(*c*) Berdasarkan Rajah 1, tentukan jisim atom relatif klorin menggunakan rumus berikut:

Based on Diagram 1, *determine the relative atomic mass of chlorine using the following formula*:

$$\text{Jisim atom relatif / } \textit{Relative atomic mass} = \frac{(\%\ \text{isotop}\ {}^{35}_{17}\text{Cl} \times \text{jisim}\ {}^{35}_{17}\text{Cl}) + (\%\ \text{isotop}\ {}^{37}_{17}\text{Cl} \times \text{jisim}\ {}^{37}_{17}\text{Cl})}{(\%\ \textit{isotope}\ {}^{35}_{17}\text{Cl} \times \textit{mass}\ {}^{35}_{17}\text{Cl}) + (\%\ \textit{isotope}\ {}^{37}_{17}\text{Cl} \times \textit{mass}\ {}^{37}_{17}\text{Cl})}{100}$$

2 Jadual 1 menunjukkan persamaan kimia bagi penghasilan sabun dan detergen.

Table 1 *shows the chemical equations for the production of soap and detergent.*

Bahan pencuci ***Cleaning agent***	**Persamaan kimia** ***Chemical equation***
Sabun *Soap*	$CH_3(CH_2)_{10}COOH + NaOH \longrightarrow Y + H_2O$
Detergen *Detergent*	$CH_3(CH_2)_{10}CH_2OSO_3H + NaOH \longrightarrow CH_3(CH_2)_{10}CH_2OSO_3Na + H_2O$

Jadual 1
Table 1

(*a*) Nyatakan nama tindak balas bagi penghasilan sabun.

State the name of the reaction for the production of soap.

(*b*) Nyatakan **satu** contoh bahan tambah yang terdapat dalam detergen.

State **one** *example of an additive found in detergent.*

(*c*) Nyatakan **satu** bahan kimia yang boleh digunakan untuk menggantikan NaOH dalam penghasilan sabun.

State **one** *chemical substance that can be used to replace* NaOH *in the production of soap.*

(*d*) Berdasarkan Jadual 1,

Based on Table 1,

(i) tuliskan formula anion bagi detergen itu

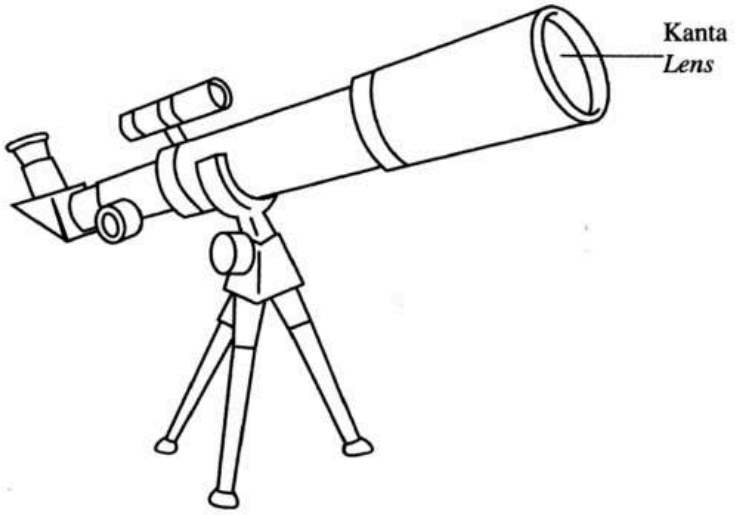
write the anion formula of the detergent

(ii) tuliskan formula kimia bagi **Y**.

write the chemical formula for **Y**.

3 (*a*) Rajah 2 menunjukkan sejenis alatan optik. Alatan optik itu menggunakan kanta yang diperbuat daripada sejenis kaca.

Diagram 2 *shows a type of optical device. The optical device uses a lens that is made of a type of glass.*



Rajah 2
Diagram 2

(i) Nyatakan **satu** sifat asas kaca.

State **one** *basic property of glass.*

(ii) Berdasarkan Rajah 2, nyatakan jenis kaca yang digunakan dalam alatan optik itu.

Based on Diagram 2, *state the type of glass used in the optical device.*

(*b*) Seorang murid meletakkan sekeping kaca tingkap di bawah satu alur cahaya putih untuk menunjukkan kepada rakannya bahawa cahaya putih boleh diserakkan kepada tujuh spektrum warna tetapi dia tidak berjaya.

A student puts a piece of window glass under a ray of white light to show his friend that white light can be dispersed into a seven-colour spectrum, but he did not succeed.

Berdasarkan masalah tersebut,

Based on the problem,

(i) cadangkan **satu** jenis kaca yang dapat mengatasi masalah itu

suggest **one** *type of glass that can overcome that problem*

(ii) hubungkait bahan kimia yang hadir dalam kaca yang dinyatakan di **3**(*b*)(i) dengan sifat kaca itu dalam mengatasi masalah tersebut.

relate the chemical substance present in that glass stated in **3**(*b*)(i) *with the characteristic of the glass in overcoming the problem.*

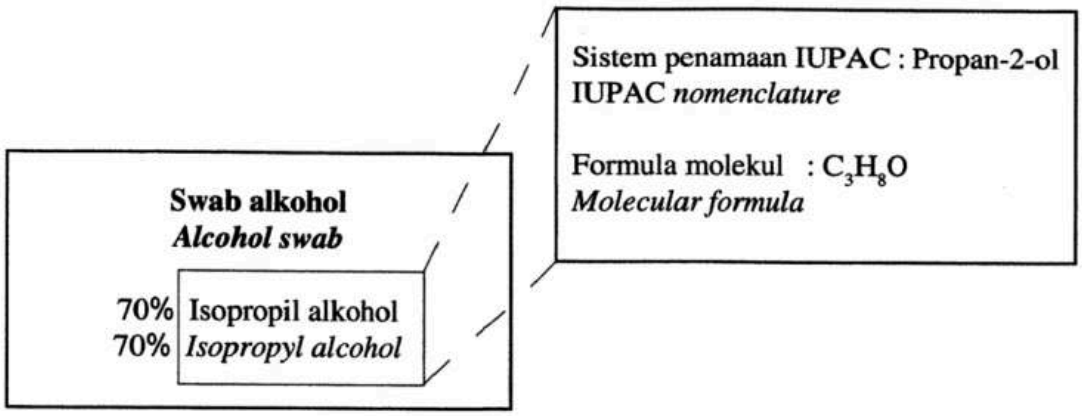
(iv) hitung jisim pepejal yang terbentuk daripada tindak balas penurunan kuprum(II) oksida jika 12g kuprum(II) oksida bertindak balas dengan lengkap.

calculate the mass of the solid formed from the reduction of copper(II) oxide if 12g of copper(II) oxide is reacted completely.

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

5 Rajah 4.1 menunjukkan maklumat bagi salah satu siri homolog sebatian karbon.

Diagram 4.1 shows the information about one of the homologous series of carbon compounds.



Rajah 4.1
Diagram 4.1

(*a*) Nyatakan nama bagi alkohol dengan dua atom karbon.

State the name of alcohol with two carbon atoms.

(*b*) Berdasarkan Rajah 4.1,

Based on Diagram 4.1,

(i) nyatakan kumpulan berfungsi bagi sebatian karbon itu

state the functional group of the carbon compound

(ii) tulis persamaan kimia bagi tindak balas pendehidratan sebatian karbon tersebut

write the chemical equation for the dehydration reaction of that carbon compound

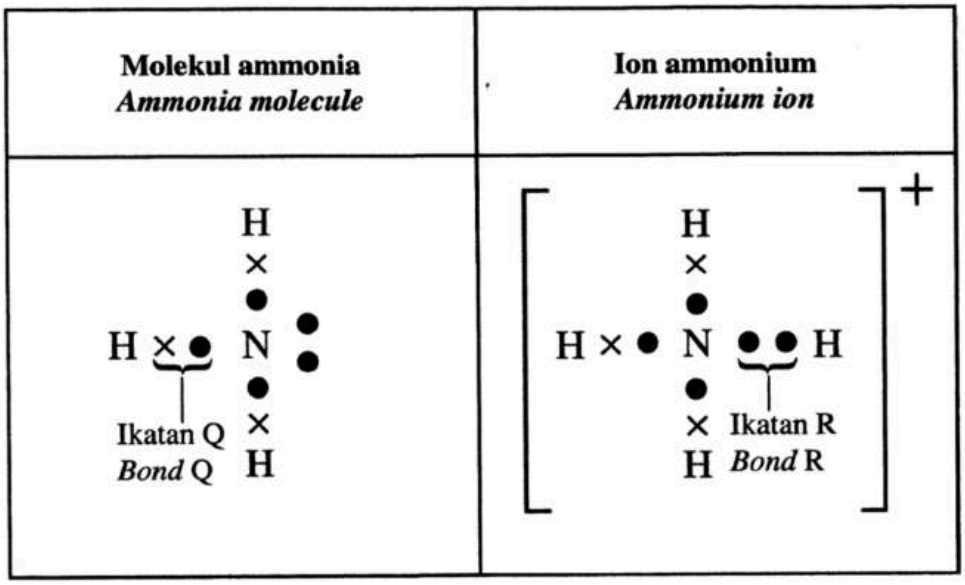
(iii) hitung peratus karbon per molekul bagi sebatian karbon itu.

calculate the percentage of carbon per molecule for that carbon compound.

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

6 (*a*) Rajah 5 menunjukkan ikatan Q dan ikatan R yang wujud dalam molekul ammonia dan ion ammonium.

Diagram 5 *shows bonds* Q *and* R *that exist in an ammonia molecule and an ammonium ion.*



Rajah 5
Diagram 5

(i) nyatakan **jenis** ikatan kovalen yang wujud dalam molekul ammonia

state the **type** *of covalent bond that exists in ammonia molecule*

(ii) nyatakan nama ikatan R

state the name of bond R

(iii) banding beza bagaimana ikatan Q dan ikatan R terbentuk.

compare and contrast how bonds Q *and* R *are formed.*

(*b*) Sewaktu membuat bayaran, seorang wanita menghadapi masalah untuk memisahkan wang kertas RM10 baharu yang melekat antara satu sama lain.

When making payment, a woman encounters a problem in separating new RM10 *paper notes that are stuck to each other.*

(i) Dengan menggunakan konsep ikatan hidrogen, cadangkan **satu** cara untuk mengatasi masalah itu.

By using the concept of hydrogen bond, suggest **one** *way to overcome the problem.*

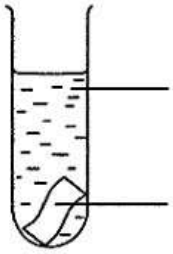
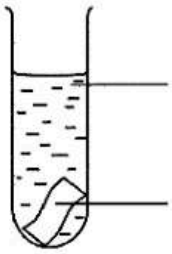
(ii) Terangkan jawapan anda.

Explain your answer.

8

(*a*) Rajah 7.1 menunjukkan pemerhatian eksperimen yang diperoleh apabila dua jalur logam direndam ke dalam sampel elektrolit yang berasingan untuk mengkaji kakisan logam.

Diagram 7.1 *shows the observations of an experiment obtained when two metal strips are immersed into separate sample of an electrolyte to study the corrosion of metal.*

Set	**Susunan radas** ***Apparatus set-up***	**Pemerhatian** ***Observation***
I	 Larutan natrium klorida *Sodium chloride solution* + Larutan natrium hidroksida *Sodium hydroxide solution* Jalur besi *Iron strip*	Mendakan hijau terbentuk *Green precipitate formed*
II	 Larutan natrium klorida *Sodium chloride solution* + Larutan natrium hidroksida *Sodium hydroxide solution* Jalur kuprum *Copper strip*	Mendakan biru terbentuk *Blue precipitate formed*

Rajah 7.1
Diagram 7.1

(i) Nyatakan nama proses bagi kakisan besi

State the name of the process for the corrosion of iron

(ii) Mengapakah larutan natrium klorida ditambahkan ke dalam Set **I** dan Set **II**?

Why is sodium chloride solution is added into Set **I** *and Set* **II**?

(iii) Berdasarkan Rajah 7.1, terangkan mengapa terdapat perbezaan dalam pemerhatian yang diperoleh

Based on Diagram 7.1, *explain why there are differences in observation obtained*

(iv) Cadangkan suatu modifikasi yang boleh dilakukan supaya tiada mendakan hijau terbentuk dalam Set **I** apabila eksperimen itu diulang.

Terangkan jawapan anda.

Suggest a modification that can be done so that no green precipitate is formed in Set **I** *when the experiment is repeated.*

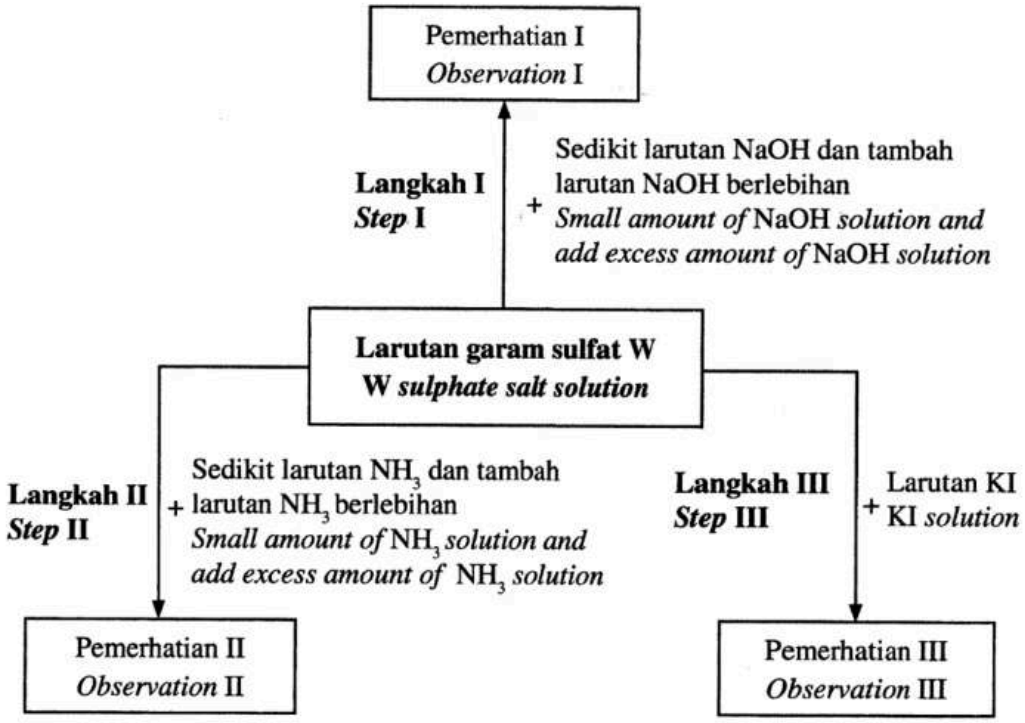
Explain your answer.

(iii) tulis persamaan kimia bagi tindak balas I. Hitungkan jisim garam Y apabila 50 cm^3 larutan garam sulfat W 1.0 mol dm^{-3} bertindak balas dengan 50 cm^3 larutan garam nitrat X 1.0 mol dm^{-3}.
[Jisim molar Y: 213 g mol^{-1}]

write the chemical equation for reaction I. *Calculate the mass of salt* Y *when* 50 cm^3 *of* 1.0 mol dm^{-3} *of* W *sulphate salt solution reacts with* 50 cm^3 *of* 1.0 mol dm^{-3} *of* X *nitrate salt solution.*
[*Molar mass of* Y: 213 g mol^{-1}]

(*c*) Rajah 8.2 menunjukkan langkah-langkah yang terlibat dalam ujian pengesahan kation yang dijalankan ke atas larutan garam sulfat W.

Diagram 8.2 *shows the steps involved in the cation confirmatory test that is carried out on* W *sulphate salt solution.*



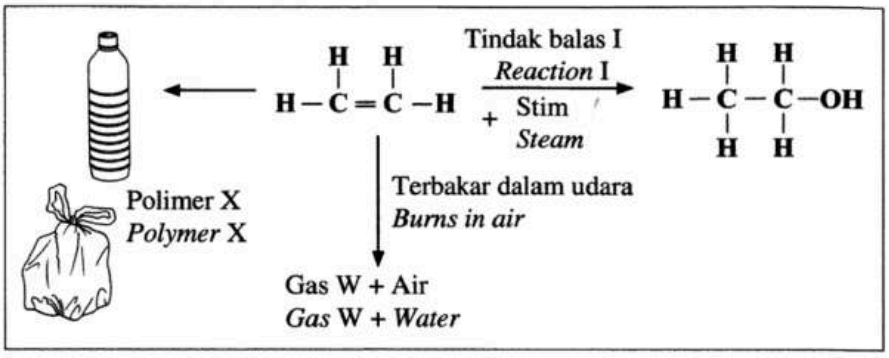
Rajah 8.2
Diagram 8.2

Berdasarkan Rajah 8.2, huraikan pemerhatian dan kenal pasti kation yang mungkin hadir bagi **setiap** langkah yang dijalankan.

Based on Diagram 8.2, *describe the observations and identify the cation that might be present for* **each** *step that is carried out.*

10 (*a*) Rajah 9.1 menunjukkan satu siri tindak balas yang melibatkan sebatian hidrokarbon tak tepu iaitu etena.

Diagram 9.1 *shows a series of reaction involving the unsaturated hydrocarbon compound which is ethene.*



Rajah 9.1
Diagram 9.1

(i) Nyatakan maksud hidrokarbon tak tepu dan kumpulan berfungsi bagi etena.

State the meaning of unsaturated hydrocarbon and the functional group for ethene.

(ii) Lukiskan formula struktur bagi polimer X dan nyatakan nama tindak balas I.

Draw the structural formula for polymer X *and state the name of reaction* I.

(iii) 11.2 g etena terbakar lengkap di dalam udara menghasilkan gas W dan air.

Tulis persamaan kimia yang terlibat dan hitung isi padu maksimum gas W yang terbebas.

[Jisim atom relatif: H = 1, C = 12]
[Isi padu molar: 24.0 dm^3 mol^{-1} pada keadaan bilik]

11.2 g *of ethene is completely burnt in air to form gas* W *and water.*

Write the chemical equation involved and calculate the maximum volume of gas W *released.*

[*Relative atomic mass*: H = 1, C = 12]
[*Molar volume*: 24.0 dm^3 mol^{-1} *at room conditions*]

(iv) Berdasarkan Rajah 9.1, banding beza formula struktur etena dengan alkohol yang terhasil daripada tindak balas I.

Based on Diagram 9.1, *compare and contrast the structural formula of ethene and alcohol that is produced from reaction* I.

Bahagian C

[20 markah]

Jawab soalan dalam bahagian ini.

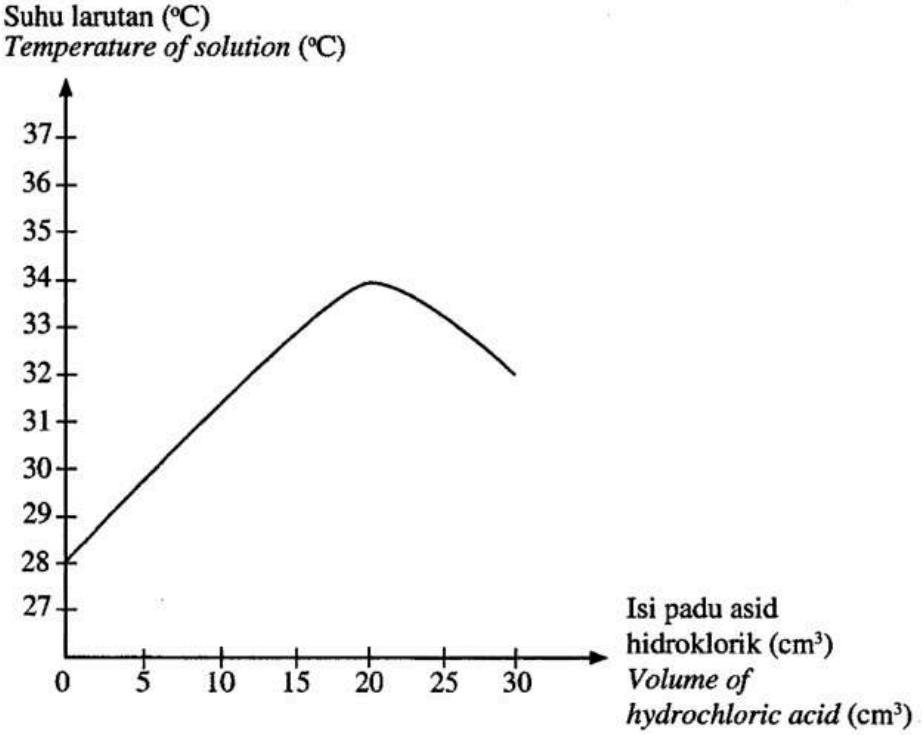
11 (*a*) Satu eksperimen dijalankan untuk menentukan haba yang terbebas ke persekitaran apabila asid hidroklorik yang berlainan isi padu ditambah kepada 20 cm^3 larutan kalium hidroksida 1.0 mol dm^{-3}. Tindak balas itu diwakili dengan persamaan kimia berikut:

An experiment is carried out to determine the heat released to the surroundings when different volumes of hydrochloric acid are added to 20 cm^3 *of* 1.0 mol dm^{-3} *potassium hydroxide solution. The reaction is represented by the following chemical equation*:

$$HCl + KOH \longrightarrow KCl + H_2O$$

Rajah 10.1 menunjukkan graf suhu larutan melawan isi padu asid hidroklorik yang diperoleh apabila asid hidroklorik bertindak balas dengan larutan kalium hidroksida.

Diagram 10.1 *shows the graph of temperature of solution against the volume of hydrochloric acid obtained when hydrochloric acid reacts with potassium hydroxide solution.*



Rajah 10.1
Diagram 10.1

Suka sampel ini?

Kertas Sebenar SPM 2025

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