Section A
Bahagian A

[60 marks]
[60 *markah*]

Answer **all** questions in this section.
Jawab **semua** *soalan dalam bahagian ini.*

1   Table 1.1 shows the elements in Period 3 of the Periodic Table of elements.
Jadual 1.1 menunjukkan unsur-unsur dalam Kala 3 bagi Jadual Berkala Unsur

Unsur Element	Na	Mg	Al	Si	P	S	Cl	Ar
Nombor proton Proton number	11	12	13	14	15	16	17	18

Table/ *Jadual* 1.1

Based on Table 1.1 :
Berdasarkan Jadual 1.1 :

(a)   (i)   Name one element which is a metal.
Namakan satu unsur logam.

....
[1 *mark*]

(ii)   Which group is the metal in (a)(i) is placed?
Dalam kumpulan manakah logam di (a)(i) terletak?

....
[1 *mark*]

(b)   (i)   Name the element that exists as monoatomic gas.
Namakan unsur yang wujud sebagai gas monoatom.

....
[1 *mark*]

(ii)   Give your reason for answer in (b)(i).
Berikan sebab bagi jawapan anda di (b)(i).

....
[1 *mark*]

(c) Sodium and chlorine can react with water to form a solution.
Natrium dan klorin boleh bertindak balas dengan air membentuk suatu larutan

(i) Write a chemical equation for the reaction of chlorine with water in Table 1.2.
Tulis persamaan kimia bagi tindak balas klorin dengan air dalam Jadual 1.2.

Element Unsur	Chemical equation Persamaan kimia	Colour change of litmus paper when dip into the solution Perubahan warna kertas litmus apabila dicelupkan ke dalam larutan
Sodium Natrium	$2Na + 2H_2O \rightarrow 2NaOH + H_2$	....
Chlorine Klorin	....	....

Table/ *Jadual* 1.2

[2 marks]

(ii) Litmus paper is placed into the solution formed.
State the colour change of the litmus paper in Table 1.2.
Kertas litmus dimasukkan ke dalam larutan yang terhasil.
Nyatakan perubahan warna kertas litmus dalam Jadual 1.2.

[2 marks]

(d) State the changes in the atomic size of the elements across the period from left to right.
Nyatakan perubahan saiz atom bagi unsur-unsur ini merentasi kala dari kiri ke kanan.

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

2   Diagram 2.1 shows a box of an ointment used for preventing and treating diaper rash.
     *Rajah 2.1 menunjukkan sekotak salap yang digunakan untuk mencegah dan merawat
   ruam lampin.*
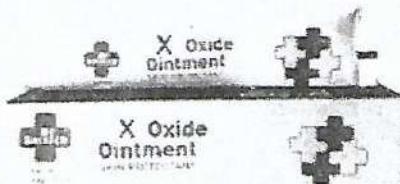
Diagram / *Rajah* 2.1

Diagram 2.2 shows the apparatus set-up to determine the empirical formula of X oxide.
Rajah 2.2 menunjukkan susunan radas untuk menentukan formula empirik X oksida.
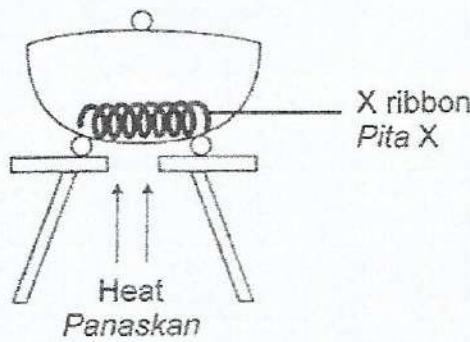

Diagram / *Rajah* 2.2

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

    ....

                                                                                    [1 *mark*]

    (ii) Why the method in Diagram 2.2 is suitable to determine the empirical formula of
         X oxide?
         *Mengapakah kaedah di dalam Rajah 2.2 sesuai digunakan untuk menentukan
         formula empirik bagi oksida X?*

    ....

                                                                                    [1 *mark*]

(iii) When carrying out an experiment in Diagram 2.2, why does the crucible lid need to be opened once a while?
Semasa menjalankan eksperimen dalam Rajah 2.2, mengapakah penutup mangkuk pijar perlu dibuka sekali sekala?

....

....

[1 *mark*]

(iv) State how to determine that the reaction between X and oxygen has completed.
Nyatakan bagaimana untuk menentukan bahawa tindak balas yang berlaku antara X dan oksigen sudah lengkap.

....

....

[1 *mark*]

(v) Table 2 shows the data obtained from the experiment.
Jadual 2 menunjukkan data yang diperoleh daripada eksperimen.

Description *Penerangan*	Mass(g) *Jisim(g)*
Mass of crucible + lid *Jisim mangkuk pijar + penutup*	24.0
Mass of crucible + lid + X *Jisim mangkuk pijar + penutup + X*	30.5
Mass of crucible + lid + X oxide *Jisim mangkuk pijar + penutup + X oksida*	32.1

Table / *Jadual* 2

Based on Table 2, determine the empirical formula of X oxide.
[Relative atomic mass: O = 16 ; X = 65]
Berdasarkan Jadual 2, tentukan formula empirik X oksida.
[*Jisim atom relatif:* O = 16 ; X = 65]

[3 *marks*]

(b) The following equation represents the reaction between aluminium and oxygen.
   Persamaan berikut mewakili tindakbalas antara aluminium dan oksigen.

$$4Al + 3O_2 \longrightarrow 2Al_2O_3$$

Give two information that can be interpreted from the chemical equation.
Berikan dua maklumat yang dapat ditafsir daripada persamaan kimia itu.

....

....

[2 marks]

3 (a) Diagram 3.1 shows a beautiful coral reefs found in Pulau Redang. These coral reefs are formed from a salt known as calcium carbonate, $CaCO_3$. Tiny organisms are able to precipitate calcium carbonate, $CaCO_3$ from the calcium ion, Ca^{2+} and carbonate ion, CO_3^{2-} dissolved in the sea water.

Rajah 3.1 menunjukkan terumbu karang yang indah yang terdapat di kawaşan perairan Pulau Redang. Terumbu karang ini terbentuk daripada garam kalsium karbonat, $CaCO_3$. Organisma seni yang hidup di dalam laut dapat memendakkan kalsium karbonat, $CaCO_3$ daripada ion kalsium, Ca^{2+} dan ion karbonat, CO_3^{2-} yang terlarut di dalam air laut.


Diagram / *Rajah* 3.1

Coral reefs
Terumbu karang
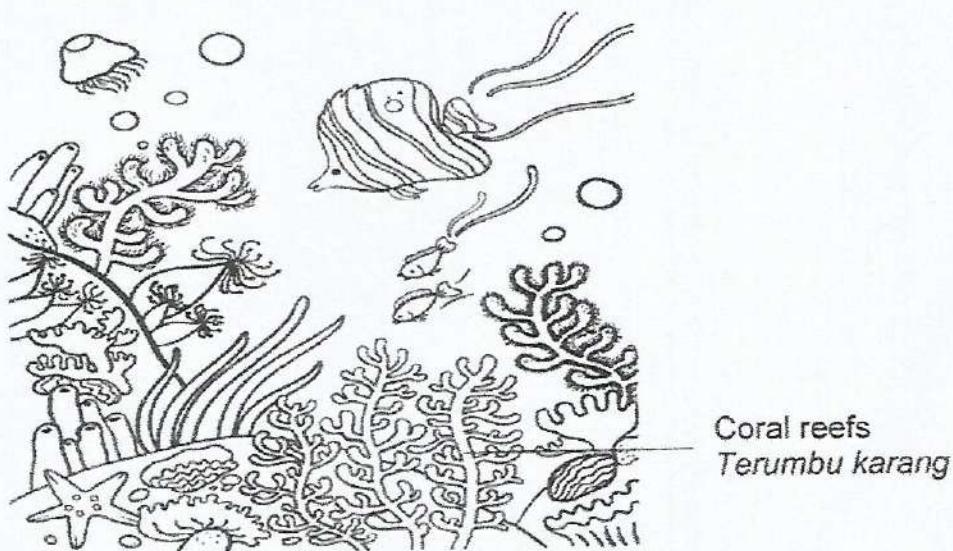
(i) State the meaning of salt.
Nyatakan maksud garam.

....

....

[1 *mark*]

(ii) Calcium carbonate, $CaCO_3$ is an insoluble salt.
State an example of insoluble salt other than calcium carbonate, $CaCO_3$.
Kalsium karbonat, $CaCO_3$ ialah garam tak terlarutkan.
Nyatakan satu contoh garam tak terlarutkan selain daripada kalsium karbonat, $CaCO_3$.

....

[1 *mark*]

(iii) Diagram 3.2 shows apparatus set-up for the heating of coral reefs powder.
       The gas released from this experiment turned lime water chalky.
       Rajah 3.2 menunjukkan susunan radas bagi pemanasan serbuk terumbu karang.
   *Gas yang terbebas daripada eksperimen ini mengeruhkan air kapur.*
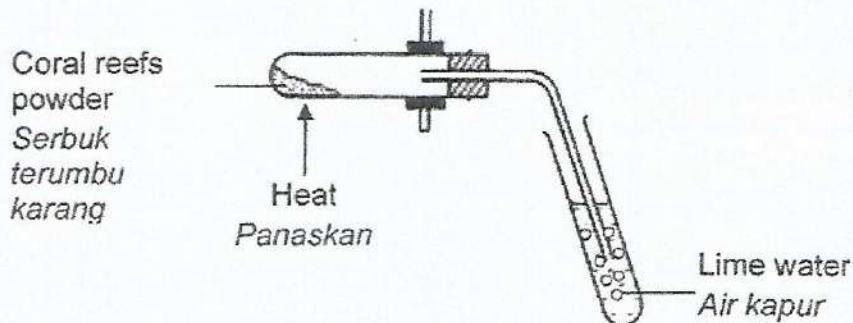

Diagram /Rajah 3.2

State the name of gas released in the experiment.
Nyatakan nama gas yang terbebas di dalam eksperimen tersebut.

....

[1 mark]

(b) Diagram 3.3 shows the set-up of apparatus of an experiment to prepare X salt.
     Rajah 3.3 menunjukkan susunan radas bagi satu eksperimen untuk menyediakan
     garam X.

Excess lead(II) nitrate solution
Larutan plumbum(II) nitrat berlebihan

Sodium nitrate solution
Larutan natrium nitrat

Precipitate of X salt
Mendakan garam X
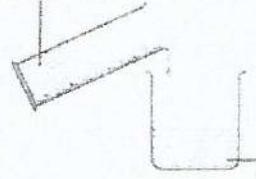
50 cm³ of 0.2 mol dm⁻³ sodium chloride solution
50 cm³ 0.2 mol dm⁻³ *larutan natrium klorida*
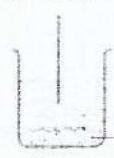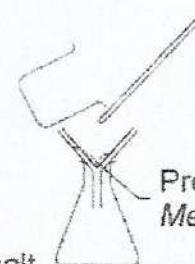
Precipitate of X salt
*Mendakan garam X*

Dry X salt
Garam X kering

Sodium nitrate solution
Larutan natrium nitrat
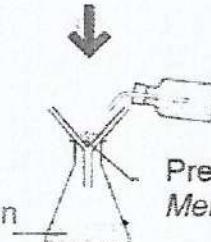
Precipitate of X salt
Mendakan garam X

Diagram / Rajah 3.3

(i)   State the type of the reaction.
       Nyatakan jenis tindak balas itu.

       ....
                                                                                            [1 mark]

(ii)   State the name of X salt.
       Nyatakan nama bagi garam X.

       ....
   [1 mark]

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

       ....
                                                                                            [2 marks]

(iv)   Calculate the mass of X salt formed.
       [Relative atomic mass ; Cl = 35.5, Pb=207]
       Hitungkan jisim garam X yang terbentuk.
       [Jisim atom relatif ; Cl = 35.5, Pb=207]

                                                                                            [3 marks]

4   Diagram 4 shows the apparatus set up for the electrolysis of sodium nitrate solution using carbon electrodes.
Rajah 4 menunjukkan susunan radas untuk elektrolisis larutan natrium nitrat menggunakan elektrod karbon.
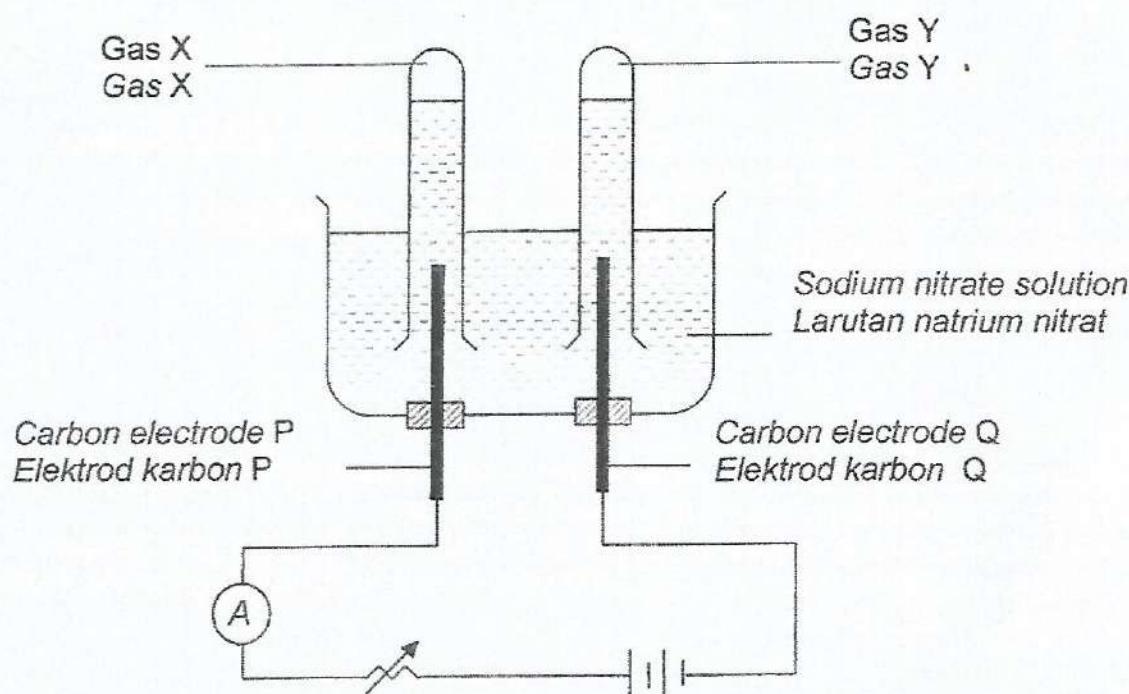
Diagram/ *Rajah* 4

(a) Write the formulae of all the ions present in sodium nitrate solution.
Tulis formula bagi semua ion yang hadir dalam larutan natrium nitrat.

....

[1 mark]

(b) Electrode Q acts as a cathode.
Elektrod Q bertindak sebagai katod.

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

....

[1 mark]

    (ii)   What is gas Y?
            Apakah gas Y?

....

[1 mark]

(iii) Explain your answer in 4(b)(ii) in terms of selective discharge of ions.
       Terangkan jawapan anda di 4(b)(ii) berdasarkan pemilihan discas ion.

       ....

       ....
                                                                               [2 *marks*]

(c) Gas X is collected at the anode. Gas X can rekindle a glowing wooden splinter.
    Write the half equation for the reaction at the anode.
    Gas X dikumpulkan di anod. Gas X boleh menyalakan kayu uji berbara.
    Tulis setengah persamaan bagi tindak balas di anod.

    ....
                                                                               [2 *marks*]

(d) Rosli discovers his key which is made up of iron has rusted. By using the knowledge on
    electrolysis, describe briefly how he solves the problem.
    Rosli mendapati anak kuncinya diperbuat daripada besi telah berkarat. Dengan
    menggunakan pengetahuan tentang elektrolisis, huraikan secara ringkas bagaimana dia
    menyelesaikan masalah itu.

    ....

    ....

    ....
                                                                               [3 *marks*]

5   Diagram 5.1 shows the graph of the mass of calcium carbonate against time for the reaction between calcium carbonate and hydrochloric acid. In this experiment, 5.00 g of calcium carbonate is added to 100 cm³ of 0.5 mol dm⁻³ hydrochloric acid to study the rate of reaction at the temperature of 30°C.

Rajah 5.1 menunjukkan graf jisim kalsium karbonat melawan masa bagi tindak balas antara kalsium karbonat dan asid hidroklorik. Dalam eksperimen ini, 5.00 g kalsium karbonat ditambahkan kepada 100 cm³ asid hidroklorik 0.5 mol dm⁻³ untuk mengkaji kadar tindak balas pada suhu 30°C.

Mass of calcium carbonate (g)
Jisim kalsium karbonat (g)
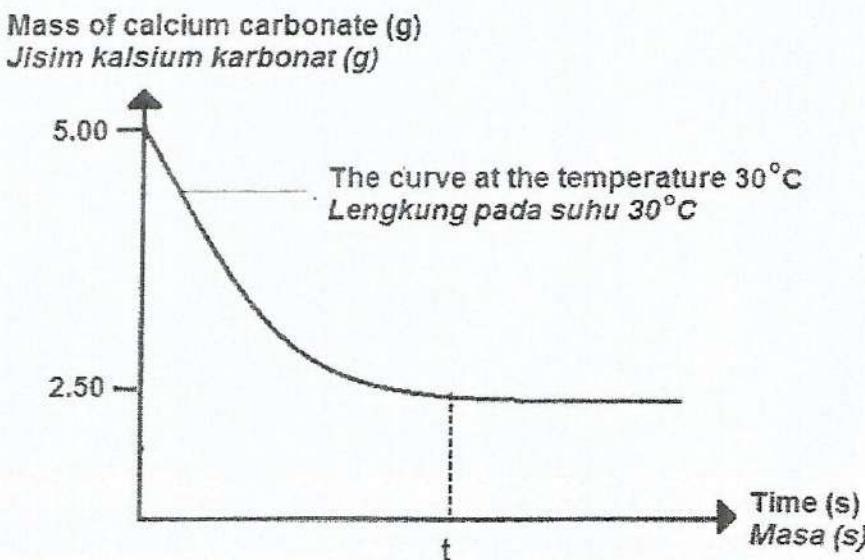
Diagram / *Rajah* 5.1

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

....

[2 *marks*]

(b)   Based on Diagram 5.1,
        Berdasarkan Rajah 5.1,

       (i)   Why is the curve in the graph remains constant after t second?
             Mengapakah lengkung bagi graf kekal mendatar selepas t saat?

....

[1 *mark*]

       (ii)   Determine the mass of unreacted calcium carbonate in the experiment.
             Tentukan jisim kalsium karbonat yang tidak bertindak balas dalam eksperimen itu.

....

[1 *mark*]

(c) In this experiment, the rate of reaction can also be determined by measuring the volume of carbon dioxide gas produced at regular intervals of time.
Draw the apparatus set-up for the experiment.
Dalam eksperimen ini, kadar tindak balas boleh ditentukan dengan mengukur isi padu gas karbon dioksida yang dihasilkan pada sela masa yang tetap.
Lukis rajah susunan radas untuk eksperimen ini.

[2 marks]

(d) The experiment is repeated at the temperature of 40 °C with the other factors remain unchanged.
Eksperimen diulangi pada suhu 40 °C dengan semua faktor lain kekal tidak berubah.

(i) Sketch the curve obtained for this experiment on the same axis in Diagram 5.2.
Lakarkan lengkung yang diperoleh dalam eksperimen pada paksi yang sama dalam Rajah 5.2.

Mass of calcium carbonate (g)
Jisim kalsium karbonat (g)

The curve at the temperature 30°C
Lengkung pada suhu 30°C
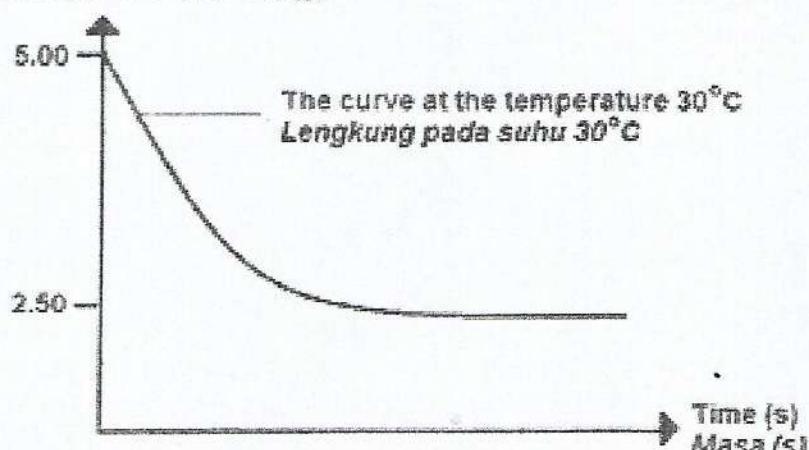
Diagram / *Rajah* 5.2

[1 mark]

(ii) Based on your answer in (d)(i), explain how temperature affect the rate of reaction by using collision theory.
Berdasarkan jawapan anda di 2(d)(i), terangkan bagaimana suhu mempengaruhi kadar tindakbalas dengan menggunakan teori perlanggaran.

....

....

....

....

[3 marks]

(e) Apart from temperature, state one other factor that will also affect the rate of reaction in this experiment.
Selain daripada suhu, nyatakan satu faktor lain yang juga boleh mempengaruhi kadar tindak balas dalam eksperimen ini.

....

[1 mark]

6   Table 6 shows the information for four sets of experiment to construct the reactivity series of metals.
     Jadual 6 menunjukkan maklumat bagi empat set eksperimen untuk membina siri kereaktifan logam.

Set	Reactants *Bahan tindak balas*	Observation *Pemerhatian*
I	Carbon + Iron(III) oxide *Karbon + Ferum(III) oksida*	Grey solid is formed *Pepejal kelabu terhasil*
II	Carbon + oxide of X *Karbon + oksida X*	Brown solid is formed *Pepejal perang terhasil*
III	Carbon + Magnesium oxide *Karbon + Magnesium oksida*	No change *Tiada perubahan*
IV	X + Iron(III) oxide *X + Ferum(III) oksida*	No change *Tiada perubahan*

Table / *Jadual* 6

(a)   Set I is a redox reaction.
       Set I adalah tindak balas redoks.

   (i)   What is the meaning of redox reaction?
          Apakah yang dimaksudkan dengan tindak balas redoks?

          ....
                                                                                              [1 mark]

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

          ....
                                                                                              [2 marks]

   (iii) State the change in the oxidation number of iron.
          Nyatakan perubahan nombor pengoksidaan bagi besi.

          ....
                                                                                              [1 mark]

   (iv)   Which substance undergoes reduction?
          Bahan manakah mengalami penurunan?

          ....
                                                                                              [1 mark]

(b)   Based on Set II and Set III, explain the difference in the observations.
        Berdasarkan Set II dan Set III, terangkan perbezaan dalam pemerhatian itu.

        ....

        ....
                                                                                            [2 marks]

(c)   (i)   Arrange X , carbon , magnesium and iron in descending order of
                reactivity.
                *Susun X , karbon , magnesium dan ferum mengikut tertib menurun
                kereaktifan.*

                ....
                                                                                            [1 mark]

        (ii)   Suggest X.
                Cadangkan X.

                ....
                                                                                            [1 mark]

(d)   Draw a labelled diagram for the apparatus set-up used in Set II.
        Lukis gambar rajah berlabel bagi susunan radas yang digunakan dalam Set II.

                                                                                            [2 marks]

Section B
Bahagian B

[20 marks]
[20 *markah*]

Answer any one question from this section.
*Jawab mana-mana **satu** soalan daripada bahagian ini.*

7   (a) Diagram 7.1 shows the label on ice cream container.
        Rajah 7.1 menunjukkan label pada satu bekas ais krim.

> Ingredients:
> Cream, non-fat milk, sugar, sunset yellow, vanilla
> flavour, soy lecithin
>
> *Ramuan:*
> *Krim, susu tanpa lemak, gula, sunset yellow,*
> *perisa vanilla, lesitin soya*

Diagram / *Rajah* 7.1

From Diagram 7.1, state the name of two food additives found on the label.
State the type and the function of each food additive.
Justify the using of food additives by giving **one** advantage and **one** disadvantage.
*Daripada Rajah 7.1, nyatakan nama **dua** bahan tambah makanan yang*
terdapat pada label tersebut. Nyatakan jenis dan fungsi bagi setiap bahan tambah
makanan tersebut.
*Wajarkan penggunaan bahan tambah makanan dengan memberikan **satu** kebaikan*
*dan **satu** keburukan.*

[8 marks]

    (b) Table 7.1 shows traditional medicines and their uses.
        Jadual 7.1 menunjukkan ubat-ubat tradisional dan kegunaannya.

Traditional medicine *Ubat tradisional*	Use *Kegunaan*
Aloe vera *Lidah buaya*	Its juice is used to threat skin wounds and burns *Jusnya digunakan untuk merawat kesan luka dan lecur pada kulit*
X	Remove winds from the body *Membuang angin di dalam badan*
Y	Used to treat flu *Digunakan untuk merawat selsema*

Table / *Jadual* 7.1

(i) State the name of traditional medicine X and Y.
     Nyatakan nama ubat tradisional X dan Y.

[2 marks]

(ii) If the burns is not threated properly, it may get infection and become worse. If
     the person is brought to the clinic, state the type of medicine prescribed by the
     doctor and state the function of the medicine.
     *Jika luka tidak dirawat dengan baik, ia boleh menyebabkan jangkitan dan
     menjadi lebih teruk. Jika orang itu dibawa ke klinik, nyatakan jenis ubat yang
     dipreskripsikan oleh doktor dan nyatakan fungsi ubat tersebut.*

[2 marks]

(c) Diagram 7.2 shows the structure formula of cleaning agent A and B.
     Rajah 7.2 menunjukkan formula struktur bagi agen pencuci A dan B.

Cleaning agent A
Agen pencuci A

Cleaning agent B
Agen pencuci B
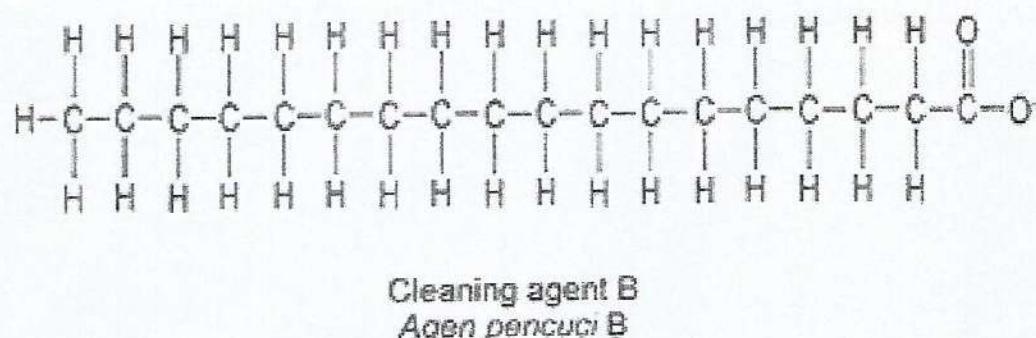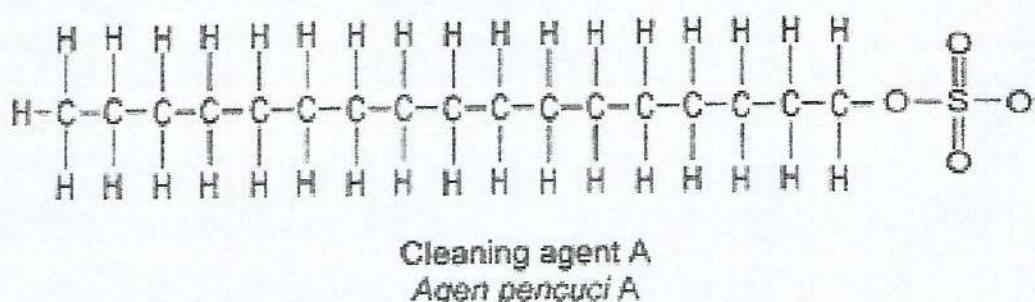
Diagram / *Rajah* 7.2

Table 7.2 shows two sets of experiment to compare the effectiveness for the cleaning action of the cleaning agents in hard water.
Jadual 7.2 menunjukkan dua set eksperimen untuk membandingkan keberkesanan tindakan pencucian kedua-dua agen pencuci dalam air liat.

Set	Material *Bahan*
I	50 cm^3 cleaning agent A + 20 cm^3 of hard water + cloth with oil stain *50 cm^3 agen pencuci A + 20 cm^3 air liat + kain bertompok minyak*
II	50 cm^3 cleaning agent B + 20 cm^3 of hard water + cloth with oil stain *50 cm^3 agen pencuci B + 20 cm^3 air liat + kain bertompok minyak*

Table /*Jadual* 7.2

Based on the structure formula of cleaning agents in Diagram 7.2, identify the cleaning agent A and cleaning agent B.
Based on Table 7.2, state the observations for Set I and Set II then compare and contrast the effectiveness of cleaning action of the two cleaning agents in hard water. Explain your answer.

Berdasarkan formula struktur bagi agen pencuci dalam Rajah 7.2, kenalpasti agen pencuci A dan agen pencuci B.
Berdasarkan Jadual 7.2, nyatakan pemerhatian bagi Set I dan Set II kemudian banding dan bezakan keberkesanan tindakan pencucian bagi kedua-dua agen pencuci dalam air liat. Terangkan jawapan anda.

[8 marks]

8   Diagram 8.1 shows an apparatus set-up to determine the end point of titration through electrical conductivity method. 20 cm³ of 1.0 mol dm⁻³ of sodium hydroxide solution is neutralised by X mol dm⁻³ of sulphuric acid.

Rajah 8.1 menunjukkan satu susunan radas bagi menentukan takat akhir pentitratan melalui kaedah kekonduksian elektrik. 20 cm³ larutan natrium hidroksida 1.0 mol dm⁻³ dineutralkan oleh X mol dm⁻³ asid sulfurik.


Carbon electrodes
Elektrod karbon

X mol dm⁻³ of sulphuric acid
X mol dm⁻³ *asid sulfurik*

20 cm³ of 1.0 mol dm⁻³ of sodium hydroxide solution
20 cm³ *larutan natrium hidroksida 1.0 mol dm⁻³*
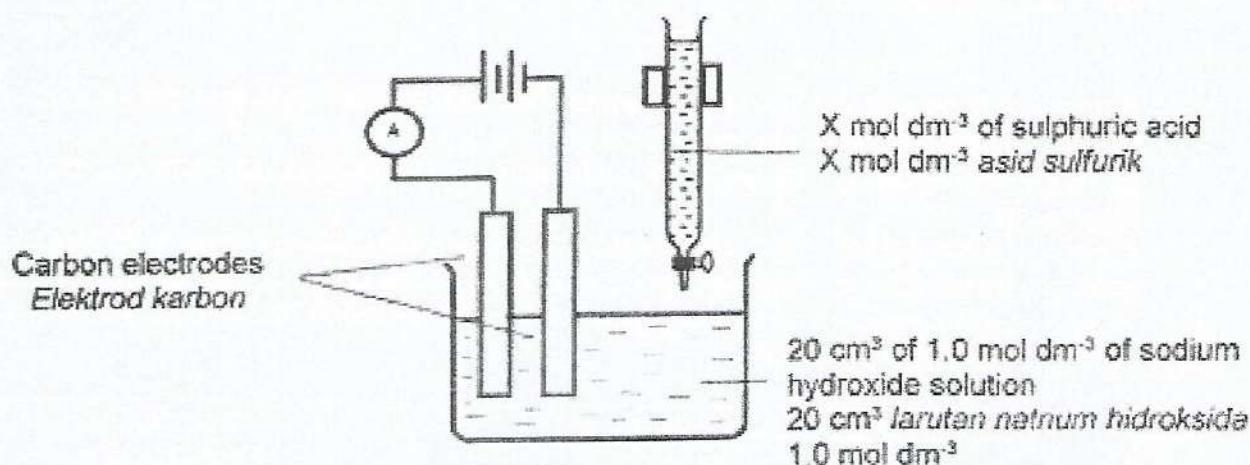
Diagram / *Rajah* 8.1

(a)   A graph of electrical conductivity, ammeter reading (A) against the volume of sulphuric acid (cm³) is then plotted. The end point of titration during neutralisation can be determined when the electrical conductivity is at the lowest.

Graf kekonduksian elektrik, bacaan ammeter (A) melawan isipadu asid sulfurik (cm³) kemudian diplotkan. Takat akhir pentitratan boleh ditentukan apabila kekonduksian elektrik berada pada takat paling rendah.

Ammeter reading / A
Bacaan ammeter/A

End point of titration
Takat akhir pentitratan

Volume of acid /cm
Isipadu asid /cm³

10
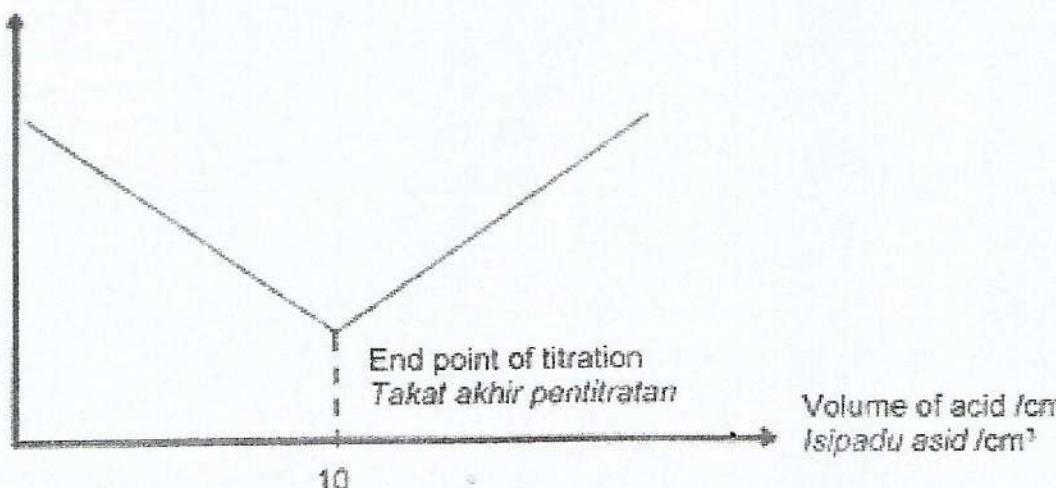
Write the chemical equation for the reaction occur in Diagram 8.1.
Determine the value of X.
At the end point of titration, ammeter still gives the reading. Explain why.
Tulis persamaan kimia bagi tindak balas yang berlaku dalam Rajah 8.1.
Tentukan nilai X.
Pada takat akhir pentitratan, ammeter masih lagi memberikan bacaan.
Terangkan mengapa.

[6 marks]

(b)   Diagram 8.2 shows two sets of experiment for the reaction between strong acid and weak acid with excess calcium carbonate. The concentration and the volume of the acids used are same. The gas that produced from the reaction is channelled into lime water.
Rajah 8.2 menunjukkan dua set eksperimen bagi tindak balas antara asid kuat dan asid lemah dengan kalsium karbonat berlebihan. Kepekatan dan isipadu asid-asid yang digunakan adalah sama. Gas yang terbebas daripada tindak balas tersebut dialirkan ke dalam air kapur

Set Set	Apparatus set-up Susunan radas	Observation Pemerhatian
1	Acid P *Asid P* Calcium carbonate *kalsium karbonat* Lime water *Air kapur* Bubbles gas *Gelembung gas*	Less gas bubbles released. *Sedikit gelembung gas terbebas.* Time taken for lime water turns chalky is longer. *Masa yang diambil untuk air kapur bertukar keruh lebih panjang.*
2	Acid Q *Asid Q* Calcium carbonate *Kalsium karbonat* Lime water *Air kapur* Bubbles gas *Gelembung gas*	More gas bubbles released. *Banyak gelembung gas terbebas.* Time taken for lime water turns chalky is shorter. *Masa yang diambil untuk air kapur bertukar keruh lebih singkat.*
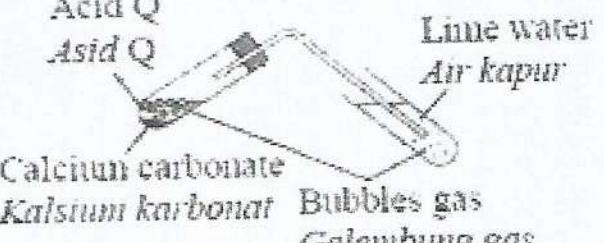
Diagram/ *Rajah* 8.2

Based on information in Diagram 8.2,
Berdasarkan maklumat dalam Rajah 8.2,

(i)   Suggest the name of acid P and acid Q.
Cadangkan nama bagi asid P dan asid Q.

(ii)   The reaction between acid P with calcium carbonate and the reaction between acid Q with calcium carbonate give different observations. Explain why.
Tindak balas antara asid P dengan kalsium karbonat dan tindak balas antara asid Q dengan kalsium karbonat memberikan pemerhatian yang berbeza.
Terangkan mengapa.

[10 marks]

(c) Table 8 shows the pH values of two solutions which have the same concentration.
   Jadual 8 menunjukkan nilai pH bagi dua larutan yang mempunyai kepekatan yang sama.

Solution *Larutan*	Concentration (mol dm^{-3}) *Kepekatan* (mol dm^{-3})	pH value *Nilai* pH
Sodium hydroxide *Natrium hidroksida*	0.5	14
Ammonia *Ammonia*	0.5	8

Table / *Jadual* 8

Explain why the pH values of the two solutions are different.
Terangkan mengapa nilai pH dua larutan tersebut berbeza.

[4 marks]

Section C
Bahagian C

[20 *marks*]
[20 *markah*]

Answer any **one** question from this section.
*Jawab mana-mana **satu** soalan daripada bahagian ini.*

9   (a) Table 9.1 shows the result of two sets of experiment to investigate the coagulation of latex.
Jadual 9.1 menunjukkan keputusan bagi dua ekperimen untuk menyiasat penggumpalan getah.

Set	Type of solution added *Jenis larutan yang ditambahkan*	Observation *Pemerhatian*
I	Latex + solution P *Susu getah + larutan P*	Latex coagulate very fast *Susu getah menggumpal dengan cepat*
II	Latex + solution Q *Susu getah + larutan Q*	Latex does not coagulate *Susu getah tidak menggumpal*

Table / *Jadual* 9.1

(i) Suggest one possible substance for solution P and Q.
Cadangkan satu bahan yang mungkin untuk larutan P dan Q.

[2 *marks*]

(ii) Explain the observations in Set I and Set II.
Terangkan pemerhatian dalam Set I dan Set II.

[6 *marks*]

(b) Diagram 9.1 shows how compound Y is formed from alkene X.
Rajah 9.1 menunjukkan bagaimana sebatian Y terbentuk daripada alkena X.

Alkene X + H_2O *Alkena X + H_2O*	→	Compound Y *Sebatian Y*

Diagram / *Rajah* 9.1

(i) State the homologous series and two chemical properties of compound Y.
Nyatakan siri homolog dan dua sifat kimia bagi sebatian Y.

[3 *marks*]

(ii) By using compound Y with more than one carbon atom per molecule, describe an experiment to convert compound Y to alkene X.

Your answer should consist of the following:

- Procedure of the experiment
- A labelled diagram showing apparatus set-up
- The chemical test to confirm the product formed

Dengan menggunakan sebatian Y yang mempunyai lebih daripada satu karbon per molekul, huraikan satu experimen untuk menukarkan sebatian Y kepada sebatian X.

Jawapan anda harus mengandungi perkara berikut:

- *Prosedur eksperimen*
- *Gambar rajah susunan radas yang berlabel*
- *Ujian kimia untuk mengesahkan hasil tindak balas yang terbentuk*

[9 marks]

10   Diagram 10 shows thermochemical equation for the formation of silver chloride.
*Rajah 10 menunjukkan persamaan termokimia bagi pembentukan argentum klorida.*

$$Ag^+_{(aq)} + Cl^-_{(aq)} \rightarrow AgCl_{(s)}, \quad \Delta H = -65.5 \text{ kJ mol}^{-1}$$
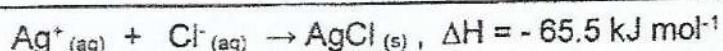
Diagram / *Rajah* 10

(a)   Draw an energy level diagram for the reaction in Diagram 10.
Explain the differences in energy content of the reactants compared to the product.
Lukiskan gambar rajah aras tenaga bagi tindak balas dalam Rajah 10.
Terangkan perbezaan kandungan tenaga dalam bahan tindak balas berbanding dengan hasil tindak balas.

[4 marks]

(b)   Table 10 shows the heat released in Experiment I, II and III using different acid that has been reacted with sodium hydroxide solution.
Jadual 10 menujukkan haba yang dibebaskan dalam Eksperimen I, II dan III menggunakan asid yang berbeza yang ditindakbalaskan dengan larutan natrium hidroksida.

Experiment *Eksperimen*	Chemical Equation *Persamaan kimia*	Heat released *Haba dibebaskan* (kJ)
I	$HCl + NaOH \rightarrow KCl + H_2O$	57.3
II	$CH_3COOH + NaOH \rightarrow CH_3COONa + H_2O$	55.0
III	$H_2SO_4 + 2NaOH \rightarrow Na_2SO_4 + 2H_2O$	114.6

Table / *Jadual* 10

Based on Table 10, explain the difference in heat released between :
Berdasarkan Jadual 10, terangkan perbezaan haba yang dibebaskan antara :

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

(ii)   Experiment I and Experiment III
Eksperimen I dan Eksperimen III

[6 marks]

(c)   Describe a laboratory experiment to determine the heat of combustion of a named alcohol with a number of carbon atoms per molecule less than four. In your description, include the steps involved in the calculation.
[Relative atomic mass: C =12, O =16, H = 1]
[Specific heat capacity of water = 4.2 J g^{-1} $°C^{-1}$; Density of water = 1 g cm^{-3}]

Huraikan eksperimen makmal untuk menentukan haba pembakaran bagi alkohol yang dinamakan dengan bilangan atom karbon per molekul kurang daripada empat Dalam penerangan anda sertakan langkah pengiraan yang terlibat.
[Jisim atom relatif: C =12, O =16, H = 1]
[Muatan haba tentu air = 4.2 J g^{-1} $°C^{-1}$; Ketumpatan air = 1 g cm^{-3}]

[10 *marks*]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT