroklorik dalam set A. Terangkan mengapa.
State the meaning of strong acid and the colour changes of phenolphthalein when reaching the end point of neutralisation. Name another suitable acid to replace hydrochloric acid in set A. Explain why.

[4 markah / 4 marks]

(ii) Berdasarkan set A, tuliskan persamaan kimia bagi tindak balas yang berlaku. Hitungkan nilai pH dan isipadu asid hidroklorik 0.5 mol dm^{-3} yang bertindak balas dengan 25 cm^3 larutan kalium hidroksida, 0.5 mol dm^{-3}.
Based on set A, write a chemical equation for the reaction. Calculate the pH value and volume of 0.5 mol dm^{-3} hydrochloric acid that reacted with 25 cm^3 of 0.5 mol dm^{-3} potassium hydroxide solution.

[6 markah / 6 marks]

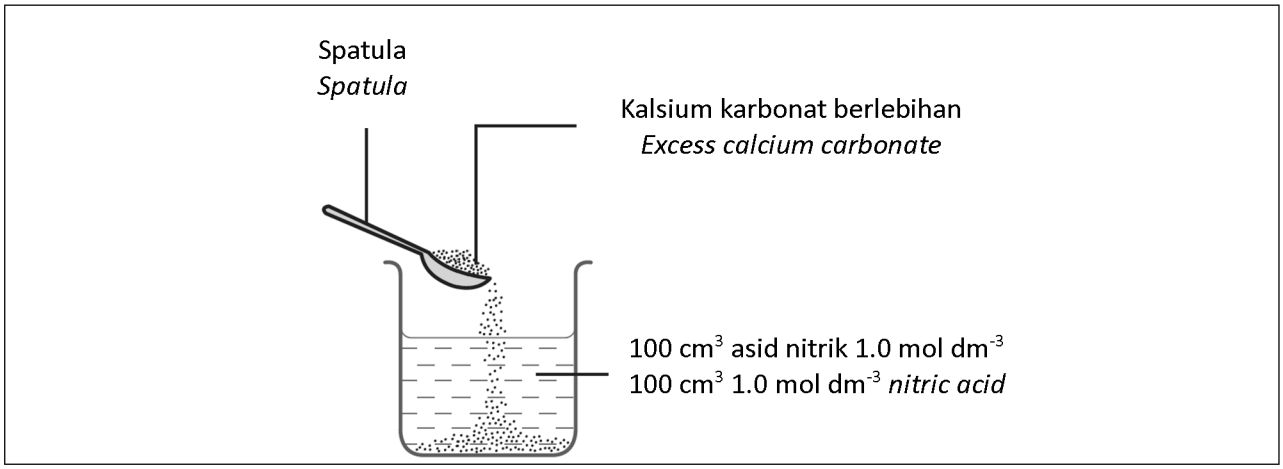
(b) Rajah 9.2 menunjukkan pertukaran garam A kepada larutan D dan pepejal B. Analisis ke atas larutan D dilakukan untuk mengenalpasti kation dan anionnya.
Diagram 9.2 shows the conversion of salt A to solution D and solid B. Analysis on solution D is done to identify its cation dan anion.



(i) Berdasarkan Rajah 9.2, kenalpasti bahan A, B, C, D, dan E. Nyatakan anion di dalam larutan tak berwarna D dan tuliskan formula kimia bagi mendakan putih yang terbentuk. Nyatakan pemerhatian bagi pembentukan logam oksida B dan jelaskan bagaimana gas E dapat dikenalpasti. Based on *Diagram 9.2, identify substance A, B, C, D, and E. State anion in the colourless solution D and write the chemical formula of white precipitate formed. State the observation for the formation of metal oxide B produced and explain how to identify gas E.*

[10 markah / 10 marks]

[2023-Putrajaya-10] Rajah 10.1 menunjukkan satu eksperimen yang dijalankan di dalam makmal.
Diagram 10.1 shows one experiment conducted in the laboratory.



Rajah/ Diagram 10.1

Tindak balas itu menghasilkan larutan S, gas U dan air.
The reaction form solution S, gas U and water.

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

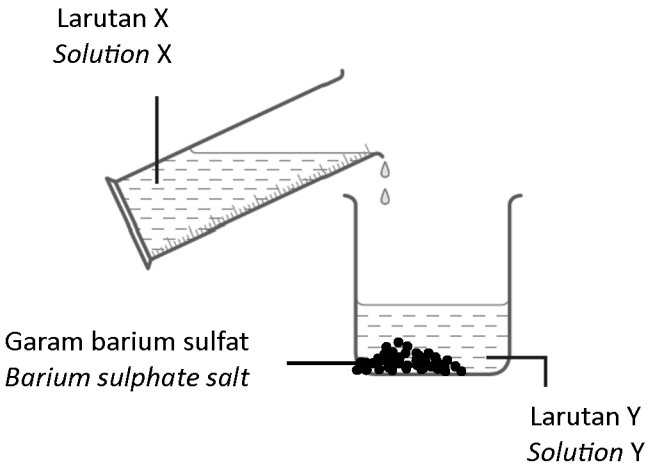
(a)(i) kenalpasti gas U kemudian huraikan satu ujian kimia untuk menentukan kehadiran anion dalam larutan S.
identify gas U then describe a chemical test to determine the presence of anion in solution S.

[5 markah/ mark]

(ii) tuliskan persamaan kimia seimbang untuk tindak balas tersebut dan hitungkan isipadu gas U yang terhasil pada keadaan bilik.
[1 mol sebarang gas menempati 24 dm^3 mol^{-1} pada keadaan bilik]
write the balance chemical equation and calculate the volume of gas U produced at room conditions.
[1 mol of any gas occupies 24 dm^3 mol^{-1} at room condition]

[5 markah/ marks]

(b) Dalam satu eksperimen yang lain, Raju mencampurkan dua larutan akueus berbeza untuk menyediakan garam barium sulfat seperti dalam Rajah 10.2.
In another experiment, Raju is mixing two different aqueous solution to prepare barium sulphate salt as shown in Diagram 10.2.



Cadangkan larutan X dan larutan Y. Selepas mendakan terbentuk, terangkan bagaimana Raju boleh mendapatkan garam barium sulfat kering.
Suggest solution X and solution Y. After the precipitate is formed, described how Raju can get dry barium sulphate salt.

[4 markah/ marks]

(c) Jadual 10 di bawah menunjukkan hubungan antara kepekatan dan nilai pH bagi asid hidroklorik.
Table 10 below shows the relationship between the concentration and the pH values of hydrochloric acid.

Kepekatan *Concentration* (mol dm^{-3})	**Nilai pH asid hidroklorik pH *value of hydrochloric acid***
0.0001	4
0.0010	3
0.0100	2
0.1000	1

Jadual/ Table 10

(i) Berdasarkan Jadual 10, nyatakan hubungan antara kepekatan asid hidroklorik dengan nilai pHnya. Nyatakan jenis asid bagi asid hidroklorik.
Based on Table 10, state the relationship between concentration of hydrochloric acid with their pH values. State the type of acid for hydrochloric acid.

[2 markah/ marks]

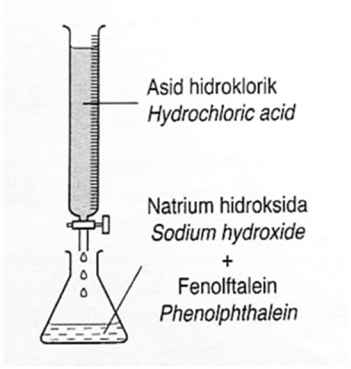
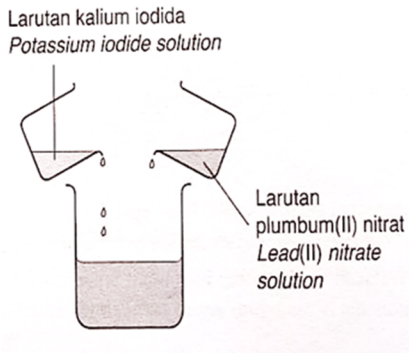
(ii) Kirakan nilai pH bagi asid sulfurik dengan kepekatan 0.1 mol dm^{-3}. Bandingkan nilai pH asid sulfurik 0.1 mol dm-3 itu dengan asid hidroklorik 0.1 mol dm^{-3}. Terangkan jawapan anda.
Calculate the pH value of sulphuric acid with the concentration of 0.1 mol dm^{-3}. Compare the pH values of 0.1 mol dm-3 sulphuric acid with 0.1 mol dm^{-3} of hydrochloric acid. Explain your answer.

[4 markah/ marks]

[2023-Perlis-09] (a) Plaster yang diperbuat daripada kalsium sulfat sesuai digunakan untuk merawat kaki yang patah. Berikan satu sebab. Nyatakan nama tindak balas untuk penyediaan garam kalsium sulfat. Cadangkan dua larutan yang diperlukan untuk menyediakan garam kalsium sulfat ini.
Plaster made of calcium sulphate is suitable to be used to treat a fractured leg. Give a reason. State the name of the reaction for the preparation of calcium sulphate. Suggest two solutions needed to prepare the calcium sulphate salt.

[4 markah][4 marks]

(b) Rajah 8 menunjukkan Eksperimen I dan Eksperimen II dalam penyediaan garam.
Diagram 8 shows Experiment I and Experiment II in the preparation of a salt.

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

Rajah 8/ Diagram 8

Terangkan perbezaan antara kaedah I dan kaedah II dari segi pemerhatian, nama tindak balas dan nama garam yang dihasilkan.
Explain the difference between method I and method II in terms of observations, name of reaction and name of the salt produced.

[6 markah][6 marks]

(c) Jadual 4 menunjukkan kepekatan dan nilai pH alkali A dan alkali B.
Table 4 shows the concentration and pH value of alkali A and alkali B.

	Alkali A *Alkali* A	Alkali B *Alkali* B
Kepekatan/ *Concentration* (mol dm^{-3})	0.5	0.5
Nilai pH/ pH *value*	11.0	14.0

Jadual 4/ Table 4

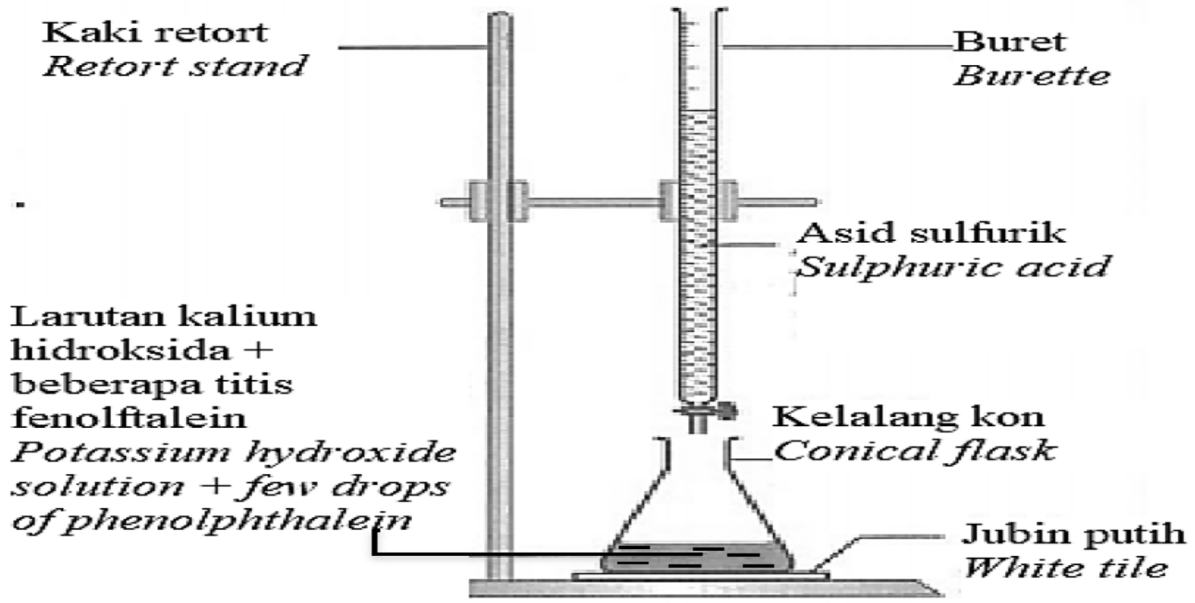
Cadangkan satu contoh alkali A dan alkali B. Terangkan mengapa nilai pH bagi alkali A dan alkali B adalah berbeza.
Suggest an example of alkali A and alkali B. Explain why the pH values of alkali A and alkali B are different.

[6 markah][6 marks]

(d) Plumbum(II) nitrat digunakan di dalam pembuatan mancis dan bahan letupan khas. Huraikan tindak balas yang berlaku apabila plumbum(II) nitrat dipanaskan dengan kuat. Tuliskan persamaan kimia yang seimbang bagi tindak balas ini.
Lead(II) nitrate is used in the manufacture of matches and special explosives. Describe the reaction that occurs when lead(II) nitrate is heated strongly. Write the balanced chemical equation of the reaction.

[4 markah] [4 marks]

[2023-Pahang-10] (a) Rajah 10.1 menunjukkan tindak balas di antara asid sulfurik, H_2SO_4 dan larutan kalium hidroksida, KOH.
Diagram 10.1 shows the reaction between sulphuric acid, H_2SO_4 and potassium hydroxide solution, KOH.



Rajah 10.1 / Diagram 10.1

(i) Nyatakan maksud peneutralan dan mengapakah fenolftalein dimasukkan ke dalam kelalang kon di dalam Rajah 10.1?
State the meaning of neutralisation and why phenolphthalein is inserted into the conical flask in Diagram 10.1?

[2 markah/ 2 marks]

(ii) Persamaan kimia bagi tindak balas tersebut ditulis seperti berikut:
Chemical equation for the reaction is written as follows:

$$H_2SO_4 + 2KOH \rightarrow K_2SO_4 + 2H_2O$$

Tafsirkan persamaan tindak balas di atas secara kualitatif dan kuantitatif. Jika 0.005 mol larutan kalium hidroksida bertindak balas dengan asid sulfurik 0.2 mol dm^{-3}, hitung isipadu asid sulfurik yang diperlukan bagi tindak balas ini.

Interpret the above equation reaction qualitatively and quantitatively. If 0.005 mol of potassium hydroxide solution reacted with 0.2 mol dm^{-3} of sulphuric acid, calculate the volume of sulphuric acid required for this reaction.

[4 markah/ 4 marks]

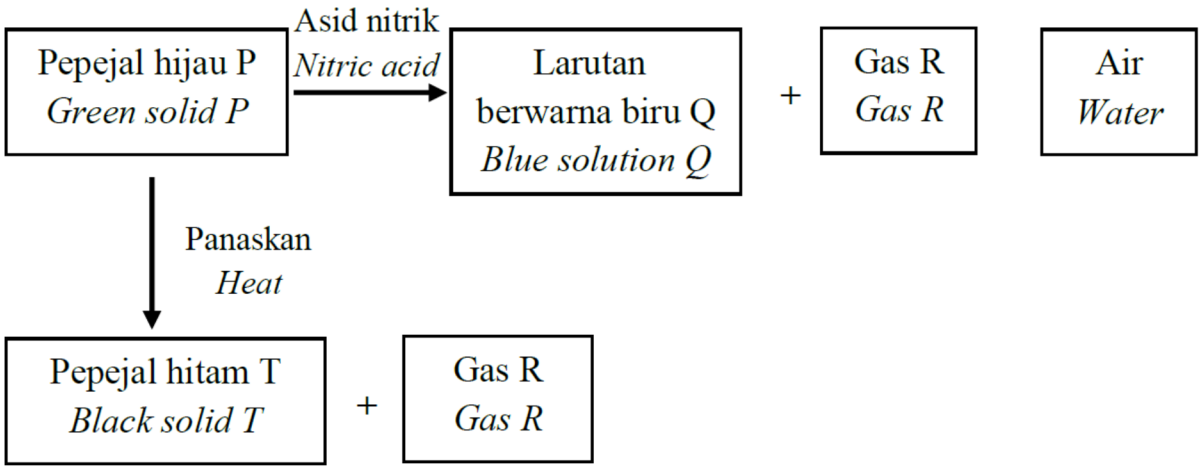
(b) Rajah 10.2 menunjukkan seorang lelaki yang menggunakan sabun pencuci tangan X untuk mencuci tangannya. Dia mendapati tangannya menjadi kemerahan setelah dicuci dengan sabun pencuci tangan X.
Diagram 10.2 shows a man using hand soap X to wash his hands. He noticed that his hands were reddened after washing them with hand soap X.

Rajah 10.2 / *Diagram* 10.2

Nyatakan bahan yang terdapat dalam sabun pencuci tangan X dan terangkan bagaimana bahan tersebut menyebabkan hal ini berlaku. Cadangkan satu bahan yang ada di rumah yang boleh digunakan untuk membantu meredakan kesan alkali berlebihan yang menyebabkan kemerahan tersebut.
State the ingredient in hand soap X and explain how it cause this to happen. Suggest one home ingredient that can be used to help alleviate the effects of excess alkali that causes the redness.

[4 markah/ 4 marks]

(c) Rajah 10.3 menunjukkan tindak balas yang melibatkan pepejal hijau P.
Diagram 10.3 shows the reaction involving the green solid P.



Rajah 10.3 / *Diagram* 10.3

Berdasarkan Rajah 10.3,/ *Based on Diagram 10.3,*

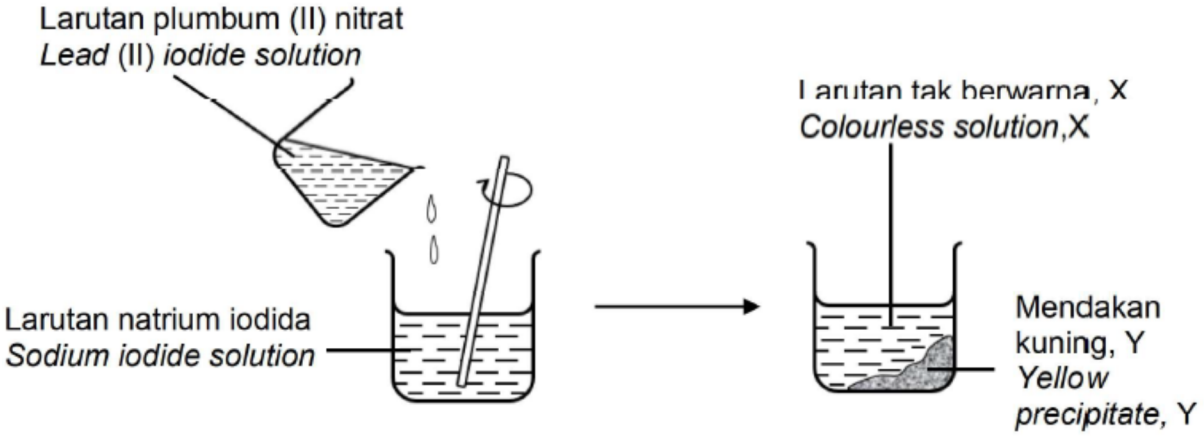
(i) kenal pasti bahan P, Q, R dan T./ *identify substance P, Q, R and T.*

[4 markah/ 4 marks]

(ii) huraikan satu ujian kimia untuk menentusahkan kehadiran kation dan anion dalam larutan Q.
describe a chemical test to confirm the presence of cations and anions in solution Q.

[6 markah/ 6 marks]

[2023-Kelantan-09] Rajah 9 menunjukkan satu kaedah penyediaan garam tak terlarutkan.
Diagram 9 shows one method to prepare insoluble salt.



(a) (i) Apakah yang dimaksudkan dengan garam tak terlarutkan dan namakan kaedah menyediakan garam tak terlarutkan.
What is meant by insoluble salt and name the method of preparing insoluble salt.

[2 markah] [2 marks]

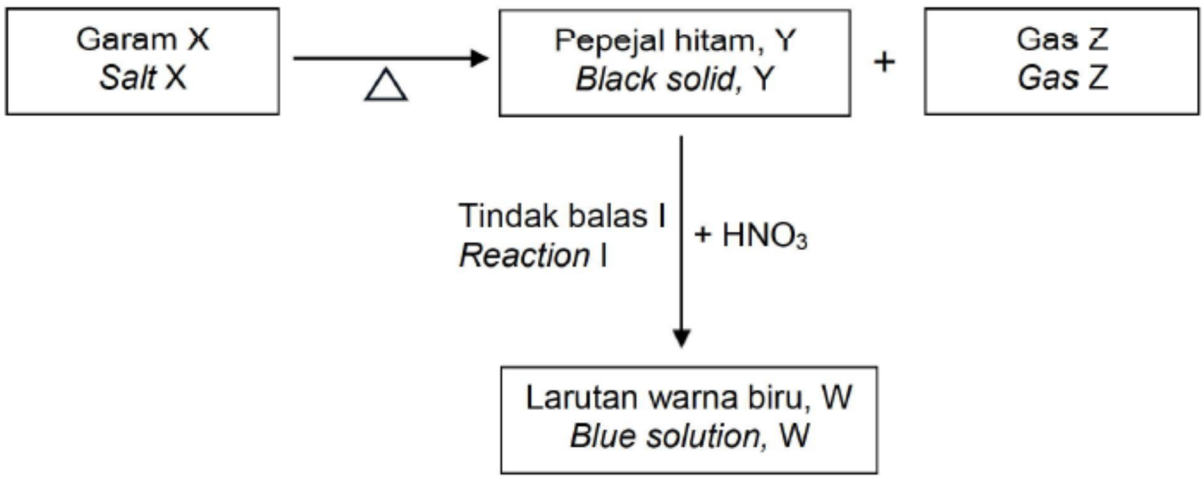
(ii) Kenal pasti larutan tak berwarna X dan mendakan kuning Y.
Identify the colourless solution, X and the yellow precipitate, Y.

[2 markah] [2 marks]

(iii) Jika eksperimen di atas diulangi menggunakan 100 cm^3 larutan plumbum (II) nitrat, 0.5 mol dm^{-3} ditambahkan kepada larutan natrium iodida berlebihan. Tuliskan persamaan kimia bagi mewakili tindak balas tersebut dan hitungkan jisim mendakan yang terbentuk dalam tindak balas tersebut.
[Jisim atom relatif: N=14, 0=16, Na=23, 1=127, Pb =207]
If the above experiment is repeated using 100 cm^3 of lead (II) nitrate solution, 0.5 mol dm^{-3} is added to the excess sodium iodide solution. Write a chemical equation to represent the reaction and calculate the mass of the precipitate formed in the reaction.
[Relative atomic mass : N=14, 0=16, Na=23, 1=127, Pb =207]

[5 markah] [5 marks]

(b) Rajah 10 menunjukkan carta alir bagi rangkaian tindak balas melibatkan beberapa jenis garam.
Diagram 10 shows a flow chart of the reaction chain involving several types of salt.



Rajah 10/ *Diagram 10*

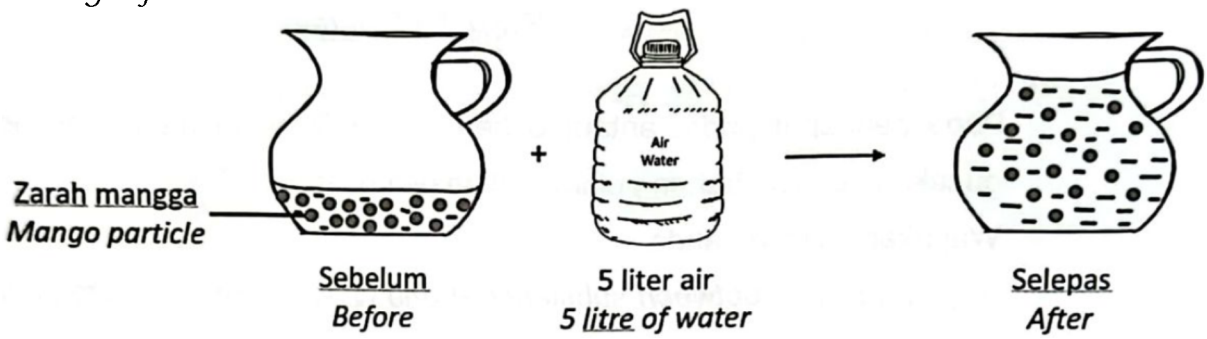
(i) Namakan garam X, pepejal hitam Y dan gas Z
Name salt X, black solid Y and gas Z

[3 markah] [3 marks]

(ii) Tuliskan persamaan kimia bagi Tindak balas I.
Huraikan ujian pengesahan bagi gas Z dan juga anion yang hadir dalam larutan biru, W
Write the chemical equation for Reaction I. Describe a confirmatory test for the gas Z and also the anion present in the blue solution, W

[8 markah] [8 marks]

[2023-Kedah-09] (a) Rajah 9.1 menunjukkan kaedah X yang digunakan oleh Zuraida untuk menyediakan air mangga semasa jamuan.
Diagram 9.1 shows method X used by Zuraida to prepare mango drinks during a feast.



Rajah 9.1 / Diagram 9.1

Berdasarkan Rajah 9.1, nyatakan kaedah X. Bandingkan kepekatan larutan sebelum dan selepas kaedah X. Terangkan jawapan anda.
Based on Diagram 9.1, state method X. Compare the concentration of solution before and after method X. Explain your answer.

(4 markah / marks)

(b) Jadual 9 menunjukkan maklumat mengenai 2 jenis asid HQ dan H_2Y.
Table 9 shows the information of 2 acids, HQ and H_2Y.

Asid/ *Acid*	Kepekatan/ *Concentration*	Nilai pH/ *pH value*
HQ	0.1 mol dm^{-3}	1.0
H_2Y	0.1 mol dm^{-3}	0.7

Jadual 9 / Table 9

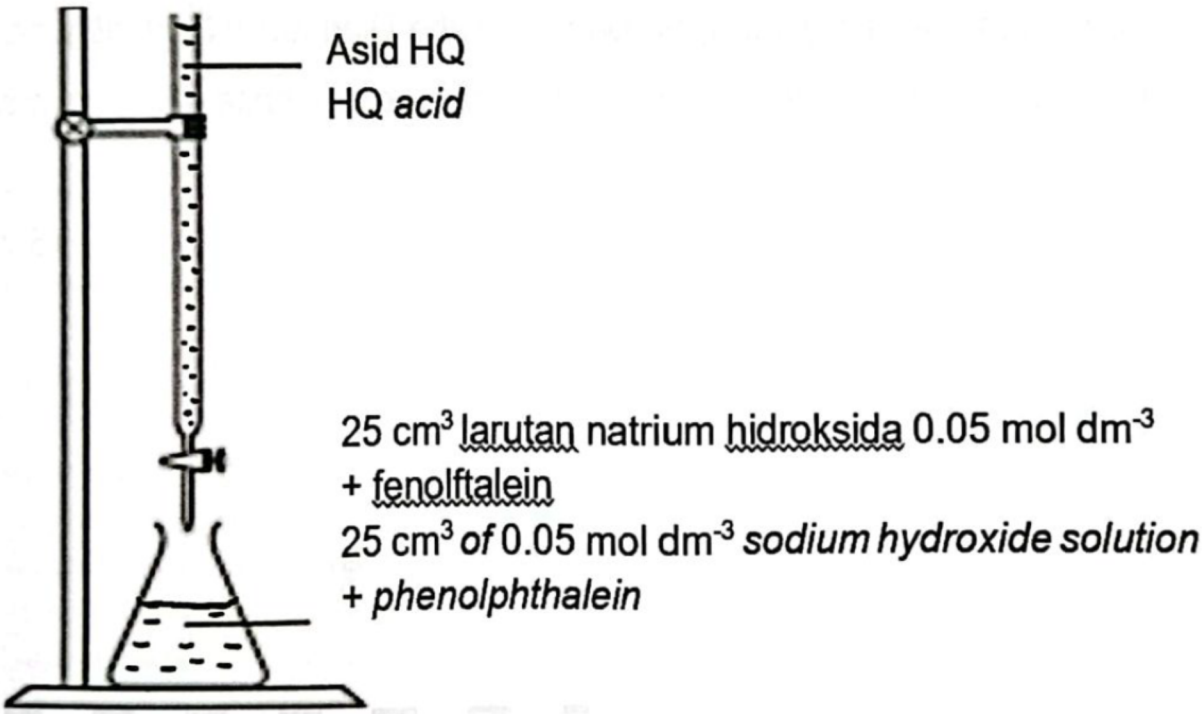
HQ dan H_2Y merupakah dua jenis asid yang mempunyai kepekatan yang sama iaitu 0.1 mol dm^{-3}.
HQ and H_2Y are two type of acids which have same concentration 0.1 mol dm^{-3}.

Berdasarkan jadual 9 di atas,/ *Based on the table 9 above,*

(i) Apakah maksud asid dan cadangkan nama bagi asid HQ dan H_2Y. Terangkan mengapa nilai pH bagi asid tersebut adalah berbeza.
What is the meaning of acid. Suggest the name of HQ and H_2Y. Explain why the pH value of the acids are different.

(5 markah / marks)

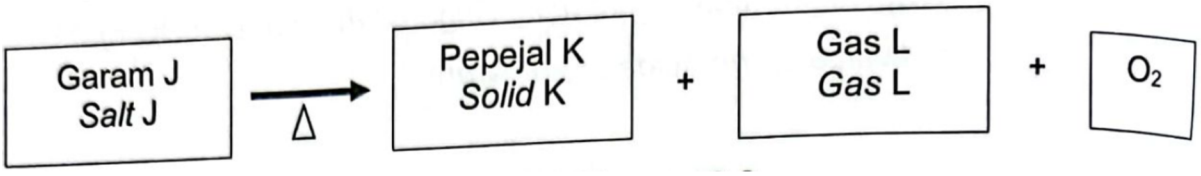
(ii) Rajah 9.2 menunjukkan susunan radas bagi eksperimen peneutralan dengan menggunakan asid HQ dan larutan natrium hidroksida.
Diagram 9.2 shows set up of apparatus of a neutralisation experiment by using HQ acid and sodium hydroxide solution.



Berdasarkan Rajah 9.2, nyatakan pemerhatian pada takat akhir bagi tindak balas ini. Tuliskan persamaan kimia dan hitungkan isi padu asid HQ yang diperlukan untuk meneutralkan larutan natrium hidroksida.
Based on Diagram 9.2, state the observation at the endpoint of this reaction. Write the chemical equation and calculate volume of HQ acid needed to neutralize sodium hydroxide solution.

(6 markah / marks)

(c) Rajah 9.3 menunjukkan carta alir bagi satu eksperimen yang telah dijalankan untuk menguji kesan pemanas garam J.
Diagram 9.3 shows a flow chart of an experiment carried out to investigate the effect of heating of salt J



Rajah 9.3 / Diagram 9.3

Selepas pemanasan, garam J menghasilkan pepejal K yang berwarna perang apabila panas dan kuning apabila sejuk, gas perang L dan gas oksigen. Berdasarkan Rajah 9.3, kenal pasti garam J, pepejal K dan gas L. Cadangkan satu ujian kimia untuk mengesahkan kehadiran kation dalam garam J.
After heating, salt J produces solid K which is brown when hot and yellow when cold, brown gas L and oxygen gas. Based on the Diagram 9.3, identify salt J, solid K and gas L. Suggest a confirmatory test to verify the presence of cation in salt J.

(5 markah / marks)

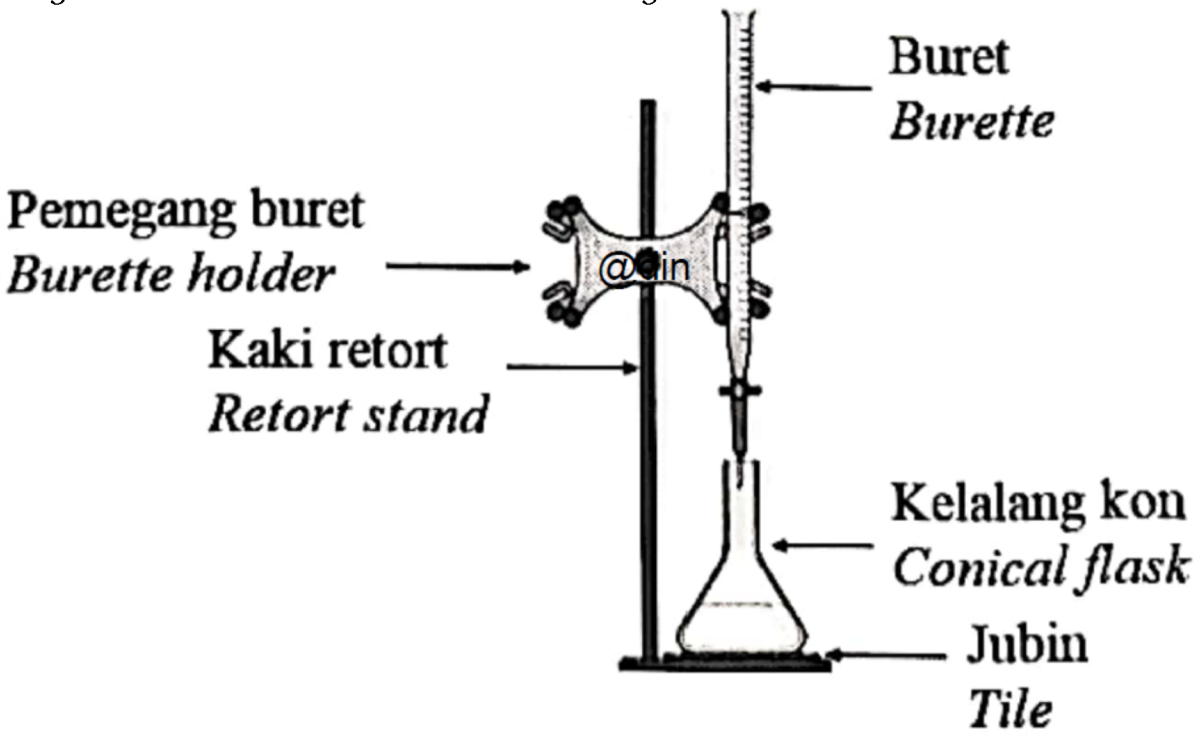
[2023 Johor Bahru-11] (a) Jadual 11 di bawah menunjukkan nilai pH bagi larutan alkali P dan alkali Q yang mempunyai kepekatan yang sama.
Table 11 shows the pH values for the solution of alkali P and alkali Q with the same concentration.

Alkali	Nilai pH / *pH value*
P	8
Q	13

Jadual 11/ Table 11

Terangkan mengapa nilai pH bagi alkali P dan alkali Q berbeza.
Explain why (he pH values for alkali P and alkali Q are different.

(b) Rajah 11 menunjukkan satu kaedah yang digunakan untuk mengkaji tindak balas peneutralan.
Diagram 11 shows a method used to study the neutralisation reaction.



Rajah 11 / Diagram 11

(i) Apakah maksud bagi tindak balas peneutralan?
What is meant by neutralisation reaction?

[1 markah] [] mark]

(ii) Dalam tindak balas ini, 25.0 cm^3 larutan natrium hidroksida 1.0 mol dm^{-3} telah dineutralkan oleh 20.0 cm^3 asid sulfurik. Tulis persamaan kimia bagi lindak balas ini dan hitung kepekatan (dalam mol dm^{-3}) bagi asid sulfurik tersebut.
In this reaction, 25.0 cm^3 sodium hydroxide solution 1.0 mol dm^3 was neutralised by 20.0 cm^3 sulphuric acid. Write the chemical equation for this reaction and calculate the concentration (in mol dm^{-3}) for the sulphuric acid.

[4 markah] [4 marks]

(c) Dalam suatu tindak balas, garam X yang berwarna hijau dipanaskan dengan kuat. Suatu pepejal berwarna hitam terhasil. Gas tidak berwarna yang terbebas dan mengeruhkan air kapur.
Namakan garam X dan pepejal berwarna hitam itu.
In a reaction, a green colour salt X is heated strongly. A black solid formed. A colourless gas produced and turns lime water cloudy.
Name salt X and the black solid.

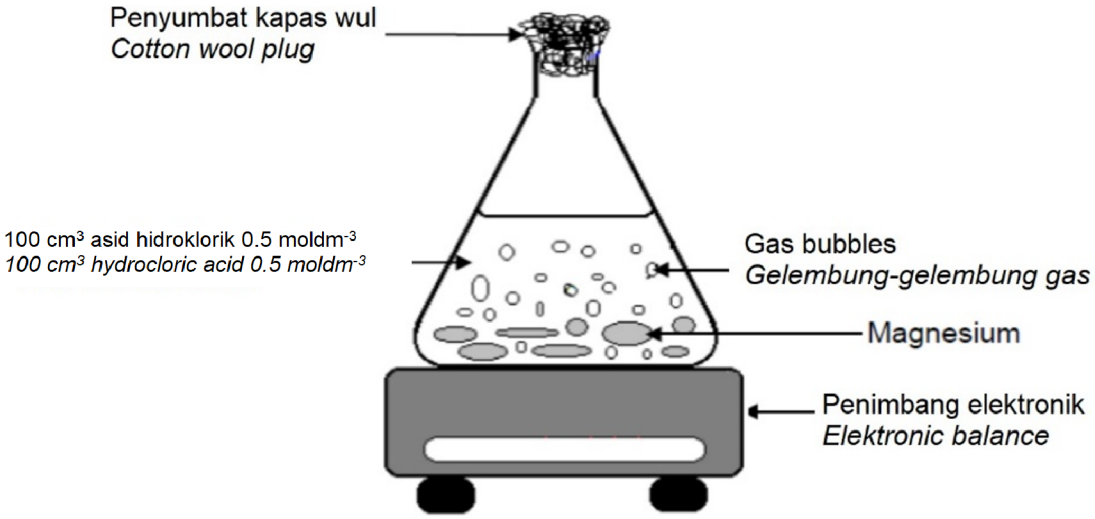
[2 markah] [2 marks]

(d) Garam kalsium sulfat digunakan secara meluas dalam bidang pembinaan. la juga dikenali sebagai *plaster of Paris.*
Cadangkan bahan kimia yang anda boleh gunakan untuk menyediakan garam kalsium sulfat dalam makmal. Seterusnya, terangkan cara untuk menyediakan garam tersebut.
Calcium sulphate salt is used widely in the construction field. It is also known as the plaster of Paris.
Suggest the chemicals that you can use to prepare calcium sulphate salt in the laboratory. Next, explain the method that is used to prepare this salt.

[8 markah] [8 marks]

Bab 7 - Kadar Tindak Balas

[2023-JohorSkudai-08] Rajah 8.1 menunjukkan susunan alat radas bagi mengkaji kadar tindak balas iaitu pengurangan jisim magnesium terhadap masa.
Diagram 8.1 shows the arrangement of the apparatus to study the rate of reaction which is the reduction of the mass of magnesium over time.



Rajah 8.1/ *Diagram 8.1*

Berikut adalah persamaan kimia bagi tindak balas itu:
The following is the chemical equation for the reaction:

$$Mg(p) + 2HCl(ak) \rightarrow MgCl_2(ak) + H_2(g)$$
$$Mg(p) + 2HCl(aq) \rightarrow MgCl_2(aq) + H_2(g)$$

Berdasarkan rajah,/ *Based on diagram,*

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

..... [1M]

(ii) Apakah kebesan asid yang bertindak balas ini?
What is the basicity of this acid?

..... [1M]

(b) Jadual menunjukkan keputusan eksperimen tersebut.
The table shows the results of the experiment.

Bacaan penimbang *elektronik(g)*	243.0	241.38	240.57	240.57	240.57
Masa(s) *Time (s)*	0	30	60	90	120

(i) Kira bilangan mol yang terdapat dalam 0.24g Mg.
Calculate the number of moles present in 0.24g of Mg.
[Jisim atom relatif:/ Relative atomic mass: Mg=24]

[1M]

(ii) Hitungkan kadar tindak balas purata dalam minit pertama.
Calculate the average rate of reaction rate in the first minute.

[2M]

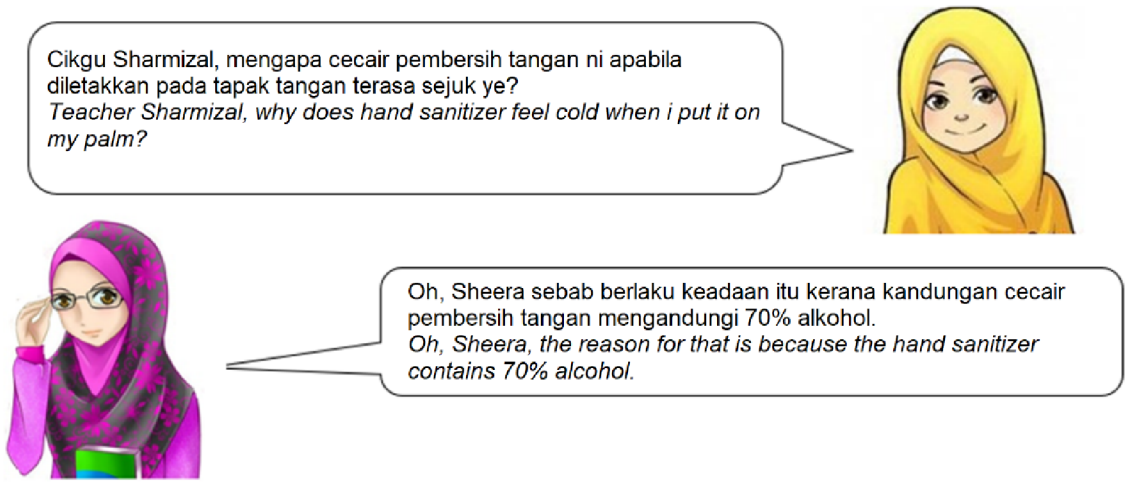
(c) Jika experiment ini diulangi dengan menggantikan kepada 100 cm^3 larutan asid hidroklorik 1 $moldm^{-3}$. Bandingkan kadar tindak balas bagi kedua-dua eksperimen ini.
If this experiment is repeated by replacing to 100 cm^3 hydrochloric acid solution 1 $moldm^{-3}$. Compare the reaction rates for the two experiments.

.....

.....

..... [2M]

(d) Rajah 8.2 di bawah menunjukkan perbualan seorang murid kepada gurunya di SMK Skudai.
Diagram 8.2 below shows a student's conversation with his teacher at SMK Skudai.



Wajarkan penggunaan alkohol di dalam cecair pembersih tangan. Huraikan jawapan anda.
Justify the use of alcohol in hand sanitizers. Explain your answer.

.....

.....

.....

..... [3M]

[2023-NegeriSembilan-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 rate of reaction.

Eksperimen *Experiment*	Bahan tindak balas *Reactants*	Masa yang diperlukan untuk mengumpul 60 cm^3 gas (s) *Time taken to collect 60 cm^3 gas (s)*
I	Ketulan zink berlebihan + 50 cm^3 asid hidroklorik 1.0 mol dm^{-3} *Excess zinc granule + 50 cm^3 of 1.0 mol dm^{-3} hydrochloric acid*	80
II	Serbuk zink berlebihan + 50 cm^3 asid hidroklorik 1.0 mol dm^{-3} *Excess zinc powder + 50 cm^3 of 1.0 mol dm^{-3} hydrochloric acid*	30

Jadual 2/ Table 2

(a) Nyatakan formula kimia bagi asid yang digunakan.
State the chemical formula for the acid used.

..... [1M]

(b) Nyatakan faktor yang mempengaruhi kadar tindak balas dalam eksperimen ini.
State the factor that affects the rate of reaction in these experiments.

..... [1M]

(c) Tuliskan persamaan kimia yang seimbang untuk tindak balas yang berlaku.
Write a balanced chemical equation for the reaction occurred.

..... [2M]

(d) Hitungkan kadar tindak balas purata untuk eksperimen I dan II
Calculate the average rate of reaction for experiment I and II

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

[2M]

(e) Bandingkan kadar tindak balas eksperimen I dan II.
Dengan menggunakan teori perlanggaran, jelaskan perbezaan kadar tindak balas bagi kedua-dua eksperimen.
Compare the rate of reaction of experiment I and II.
By using collision theory, explain the difference in the rate of reaction for both experiments.

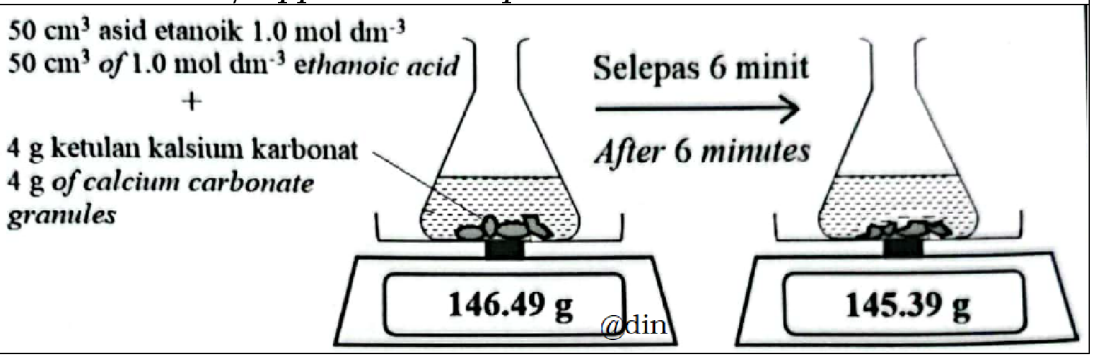
.....

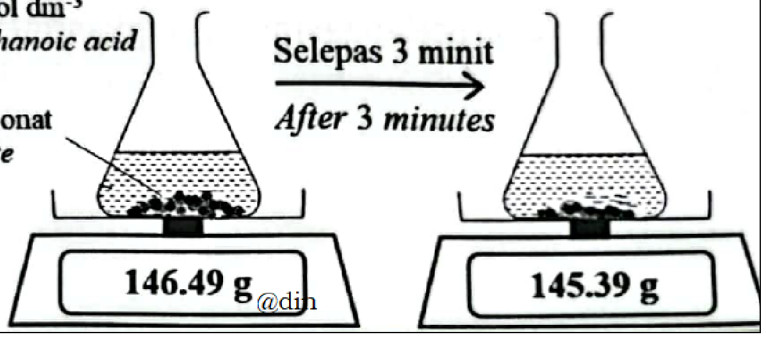
.....

.....

..... [3M]

[2023-SBP-07] Rajah 7 menunjukkan susunan radas bagi dua set eksperimen untuk menyiasat satu faktor yang mempengaruhi kadar tindak balas.
Diagram 7 shows the apparatus set-up for two sets of experiments to investigate a factor that affects the rate of reaction.

Set	susunan radas/ *apparatus set-up*
I	

II	50 cm^3 asid etanoik 1.0 mol dm^{-3} 50 cm^3 *of* 1.0 mol dm^{-3} *ethanoic acid* + 4.0 g serbuk kalsium karbonat 4.0 g *of calcium carbonate powder* 

Rajah 7/ Diagram 7,

Berdasarkan Rajah 7,/ *Based on Diagram 7,*

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

.....

..... [1M]

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

..... [1M]

(iii) Hitungkan kadar tindak balas purata bagi Set I.
Calculate the average rate of reaction for Set I.

[1M]

(b) Tuliskan persamaan kimia bagi tindak balas itu.
Write the chemical equation for the reaction.

..... [2M]

(c)Kadar tindak balas bagi Set I adalah lebih rendah berbanding Set II. Merujuk kepada teori perlanggaran, terangkan mengapa.
The rate of reaction for Set I is lower than Set II. Referring to collision theory, explain why.

.....

.....

..... [3M]

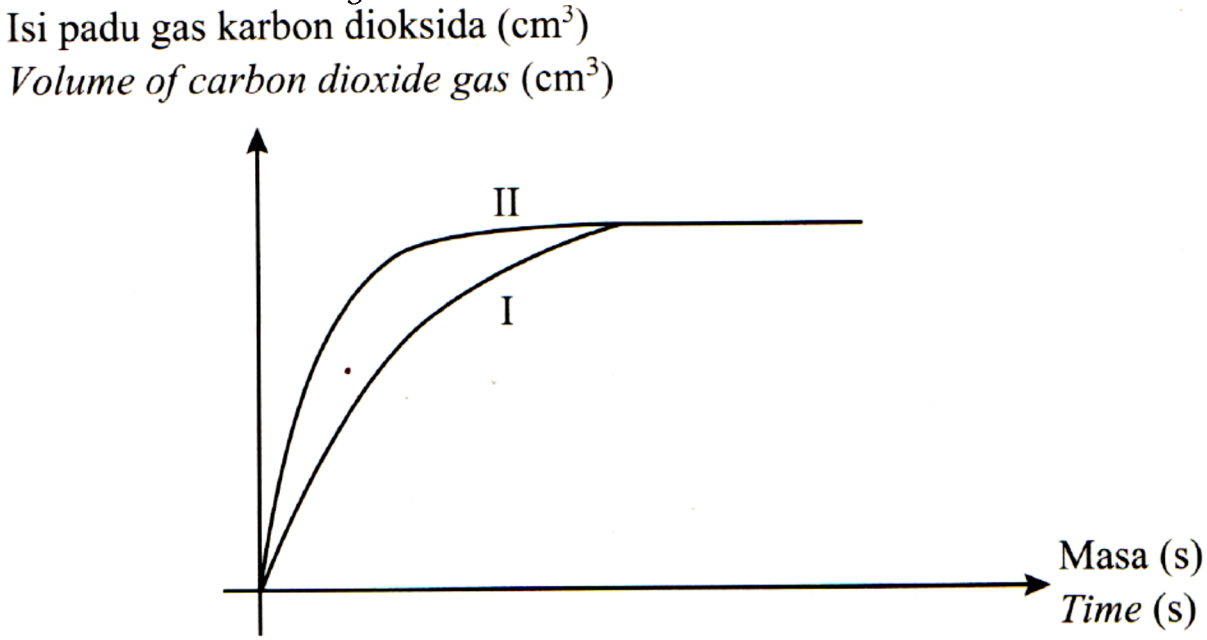
(d) Seorang murid ingin meningkatkan kadar tindak balas bagi Set I dengan menukarkan asid etanoik kepada asid hidroklorik yang sama kepekatan. Pada pendapat anda, adakah murid itu membuat keputusan yang betul? Berikan sebab.
A student wants to increase the rate of reaction for Set 1 by replacing ethanoic acid with hydrochloric acid of the same concentration. In your opinion, does the student made the right decision? Give a reason.

.....

.....

..... [2M]

[2023-Selangor-Set02-07] Dua eksperimen, I dan II dijalankan oleh sekumpulan murid untuk mengkaji kesan saiz kalsium karbonat ke atas kadar tindak balas. Rajah 7.1 menunjukkan lengkung yang diperoleh apabila 5 g kalsium karbonat yang berlainan saiz bertindak balas dengan asid hidroklorik.
Two experiments, I and II are carried out by a group of students to investigate the effect of size of calcium carbonate on the rate of reaction. Diagram 7.1 shows curves which are obtained when 5 g of calcium carbonate in different sizes is reacted with hydrochloric acid.



Rajah 7.1/ Diagram 7.1

(a) Apakah yang dimaksudkan dengan kadar tindak balas?
What is the meaning of rate of reaction?

.....

..... [1M]

(b) Apakah saiz kalsium karbonat yang menghasilkan lengkung graf II?
What size of calcium carbonate produced the curve II of graph?

..... [1M]

(c) Sekiranya murid ingin meningkatkan lagi kadar tindak balas bagi eksperimen II, cadangkan dua cara untuk meningkatkan kadar tindak balas tanpa mengubah isi padu gas karbon dioksida.
If the students want to increase the rate of reaction for experiment II, suggest two ways to increase the rate of reaction without changing the volume of carbon dioxide gas.

.....

..... [2M]

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

$$CaCO_3 + 2HC1 \rightarrow CaCl_2 + CO_2 + H_2O$$

Hitung isi padu asid hidroklorik 2 mol dm^{-3} yang perlu digunakan untuk bertindak balas dengan 5 g kalsium karbonat.
Calculate the volume of 2. mol dm^{-3} hydrochloric acid should be used to react with 5 g of calcium carbonate.
[Jisim atom relative/ Relative atomic mass'. C = 12; O = 16; Ca = 40]

[3M]

(e) Rajah 7.2 menunjukkan kentang yang dipotong berlainan saiz.
Diagram 7.2 shows potatoes which are cut into different sizes.

X Y

Rajah 7.2/ Diagram 7.2

Pada pendapat anda, saiz kentang yang manakah lebih cepat dimasak? Wajarkan jawapan anda.
In your opinion, which potato size can be cooked faster? Justify your answer.

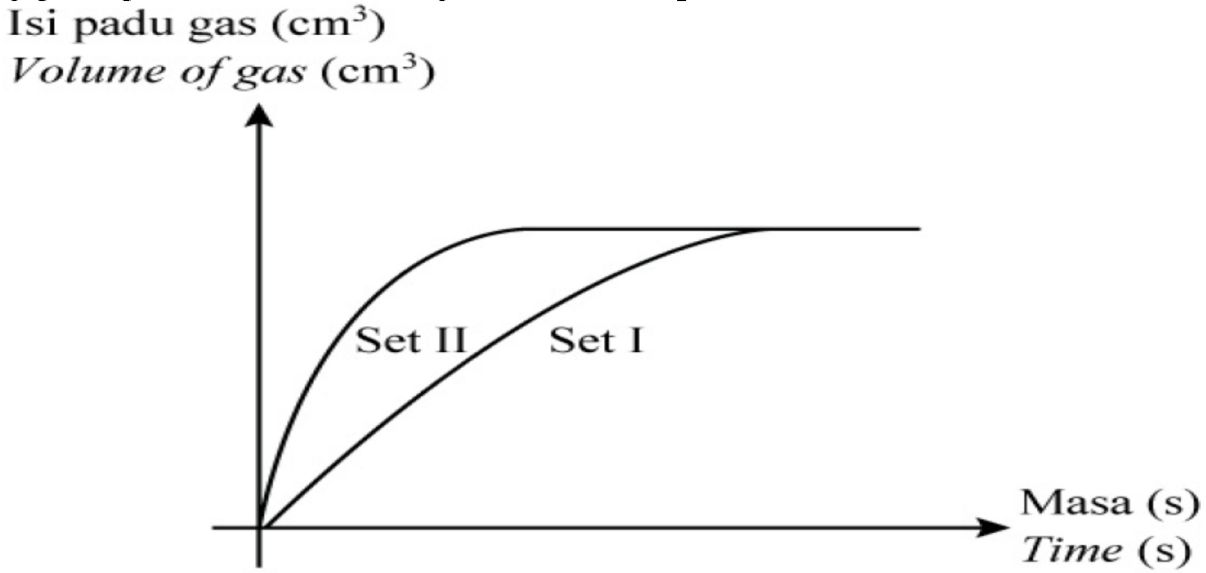
.....

.....

.....

..... [3M]

[2023-Selangor-Set01-07] (a) Dua set eksperimen telah dijalankan untuk menyiasat salah satu faktor yang mempengaruhi kadar tindak balas antara 100 cm^3 asid hidroklorik 0.5 mol dm^{-3} dengan 2 g serbuk zink. Rajah 7.1 menunjukkan lengkung graf isi padu gas melawan masa yang diperoleh daripada dua set eksperimen, Set I dan Set II.
Two sets of experiment are carried out to investigate one of the factors that affects the rate of reaction between 100 cm^3 of 0.5 mol dm^{-3} hydrochloric acid and 2 g of zinc powder. Diagram 7.1 shows the curves of the graph of volume of gas against time obtained from the two experiments, Set I and Set 11.



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

..... [1M]

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

..... [2M]

(iii) Dengan memjiik kepada Rajah 7.1, nyatakan satu cara untuk mendapatkan lengkung Set II bagi tindak balas antara 100 cm^3 asid hidroklorik 0.5 mol dm^{-3} dengan 2 g serbuk zink.
By referring to Diagram 7.1, state one method to obtain curve Set II for the reaction between 100 cm^3 of 0.5 mol dm^{-3} hydrochloric acid and 2 g of zinc powder.

..... [1M]

(iv) Terangkan jawapan anda di 7(a)(iii) berdasarkan teori perlanggaran.
Explain your answer in 7(a)(iii) based on collision theory.

.....

.....

..... [3M]

(b) Rajah 7.2 menunjukkan dua situasi memanggang 1 kg daging.
Diagram 7.2 shows two situations of grilling 1 kg meat.

Situasi A
Situation A

Situasi B
Situation B

Rajah 7.2/ Diagram 7.2

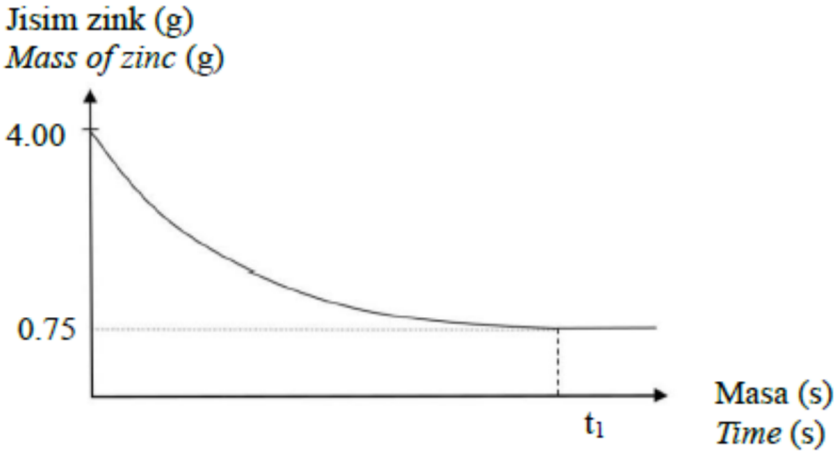
Dalam situasi manakah daging akan masak dengan lebih cepat? Terangkan jawapan anda.
In which situation will the meat cook faster? Explain your answer.

.....

.....

..... [3M]

[2023-MRSM-06] Rajah 4.1 menunjukkan graf jisim zink melawan masa bagi mengkaji kadar tindak balas antara zink dan asid hidroklorik.
Dalam eksperimen ini, 4.0 g zink ditambahkan kepada 100 cm^3 asid hidroklorik 1.0 mol dm^{-3} pada suhu bilik.
Diagram 4.1 shows the graph of mass of zinc against time to study the rate of reaction between zinc and hydrochloric acid.
In this experiment, 4.0 g of zinc was added to 100 cm^3 of 1.0 mol dm^{-3} hydrochloric acid at room temperature.



Rajah 4.1/ Diagram 4.1

(a) Apakah yang dimaksudkan dengan kadar tindak balas bagi eksperimen ini?
What is the meaning of rate of reaction for this experiment?

.....

..... [1M]

(b) Tulis persamaan ion bagi tindak balas ini.
Write the ionic equation for the reaction.

..... [2M]

(c) Berdasarkan Rajah 4.1,/ *Based on Diagram 4.1,*

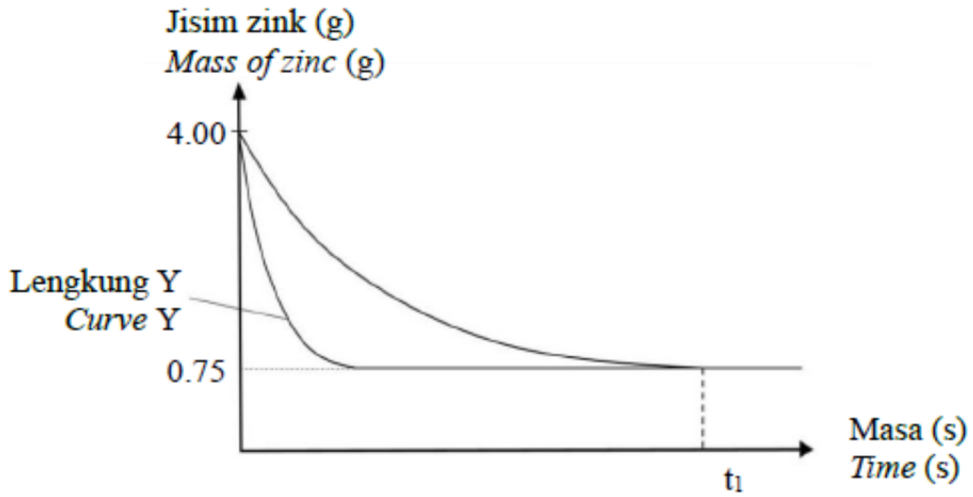
(i) mengapakah lengkung bagi graf kekal malar selepas t1 saat.
why does the curve of the graph remain constant after t1 seconds.

..... [1M]

(ii) tentukan jisim zink yang bertindak balas dalam eksperimen ini.
determine the mass of zinc that react in this experiment.

..... [1M]

(d) Eksperimen ini diulangi dengan menggunakan kuantiti yang sama bagi semua bahan tindak balas untuk menghasilkan lengkung Y seperti dalam Rajah 4.2.
This experiment was repeated by using same quantity of all reactants to produce curve Y as in Diagram 4.2.



Rajah 4.2/ *Diagram* 4.2

Berdasarkan Rajah 4.2, cadangkan satu faktor yang menghasilkan lengkung Y. Terangkan jawapan anda dengan menggunakan teori perlanggaran.
Based on Diagram 4.2, suggest one factor that produced curve Y. Explain your answer by using collision theory.

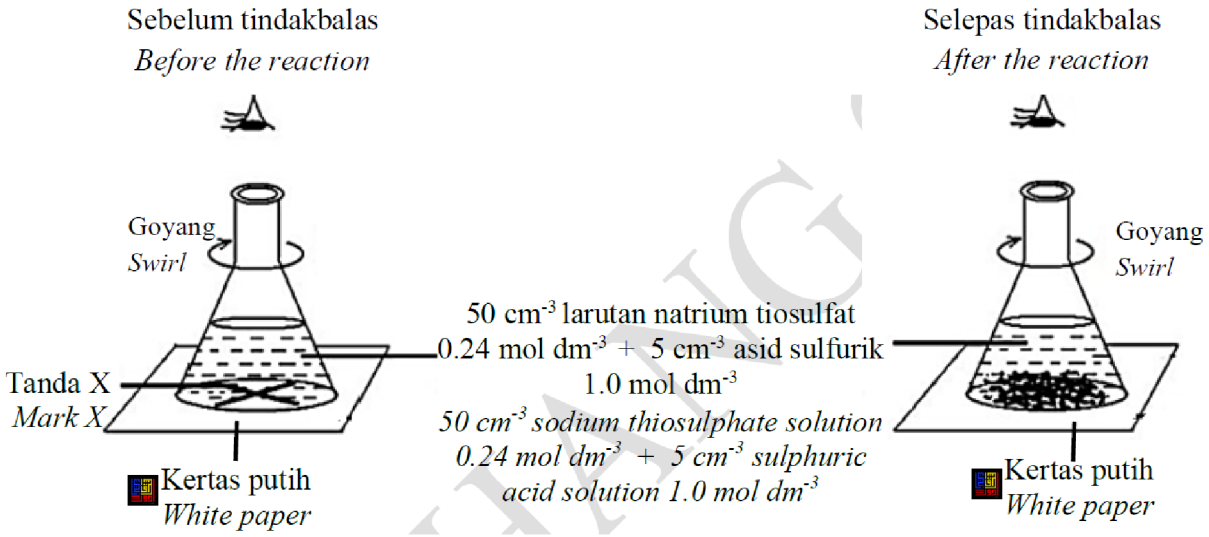
.....

.....

.....

..... [4M]

[2023-JUJ-Set01-05] Rajah 5.1 menunjukkan susunan radas bagi eksperimen untuk mengkaji kesan kepekatan ke atas kadar tindak balas antara larutan natrium tiosulfat dan asid sulfurik menggunakan saiz kelalang kon yang sama. Masa yang diambil untuk tanda 'X' hilang dari penglihatan dicatatkan seperti dalam Jadual 5.1. Eksperimen ini diulangi dengan menggunakan isipadu larutan natrium tiosulfat yang sama tetapi dengan kepekatan yang berbeza.
Diagram 5.1 shows the apparatus set-up of the experiment to investigate the effect of concentration on the rate of reaction between sodium thiosulphate solution and sulphuric acid using the same size of conical flask. Time taken for the 'X' mark to disappear from sight recorded as in the Table 5.1. The experiment was repeated using the same volume of sodium thiosulphate solution but with a different concentration.



Rajah 5.1/ *Diagram* 5.1

Set	Kepekatan *Concentration* (mol dm^{-3})	Masa yang diambil untuk tanda 'X' hilang dari penglihatan *Time taken for the 'X' mark to disappear from sight*	1/masa 1/time (s^{-1})
I	0.20	20	
II	0.16	23	
III	0.12	32	
IV	0.08	46	
V	0.04	95	

Jadual 5.1/*Table* 5.1

(a) Pembentukan sulfur menyebabkan tanda 'X' hilang daripada penglihatan. Apakah warna sulfur yang dihasilkan?
The formation of sulphur causes the 'X' mark to disappear from sight. What is the colour of the sulphur produced?

..... [1M]

(b) (i) Lengkapkan Jadual 5.1 dengan menentukan nilai bagi 1/Masa.
Complete Table 5.1 by writing the values of 1/time.

[1M]

(ii) Plotkan graf kepekatan melawan 1Masa menggunakan kertas graf yang dibekalkan.
Plot a graph of concentration against 1/time on the graph paper provided.

[2M]

(iii) Berdasarkan graf, nyatakan hubungan antara kadar tindak balas dengan kepekatan larutan natrium tiosulfat.
Based on the graph, state the relationship between rate of reaction and concentration of sodium thiosulphate solution.

.....

..... [1M]

(iv) Bandingkan kadar tindak balas bagi Set I dan Set III. Terangkan jawapan anda menggunakan teori perlanggaran.
Compare the rate of reaction for Set I and Set III. Explain your answer using collision theory.

.....

.....

.....

.....

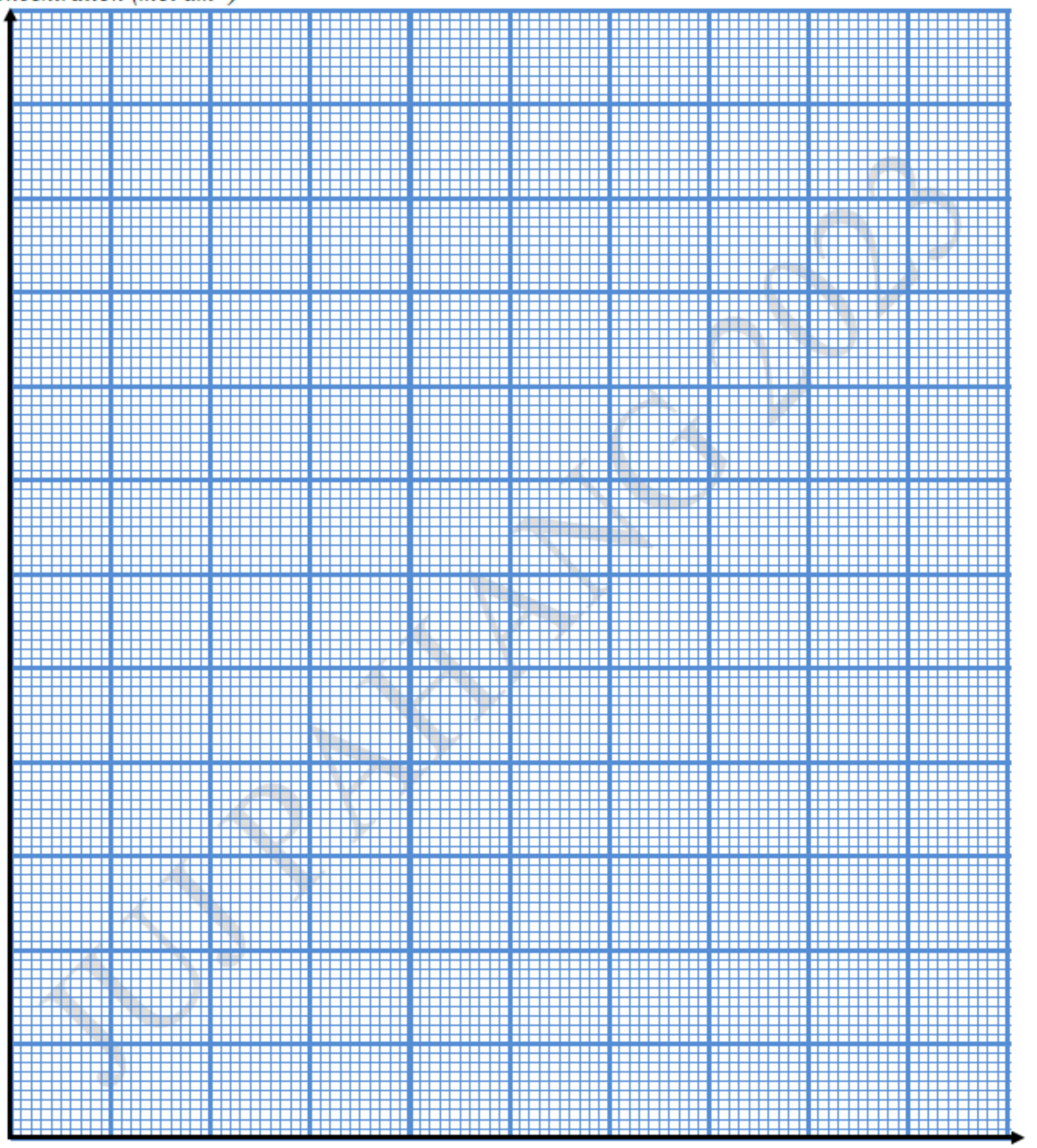
..... [3M]

Graf kepekatan melawan $\frac{1}{\text{Masa}}$

Graph of concentration against $\frac{1}{Time}$

Kepekatan (mol dm^{-3})

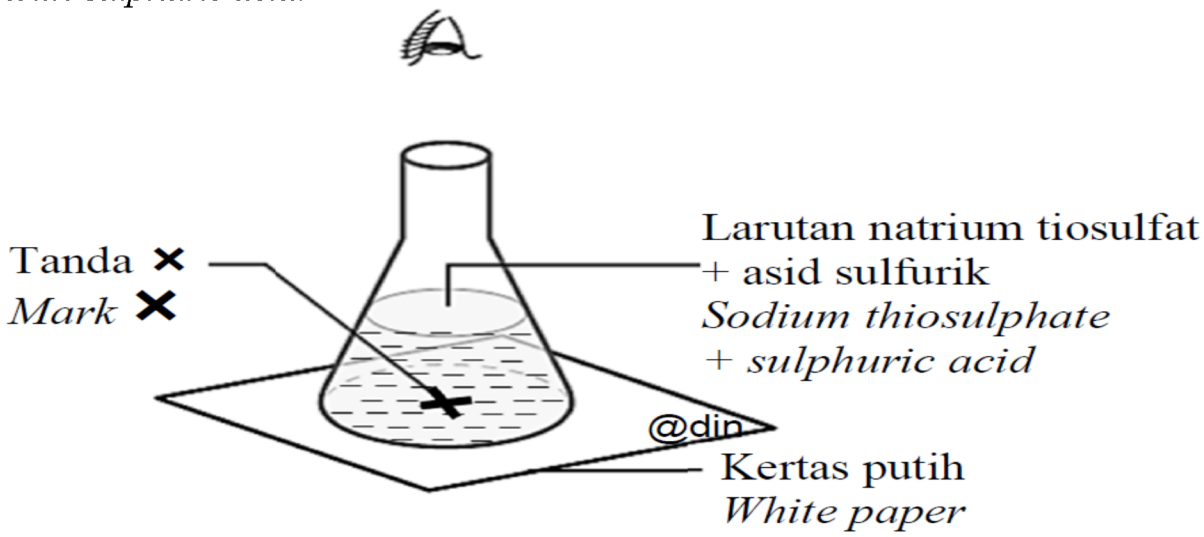
Concentration (mol dm^{-3})



$\frac{1}{\text{Masa}}$ (s^{-1})

$\frac{1}{Time}$ (s^{-1})

[2023-JohorPPDTangkak-08] (a) Rajah 6.1 menunjukkan susunan radas bagi Eksperimen I dan Eksperimen II pada suhu yang berbeza untuk menentukan kadar tindak balas antara natrium tiosulfat dengan asid sulfurik.
Diagram 6.1 shows the apparatus set up for Experiment I and II at different temperatures to determine the rate of reaction between sodium thiosulphate with sulphuric acid.



Rajah 6.1/ Diagram 6.1

Jadual 6 menunjukkan keputusan dua eksperimen itu.
Table 6 shows the result of the experiment.

Eksperimen *Experiment*	Bahan tindak balas *Reactants*	Masa untuk tanda "X" hilang dari penglihatan / s *Time taken for the mark "X" to disappear from sight / s*
I	50 cm^3 larutan natrium tiosulfat 0.2 mol dm^{-3} + asid sulfurik 1.0 mol dm^{-3} berlebihan pada 30°C *50 cm^3 of 0.2 moldm^{-3} sodium thiosulphate solution + 1.0 mol dm^{-3} excess sulphuric acid at 30°C*	40
II	50 cm^3 larutan natrium tiosulfat 0.2 mol dm^{-3} + asid sulfurik 1.0 mol dm^{-3} berlebihan pada 40°C *50 cm^3 of 0.2 moldm^{-3} sodium thiosulphate solution + 1.0 mol dm^{-3} excess sulphuric acid at 40°C*	20

Jadual 6/ *Table 6*

Berdasarkan Rajah 6.1 dan Jadual 6,/ *Based on Diagram 6.1 and Table 6,*

(i) Apakah warna mendakan sulfur?
What is the colour of sulphur precipitate?

..... [1M]

(ii) Hitungkan kadar tindak balas bagi :
Calculate the average rate of reaction for:

Eksperimen I *Experimen I*	Eksperimen II *Experimen II*

[2M]

(iii) Bandingkan kadar tindak balas Eksperimen I dan Eksperimen II.
Compare the rate of reaction of Experiment I and Experiment II.

..... [1M]

(iv) Terangkan jawapan anda di (a)(iii) menggunakan teori perlanggaran.
Explain your answer in (a)(iii) using collision theory.

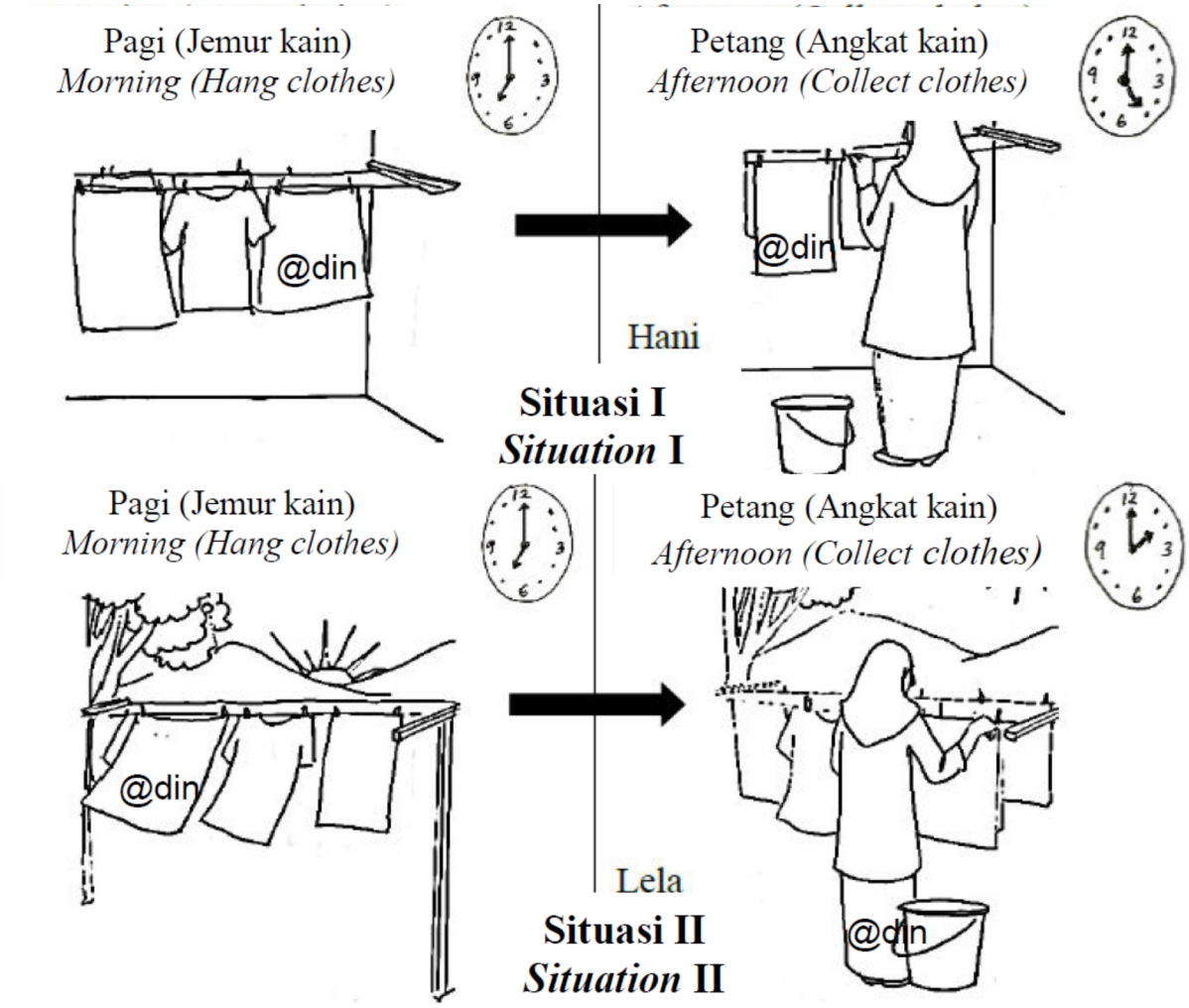
.....

.....

.....

..... [3M]

(b) Rajah 6.2 menunjukkan Hani dan Lela menjemur pakaian mereka dalam dua situasi yang berbeza. Pada pukul 7.00 pagi, Hani menjemur pakaiannya di balkoni yang berbumbung manakala Lela menjemur pakaiannya di bawah cahaya matahari.
Diagram 6.2 shows Hani and Lela hang their clothes in two difference situations. At 7.00 a.m, Hani hang her clothes at the balcony under the roof while Lela hangs her clothes outside the house under the sun light.



Rajah 6.2/ Diagram 6.2

Berdasarkan maklumat dalam Rajah 6.2, situasi manakah boleh menyebabkan pakaian mengering dengan lebih cepat. Terangkan jawapan anda.
Based on information in Diagram 6.2, which situation can cause the clothes to dry faster? Explain your answer.

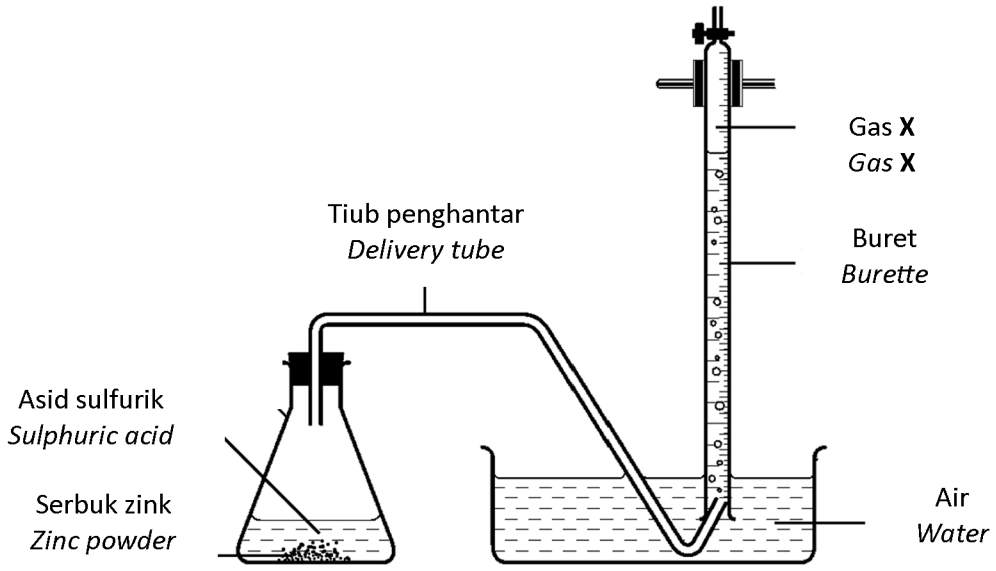
.....

.....

.....

..... [3M]

[2023-Putrajaya-02] Rajah 2 menunjukkan susunan radas untuk mengkaji kadar tindak balas antara 50 cm^3 asid sulfurik 1.0 mol dm^{-3} dan serbuk zink.
Diagram 2 shows the apparatus set up to investigate the rate of reaction between 50 cm^3 of 1.0 mol dm^{-3} of sulphuric acid and zink powder.



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

..... [1M]

(b) Tindak balas antara bahan-bahan tindak balas menghasilkan satu garam terlarutkan dan gas X.
Nyatakan nama garam terlarutkan itu dan formula kimia bagi gas X.
Reaction between the reactants form one soluble salt and gas X.
State the name of the soluble salt and chemical formula of gas X.

Garam terlarutkan : .....
Soluble salt

Gas X : ..... [2M]

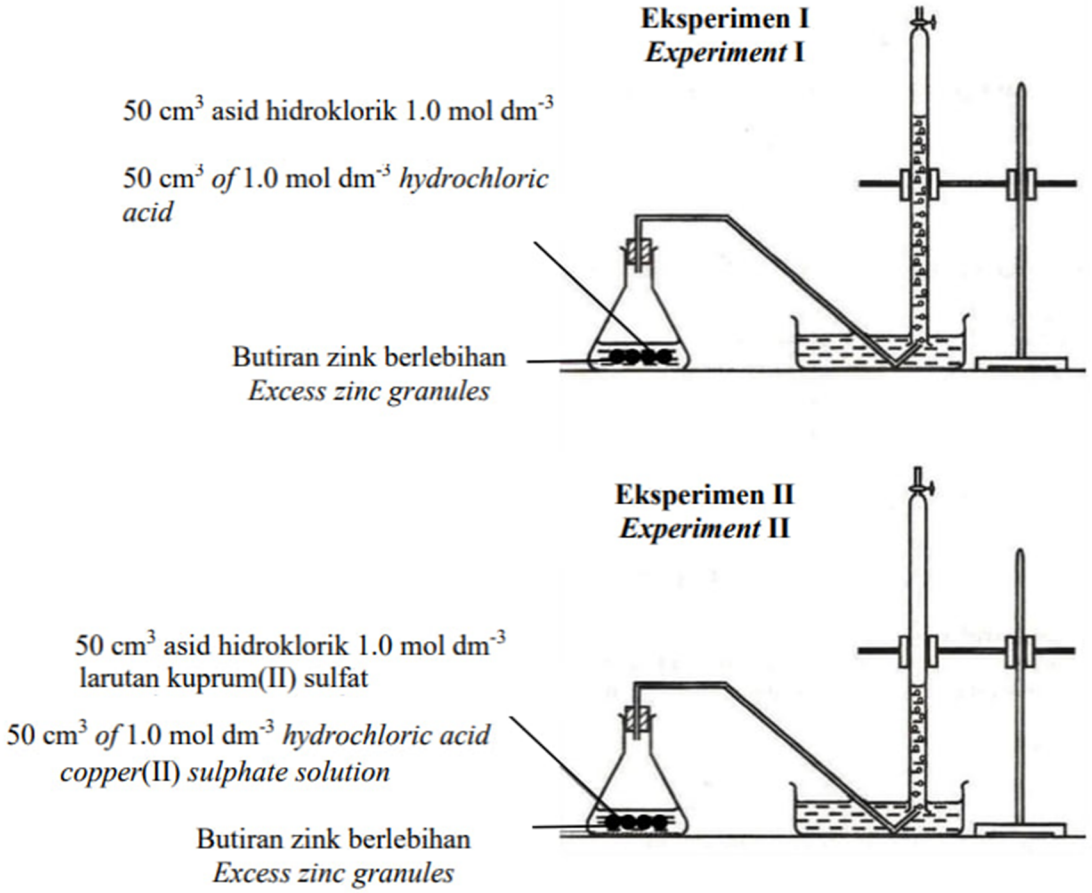
(c) Seorang murid mengulang eksperimen dengan menambahkan serbuk kuprum(II) sulfat ke dalam kelalang kon. Nyatakan fungsi kuprum(II) sulfat. Apakah yang berlaku kepada kadar tindak balas eksperimen tersebut?
A student repeats the experiment by adding copper(II) sulphate powder into the conical flask. State the function of copper(II) sulphate. What happen to the rate of reaction of the experiment?

.....

.....

..... [2M]

[2023-Perlis-08] Rajah 7 menunjukkan dua eksperimen yang dijalankan untuk mengkaji satu faktor yang mempengaruhi kadar tindak balas antara zink dan asid hidroklorik.
Diagram 7 shows two experiments carried out to study one factor that affects the rate of reaction between zinc and hydrochloric acid.



(a) Berdasarkan Rajah 7, nyatakan faktor yang mempengaruhi kadar tindak balas.
Based on Diagram 7, state the factor that affects the rate of reaction.

..... [1M]

(b) Bagaimanakah cara menentukan kadar tindak balas dalam eksperimen itu?
How to determine the rate of reaction in the experiment?

..... [1M]

(c) Hitungkan isipadu gas hidrogen yang dibebaskan dalam Eksperimen I.
Calculate the volume of hydrogen gas released in Experiment I.
[Isipadu molar gas pada suhu bilik = 24 dm^3 mol^{-1}]
[Molar volume of gas at room temperature = 24 dm^3 mol^{-1}]

[3M]

(d) Bandingkan kadar tindak balas dalam Eksperimen I dan Eksperimen II berdasarkan Teori Perlanggaran.
Compare the rate of reaction in Experiment I and Experiment II based on Collision Theory

.....

.....

..... [3M]

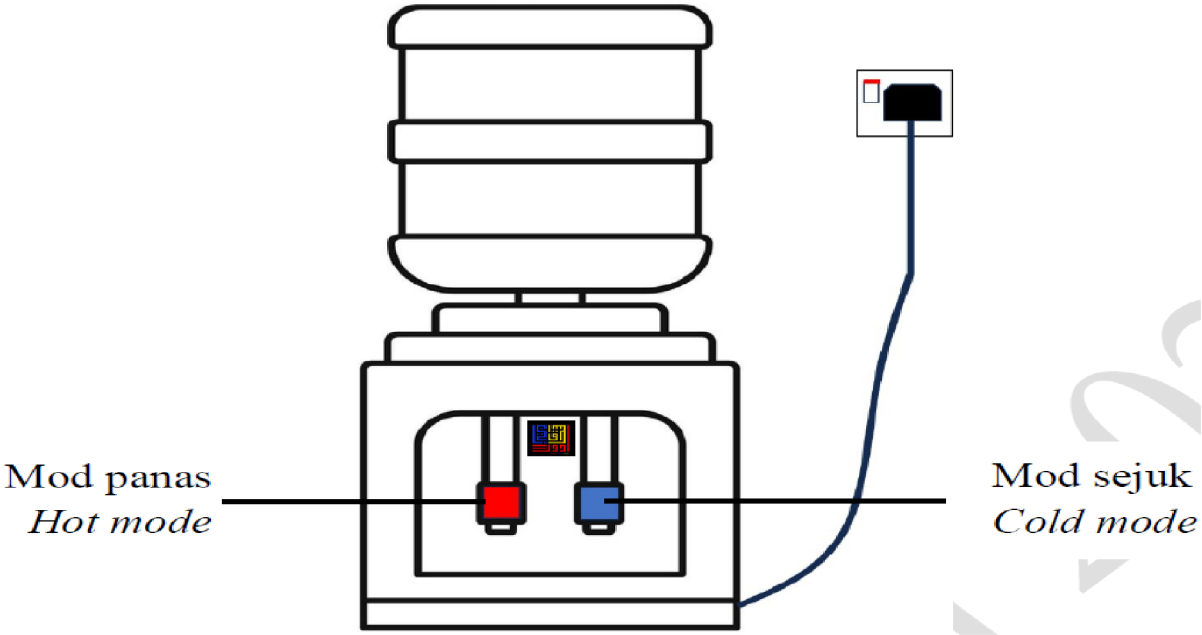
(e) Marisa ingin menghasilkan dua kali ganda jumlah isipadu gas hidrogen yang terbebas dalam Eksperimen II. Nyatakan bahan yang perlu Marisa tukar. Terangkan.
Marisa wants to produce double the total volume of hydrogen gas in Experiment II. State the substance needs to be changed by Marisa. Explain.

.....

..... [2M]

Esei/ Essay

[2023-JUJ-Set02-10] Rajah 10 di bawah menunjukkan sebuah mesin penapis air.
Diagram 10 below shows a water filter machine.



Rajah 10 / Diagram 10

(a) Latipah membeli mi segera berperisa kari di sebuah pasaraya. Dia ingin merendam mi segera dan perencah kari itu untuk dimakan.
Berdasarkan Rajah 10, cadangkan mod air yang lebih sesuai untuk merendam mi segera dan perencah kari itu dan nyatakan satu faktor yang terlibat. Jelaskan.
Latipah bought a curry flavoured instant noodle at supermarket. She wants to soak the instant noodle and curry seasoning to eat.
Based on Diagram 10, suggest a suitable water mode to soak the instant noodle and curry seasoning and state one factor involved. Explain.
[4 markah/ 4 marks]

(b) Jadual 10 menunjukkan data bagi tiga set eksperimen yang telah dijalankan untuk
mengkaji kadar tindak balas antara ketulan zink berlebihan dan asid hidroklorik.
Table 10 shows data for three sets of experiment conducted to study the rate of reaction between excess zinc granule and hydrochloric acid.

Set	Bahan tindak balas Reactants	Masa diambil untuk mengumpul 40 cm^3 gas H_2 (s) *Time taken to collect 40 cm^3 of H_2 gas (s)*
I	25 cm^3 asid hidroklorik 0.2 mol dm^{-3} + ketulan zink berlebihan *25 cm^3 of 0.2 mol dm^{-3} hydrochloric acid + excess zinc granule*	90
II	25 cm^3 asid hidroklorik 0.4 mol dm^{-3} + ketulan zink berlebihan *25 cm^3 of 0.4 mol dm^{-3} hydrochloric acid + excess zinc granule*	70
III	25 cm^3 asid hidroklorik 0.2 mol dm^{-3} + ketulan zink berlebihan + 5 cm^3 larutan $CuSO_4$ *25 cm^3 of 0.2 mol dm^{-3} hydrochloric acid + excess zinc granule + 5 cm^3 of $CuSO_4$ solution*	60

Jadual 10 / Table 10

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

[1 markah/ 1 mark]

(ii) Berdasarkan Set III, namakan larutan $CuSO_4$ mengikut sistem penamaan IUPAC.
Nyatakan peranan dan fungsi larutan $CuSO_4$.
Based on Set III, name $CuSO_4$ solution based on IUPAC nomenclature.
State the role and function of $CuSO_4$ solution.

[3 markah/ 3 marks]

(iii) Hitung kadar tindak balas bagi Set I dan Set II. Bandingkan kadar tindak balas bagi :
Calculate the rate of reaction for Set I and Set II. 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 Perlanggaran.
Explain your answer based on Collision Theory.

[12 markah/ 12 marks]

[2023-TerengganuMPP3-09] Tiga eksperimen I, II dan III dijalankan untuk mengkaji faktor- faktor yang mempengaruhi kadar tindak balas. Jadual 9 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 9 shows the reactants and conditions of reaction involved.

Eksperimen *Experiment*	Bahan tindak balas *Reactants*	Keadaan tindak balas *Condition of reaction*
I	Ketulan zink berlebihan + 50 cm^3 asid hidroklorik 0.5 mol dm^{-3} *Excess zinc granules +* *50 cm^3 hydrochloric acid 0.5 mol dm^{-3}*	Suhu bilik *Room condition*
II	Ketulan zink berlebihan + 50 cm^3 asid hidroklorik 0.5 mol dm^{-3} + bahan X *Excess zinc granules + 50 cm^3 hydrochloric acid 0.5 mol dm^{-3} + substance X*	Suhu bilik *Room condition*
III	Ketulan zink berlebihan + 50 cm^3 asid hidroklorik 1.0 mol dm^{-3} *Excess zinc granules +* *50 cm^3 hydrochloric acid 1.0 mol dm^{-3}*	Suhu bilik *Room condition*

Jadual/ Table 9

(a) Berdasarkan Jadual 9, nyatakan dua faktor yang mempengaruhi kadar tindak balas.
Based on Table 9, state two factors that affect the rate of reaction.

[2 marks]

(b) Tulis persamaan kimia yang seimbang bagi tindak balas dalam eksperimen I. Hitung isi padu gas yang terbebas dalam eksperimen I.
[Isi padu molar gas pada keadaan bilik ialah 24 dm^3 mol^{-1}]
Write the balanced chemical equation for the reaction in experiment I.
Calculate the volume of gas released in experiment I.
[Molar volume at room condition is 24 dm^3 mol^{-1}]

[5 marks]

(c) Lakarkan graf isi padu gas melawan masa bagi eksperimen I dan II ATAU eksperimen I dan III.
Sketch the graph of volume of gas against time for experiment I and II OR experiment I and III.

[3 marks]

(d) Cadangkan nama bahan X yang digunakan dalam eksperimen II. Seterusnya, bandingkan kadar tindak balas dan terangkan dengan menggunakan teori pelanggaran antara tindak balas yang berlaku dalam:
Suggest the name of substance X used in experiment II.
Next, compare the rate of reaction and explain by using collision theory between the reactions that occurs in:

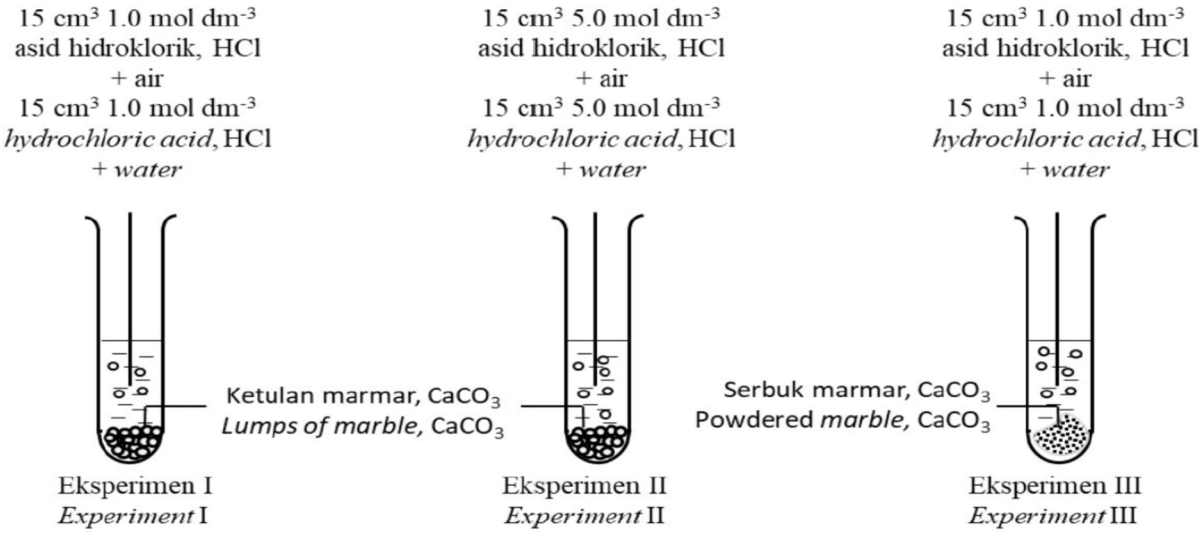
- Eksperimen I dan II/ *Experiment I and II*
- Eksperimen I dan III/ *Experiment I and III*

[10 marks]

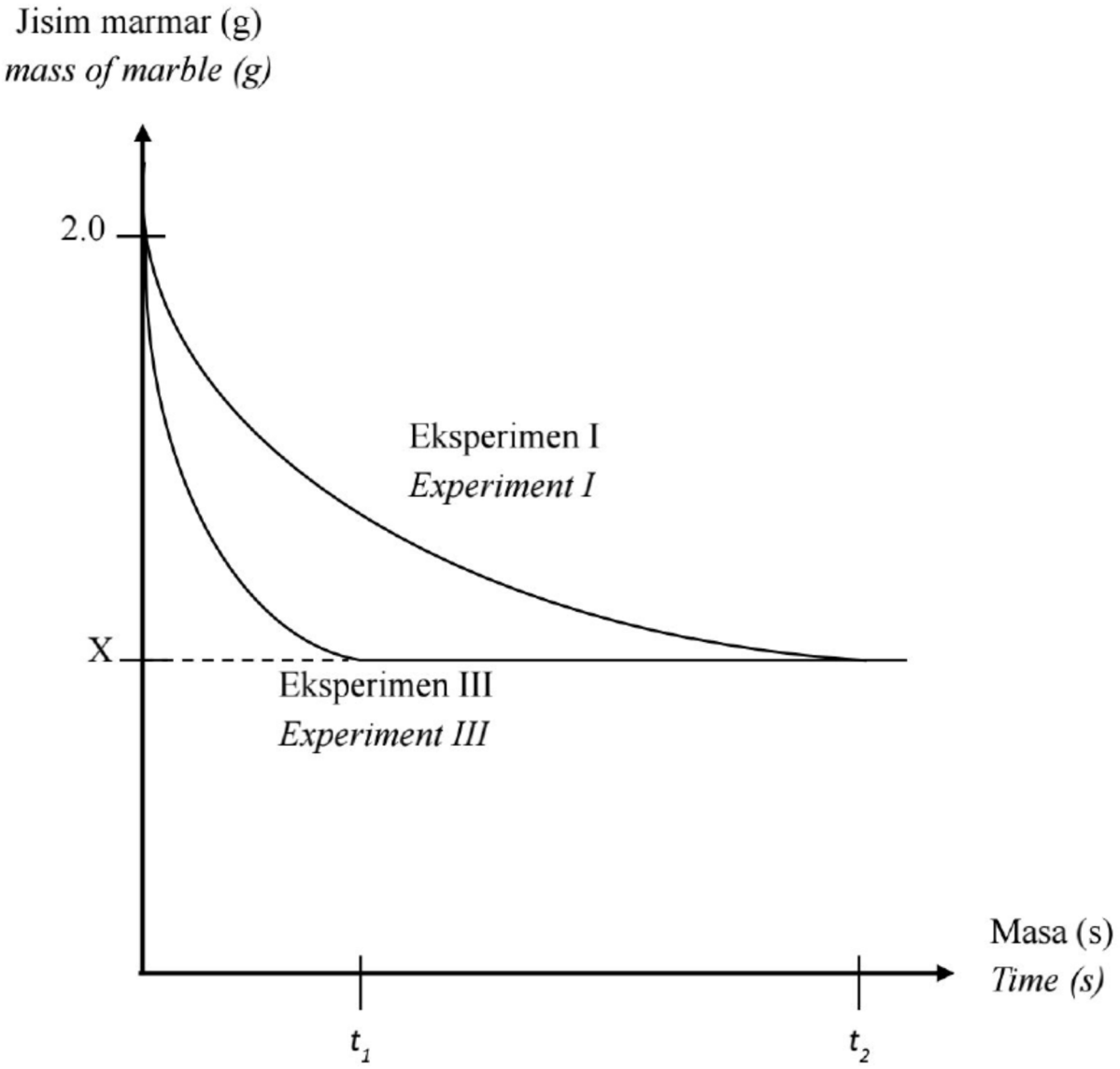
[2023-Melaka-09] (a) Aiman menjalankan eksperimen untuk mengkaji penguraian hidrogen peroksida, H_2O_2. Dia merekodkan isi padu gas oksigen yang terbebas. Pada minit yang ke-5, dia menambahkan satu spatula serbuk hitam ke dalam larutan hidrogen peroksida, H_2O_2. Serbuk hitam yang digunakan dapat meningkatkan 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, H_2O_2. 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, H_2O_2. Black powder used able to increase the rate of decomposition of hydrogen peroxide, Identify the black powder and state the function of the black powder used.

[2 markah/ marks]

(b) Seorang pelajar menjalankan tiga set eksperimen untuk mengkaji faktor yang mempengaruhi kadar tindak balas antara 2 g marmar dan asid hidroklorik. Rajah 7.1 menunjukkan gambar rajah susunan radas bagi eksperimen tersebut.
A student carried out three sets of experiment to study the factors that affect the rate of reaction between 2 % of marble and hydrochloric acid. Diagram 1.1 shows the apparatus set-up for the experiment.



Rajah 7.2 menunjukkan masa yang diambil untuk perubahan jisim marmar bagi Eksperimen I dan Eksperimen III.
Diagram 7.2 shows the time taken for change in mass of marble for Experiment I and Experiment III.



Rajah 7.2 / Diagram 7.2

(i) Tuliskan persamaan kimia bagi tindak balas antara marmar dan asid hidroklorik. Hitungkan nilai X.
[Jisim relatif marmar : 100]
Write the chemical equation for the reaction between marble and hydrochloric acid. Calculate the value of X.
[Relative mass of marble : 100]

[6 markah/ marks]

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

• Eksperimen I dan Eksperimen II/ *Experiment I and Experiment II*
• Eksperimen I dan Eksperimen III/ *Experiment I and Experiment III*

Terangkan perbandingan anda dengan merujuk kepada Teori Perlanggaran.
Explain your comparisons with reference to the Collision Theory.
[10 markah/ marks]

(c) Apabila gas hidrogen, H_2 ditindakbalaskan bersama-sama dengan gas klorin, Cl_2 gas hidrogen klorida, HCl terbentuk.
Bahan tindak balas, gas hidrogen, H_2 dan gas klorin, Cl_2 perlu berlanggar pada orientasi yang betul untuk menghasilkan perlanggaran berkesan dan tindak balas berlaku. Rajah 7.3 menunjukkan susunan atom bahan dan hasil tindak balas.
When hydrogen gas, H_2 is reacted with chlorine gas, Cl_2 hydrogen chloride gas, HC1 produced.
The reactants, hydrogen gas, H_2 and chlorine gas, Cl_2 need to collide in the correct orientation to produce an effective collision and reaction occur.
Diagram 7.3 shows arrangement of atoms of reactants and products.

Lukiskan gambar rajah berlabel bagi menunjukkan orientasi zarah bahan tindak balas, hidrogen, H_2 dan klorin, Cl_2 yang menghasilkan perlanggaran berkesan.
Draw a labelled diagram to show the orientation of the reactant particles, hydrogen, H_2 and chlorine, Cl_2 that results in effective collisions.
[2 markah/ marks]

[2023-Kelantan-10] (a) Suatu eksperimen dijalankan bagi menentukan kadar penguraian hidrogen peroksida, H_2O_2 kepada air dan oksigen dengan kehadiran bahan X sebagai mangkin. Keputusan bagi eksperimen ini direkodkan seperti dalam Jadual 6.
An experiment is carried out to determine the rate of decomposition of hydrogen peroxide, H_2O_2 to water and oxygen with the presence of substance X as a catalyst. The results of the experiment is recorded in Table 6.

Masa, s *Time, s*	Isi padu gas O2, cm^3 *Volume of gas O2, cm^3*
0	0.00
60	22.00
120	33.00
180	40.50
240	45.00
300	48.00
360	50.00
420	50.00

Jadual 10.1/ Table 10.1

Berdasarkan Jadual 6/ *Based on Table 6*

(i) Nyatakan maksud mangkin dan cadangkan nama bahan X.
State the meaning of catalyst and suggest the name of substance X

(ii) Plotkan graf isi padu gas oksigen melawan masa yang diambil.
Hitungkan kadar tindak balas purata

• dalam minit kedua
• dalam minit ke enam

Bandingkan kadar tindak balas dalam minit kedua dan keenam.
Terangkan jawapan anda.

Plot a graph of the volume of oxygen gas against the time taken.
Calculate the average rate of reaction

- *in second minute*
- *in sixth minute*

Compare the rate of reaction in the second and sixth minutes.
Explain your answer.

[8 markah] [8 marks]

(b) Tiga set eksperimen dijalankan untuk mengkaji kadar pembebasan gas hidrogen dalam tindak balas antara asid kuat dengan zink. Jadual 7 menunjukkan maklumat tentang eksperimen tersebut.
Three sets of experiments were conducted to study the rate of hydrogen gas release in the reaction between strong acid and zinc. Table 7 shows information about the experiment.

Set Eksperimen Set Experiment	Bahan tindak balas Reactants	Suhu,°C Temperature, °C
I	50 cm^3 asid monoprotik X 1.0 mol dm^{-3} + serbuk zink *50 cm^3 of 1.0 mol dm^{-3} monoprotic acid X + zinc powder*	60
II	50 cm^3 asid monoprotik X 1.0 mol dm^{-3} + serbuk zink *50 cm^3 of 1.0 mol dm^{-3} monoprotic acid X + zinc powder*	30
III	50 cm^3 asid diprotik Y 1.0 mol dm^{-3} + serbuk zink *50 cm^3 of 1.0 mol dm^{-3} diprotic acid Y + zinc powder*	30

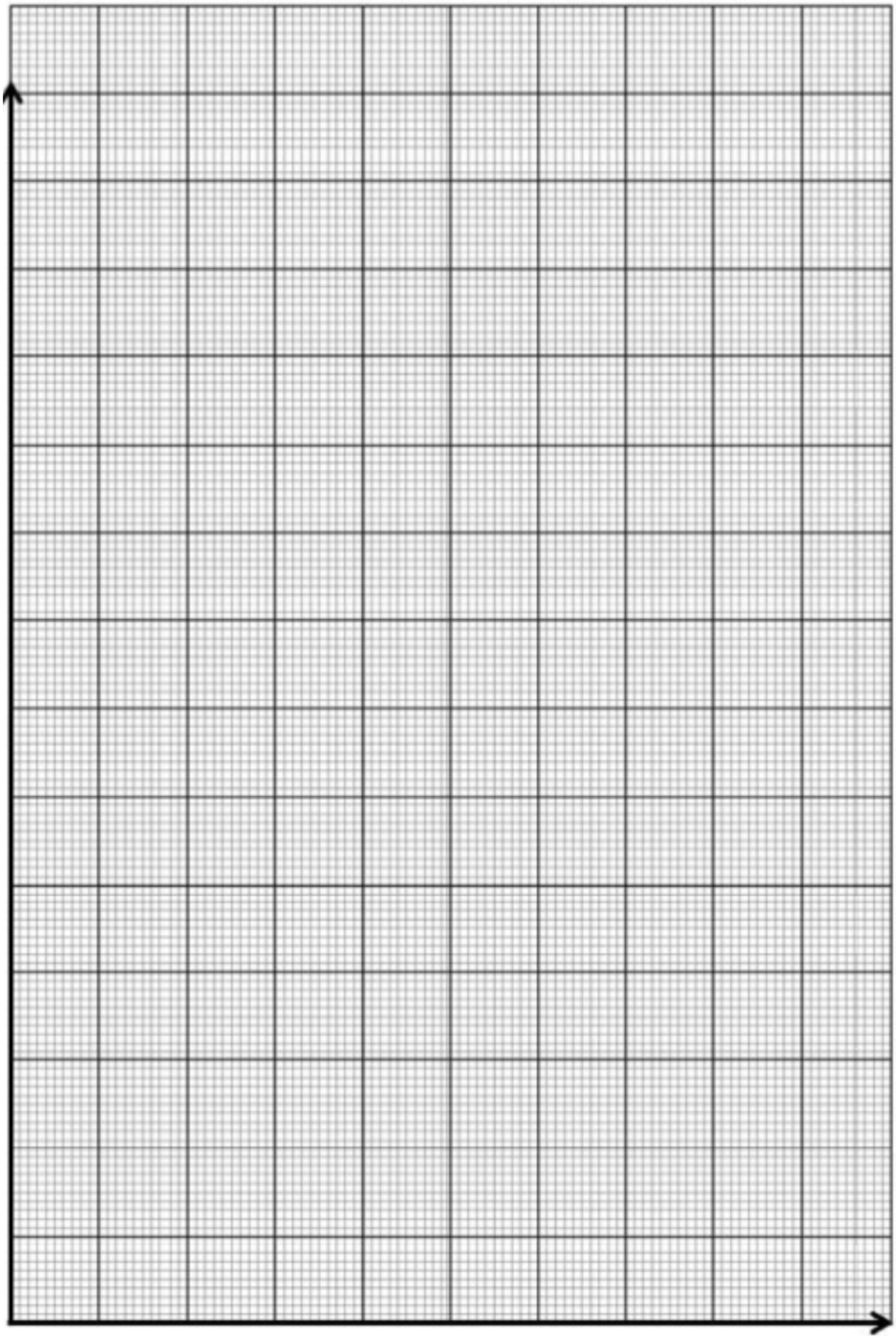
Jadual 7 /*Table 7*

(i) Bandingkan kadar tindak balas antara
- Set I dan Set II
- Set II dan Set III

Terangkan jawapan anda menggunakan teori perlanggaran.

Compare the rate of reaction between
- *Set I and Set II*
- *Set II and Set III*

[10 markah] [10 marks]



[2023-Pahang-09] (a) Jadual 9 menunjukkan maklumat bagi tiga set eksperimen untuk menyiasat faktor-faktor yang mempengaruhi kadar tindak balas antara zink dengan asid sulfurik.
Table 9 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 mol dm^{-3} + ketulan zink berlebihan *25 cm^3 of 0.2 mol dm^{-3} sulphuric acid + excess zink granule*	45
III	25 cm^3 asid sulfurik 0.2 mol dm^{-3} + serbuk zink berlebihan + larutan kuprum(II) sulfat *25 cm^3 of 0.2 mol dm^{-3} + excess zinc powder + copper(II) sulphate solution*	25

Jadual 9 / Table 9

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

[1 markah/ 1 mark]

Berdasarkan Jadual 9,/*Based on Table 9,*

(ii) tuliskan persamaan ion bagi tindak balas tersebut 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 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'.

[6 markah/ 6 marks]

(iii) bandingkan kadar tindak balas antara;
compare the rate of reaction between;

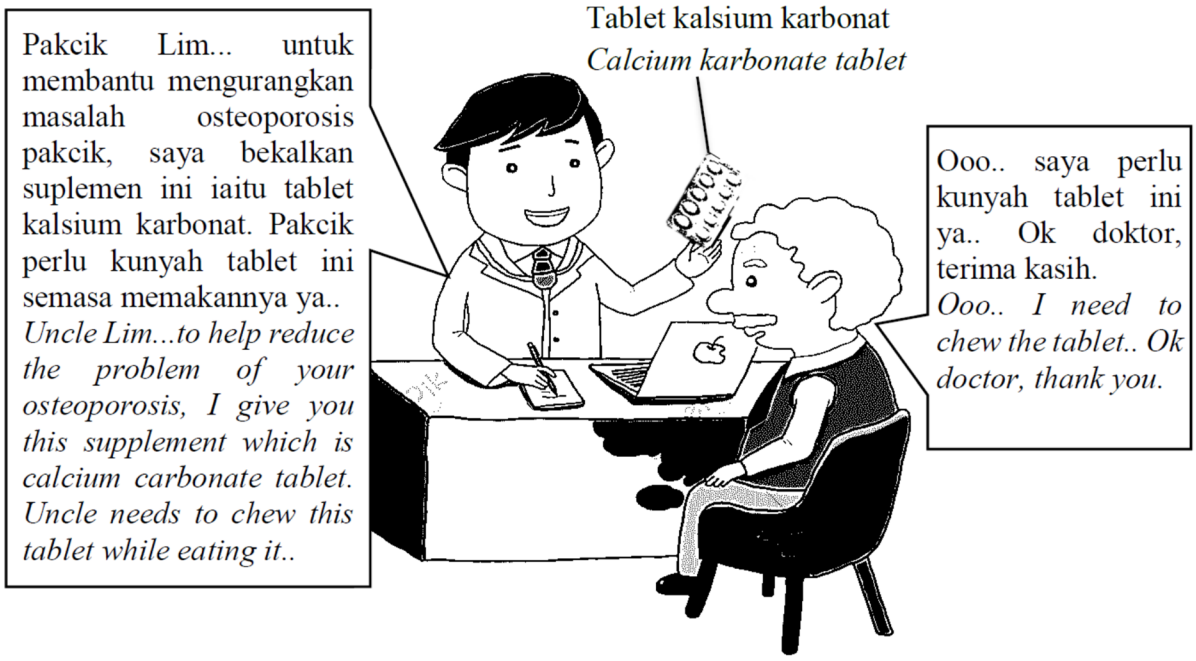
● Set I dan Set II
Set I and Set II

● Set I dan Set III
Set I and Set III

Jelaskan jawapan anda berdasarkan teori perlanggaran.
Explain your answer based on collision theory.

[10 markah/ 10 marks]

(b) Rajah 9 menunjukkan perbualan semasa temujanji antara doktor dan pesakitnya.
Diagram 9 shows conversation during appointment between a doctor and his patient.



Rajah 9 / Diagram 9

Berdasarkan Rajah 9 dan 140octor mempengaruhi kadar tindak balas, terangkan mengapa 140octor tersebut mengarahkan Pakcik Lim mengunyah tablet tersebut semasa memakannya.
Based on Diagram 9 and factor that affect the rate of reaction, explain why the doctor instructed Uncle Lim to chew the tablet while eating it.

[3 markah/ 3 marks]

[2023-Kedah-10] Rajah 10.1 menunjukkan dua jenis gula-gula yang berbeza.
Diagram 10.1 shows two different types of candy.

	
Gula-gula A *Candy A*	Gula-gula B *Candy B*

Rajah 10.1 / Diagram 10.1

Berdasarkan Rajah 10.1, gula-gula manakah yang akan dipilih supaya melarut dengan perlahan dalam mulut dan rasa enaknya dapat dinikmati lebih lama? Terangkan jawapan anda berdasarkan faktor yang mempengaruhi kadar tindak balas.
Based on Diagram 10.1, which candy will be chosen so that it dissolves slowly in the mouth and the good taste can be enjoyed longer? Explain your answer based on the factors that affect the rate of reaction.

(3 markah / marks)

(b) Seorang murid menjalankan dua set eksperimen untuk mengkaji kadar keterlarutan antara zink dan dua jenis asid X dan Y. Data eksperimen direkodkan dalam Jadual 10.
A student carried out two sets of experiment to study the rate of solubility between zinc and two type of acids X and Y. The data for the experiments are shown in the Table 10.

Set *Set*	Bahan tindak balas *Reactants*	Pemerhatian *Observation*	Hasil tindak balas *Products*
I	3.25 g serbuk zink dan asid X 1.0 mol dm^{-3} yang berlebihan. *3.25 g zinc powder and excess 1.0 mol dm^{-3} acid X*	Serbuk zink larut sepenuhnya dalam asid X dalam masa 1 minit *Zinc powder dissolves completely in acid X in 1 minute.*	Zink sulfat dan gas W *Zinc sulphate and gas W*
II	3.25 g serbuk zink dan asid Y 1.0 mol dm^{-3} yang berlebihan. *3.25 g zinc powder and excess 1.0 mol dm^{-3} acid Y.*	Serbuk zink larut sepenuhnya dalam asid Y dalam masa 2 minit. *Zinc powder dissolves completely in acid Y in 2 minutes.*	Zink klorida dan gas W *Zinc chloride and gas W*

jadual 10 / Table 10

Berdasarkan Jadual 10,/ *Based on Table 10,*

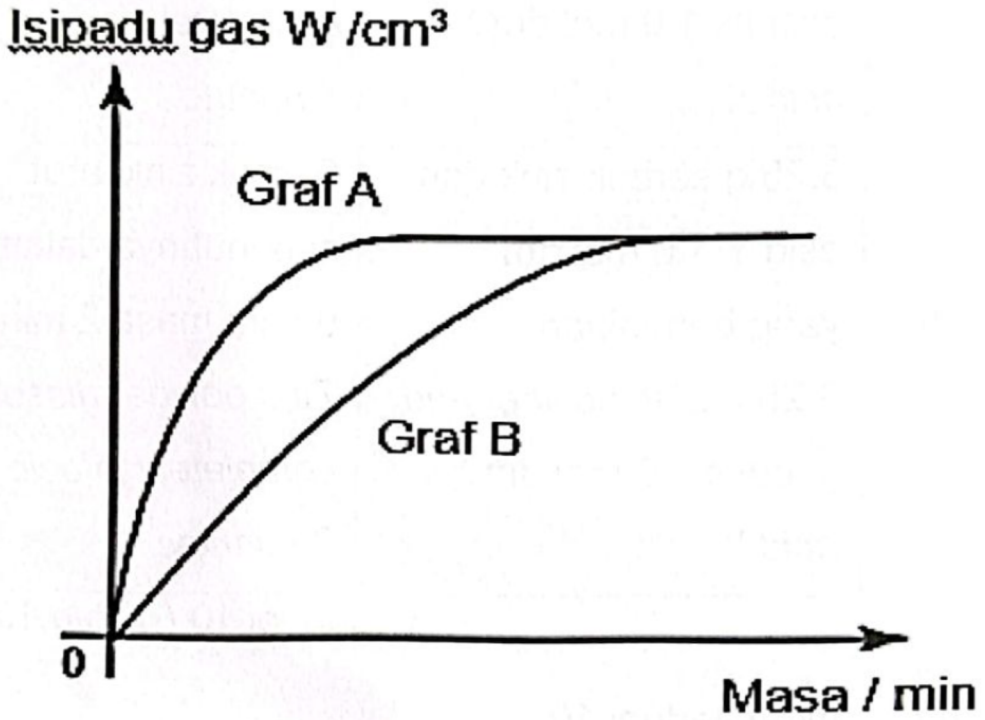
(i) Nyatakan maksud kadar tindak balas. Cadangkan nama asid X dan Y.
State the meaning of rate of reaction. Suggest the names of the acids X and Y.
(3 markah / marks)

(ii) Berdasarkan nama asid yang dicadangkan di (b)(i), tulis persamaan kimia bagi tindak balas dalam Set II. Hitung bilangan atom bagi gas W yang terhasil dalam Set II.
[Jisim atom reiatif: Zn = 65; Pemalar Avogadro, NA = 6.02 x 10^{23}]
Based on name of the acid suggested in (b)(i), write chemical equation for the reaction in Set II. Calculate the number of atoms of gas W produced in Set II.
[Relative atomic mass: Zn = 65; Avogadro Constant, NA = 6.02 x 10^{23}]
(5 markah / marks)

(iii) 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.
(2 markah / marks)

(iv) Merujuk pada teori perlanggaran, terangkan mengapa terdapat perbezaan dalam kadar tindak balas bagi Set I dan Set II.
By referring to collision theory, explain why there is difference in the rate of reaction in Set I and Set II.
(5 markah / marks)

(v) Keputusan eksperimen Set I dan Set II diplot dalam graf yang sama seperti Rajah 10.2.
The results of Set I and Set II experiments are plotted in the same graph as in Diagram 10.2.

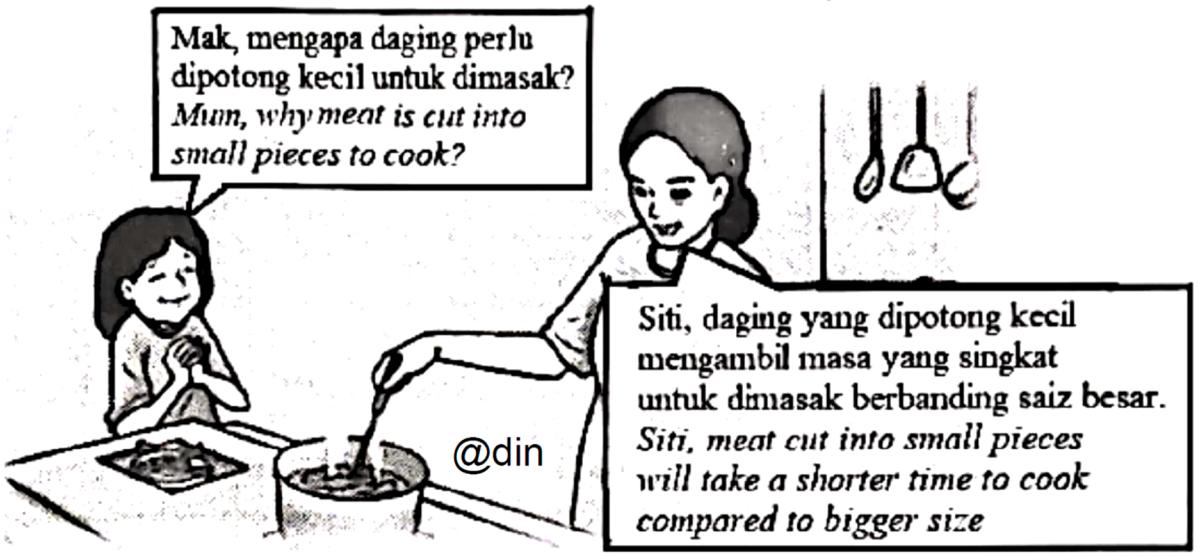


Rajah 10.2 / Diagram 10.2

Graf yang manakah mewakili eksperimen Set II? Mengapakah isipadu gas W bagi Set I dan Set II adalah sama?
Which graph represents the Set II experiment? Why the volume of gas W for Set I and Set II are the same?

(2 markah / marks)

[2023 Johor Bahru-09] Kadar tindak balas dipengaruhi oleh beberapa faktor. Rajah 9 menunjukkan perbualan antara Siti dengan ibunya tentang kadar tindak balas.
The rate of reaction is affected by several factors. Diagram 9 shows the conversation between Siti and her mother about rate of reaction.



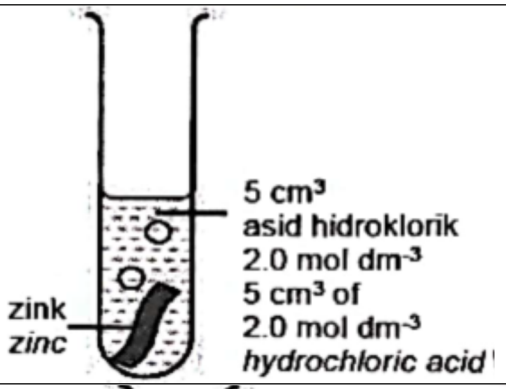
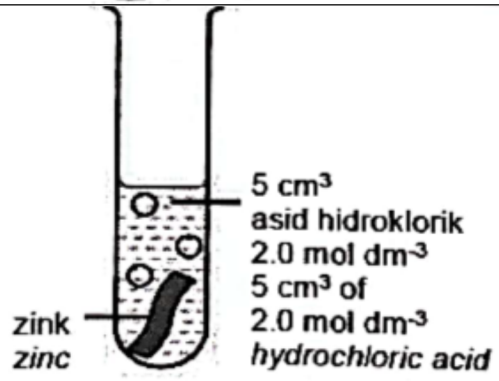
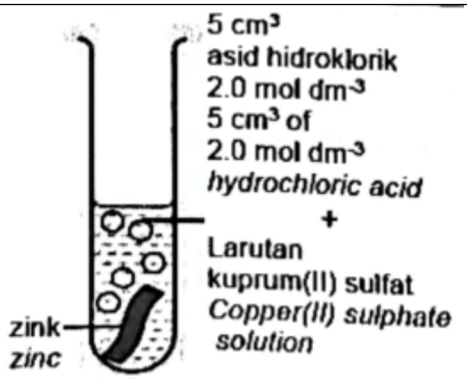
Rajah 9/ *Diagram 9*

Berdasarkan perbualan di atas, /*Based on the conversation above,*

(a) nyatakan maksud kadar tindak balas. Berikan faktor yang mempengaruhi masa yang diambil untuk daging masak dan terangkan jawapan anda.
state the meaning of rate of reaction. Give the factor that affect the time taken for the meat to cook and explain your answer

[4 markah] [4 marks]

(b) Seorang pelajar menjalankan tiga eksperimen untuk mengkaji kesan faktor yang mempengaruhi kadar tindak balas. Jadual 10 menunjukkan keputusan bagi eksperimen-eksperimen itu.
A student carried out three experiments to investigate the effects of the factors affecting the rate of reaction. Table 10 shows the results of the experiments.

Eksperimen Experiment	Susunan radas Apparatus set-up	Suhu Temperature (°C)	Masa yang diambil untuk tindak balas lengkap Time taken for the reaction to complete (s)
I		30	50
II		40	30
III		40	10

Jadual 10/ Table 10

(i) Tulis persamaan kimia bagi tindak balas dalam Eksperimen I. Hitung jisim garam yang terhasil.
[Jisim atom relatif: Cl = 35.5, Zn = 65]
Write the chemical equation for the reaction in Experiment I. Calculate the mass of salt produced.
[Relative atomic mass: Cl = 35.5, Zn = 65]

[6 markah] [6 marks]

(ii) Bandingkan kadar tindak balas bagi
Compare the rates of reaction between

i) Eksperimen I dan Eksperimen II
Experiment I and Experiment II

ii) Eksperimen II dan Eksperimen III
Experiment II and Experiment III

Terangkan, dengan merujuk kepada teori perlanggaran, mengapa terdapat perbezaan dalam kadar tindak balas dalam eksperimen-eksperimen tersebut.
Explain, with the reference to the collision theory, why there are differences in the rates of reaction in the experiments.

[10 markah] [10 marks]

Bab 8 - Bahan Buatan dalam Industri

[2023-Putrajaya-01] Rajah 1 menunjukkan satu monumen yang terkenal di Malaysia. Monumen ini diperbuat daripada aloi X dengan komposisi tertentu di mana logam tulennya adalah kuprum.
Diagram 1 shows a famous monument in Malaysia. This monument is made of alloy X with certain composition where the pure metal is copper.

Rajah/ Diagram 1

(a) Namakan aloi X./ *Name alloy X.*

..... [1M]

(b) Lukis susunan atom dalam aloi yang dinyatakan di dalam (a) dan labelkan atom – atom yang hadir.
Draw an atom arrangement in alloy that is stated in (a) and label the atoms present.

[2 markah/ marks]

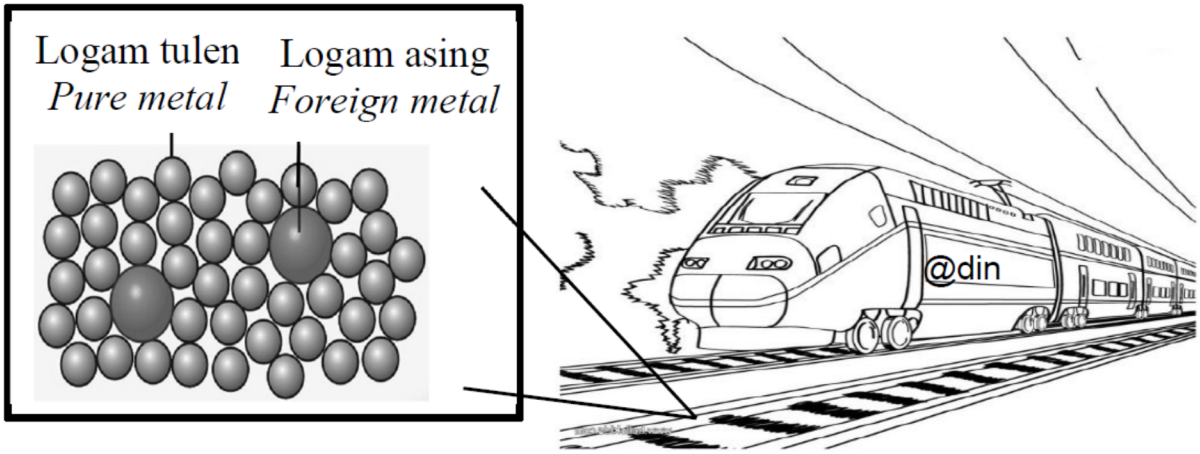
(c) Bandingkan kekerasan aloi X dengan logam tulennya.
Compare the hardness of alloy X with it's pure metal.

..... [1M]

(d) Nyatakan satu aloi lain bagi kuprum./ *State one other alloy of copper.*

..... [1M]

[2023-JohorPPDTangkak-01] Rajah 1 menunjukkan susunan atom bagi aloi X yang digunakan untuk membuat landasan keretapi.
Diagram 1 shows an arrangement of atom of alloy X which is used to make railway track.



Rajah 1/ Diagram 1

(a) Apakah yang dimaksudkan dengan aloi?/ *What is meant by alloy?*

..... [1M]

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

(i) Namakan aloi X./ *Name the alloy X.*

..... [1M]

(ii) Aloi X terbina dari gabungan logam tulen dan logam asing. Nyatakan nama bagi
Alloy X is built from the mixture of pure metal and foreign metal.
State the name for

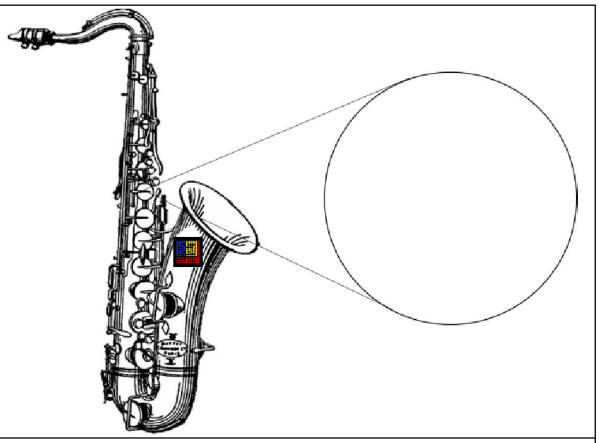
Logam tulen/*Pure metal* :.....

Logam asing/ Foreign metal :..... [2M]

(c) Nyatakan satu sebab mengapa aloi X sesuai digunakan untuk membuat landasan keretapi.
State one reason why alloy X is suitable for use to make railway track.

..... [1M]

[2023-JUJ-Set02-03] Rajah 3 menunjukkan dua jenis aloi, gangsa dan aloi Z.
Diagram 3 shows the two types of alloy, bronze and alloy Z.

	
Gangsa/ *Bronze*	Aloi Z/ *Alloy Z*

Rajah 3 / *Diagram* 3

(a) Berdasarkan Rajah 3, gangsa terdiri daripada campuran dua logam iaitu logam tulen X dan logam Y.
Based on Diagram 3, bronze consists of two mixture of metals which is pure metal X and metal Y.

(i) namakan logam tulen X dalam gangsa./*name the pure metal X in bronze.*

..... [1M]

(ii) kenalpasti logam Y./*identify metal Y.*

..... [1M]

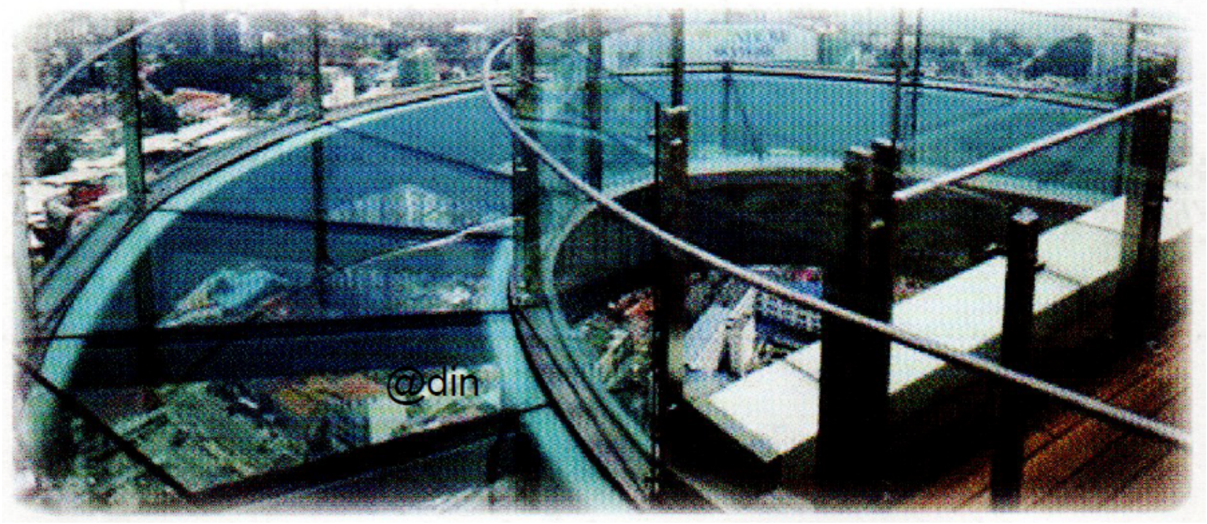
(b) Lukis susunan zarah aloi Z dalam Rajah 3.
Draw the arrangement of particles alloy Z in Diagram 3.

[2M]

(c) Dalam pembuatan gangsa, 90% logam tulen X dan 10% logam Y perlu dicampurkan. Jika Amir ingin menyediakan piala berjisim 500 g, berapakah jisim logam Y yang diperlukan?
In bronze manufactured, 90% of pure metal X and 10% metal Y are mixed. If Amir want to prepare 500 g of trophy, what is the mass of metal Y required?

[2M]

[2023-Selangor-Set02-02] Rajah 2.1 menunjukkan Rainbow Skywalk yang terletak di Georgetown, Pulau Pinang. Ia merupakan jambatan yang dibina daripada kaca.
Diagram 2.1 shows Rainbow Skywalk in Georgetown, Penang. It is a bridge which made of glass.



Rajah 2.1/ *Diagram* 2.1

(a) Nyatakan komponen utama kaca./ *State the main component of glass.*

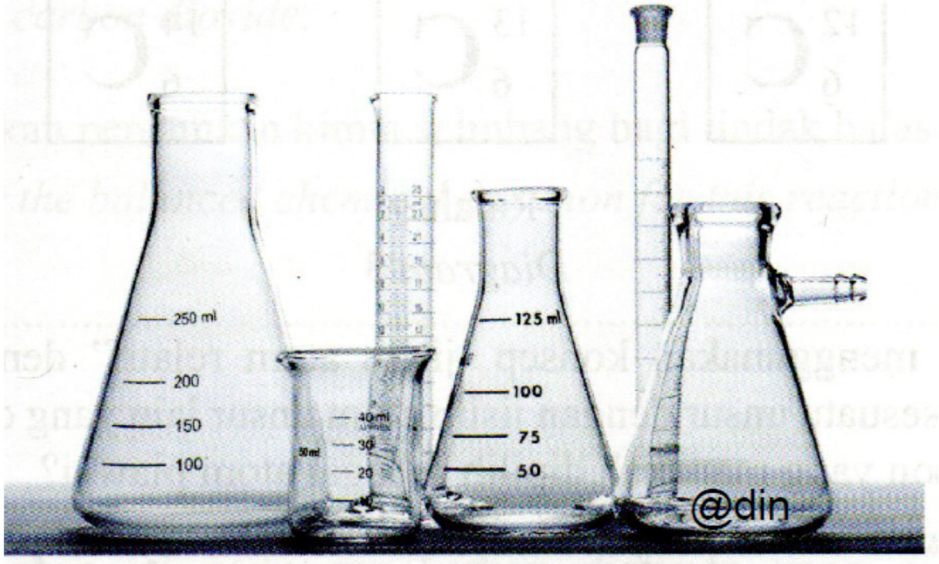
..... [1M]

(b) Nyatakan dua sifat asas kaca./ *State two basic properties of glass.*

.....

..... [2M]

Rajah 2.2 menunjukkan radas kaca makmal.
Diagram 2.2 shows the laboratory glassware.



Rajah 2.2/ Diagram 2.2

(i) Cadangkan jenis kaca yang sesuai untuk membuat radas kaca makmal.
Suggest the type of glass that is suitable to make the laboratory glassware.

..... [1M]

(ii) Berikan satu sebab bagi jawapan anda di 2(c)(i).
Give one reason for your answer in 2(c)(1).

..... [1M]

[2023-MRSM-08] (a) Jadual 2 menunjukkan data daripada eksperimen untuk mengkaji kekerasan logam kuprum tulen dan aloinya.
Table 2 shows a data from an experiment to study the hardness of pure copper metal and its alloy.

Jenis bongkah *Type of block*	Diameter lekuk (cm)/ *Diameter of dent (cm)*			
	1	2	3	Purata /*Average*
Kuprum/ *Copper*	0.6	0.5	0.6	x
Loyang/ *Brass*	0.2	0.3	0.3	y

Jadual 2/ Table 2

(i) Apakah maksud aloi?/ *What is meant by alloy?*

.....

..... [1M]

(ii) Lukis gambar rajah berlabel susunan zarah bagi loyang.
Draw a labelled diagram to show the arrangement of particles in brass.

[2M]

(iii) Hitungkan nilai x dan y./ *Calculate the value of x and y.*

[1M]

(b) Tingkap kaca pada sebahagian bangunan diperbuat daripada kaca fotokromik yang berubah menjadi gelap apabila terdedah kepada cahaya matahari disebabkan oleh pembentukan atom argentum yang terkumpul dan menghalang pancaran cahaya. Nyatakan komponen utama kaca fotokromik dan wajarkan penggunaannya.
Glass window in some building is made of photochromic glass that turns dark when exposed to sunlight because of the formation of silver atoms that accumulate and block light rays. State the major components in photochromic glass and justify its use.

.....

.....

..... [3M]

(c) Rajah 6 menunjukkan pintu gerbang Istana Negara yang bahan utamanya diperbuat daripada konkrit.
Diagram 6 shows the archway of Istana Negara which the main material is made of concrete.

Rajah 6/ *Diagram 6*

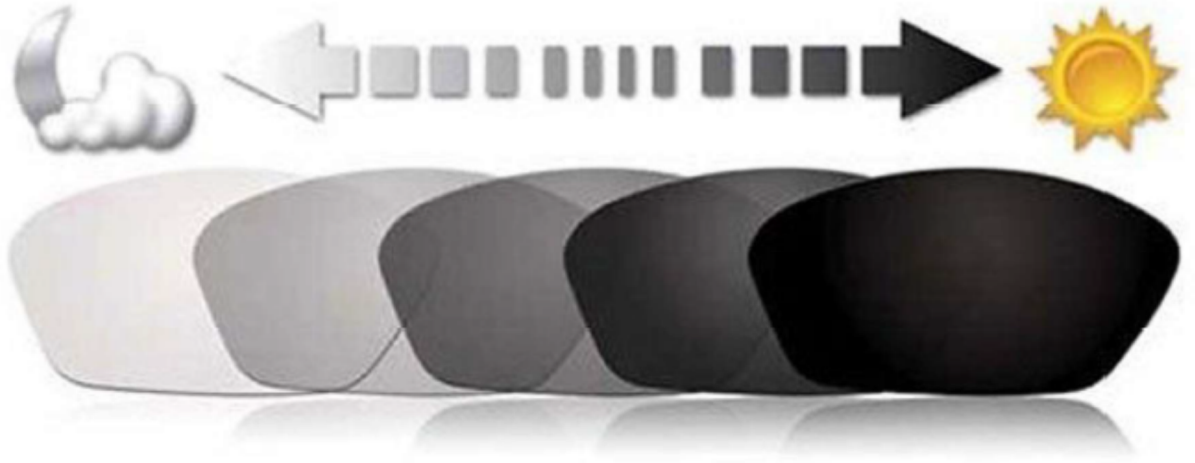
Anda ditugaskan untuk membina model sebuah pintu gerbang di sekolah. Cadangkan bagaimana struktur binaan yang kukuh dan berkualiti dapat dihasilkan.
You are assigned to build a model of archway in your school.
Suggest how a high quality and strong building structure can be produced.

.....

.....

..... [3M]

[2023-Kelantan-03] (a) Rajah 3 menunjukkan perubahan yang berlaku kepada kaca S apabila terdedah kepada keamatan cahaya matahari yang berbeza
Diagram 3 shows the changes that occur to S glass when exposed to different intensities of sunlight



Rajah 3/ Diagram 3

(i) Apakah bahan utama yang digunakan dalam pembuatan kaca?
What are the main substance used in glass manufacturing?

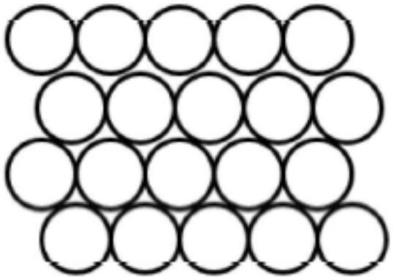
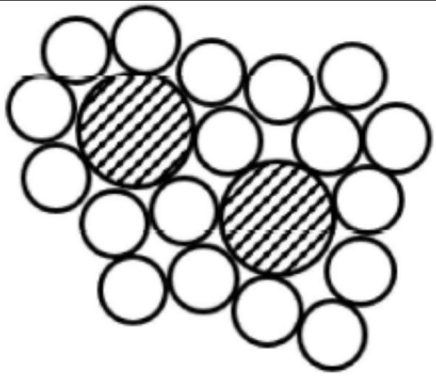
..... [1M]

(ii) Namakan */Name*

Bahan matriks dalam kaca S : .....
Matric substance in glass S

Bahan pengukuhan dalam kaca S : .....
Reinforcement substance in glass S

(b) Jadual 1 menunjukkan maklumat komposisi bagi bahan P dan bahan Q
The table 1 shows compositional information for substance P and substance Q

Bahan/ *Substance*	Susunan Zarah/ *Particles arrangement*
X	
Y	

Jadual 1/ Table 1

Bandingkan kekerasan antara bahan X dan bahan Y. Terangkan jawapan anda.
Compare the hardness between substance X and substance Y. Explain your answer.

.....

.....

..... [3M]

[2023-JUJ-Set01-01] Rajah 1 menunjukkan kaca X dan seramik Y yang digunakan dalam kehidupan harian.
Diagram 1 shows glass X and ceramic Y used in daily life.

Kaca X / Glass X

Seramik Y / Ceramic Y

(a) Apakah yang dimaksudkan dengan seramik?
What is meant by ceramic?

..... [1M]

(b) Apakah komponen utama kaca dan seramik?
What is the main component of glass and ceramic?

..... [1M]

(c) Namakan jenis kaca X dan seramik Y.
Name the type of glass X and ceramic Y.

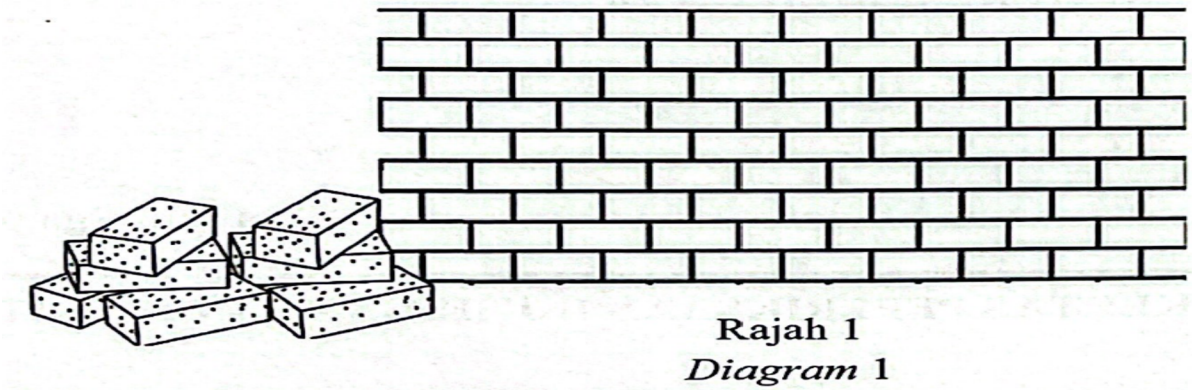
Kaca X/ *Glass X* : .....

Seramik Y/ *Ceramic Y* : .....
[2M]

(d) Seramik juga telah digunakan dalam bidang perubatan. Nyatakan seramik yang digunakan dalam implan gigi.
Ceramic have also been used in medical field. State the ceramic used in dental implants.

..... [1M]

[2023-NegeriSembilan-01] Rajah 1 menunjukkan sejenis seramik yang digunakan untuk membina dinding bangunan.
Diagram 1 shows a type of ceramics that is used to construct building's wall.



Rajah 1
***Diagram* 1**

Berdasarkan Rajah 1,/ *Based on Diagram 1,*

(a) nyatakan bahan utama dalam seramik.
state the main material in ceramics.

..... [1M]

(b) nyatakan dua sifat seramik./ *state two characteristic of ceramics.*

..... [1M]

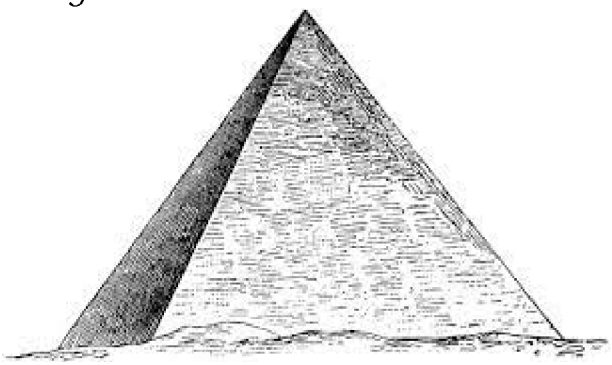
(c) nyatakan jenis seramik yang lain./ *state another type of ceramics.*

..... [2M]

(d) nyatakan satu kegunaan seramik yang dinyatakan di 1(c).
state one uses of the ceramic stated in 1(c).

..... [1M]

[2023-Perlis-02] Rajah 1 menunjukkan Piramid Giza yang diperbuat daripada seramik. Menurut analisis ahli sejarah, piramid ini dibina antara tahun 2560 dan 2580 sebelum Masihi.
Diagram 1 shows the Pyramids of Giza which are made up from ceramics. According to the analysis of historians, this pyramid was built between 2560 and 2580 before century.



Rajah 1/ Diagram 1

(a) (i) Nyatakan maksud seramik./ *State the meaning of ceramic.*

.....

..... [1M]

(ii) Nyatakan satu sifat seramik yang membolehkan piramid kukuh sehingga kini.
State one characteristic of ceramics that allowed the pyramid sturdy until now.

..... [1M]

(b) Jadual 2 menunjukkan tiga jenis bahan komposit K, L dan M dan komponennya.
Table 2 shows three types of composite materials K, L and M and their components.

Bahan komposit *Composite material*	Komponen *Component*
K	Kaca, kuprum(I) klorida dan argentum klorida *Glass, copper*(I) *chloride and silver chloride*
L	Itrium(III) karbonat, barium karbonat, kuprum(II) karbonat dan oksigen *Yttrium*(III) *carbonate, barium carbonate, copper*(II) *carbonate and oxygen*
M	Konkrit dan keluli *Concrete and steel*

Berdasarkan Jadual 2, kenal pasti bahan komposit K, L dan M.
Based on Table 2, identify the composite material K, L and M.

K : .....

L : .....

M : ..... [3M]

[2023-Kedah-04] Rajah 4.1 menunjukkan endoskop yang menggunakan bahan komposit dalam salah satu komponennya.
The diagram 4.1 shows an endoscope that uses composite materials in one of its components.

Rajah 4.1 / Diagram 4.1

Endoskopi ialah prosedur tanpa pembedahan di mana organ dalam badan atau tisu dalaman dilihat menggunakan endoskop. Bahan komposit tersebut digunakan untuk menghantar maklumat dan data dalam bentuk cahaya. Komponen yang menggunakan bahan komposit itu disambung kepada skrin televisyen untuk melihat bahagian endoskop ini dimasukkan.
Endoscopy is a non-surgical procedure in which internal organs or internal tissues are viewed using an endoscope. The composite material is used to transmit information and data in the form of light. The component that uses the composite material is connected to a television screen to see the part of the endoscope inserted.

(a)(i) Apakah bahan komposit yang digunakan dalam endoskop?
What composite materials is used in endoscopes'?

..... [1M]

(ii) Nyatakan dua sifat bahan komposit di a (i) yang membolehkan ia digunakan dalam endoskop.
State two properties of the composite material in a (i) that enable them to be used in endoscopes.

.....

.....

..... [2M]

(b) Jadual 4 menunjukkan tiga jenis kaca X, Y dan Z dan komponennya.
Table 4 shows three types of glass X, Y and Z and their components.

Kaca *Glass*	Komponen *Component*
X	Silika, soda (natrium karbonat), batu kapur (kalsium karbonat) *Silica, soda (sodium carbonate), limestone (calcium carbonate)*
Y	Silika, soda (natrium karbonat), batu kapur (kalsium karbonat), boron oksida, aluminium oksida *Silica, soda (sodium carbonate), limestone (calcium carbonate), boron oxide, aluminum oxide*
Z	Silika, soda (natrium karbonat), plumbum(II) oksida *Silica, soda (sodium carbonate), lead(II) oxide*

Jadual 4 / Table 4

Berdasarkan Jadual 4,/ *Based on Table 4,*

(i) Kenal pasti kaca Z./ *Identify glass Z.*

..... [1M]

(ii) Rajah 4.2 menunjukkan peralatan memasak yang digunakan di rumah.
Figure 4.2 shows the cooking equipment that is used at home.

Rajah 4.2 / Diagram 4.2

Berdasarkan Jadual 4, pilih kaca yang sesuai untuk menghasilkan peralatan memasak pada Rajah 4.2. Wajarkan pemilihan jenis kaca yang dibuat.
Based on Table 4, choose the suitable glass to produce the cooking equipment in Figure 4.2. Justify the selection of the type of glass made.

.....

.....

.....

..... [3M]

[2023-JohorSkudai-01] Topi keledar dan kanta kamera diperbuat daripada bahan komposit.
Helmet and camera lens are made up of composite material.

(a) (i) Apakah maksud bahan komposit?
What is the meaning of composite material?

.....

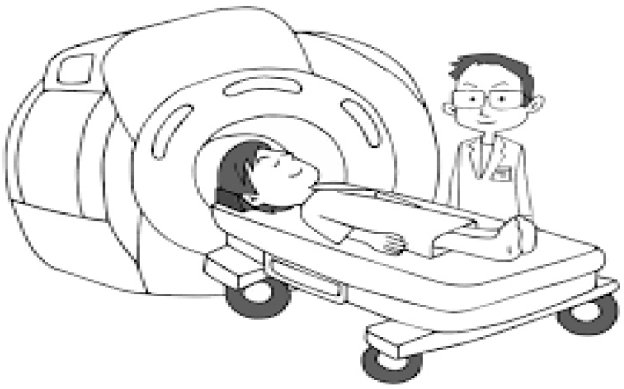
..... [1M]

(ii) Apakah bahan komposit dalam:
What is the composite in?

Topi keledar/ *Helmet* : .....

Kanta kamera/ *Camera lens* : ..... [2M]

(b) Rajah 1 menunjukkan alat pengimejan resonans magnetik (MRI) yang digunakan di hospital. Alat ini diperbuat daripada bahan komposit.
Diagram 1 shows the magnetic resonance imaging (MRI) equipment used in hospital. This tool is made of composite material.



(i) Namakan bahan komposit dalam alat itu.
Name the composite material in the device.

..... [1M]

(ii) Nyatakan sebab bahan komposit itu digunakan.
State the reason this composite material is being used.

..... [1M]

[2023-SBP-08] Jadual 8 menunjukkan maklumat bagi tiga jenis bahan komposit.
Table 8 shows information about three types of composite materials.

Bahan komposit *Composite material*	Komponen *Components*	Kegunaan *Uses*
X	• Kaca/*Glass* • Argentum klorida *Silver chloride*	Tingkap bangunan *Building window*
Y	• Plastik/*Plastic* • Gentian kaca silika *Silica glass fibre*	Perkabelan rangkaian komputer *Cables in computer network*
Z	• Plastik/ *Plastic* • Gentian kaca *Glass fibre*	Topi keledar *Helmet*

(i) Bahan komposit diperbuat daripada gabungan dua bahan yang bukan homogen iaitu bahan matriks dan bahan W. Apakah W?
Composite material is made from combining two non-homogenous substances which is matrix substance and substance W. What is W?

..... [1M]

(ii) Berdasarkan Jadual 8, nyatakan bahan komposit X dan Y.
Based on Table 8, state the composite material X and Y.

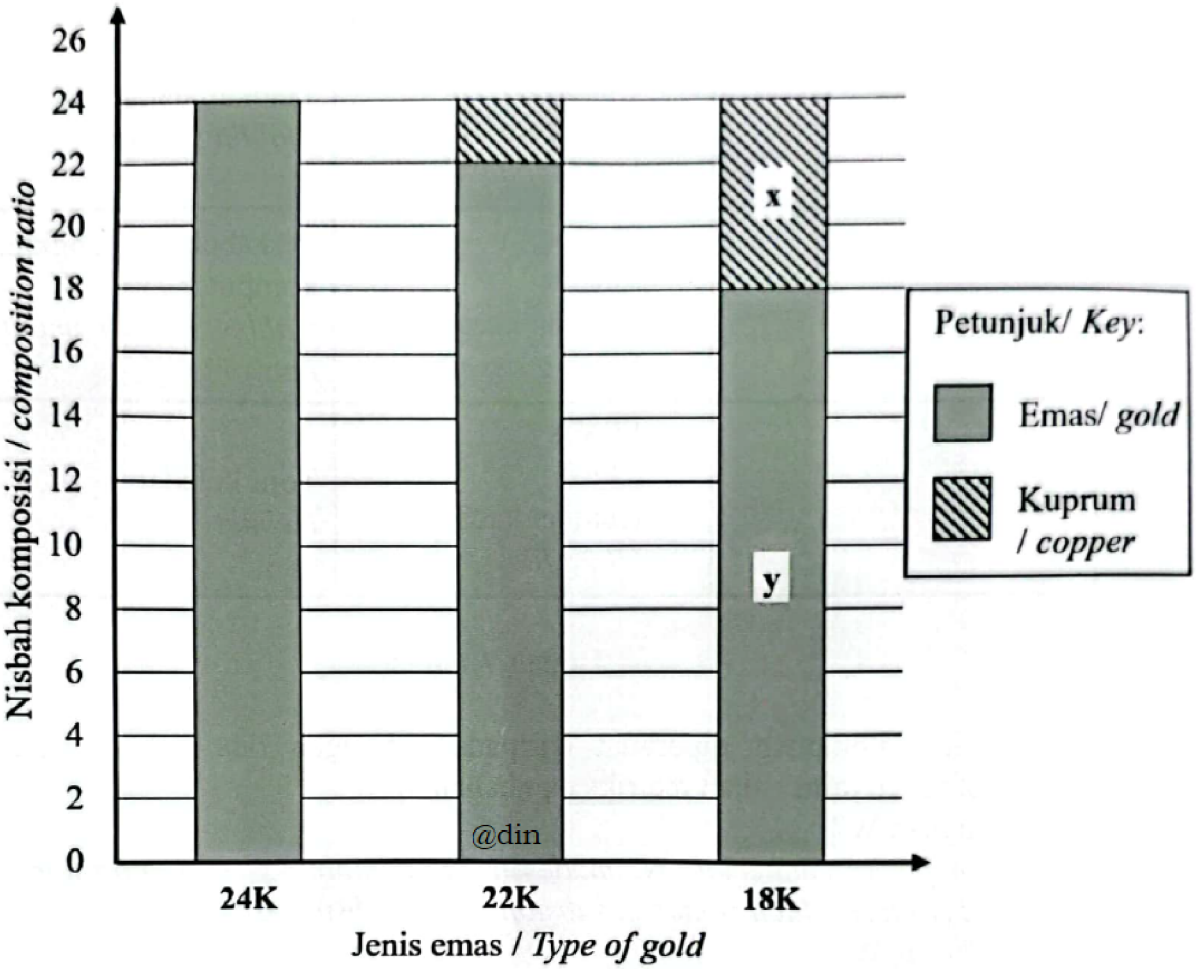
X : .....

Y : ..... [2M]

(iii) Nyatakan satu sifat bagi bahan Z./ *State one property of material Z.*

..... [1M]

(b) Rajah 8.1 menunjukkan carta liar nisbah komposisi emas terhadap kuprum berdasarkan jenis emas.
Diagram 8.1 shows a bar chart of ratio composition of gold toward copper basal on type of gold.



Rajah/ Diagram 8.1

(i) Hitungkan peratus y dalam emas 18 K.
Calculate the percentage of y in 18 K gold.

[1M]

(ii) Emas yang manakah paling mudah kemek apabila dikenakan daya terhadapnya? Berikan satu alasan.
Which gold is the most easily dented when force is exerted on it? Give one reason.

.....

..... [2M]

(c) Rajah 8.2 mcnunjukkan carta alir bagi sebahagian daripada proses pengurusan air sisa.
Diagram 8.2 shows the flowchart of part of the wastewater treatment process.

Langkah 1 *Step 1*	Air sisa dipam masuk *Wastewater is pumped in*
	↓
Langkah 2 *Step 2*	Pengasingan sisa pepejal Screening of solid waste
	↓
Langkah 3 *Step 3*	Proses elcktro-penggumpalan *Electrocoagulation process*
	↓
Langkah 4 *Step 4*	Proses pengasingan pepejal dan air sisa *Solid and wastewater settling process*
	↓
Langkah 5 *Step 5*	Pengumpulan enapcemar *Collection of sludge*

Rajah/ Diagram 8.2

(i) Berdasarkan Rajah 8.2, langkah yang manakah melibatkan "Kaedah Olahan Larut lesapan Tapak Pelupusan"?
Based on Diagram 8.2, which step involving "Landfill Leachate Treatment Method'?

..... [1M]

(ii) Lukis susunan radas untuk merawat air sisa bagi langkah yang dinyatakan di 8(c)(i) jika proses itu dijalankan di dalam makmal.
Draw apparatus set-up to treat the wastewater for the step mentioned in 8(c)(i) if the process is carried out in laboratory.

[2M]

[2023-Melaka-01] Jadual 1 menunjukkan bahan komposit dan kegunaannya.
Table 1 shows composite materials and its uses.

Bahan komposit *Composite material*	Kegunaan *Uses*
V	Kamera video dan kabel rangkaian komputer *Video camera and cables in computer*
W	Mesin resonan magnet nukleus(MNR) dan mesin pengimejan resonan magnet(MRI) *Nuclear Magnetic Resonance (NMR) machines and Magnetic Resonance Imaging (MRT) machines*
X	Tingkap kereta dan kanta kamera *Car window and camera lens*
Y	Topi keledar dan bampar kereta *Helmet and car bumper*

Jadual 1 / *Table* 1

Berdasarkan Jadual 1,/ *Based on Table 1,*

(a) Nyatakan namakan bahan komposit W dan Y.
State the name of composite materials W and Y.

W : .....

Y : .....
[2M]

(b) Nyatakan sifat istimewa bagi bahan komposit V dan X.
State the special properties of the composite material V and X.

V : .....

X : .....
[2M]

(c) Bahan komposit W dikenali sebagai magnet yang sangat kuat. Apakah kegunaan bahan komposit W dalam bidang pengangkutan?
Composite materials W is known as a very strong magnet. What is the use of composite material W in transportation field?

..... [1M]

[2023-Pahang-06] (a)

Aloi J yang bersifat ringan tetapi kuat digunakan untuk membuat basikal lumba.
Alloy J which is light but strong is used to make racing bicycles.

Berdasarkan pernyataan di atas,/ *Based on the above statement,*

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

.....

..... [1M]

(ii) Kenal pasti aloi J./ *Identify alloy J.*

..... [1M]

(b) Seramik termaju diperbuat daripada bahan bukan organik seperti oksida, karbida, dan nitrida. Nyatakan satu kegunaan seramik termaju dalam industri pembuatan kenderaan dan jelaskan jawapan anda.
Advanced ceramics are made from inorganic compounds such as oxides, carbides and nitrides. State one use of advanced ceramics in the vehicle manufacturing industry and explain your answer.

.....

.....

.....

..... [3M]

(c) Bahan komposit W dihasilkan daripada gabungan bahan matriks U dan bahan pengukuhan V. Jadual 6 menunjukkan perbandingan sifat bagi bahan matriks U, bahan pengukuhan V dan bahan komposit W.
Composite material W is produced from a combination of matrix substance U and strengthening substance V. Table 6 shows the comparison of properties for matrix substance U, strengthening substance V and composite material W.

Bahan matriks U *Matrix substance U*	Bahan pengukuhan V Strengthening substance V	Bahan komposit W Composite material W

□ Kekuatan regangan rendah *Low stretching strength* □ Kekonduksian haba dan elektrik rendah *Low heat and electrical Conductivity* □ Tahan kakisan *Resistant to corrosion* □ Tahan lasak *Durable*	□ Kekuatan regangan tinggi *High stretching strength* □ Kekonduksian haba dan elektrik rendah *Low heat and electrical conductivity*	□ Kekuatan regangan tinggi *High stretching Strength* □ Penebat haba dan elektrik *Heat and electrical Insulator* □ Tahan kakisan *Resistant to corrosion* □ Tahan lasak *Durable*

Jadual 6 / Table 6

(i) Kenal pasti bahan matriks U, bahan pengukuhan V dan bahan komposit W.
Identify matrix substance U, strengthening substance V and composite material W.

Bahan matriks U
Matrix substance U : .....

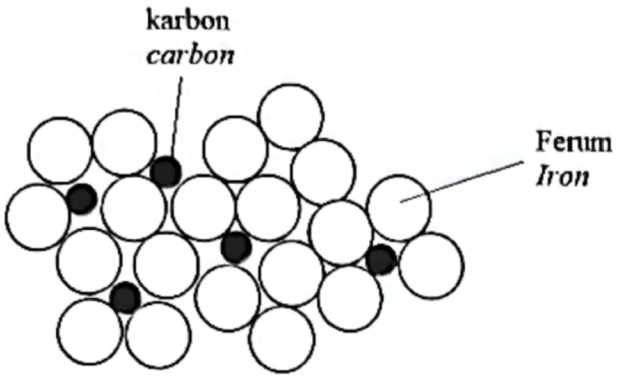
Bahan pengukuhan V
Strengthening substance V : .....

Bahan komposit W
Composite material W : ..... [3M]

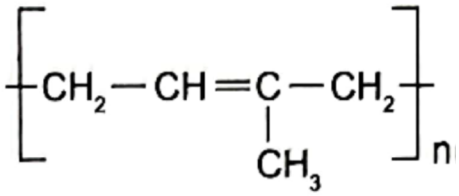
(ii) Nyatakan satu kegunaan bahan komposit W dalam kehidupan seharian.
State one use of composite material W in daily life.

..... [1M]

[2023 Johor Bahru-06] Rajah 6.1 menunjukkan susunan atom dalam aloi X dan formula struktur bagi polimer Y.
Diagram 6.1 shows the arrangement of atoms in alloy X and the structural formula of polymer Y.



Aloi X
Alloy X



Polimer Y
Polymer Y

(a) Nyatakan maksud aloi./ *State the meaning of alloy.*

..... [1M]

(b) Nyatakan nama bagi aloi X./ *State the name of alloy X.*

..... [1M]

(c) Lukiskan monomer bagi polimer Y./ *Draw the monomer of rubber Y.*

[1M]

(d) Bahan yang mengandungi polimer Y wujud dalam bentuk cecair. Tetapi apabila dibiarkan beberapa jam, bahan itu boleh menjadi pepejal. Apakah cara yang perlu dilakukan supaya bahan itu boleh kekal dalam bentuk cecair? Berikan alasan anda.
Substance containing polymer Y exists in liquid form. But when left for several hours, the substance turns to solid Hliat should be done so that the substance can remain in liquid form? Give your reason.

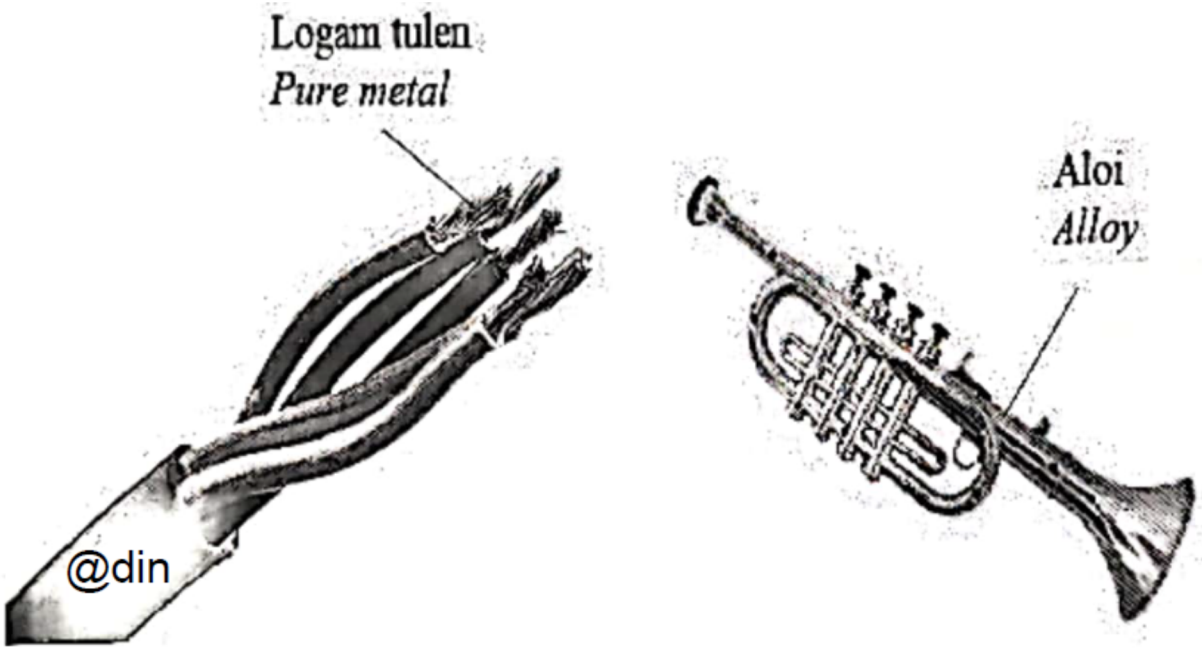
.....

.....

.....

..... [3M]

(e) Rajah 6.2 menunjukkan dua bahan yang boleh dijumpai dalam kehidupan harian.
Diagram 6.2 shows two substances that can be found in daily life.



Rajah 6.2/ Diagram 6.2

Banding bezakan kedua-dua bahan itu.
Compare and contrast the two substances.

.....

.....

.....

..... [3M]

[2023-Selangor-Set01-02] Jadual 2 menunjukkan contoh-contoh dan komponen bagi tiga jenis bahan buatan dalam industri.
Table 2 shows the examples and components for three types of manufactured substances in industry.

Jenis bahan buatan *Type of manufactured substances*	Contoh *Examples*	Komponen *Components*
p	Konkrit yang diperkukuhkan *Reinforced concrete*	Simen, pasir, batu kecil dan keluli *Cement, sand, small pebbles and steel*
Aloi *Alloy*	Q	Aluminium, kuprum, magnesium dan mangan *Aluminium, copper, magnesium and manganese*
Seramik *Ceramic*	Tungsten karbida *Tungsten carbide*	Tungsten dan karbon *Tungsten and carbon*

Jadual 2/ *Table 2*

(a) (i) Namakan P./ *Name P*

..... [1M]

(ii) Nyatakan satu kegunaan konkrit yang diperkukuhkan.
State one use of reinforced concrete.

..... [1M]

(b) Rajah 2 menunjukkan kereta api peluru Maglev. Kereta api berhalaju tinggi ini mampu mencapai kelajuan maksimum sehingga 603 km/j.
Diagram 2 shows a Maglev bullet train. This high-speed train can achieve a maximum speed up to 603 km/h.

Rajah 2/ *Diagram 2*

Aloi Q digunakan pada kereta api berhalaju tinggi. Mengapakah aloi ini sesuai digunakan?
Alloy Q is used on high-speed train. Why this alloy is suitable to be used?

..... [1M]

(c) (i) Namakan kategori seramik bagi tungsten karbida.
Name the category of ceramic of tungsten carbide.

..... [1M]

(ii) Nyatakan satu sifat bagi tungsten karbida.
State one property of tungsten carbide.

..... [1M]