Bahagian A

[60 *markah*]

Jawab **semua** *soalan.*

1 Rajah 1 menunjukkan produk-produk yang dihasilkan menggunakan getah sintetik X dan getah asli.
Diagram 1 *shows the products that are manufactured by using synthetic rubber* X *and natural rubber.*

Getah sintetik X *Synthetic rubber* **X**	**Getah asli** *Natural rubber*
	

Rajah/ *Diagram* 1

(*a*) Nyatakan satu ciri getah sintetik dan getah asli.
State one characteristic of synthetic rubber and natural rubber.

(i) Getah sintetik:
Synthetic rubber

.....
[1 markah/ *mark*]

(ii) Getah asli:
Natural rubber

.....
[1 markah/ *mark*]

(*b*) Nyatakan nama bagi polimer getah asli.
State the name of natural rubber polymer.

.....
[1 markah/ *mark*]

(*c*) Berdasarkan Rajah 1:
Based on Diagram 1:

(i) Apakah getah sintetik X?
What is synthetic rubber X?

.....

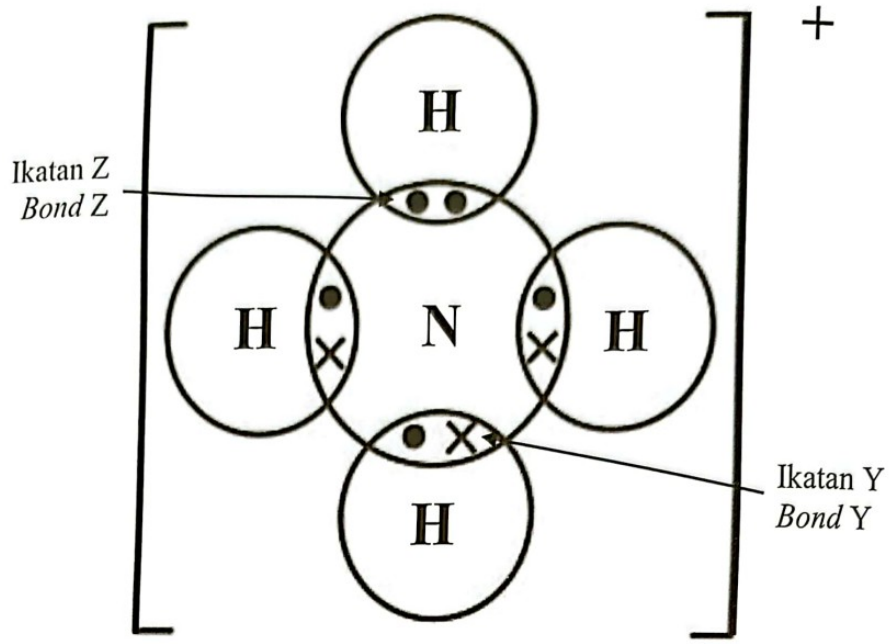
[1 markah/ *mark*]

(ii) Nyatakan nama proses untuk meningkatkan ciri-ciri getah asli supaya ia mempunyai kualiti yang lebih baik dan tahan lebih lama?
State the name of the process to improve the characteristics of natural rubber so it has a better quality and last longer?

.....

[1 markah/ *mark*]

2 Rajah 2 menunjukkan dua jenis ikatan yang terdapat dalam ion ammonium.
Diagram 2 shows two types of bonds found in ammonium ion.



Rajah/ *Diagram* 2

(*a*) Nyatakan jenis zarah bagi ion ammonium.
State the type of particle for the ammonium ion.

.....

[1 markah/ *mark*]

(*b*) Apakah unsur-unsur yang terdapat dalam ion ammonium?
What are the elements found in ammonium ion?

.....

[1 markah/ *mark*]

(*c*) Nyatakan formula kimia bagi ion ammonium itu.
State the chemical formula for the ammonium ion.

.....

[1 markah/ *mark*]

(*d*) Berdasarkan Rajah 2, labelkan jenis ikatan Y dan ikatan Z.
Based on Diagram 2, *label the type of bond* Y *and bond* Z.

Y : .....

Z : .....

[2 markah/ *marks*]

3 Jadual 3 menunjukkan maklumat bagi unsur P, Q dan R.
Table 3 shows the information about elements P, Q *and* R.

Unsur ***Element***	**Nombor proton** ***Proton number***	**Nombor nukleon** ***Nucleon number***
P	11	23
Q	11	24
R	12	24

Jadual/ *Table* 3

(*a*) Apakah yang dimaksudkan dengan nombor nukleon?
What is meant by nucleon number?

.....

.....

[1 markah/ *mark*]

(*b*) Berdasarkan Jadual 3,
Based on Table 3,

(i) Tulis susunan elektron bagi ion P.
Write the electron arrangement of ion P.

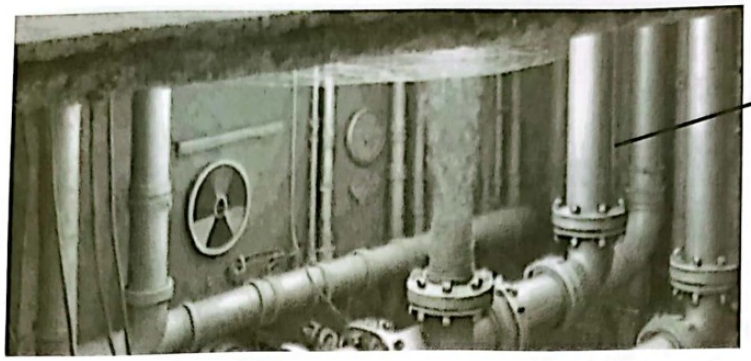
.....

[1 markah/ *mark*]

(ii) Lukis struktur atom bagi unsur R.
Draw the atomic structure of element R.

[2 markah/ *marks*]

(*c*) Rajah 3 menunjukkan satu kebocoran paip.
Diagram 3 *shows the leakage of pipe.*



Rajah/ *Diagram* 3

(i) Unsur yang manakah paling sesuai digunakan pada satu peralatan bagi mengesan kebocoran itu?
Which element is the most suitable to be used on the instrument to detect the leakage?

.....

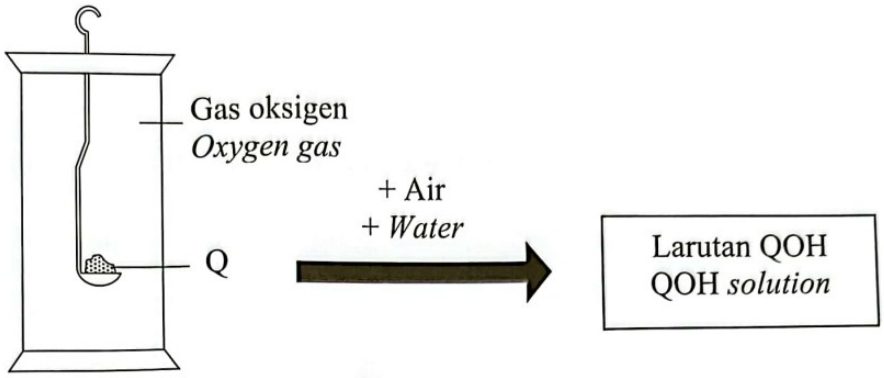
[1 markah/ *mark*]

(ii) Nyatakan satu kelemahan bagi peralatan yang digunakan.
State one disadvantage of the instrument used.

.....

[1 markah/ *mark*]

4 Rajah 4 menunjukkan susunan radas bagi mengkaji sifat kimia satu unsur Kumpulan 1 dalam Jadual Berkala Unsur.
Diagram 4 shows an apparatus set up to investigate the chemical properties of Group 1 element in the Periodic Table of Elements.



Rajah/ *Diagram* 4

(*a*) Nyatakan kaedah penyimpanan unsur Kumpulan 1 di dalam makmal.
State one method to store Group 1 elements in laboratory.

.....

[1 markah/ *mark*]

(*b*) Tulis persamaan kimia bagi tindak balas antara Q dan gas oksigen.
Write a chemical equation for the reaction between Q *and oxygen gas.*

.....

[2 markah/ *marks*]

(*c*) Hitungkan jisim sebatian yang terbentuk apabila 0.08 mol unsur Q bertindak balas lengkap dengan oksigen.
Calculate the mass of the compound formed when 0.08 mol *of element* Q *reacts completely with oxygen.*
[Jisim atom relatif: O = 16, Q = 39]
[*Relative atomic mass*: O = 16, Q = 39]

[2 markah/ *marks*]

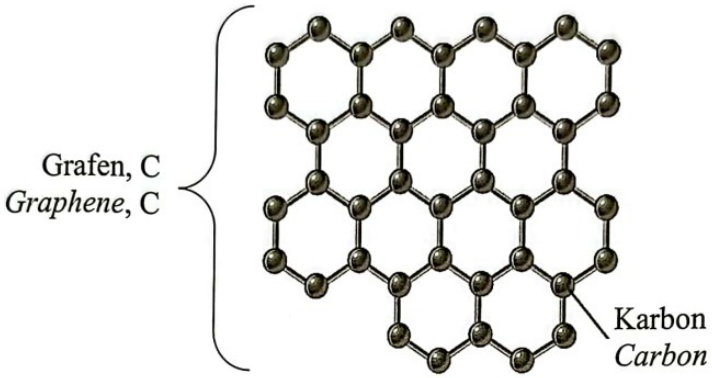
(*d*) Ramalkan nilai pH bagi larutan QOH yang terbentuk. Berikan satu alasan.
Predict the pH *value of* QOH *solution formed. Give one reason.*

.....

.....

[2 markah/ *marks*]

5 Rajah 5.1 menunjukkan susunan atom bagi satu bahan yang digunakan secara meluas dalam bidang nanoteknologi.
Diagram 5.1 *shows the arrangement of atom of one material that is widely used in nanotechnology field.*



Rajah/ *Diagram* 5.1

(*a*) Apakah yang dimaksudkan dengan nanoteknologi?
What is meant by nanotechnology?

.....

.....

[1 markah/ *mark*]

(*b*) Nyatakan satu ciri yang terdapat pada bahan tersebut yang membolehkan ianya digunakan dalam penghasilan sensor.
State one characteristic of the material that allow it to be used in the production of sensor.

.....

[1 markah/ *mark*]

(*c*) Tulis persamaan kimia bagi tindak balas antara grafen dengan oksigen untuk menghasilkan karbon dioksida.
Write the chemical equation for the reaction between graphene and oxygen to produce carbon dioxide.

.....

[2 markah /*marks*]

(*d*) Rajah 5.2 menunjukkan keadaan tapak pelupusan sampah yang memberi impak buruk kepada alam sekitar.
Diagram 5.2 *shows the situation in landfill that gives bad impact on the environment.*

Gas metana terhasil menyebabkan kebakaran dan pemanasan global
Methane gas produced causes fire and global warming

Sisa organik terurai menghasilkan bau busuk
Organic waste decomposed producing foul odour

Rajah/ *Diagram* 5.2

Cadangkan dua kaedah yang boleh dilakukan untuk mengurangkan impak buruk seperti yang ditunjukkan dalam Rajah 5.2.
Suggest two methods that can be done to reduce the bad impact as shown in Diagram 5.2.

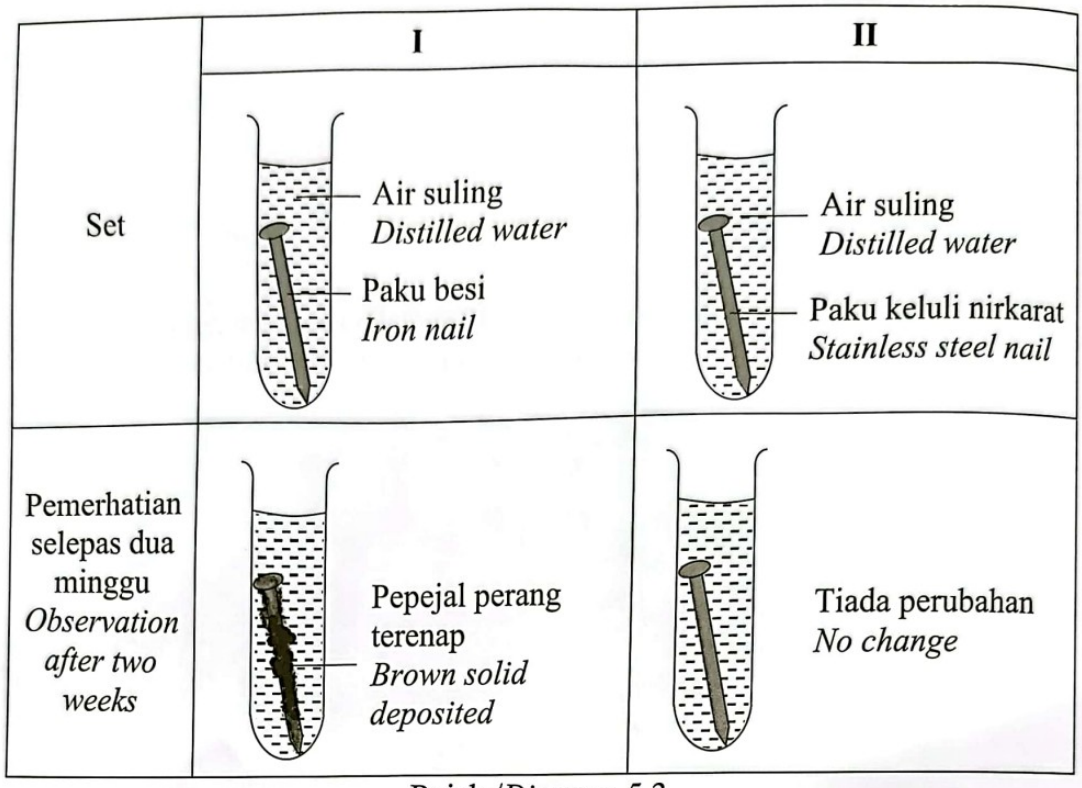
.....

.....

.....

[2 markah /*marks*]

(*e*) Rajah 5.3 menunjukkan susunan radas bagi mengkaji kakisan logam tulen dan aloinya.
Diagram 5.3 shows the apparatus set up to study the corrosion of pure metal and its alloy.



Rajah /*Diagram* 5.3

Terangkan perbezaan pemerhatian dalam Rajah 5.3.
Explain the difference in the observation in Diagram 5.3.

.....

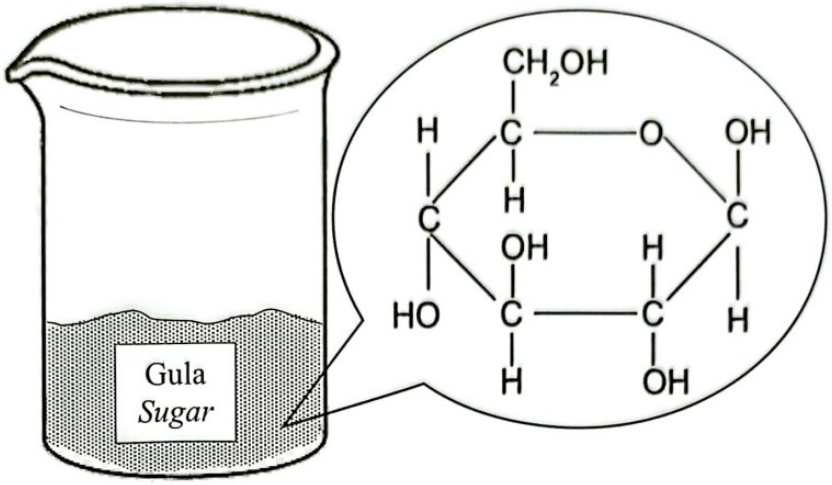
.....

.....

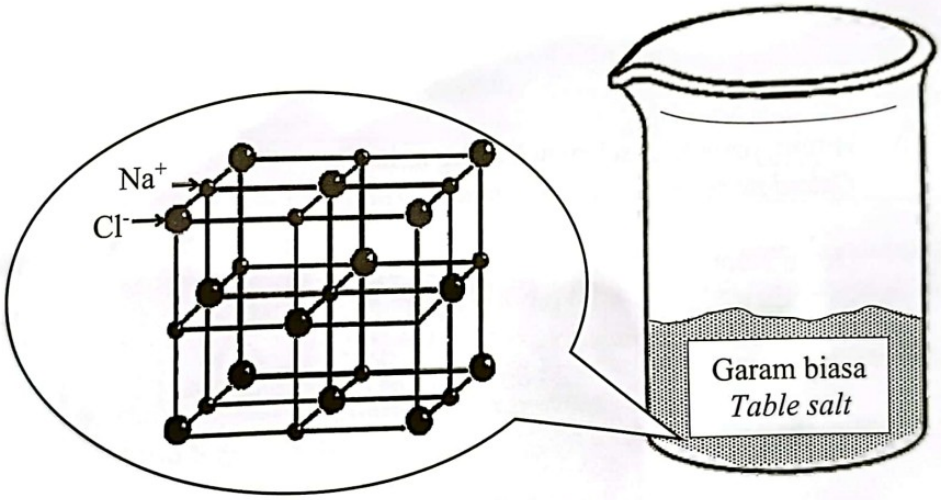
.....

[2 markah /*marks*]

6 Rajah 6.1 menunjukkan formula struktur bagi dua jenis sebatian yang biasa digunakan sebagai bahan tambah makanan.
Diagram 6.1 *shows the structural formula for two types of compounds that commonly used as food additives.*



Sebatian X
Compound X



Sebatian Y
Compound Y

Rajah/ *Diagram* 6.1

(*a*) Berdasarkan Rajah 6.1:
Based on Diagram 6.1:

(i) Nyatakan fungsi bagi kedua-dua sebatian tersebut.
State the function of both of the compounds.

.....
[1 markah /*mark*]

(ii) Nyatakan jenis zarah dan formula empirik bagi sebatian X.
State the type of particle and empirical formula of compound X.

Jenis zarah: .....
Type of particle

Formula empirik: .....
Empirical formula

[2 markah /*marks*]

(iii) 1200 cm^3 gas klorin bertindak balas dengan natrium berlebihan untuk membentuk sebatian Y. Persamaan kimia berikut mewakili tindak balas itu.
1200 cm^3 *chlorine gas reacted with excess sodium to form compound* Y. *The following chemical equation represents the reaction.*

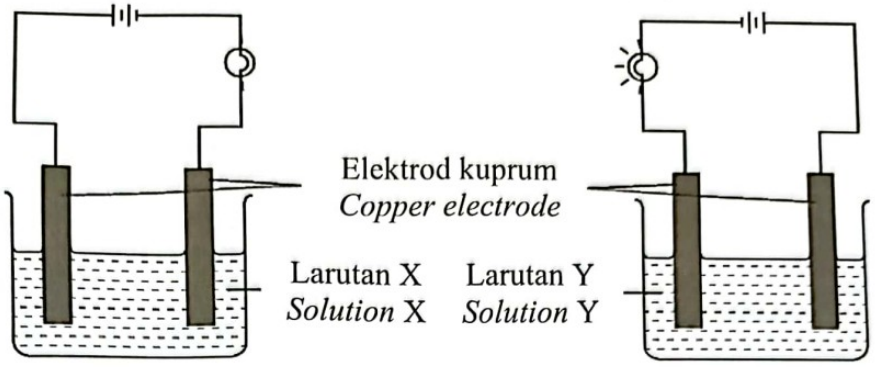
$$2Na + Cl_2 \rightarrow 2NaCl$$

Hitung jisim bagi sebatian Y yang terhasil.
Calculate the mass of compound Y *produced.*

[Jisim atom relatif: Na = 23, Cl = 35.5;
Isi padu molar gas = 24 $dm^3\ mol^{-1}$ pada keadaan bilik]
[*Relative atomic mass*: Na = 23, Cl = 35.5;
Molar volume of gas = 24 $dm^3\ mol^{-1}$ *at room conditions*]

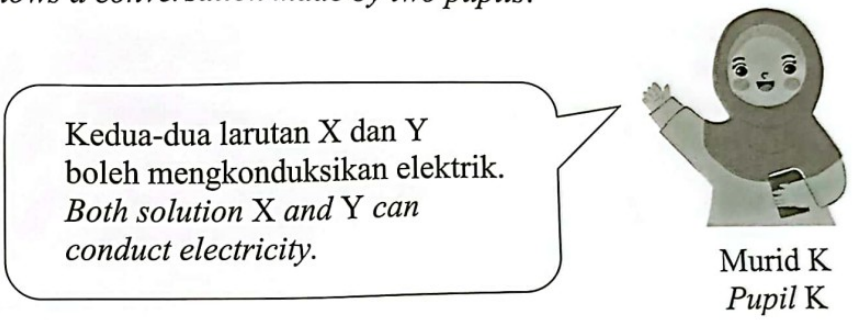
[3 markah /*marks*]

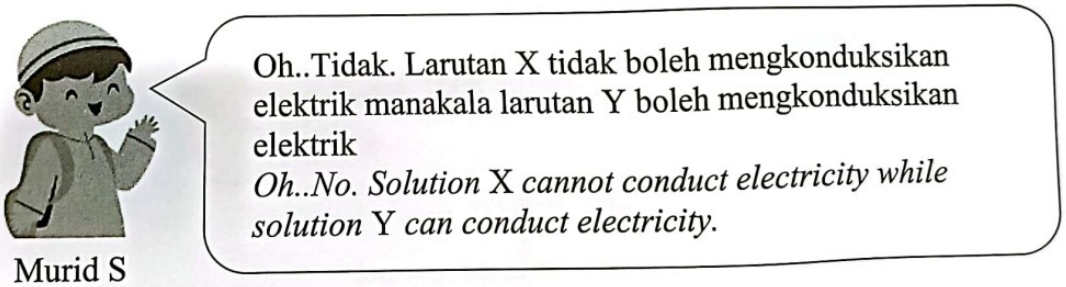
(*b*) Pepejal X dan pepejal Y dilarutkan dalam air bagi menghasilkan larutan. Rajah 6.2 menunjukkan susunan radas bagi mengkaji kekonduksian elektrik larutan itu.
Solid X *and* Y *are dissolve in water to form solutions. Diagram* 6.2 *shows the apparatus set up to investigate the electrical conductivity of the solutions.*



Rajah/ *Diagram* 6.2

Rajah 6.3 menunjukkan perbualan antara dua orang murid.
Diagram 6.3 *shows a conversation made by two pupils.*





Rajah/ *Diagram* 6.3

Berdasarkan Rajah 6.1, Rajah 6.2 dan Rajah 6.3, murid manakah yang memberikan pernyataan yang betul?
Terangkan jawapan anda.
Based on Diagram 6.1, 6.2 *and* 6.3, *which pupil gives correct statement*?
Explain your answer.

.....

.....

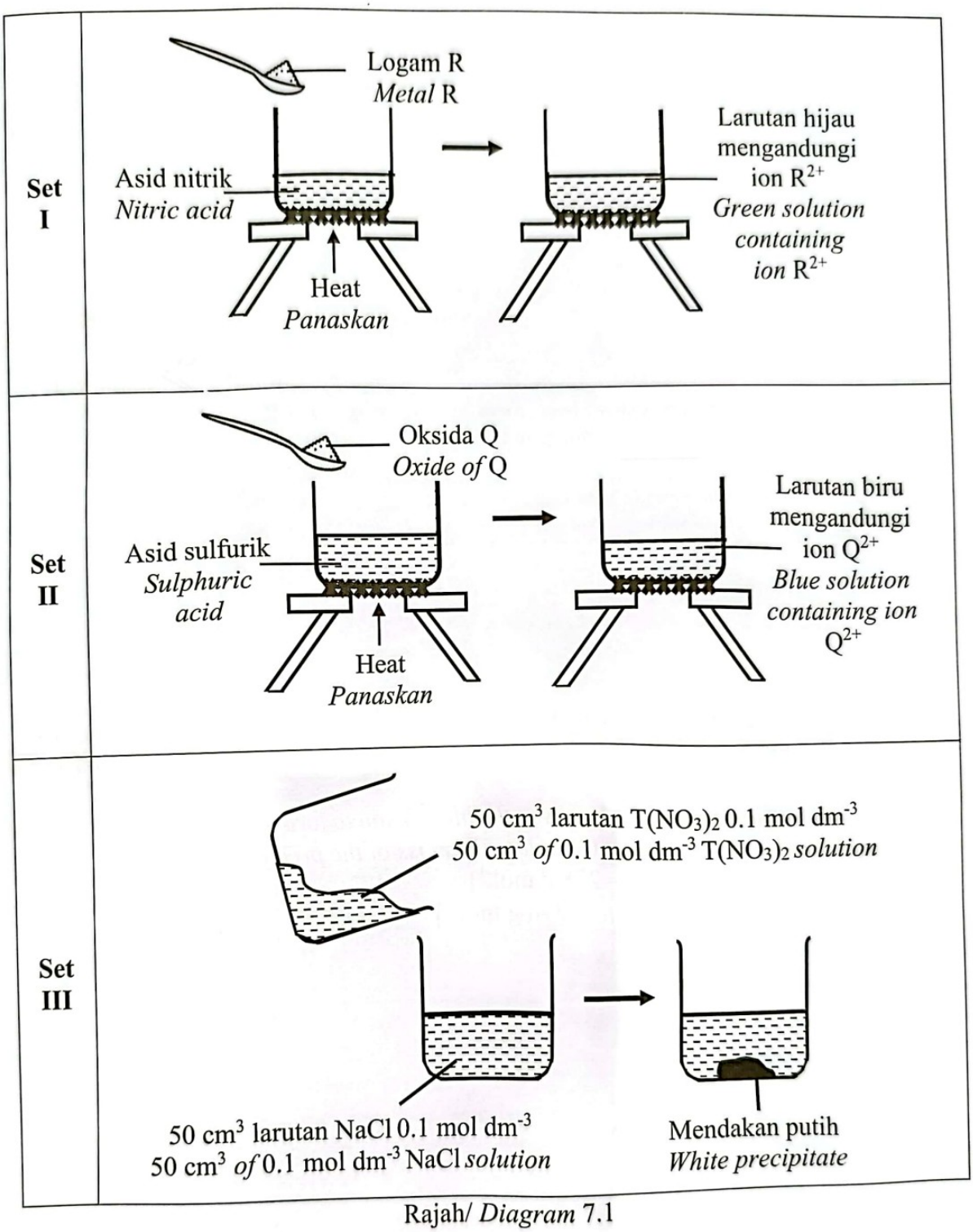
.....

.....

.....

[3 markah /*marks*]

7 Rajah 7.1 menunjukkan susunan radas untuk menghasilkan garam.
Diagram 7.1 *shows the apparatus set up to produce salts.*



Rajah/ *Diagram* 7.1

(*a*) Garam ialah sebatian ion yang terbentuk apabila satu ion daripada asid digantikan dengan ion logam atau ion ammonium. Apakah ion itu?
Salt is ionic compound formed when an ion from acid is replaced with metal ion or ammonium ion. What is the ion?

.....

[1 markah/ *mark*]

(*b*) Tuliskan formula kimia bagi larutan hijau yang terbentuk dalam Set I.
Write the chemical formula for the green solution in Set I.

.....

[1 markah/ *mark*]

(*c*) Berdasarkan pemerhatian dalam Rajah 7.1, kenal pasti ion R^{2+}, ~~S^{2+}~~ Q^{2+} dan ion T.
Based on the observation in Diagram 7.1, *identify ions* R^{2+}, S^{2+} *and ion* T.

R^{2+} : .....

~~S^{2+}~~ Q^{2+} : .....

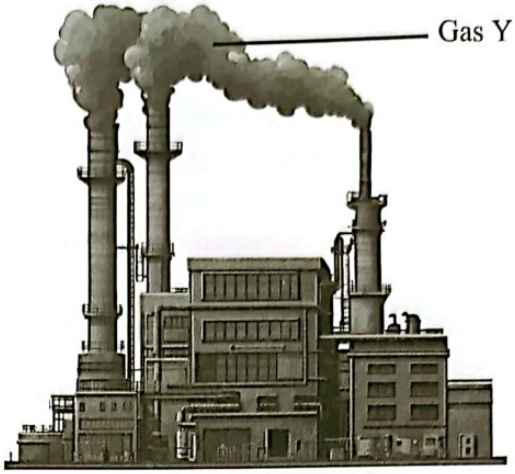
Ion T : .....

[3 markah/ *marks*]

(*d*) 0.1 mol ion T dalam Set III bertindak balas dengan ion klorida membentuk mendakan. Tulis persamaan ion bagi tindak balas itu. Hitung jisim mendakan yang terbentuk.
0.1 mol *of ion* T *in Set* III *reacts with chloride ion to form precipitate. Write an ionic equation for the reaction. Calculate the mass of the precipitate formed.*
[Jisim molar mendakan = 278 g mol^{-1}]
[*Molar mass of precipitate* = 278 g mol^{-1}]

[3 markah/ *marks*]

(*e*) Rajah 7.2 menunjukkan sejenis gas berasid Y yang dibebaskan oleh kilang industri.
Diagram 7.2 *shows a type of acidic gas* Y *released by the industrial factory.*



Rajah/ *Diagram* 7.2

Gas Y boleh dihasilkan daripada tindak balas antara pepejal natrium sulfit, Na_2SO_3 dan asid hidroklorik. Lukis gambar rajah berlabel untuk menentusahkan kehadiran gas Y di dalam makmal.
Gas Y *can be produced from the reaction between sodium sulphite,* Na_2SO_3 *and hydrochloric acid. Draw a labelled apparatus set up to verify the presence of gas* Y *in laboratory.*

[2 markah/ *marks*]

8 Tindak balas jam iodin ialah tindak balas yang berlaku antara larutan hidrogen peroksida berasid dengan larutan kalium iodida bagi menghasilkan iodin. Iodin kemudiannya bertindak balas dengan kanji membentuk larutan biru tua. Kadar tindak balas ditentukan dengan merekod masa apabila warna biru kelihatan. Persamaan ion berikut mewakili tindak balas yang berlaku.

Iodine clock reaction is reaction occur between acidified hydrogen peroxide solution and potassium iodide solution to form iodine. Iodine is then reacted with starch to produce dark blue solution. Rate of reaction is determined by recording the time taken for the blue colour to appear. The following ionic equation represents the reaction.

$$H_2O_2\,(ak/aq) + 2I^-(ak/aq) + 2H^+(ak/aq) \rightarrow I_2\,(ak/aq) + 2H_2O\,(ce/l)$$

Sekumpulan murid menjalankan eksperimen tindak balas jam iodin untuk mengkaji satu faktor yang mempengaruhi kadar tindak balas. Jadual 8 menunjukkan keputusan bagi eksperimen itu.

A group of students conduct an experiment of iodine clock reaction to investigate a factor that affects the rate of reaction. Table 8 *shows the result of the experiment.*

Set	Kepekatan larutan kalium iodida (mol dm^{-3}) *Concentration of potassium iodide* (mol dm^{-3})	Masa diambil bagi warna biru untuk kelihatan (s) *Time taken for blue colour to appear* (s)	1/masa (s^{-1}) 1/*time* (s^{-1})
I	3.0	20	0.050
II	4.5	13	0.077
III	6.0	10	0.100

Jadual/ *Table* 8

Berdasarkan Jadual 8:
Based on Table 8:

(*a*) Apakah yang diwakili dengan 1/masa?
What is represented by 1/*time*?

.....

[1 markah/ *mark*]

(*b*) Lakarkan graf bagi kepekatan larutan kalium iodida melawan 1/masa.
Sketch the graph for concentration of potassium iodide against 1/*time*.

[2 markah/ *marks*]

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

.....

[1 markah/ *mark*]

(ii) Bandingkan kadar tindak balas bagi Set I dan Set II. Terangkan jawapan anda berdasarkan Teori Perlanggaran.
Compare the rate of reaction for Set I *and Set* II. *Explain your answer based on Collision Theory.*

.....

.....

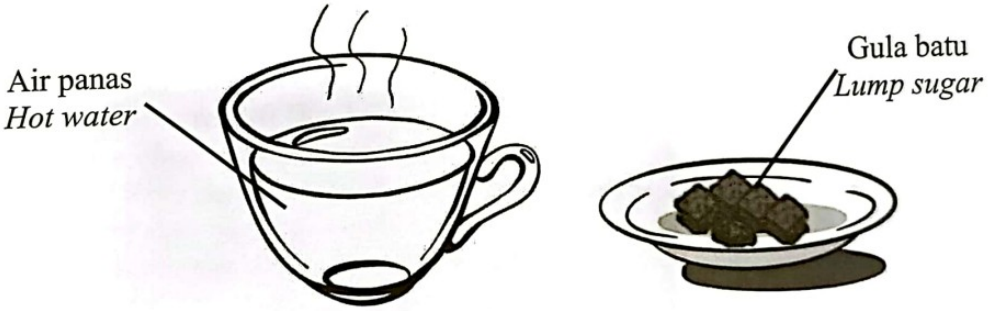
.....

.....

.....

[3 markah/ *marks*]

(*d*) Rajah 8 menunjukkan beberapa ketul gula batu dan secawan air.
Diagram 8 *shows few lump sugar and a cup of water.*



Rajah/ *Diagram* 8

Tanpa mengubah suhu air, nyatakan satu kaedah bagi melarutkan gula itu dengan kadar keterlarutan yang lebih tinggi. Terangkan jawapan anda.
Without changing the temperature of water, state a method to dissolve the sugar with higher rate of solubility. Explain your answer.

.....

.....

.....

.....

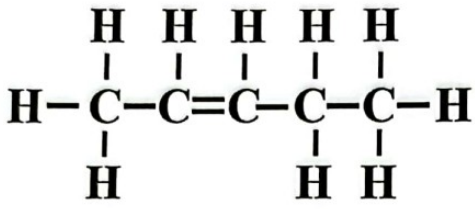
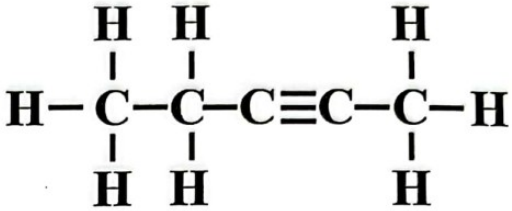
[3 markah/ *marks*]

Bahagian B

[20 *markah*]

Bahagian ini mengandungi **dua** *soalan. Jawab* **satu** *soalan.*

9 Rajah 9.1 menunjukkan dua contoh sebatian hidrokarbon tak tepu.
Diagram 9.1 *shows two examples of unsaturated hydrocarbon compounds.*

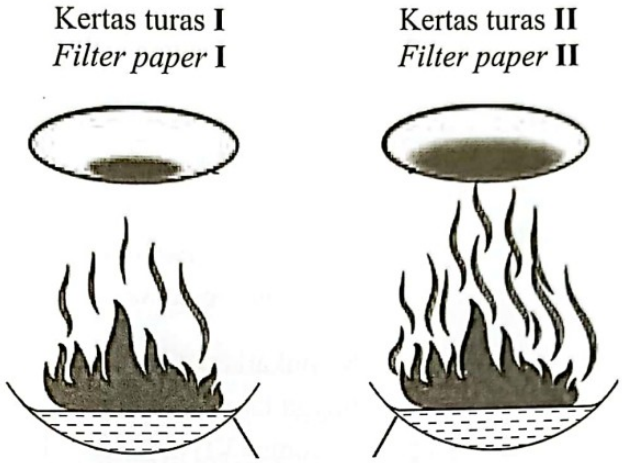
Sebatian **X** *Compound* **X**	Sebatian **Y** *Compound* **Y**
	

Rajah/ *Diagram* 9.1

(*a*) Nyatakan satu ciri hidrokarbon tak tepu.
Nyatakan nama bagi sebatian X dan sebatian Y mengikut sistem penamaan IUPAC.
Kemudian lukiskan satu formula struktur isomer lain bagi sebatian Y.
State one characteristic of unsaturated hydrocarbon.
State the names of compounds X *and* Y *based on* IUPAC *nomenclature system.*
Then draw a structural formula of other isomer of compound Y.

[4 markah/ *marks*]

(*b*) Hidrokarbon tepu Z mempunyai bilangan atom karbon yang sama dengan sebatian X. Kedua-dua sebatian terbakar dengan lengkap dalam oksigen berlebihan.
Rajah 9.2 menunjukkan kejelagaan nyalaan semasa pembakaran kedua-dua sebatian.
Saturated hydrocarbon Z *has the same number of carbon atoms as compound* X. *Both of the compounds burns completely in excess oxygen.*
Diagram 9.2 *shows the sootiness of flames during the combustion of both compounds.*



Rajah/ *Diagram* 9.2

Tulis persamaan kimia bagi pembakaran sebatian Z.
Kertas turas manakah menunjukkan kejelagaan bagi sebatian Z?
Terangkan jawapan anda.
[Jisim atom relatif: H = 1, C = 12]
Write a chemical equation for the combustion of compound Z.
Which filter paper shows the sootiness of compound Z?
Explain your answer.
[*Relative atomic mass*: H = 1, C = 12]

[6 markah/ *marks*]

(c) Jadual 9 menunjukkan maklumat tentang sebatian karbon J, M dan Q.
Table 9 shows the information about carbon compounds J, M *and* Q.

J	M	Q
• Terhasil daripada proses penapaian ketulan nanas. *Formed from the fermentation process of pineapple chunks.* • Mudah terbakar dengan nyalaan biru dan tidak menghasilkan jelaga. *Highly flammable and burn with a blue flame without soot.*	• Sebatian yang mempunyai ikatan ganda dua antara atom karbon yang merupakan ahli kedua dalam siri homolog itu. *Compound that has double bond between carbon atoms which is the second member of the homologous series.* • Menukarkan warna jingga larutan kalium dikromat(VI) berasid kepada warna hijau. *Change the orange colour of acidified potassium dichromate*(VI) *solution to green.*	• Sebatian bukan hidrokarbon dengan tiga atom karbon. *Non hydrocarbon compound with three carbon atoms.* • Bertindak balas dengan sebatian J membentuk sebatian berbau manis buah-buahan. *Reacted with compound J to form sweet fruity smell compound.*

Jadual/ *Table* 9

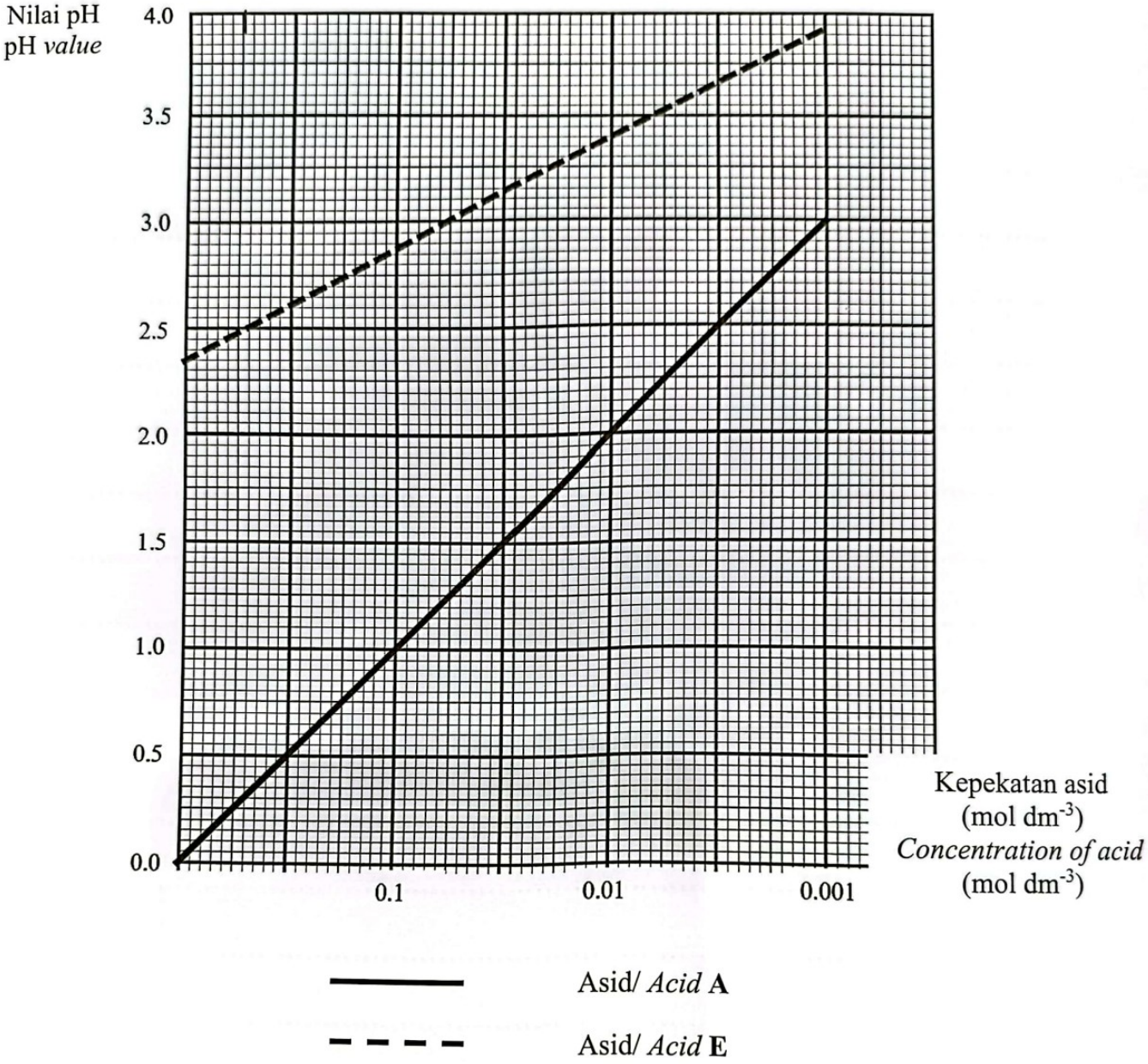
(i) Kenal pasti sebatian karbon J, M dan Q. Kemudian nyatakan formula am dan lukiskan formula struktur bagi sebatian karbon J, M dan Q tersebut.
Identify carbon compounds J, M *and* Q. *Then state the general formula and draw the structural formula of compounds* J, M *and* Q.

[9 markah/ *marks*]

(ii) Sebatian J juga boleh bertindak balas dengan larutan kalium dikromat(VI) berasid. Nyatakan nama hasil tindak balas itu.
Compound J *can also react with acidified potassium dichromate*(VI) *solution. State the name of the product of the reaction.*

[1 markah/ *mark*]

10 Rajah 10 menunjukkan hubungan antara kepekatan asid dan nilai pH bagi asid A dan asid E. Kedua-dua asid adalah asid monoprotik.
Diagram 10 *shows the relationship between the concentration of acid and* pH *value for acid* A *and acid* E. *Both acids are monoprotic acid.*



Rajah/ *Diagram* 10

Jadual 10 menunjukkan maklumat tentang tindak balas peneutralan yang melibatkan asid A dan asid E. Tindak balas yang berlaku adalah tindak balas eksotermik.
Table 10 *shows the information about neutralisation reaction involving acid* A *and acid* E. *The reactions occur are exothermic reactions.*

Set	**Bahan tindak balas** ***Reactants***	**Haba peneutralan ($kJ\ mol^{-1}$)** ***Heat of neutralisation*** **($kJ\ mol^{-1}$)**
I	50 cm^3 asid A + 50 cm^3 natrium hidroksida 50 cm^3 *of acid* A + 50 cm^3 *of sodium hydroxide*	− 57.3
II	50 cm^3 asid E + 50 cm^3 natrium hidroksida 50 cm^3 *of acid* E + 50 cm^3 *of sodium hydroxide*	$-x$
III	50 cm^3 asid E + 50 cm^3 larutan ammonia 50 cm^3 *of acid* E + 50 cm^3 *of ammonia solution*	$-y$

Jadual/ *Table* 10

(*a*) Nyatakan dua maklumat bagi tindak balas eksotermik.
State two informations of exothermic reaction.

[2 markah/ *marks*]

(*b*) Berdasarkan Rajah 10 dan Jadual 10:
Based on Diagram 10 *and Table* 10:

(i) Cadangkan asid A dan asid E. Tuliskan persamaan kimia bagi tindak balas yang berlaku dalam Set I. Hitung perubahan suhu bagi Set I sekiranya kemolaran kedua-dua asid A dan larutan natrium hidroksida ialah 1.0 mol dm^{-3}.
Suggest acid A *and acid* E. *Write the chemical equation for the reaction occur in Set* I. *Calculate the temperature change in Set* I *if the molarity of both acid A and sodium hydroxide solution is* 1.0 mol dm^{-3}.

[7 markah/ *marks*]

(ii) Tentukan kepekatan ion hidrogen bagi asid A dengan nilai pH 1.0.
Bandingkan nilai pH bagi kedua-kedua asid A dan E dengan kepekatan 0.01 mol dm^{-3}.
Terangkan jawapan anda berdasarkan aspek berikut:

- kepekatan ion hidrogen
- hubungan antara kepekatan ion hidrogen dan nilai pH

Determine the concentration of hydrogen ion for acid A *with the* pH *value of* 1.0.
Compare the pH *value for both acid* A *and* E *with the concentration of* 0.01 mol dm^{-3}.
Explain your answer according to the following aspects:

- *concentration of hydrogen ion*
- *relationship between concentration of hydrogen ions and* pH *value*

[4 markah/ *marks*]

(iii) Ramalkan nilai bagi x dan y.
Terangkan perbezaan haba peneutralan bagi:

- Set I dan Set II
- Set II dan Set III

Predict the value of x *and* y.
Explain the difference of heat of neutralisation between:

- *Set* I *and Set* II
- *Set* II *and Set* III

[7 markah/ *marks*]

Bahagian C

[20 *markah*]

Soalan ini **mesti** *dijawab*

11 (*a*) Tindak balas redoks berdasarkan pemindahan elektron boleh dikaji dengan menggunakan sel kimia. Jadual 11 menunjukkan sebahagian daripada nilai keupayaan elektrod piawai sel setengah.
A redox reaction based on the transfer of electrons can be investigated by using a chemical cell. Table 11 *shows a part of the standard electrode potential value of half-cells.*

Tindak balas sel setengah ***Half-cell equations***	**E°/ V (298K)**
$O_2 + 2H_2O + 4e^- \leftrightharpoons 4OH^-$	+ 0.40
$Cu^{2+} + 2e^- \leftrightharpoons Cu$	+ 0.34
$2H^+ + 2e^- \leftrightharpoons H_2$	0.00
$Mg^{2+} + 2e^- \leftrightharpoons Mg$	– 2.38

Jadual/ *Table* 11

Berikut merupakan notasi sel yang mewakili satu sel kimia.
The following is a cell notation that represents a chemical cell.

$$Mg_{(p)} \mid Mg^{2+}_{(ak,\ 1.0\ mol\ dm^{-3})} \parallel Cu^{2+}_{(ak,\ 1.0\ mol\ dm^{-3})} \mid Cu_{(p)}$$
$$Mg_{(s)} \mid Mg^{2+}_{(aq,\ 1.0\ mol\ dm^{-3})} \parallel Cu^{2+}_{(aq,\ 1.0\ mol\ dm^{-3})} \mid Cu_{(s)}$$

Berdasarkan maklumat dalam Jadual 11 dan notasi sel:
Based on the information in Table 11 *and the cell notation*:

(i) Nyatakan perubahan tenaga yang berlaku dalam sel kimia.
State the energy change in a chemical cell.

[1 markah/ *mark*]

(ii) Kenal pasti terminal negatif sel kimia tersebut dan berikan satu sebab.
Lukis susunan radas dan seterusnya hitung voltan sel kimia itu.
Identify the negative terminal of the chemical cell and give one reason.
Draw the apparatus set up and calculate the cell voltage of the chemical cell.

[6 markah/ *marks*]

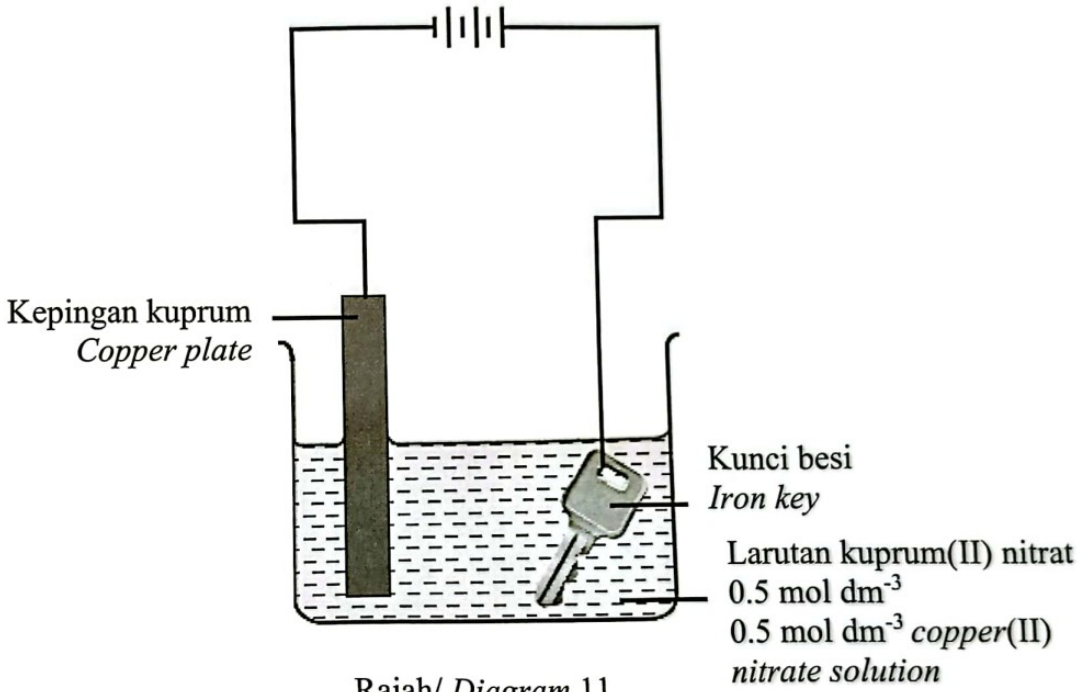
(iii) Bandingkan terminal positif dan terminal negatif sel kimia tersebut dari segi:
Compare the positive and negative terminals of the chemical cell in terms of:

- Bahan yang mengalami penurunan dan pengoksidaan
  Substance that undergoes reduction and oxidation
- Pemerhatian
  Observation

Kemudian, terangkan proses pengoksidaan berdasarkan pemindahan elektron.
Hence, explain the oxidation process based on the transfer of electrons.

[5 markah/ *marks*]

(*b*) Ahmad menggunakan susunan radas dalam Rajah 11 untuk menyadur kunci besi dengan logam kuprum. Selepas 30 minit eksperimen dijalankan, Ahmad mendapati tiada perubahan pada kunci besi itu.
Ahmad uses the apparatus set up in Diagram 11 *to electroplate an iron key with copper. After* 30 *minutes Ahmad found out that there is no change at the iron key.*



Rajah/ *Diagram* 11

Dengan mengubahsuai susunan radas itu, huraikan satu eksperimen untuk menyadur kunci besi dengan kuprum.
Dalam huraian anda, sertakan setengah persamaan bagi tindak balas yang berlaku di anod dan katod.
By modifying the apparatus set up, describe an experiment to electroplate the iron key with copper.
In your description, include the half equation for the reactions occur at the anode and cathode.

[8 markah/ *marks*]