

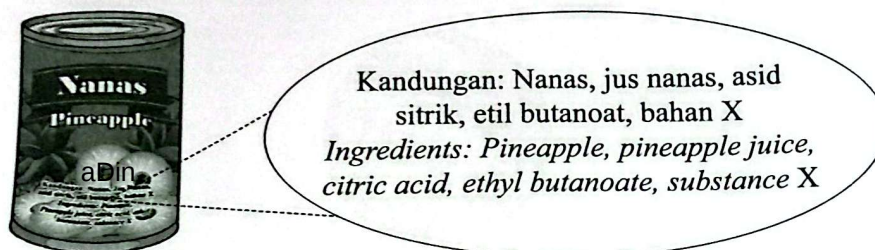
**Bahagian A**

[60 markah]

*Jawab semua soalan dalam bahagian ini.*

- 1 Rajah 1 menunjukkan kandungan dalam satu tin nanas.

*Diagram 1 shows the ingredients in a can of pineapple.*



Rajah / Diagram 1

- (a) Nyatakan maksud bahan tambah makanan.

*State the meaning of food additive.*

.....

.....

[1 markah / mark]

Berdasarkan Rajah 1,

*Based on Diagram 1,*

- (b) Nyatakan fungsi asid sitrik dan etil butanoat.

*State the function of citric acid and ethyl butanoate.*

- (i) Asid sitrik

*Citric acid*

.....

[1 markah / mark]

- (ii) Etil butanoat

*Ethyl butanoate*

.....

[1 markah / mark]

- (c) Bahan X ditambah sebagai pengawet dan perisa.  
*Substance X is added as preservative and flavouring.*

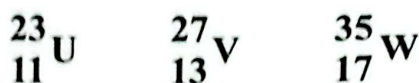
- (i) Nyatakan bahan X.  
*State substance X.*

.....  
[1 markah / mark]

- (ii) Nyatakan bagaimana bahan X boleh berfungsi sebagai pengawet?  
*State how substance X can function as preservative?*

.....  
[1 markah / mark]

- 2 (a) Rajah 2 menunjukkan simbol bagi unsur U, unsur V dan unsur W. Huruf yang digunakan bukan simbol sebenar bagi unsur-unsur itu. *Diagram 2 shows the symbols of elements U, V and W. The letters used are not the actual symbols of the elements.*



Rajah / Diagram 2

- (i) Nyatakan maksud kala. *State the meaning of period.*

.....  
[1 markah / mark]

- (ii) Dalam kala manakah terletak unsur U, V dan W dalam Jadual Berkala Unsur? Terangkan jawapan anda. *In which period are elements U, V and W located in the Periodic Table of Elements? Explain your answer.*

.....  
[2 markah / marks]

- (b) Asid nitrik dihasilkan melalui proses Ostwald. *Nitric acid is produced through the Ostwald process.*

- (i) Nyatakan logam peralihan yang digunakan sebagai mangkin dalam proses itu. *State the transition metal used as the catalyst in the process.*

.....  
[1 markah / mark]

- (ii) Nyatakan **satu** sifat istimewa **lain** bagi unsur peralihan. *State one other special characteristic of transition elements.*

.....  
[1 markah / mark]

- 3 Penguraian kalium klorat(V),  $\text{KClO}_3$  oleh haba digunakan untuk menghasilkan gas oksigen di makmal. Persamaan kimia berikut mewakili tindak balas penguraian kalium klorat(V).  
*The decomposition of potassium chlorate(V),  $\text{KClO}_3$  by heat is often used to produce oxygen gas in the laboratory. The following chemical equation represents the decomposition of potassium chlorate(V).*



Berdasarkan persamaan kimia,  
*Based on the chemical equation,*

- (a) Nyatakan keadaan fizik bagi kalium klorat(V).  
*State the physical state of potassium chlorate(V).*

[1 markah / mark]

- (b) Nyatakan nilai X dan Y.  
*State the value of X and Y.*

X: .....

Y: .....

[1 markah / mark]

- (c) Sekumpulan penyelidik memerlukan  $200 \text{ dm}^3$  gas oksigen bagi satu penyelidikan. Sebagai persediaan, 1 kg kalium klorat(V),  $\text{KClO}_3$  telah dibeli. Adakah pembelian tersebut mencukupi? Terangkan.

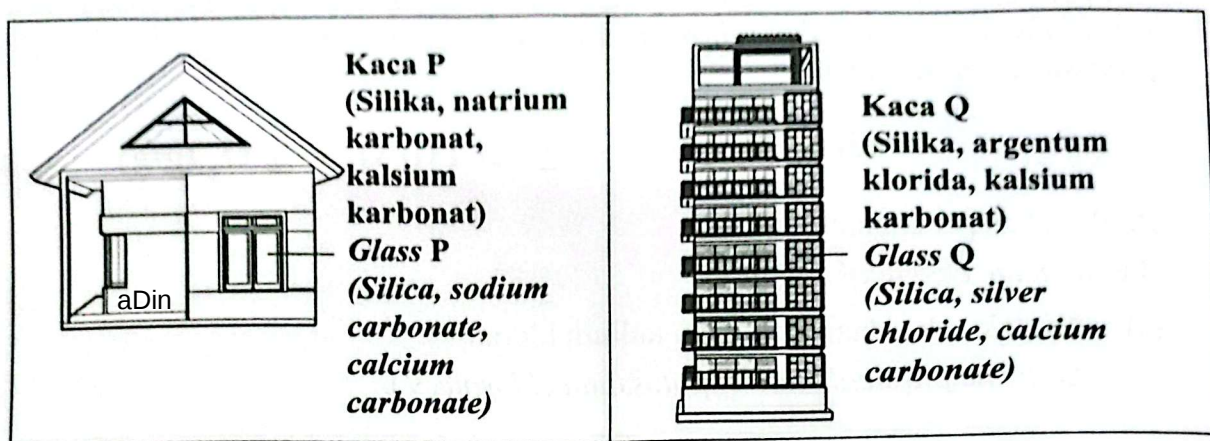
[Jisim atom relatif: O = 16, Cl = 35.5, K = 39; 1 mol gas menempati  $24 \text{ dm}^3$  pada keadaan bilik]

*A group of researchers require  $200 \text{ dm}^3$  of oxygen gas for a research project. As preparation, 1 kg of potassium chlorate(V),  $\text{KClO}_3$ , has been purchased. Is the purchase sufficient? Explain.*

[Relative atomic mass: O = 16, Cl = 35.5, K = 39; 1 mole of gas occupies  $24 \text{ dm}^3$  at room conditions]

[4 markah / marks]

- 4 (a) Rajah 3.1 menunjukkan penggunaan kaca P dan kaca Q.  
 Diagram 3.1 shows the use glass P and glass Q.



Rajah / Diagram 3.1

- (i) Nyatakan jenis kaca P dan kaca Q.  
 State the type of glass P and glass Q.

P : .....

Q : .....

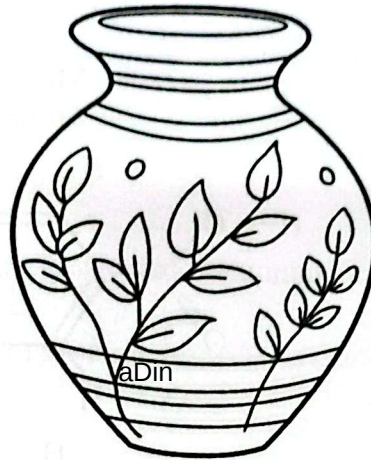
[2 markah / marks]

- (ii) Terangkan mengapa kaca P dan kaca Q digunakan pada bangunan tersebut?  
 Explain why glass P and glass Q are used on the buildings?

.....  
 .....  
 .....  
 .....

[2 markah / marks]

- (b) Rajah 3.2 menunjukkan satu pasu seramik.  
*Diagram 3.2 shows a ceramic pot.*



Rajah / Diagram 3.2

- (i) Apakah komponen utama untuk membuat pasu seramik?  
*What is the major component in making ceramic pots?*

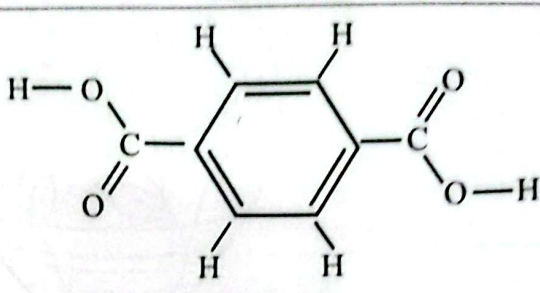
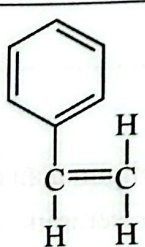
.....  
 [1 markah / mark]

- (ii) Seramik juga digunakan dalam bidang perubatan.  
 Nyatakan jenis seramik termaju yang digunakan dalam implan gigi dan berikan **satu** sifat seramik termaju itu.  
*Ceramics is also used in the medical field.*  
*State the type of advanced ceramic used in dental implants and give **one** property of the advanced ceramic.*

.....  
 [2 markah / marks]

- 5 Jadual 1 menunjukkan maklumat tentang dua polimer sintetik yang digunakan dalam kehidupan seharian, terilena dan polisterina.

*Table 1 shows the information about two synthetic polymers used in daily life, terylene and polystyrene.*

| Polimer<br>Polymer         | Monomer<br>Monomer                                                                                                                                                        |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Terilena<br>Terylene       | <br> |
| Polisterina<br>Polystyrene |                                                                                                                                                                           |

Jadual / Table 1

- (a) Nyatakan maksud polimer.  
*State the meaning of polymer.*

.....  
[1 markah / mark]

- (b) (i) Nyatakan **satu** kegunaan terilena.  
*State **one** use of terylene.*

.....  
[1 markah / mark]

- (ii) Nyatakan hasil sampingan tindak balas pempolimeran bagi pembentukan terilena.  
*State the by-product of the polymerisation reaction for the formation of terylene.*

.....  
[1 markah / mark]

- (iii) Bandingkan tindak balas pempolimeran bagi penghasilan terilena dan polisterina, selain daripada penghasilan hasil sampingan.

*Compare the polymerisation reaction of terylene and polystyrene, other than the production of by-products.*

.....  
 .....

[1 markah / mark]

- (c) Tuliskan satu persamaan kimia untuk menunjukkan tindak balas pempolimeran untuk menghasilkan polisterina.

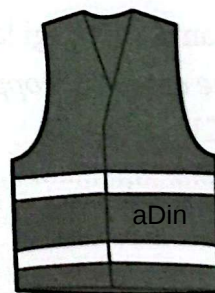
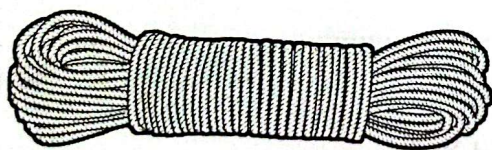
*Write a chemical equation to show the polymerisation reaction to produce polystyrene.*

|                                                                     |                                                                     |
|---------------------------------------------------------------------|---------------------------------------------------------------------|
| $2\text{H}_2\text{O} \rightarrow \text{H}_2 + \text{O}_2$           | $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$          |
| $\text{H}_2 + \text{O}_2 \rightarrow \text{H}_2\text{O}_2$          | $\text{H}_2 + \text{O}_2 \rightarrow \text{H}_2\text{O}_2$          |
| $\text{H}_2 + \text{O}_2 \rightarrow \text{H}_2\text{O} + \text{O}$ | $\text{H}_2 + \text{O}_2 \rightarrow \text{H}_2\text{O} + \text{O}$ |

[2 markah / marks]

- (d) Rajah 4 menunjukkan contoh bahan yang dihasilkan daripada nilon.

*Diagram 4 shows example of materials made from nylon.*



Rajah / Diagram 4

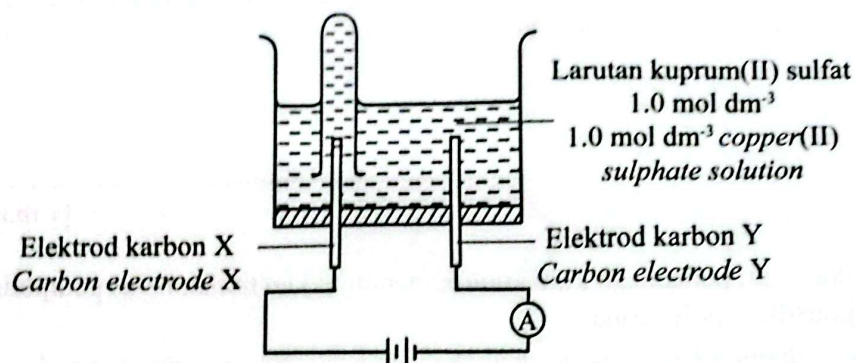
Beri **dua** sebab mengapa nilon sesuai untuk tujuan ini.

*Give **two** reasons why nylon is suitable for this purpose.*

.....  
 .....

[2 markah / marks]

- 6 Rajah 5.1 menunjukkan susunan radas untuk elektrolisis larutan kuprum(II) sulfat.  
 Diagram 5.1 shows setup of the apparatus for electrolysis of copper(II) sulphate solution.



Rajah / Diagram 5.1

- Jadual 2 menunjukkan sebahagian siri keupayaan elektrod piawai.  
 Table 2 shows part of the standard electrode potential series.

| Tindak balas sel setengah<br><i>Half-cell equation</i>                               | $E^{\circ} / \text{V (298K)}$ |
|--------------------------------------------------------------------------------------|-------------------------------|
| $2\text{H}^{+} + 2\text{e}^{-} \rightleftharpoons \text{H}_2$                        | 0.00                          |
| $\text{Cu}^{2+} + 2\text{e}^{-} \rightleftharpoons \text{Cu}$                        | + 0.34                        |
| $\text{O}_2 + 2\text{H}_2\text{O} + 4\text{e}^{-} \rightleftharpoons 4\text{OH}^{-}$ | + 0.40                        |
| $\text{S}_2\text{O}_8^{2-} + 2\text{e}^{-} \rightleftharpoons 2\text{SO}_4^{2-}$     | + 2.01                        |

Jadual / Table 2

- (a) Nyatakan warna bagi larutan kuprum(II) sulfat.  
 State the colour of copper(II) sulphate solution.

.....  
 [1 markah / mark]

- (b) Nyatakan pemerhatian pada elektrod X. Terangkan.  
 State the observation at electrode X. Explain.

.....  
 .....  
 .....  
 [3 markah / marks]

- (c) Seorang murid mendapati cincin besinya telah berkarat.

*A student found that his iron ring rusted.*

- (i) Cadangkan bagaimana untuk menjadikan cincin besi tersebut lebih menarik dan tahan karat dengan menggunakan konsep elektrolisis.

*Suggest how to make the iron ring looks more attractive and resistant to rust by using the concept of electrolysis.*

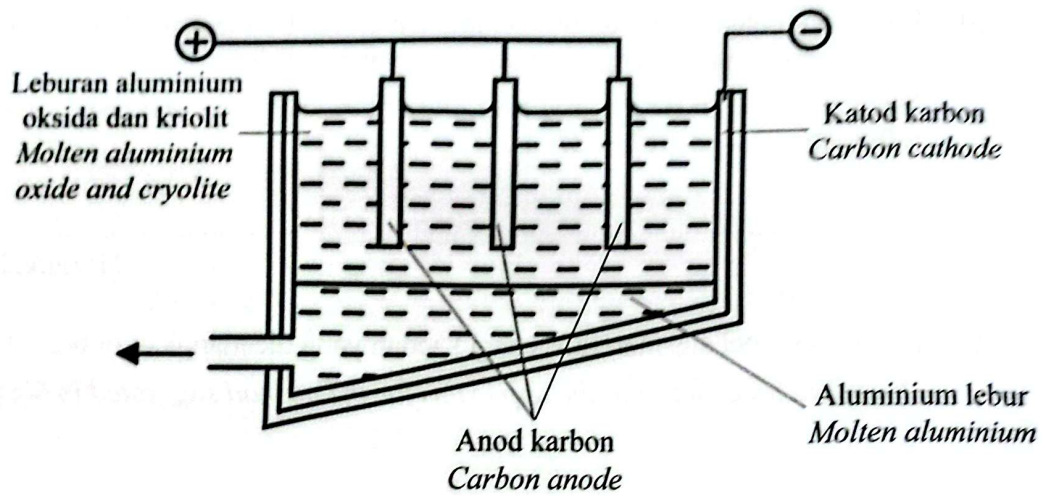
.....  
[1 markah / mark]

- (ii) Lukis dan label susunan radas bagi kaedah yang dicadangkan di 6(c)(i).

*Draw and label setup of the apparatus for the method suggested in 6(c)(i).*

[2 markah / marks]

- (d) Rajah 5.2 menunjukkan proses pengekstrakan aluminium daripada aluminium oksida.  
*Diagram 5.2 shows the extraction process of aluminium from aluminium oxide.*



Rajah / Diagram 5.2

Terangkan kesan pengekstrakan logam ini kepada alam sekitar.

*Explain the effect of the metal extraction method towards the environment.*

.....

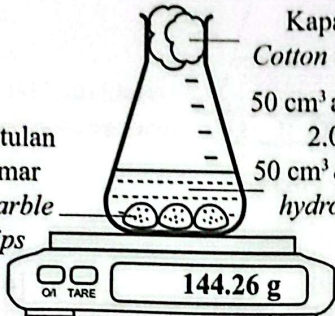
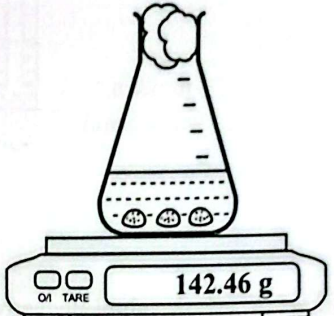
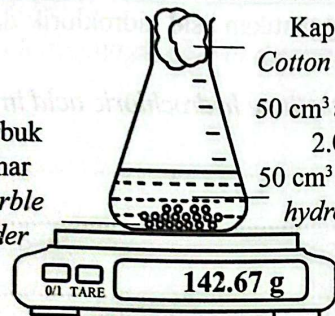
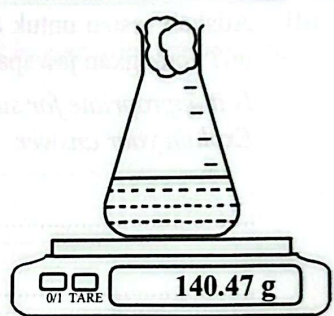
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.....

[2 markah / marks]

- 7 Sekumpulan murid menjalankan eksperimen untuk mengkaji faktor yang mempengaruhi kadar tindak balas. Rajah 6.1 menunjukkan pemerhatian bagi eksperimen tersebut.

*A group of students conducted an experiment to study the factor that affect the rate of reaction. Diagram 6.1 shows the observation of the experiment.*

| Set | Pemerhatian<br>Observation                                                                                                                                                                                                                                                                   |                                                                                                     |
|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|
|     | Pada awal eksperimen<br><i>At the beginning of the experiment</i>                                                                                                                                                                                                                            | Selepas 5 minit<br><i>After 5 minutes</i>                                                           |
| I   | <p>5g ketulan marmar<br/>5g marble chips</p>  <p>Kapas<br/>Cotton wool<br/>50 cm³ asid hidroklorik<br/>2.0 mol dm<sup>-3</sup><br/>50 cm³ of 2.0 mol dm<sup>-3</sup> hydrochloric acid</p> <p>144.26 g</p>  |  <p>142.46 g</p>  |
| II  | <p>5g serbuk marmar<br/>5g marble powder</p>  <p>Kapas<br/>Cotton wool<br/>50 cm³ asid hidroklorik<br/>2.0 mol dm<sup>-3</sup><br/>50 cm³ of 2.0 mol dm<sup>-3</sup> hydrochloric acid</p> <p>142.67 g</p> |  <p>140.47 g</p> |

Rajah / Diagram 6.1

Berdasarkan Rajah 6.1,

*Based on Diagram 6.1,*

- (a) Nyatakan faktor yang mempengaruhi kadar tindak balas.

*State the factor that affect the rate of reaction.*

[1 markah / mark]

- (b) Nyatakan **satu** perubahan yang dapat diperhatikan dalam eksperimen ini yang boleh digunakan untuk menentukan kadar tindak balas.

*State **one** observable change in this experiment that can be used to determine the rate of reaction.*

[1 markah / mark]

- (c) Hitung kadar tindak balas bagi Set I dan Set II.  
*Calculate the rate of reaction for Set I and Set II.*

Set I

Set II

[4 markah / marks]

- (d) Adakah sesuai untuk asid sulfurik menggantikan asid hidroklorik dalam eksperimen ini? Terangkan jawapan anda.

*Is it appropriate for sulphuric acid to substitute hydrochloric acid in this experiment?  
Explain your answer.*

.....

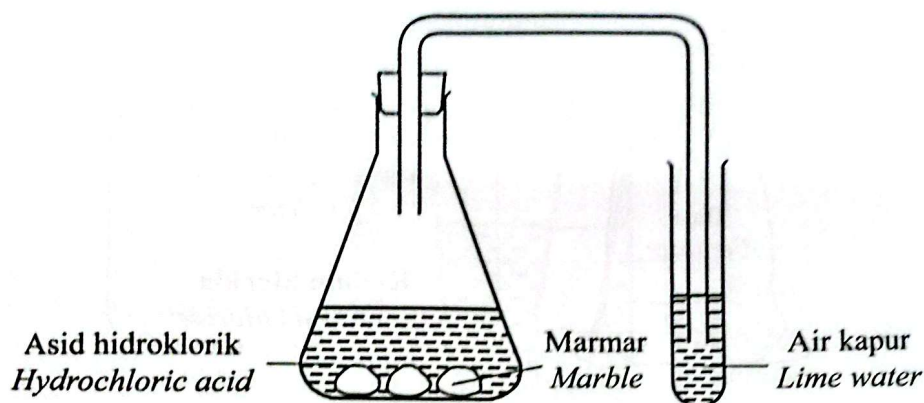
.....

.....

[2 markah / marks]



- (e) Ahmad mengulangi eksperimen dengan menggunakan susunan radas seperti Rajah 6.2.  
*Ahmad repeats the experiment using the apparatus setup in Diagram 6.2.*



Rajah / Diagram 6.2

Terangkan bagaimana Ahmad dapat menentukan perbezaan kadar tindak balas bagi Set I dan Set II.

*Explain how Ahmad able to determine the differences in rate of reaction for Set I and Set II.*

.....

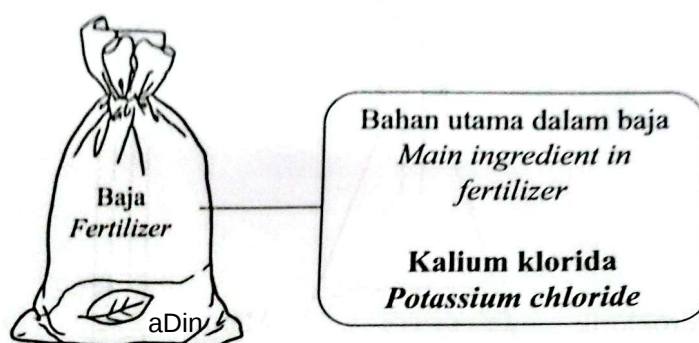
.....

.....

.....

[2 markah / marks]

- 8 (a) Rajah 7.1 menunjukkan satu sebatian yang digunakan untuk menghasilkan baja.  
*Diagram 7.1 shows a compound used to produce fertilizer.*



Rajah / Diagram 7.1

- (i) Nyatakan jenis ikatan kimia bagi sebatian tersebut.  
*State the type of chemical bond for the compound.*

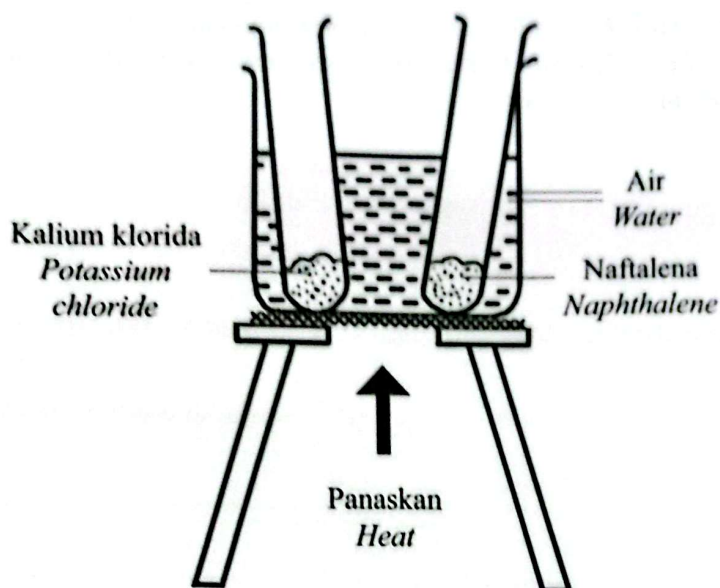
.....  
[1 markah / mark]

- (ii) Nyatakan bagaimana ikatan di 8(a)(i) terbentuk.  
*State how the bond in 8(a)(i) is formed.*

.....  
[1 markah / mark]

- (b) Rajah 7.2 menunjukkan susunan radas bagi mengkaji takat lebur dan takat didih bagi kalium klorida dan naftalena.

*Diagram 7.2 shows setup of the apparatus used to study the melting point and boiling point of potassium chloride and naphthalene.*



Rajah / Diagram 7.2

Didapati naftalena telah melebur pada  $78^{\circ}\text{C}$ , manakala kalium klorida tidak menunjukkan perubahan selepas sepuluh minit. Terangkan.

*It is found that the naphthalene melted at  $78^{\circ}\text{C}$ , while potassium chloride shows no change after ten minutes. Explain.*

.....

.....

.....

.....

[2 markah / marks]

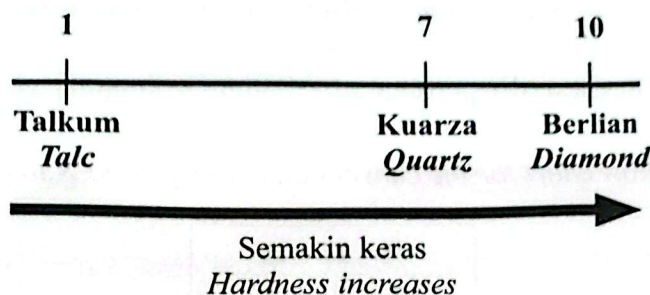
- (c) Apabila ketulan ais ditambahkan ke dalam segelas sirap, ais akan terapung kerana ais kurang tumpat daripada sirap. Hal ini kerana molekul air dalam ais membentuk ikatan hidrogen. Lukis dan label satu gambar rajah untuk menerangkan pernyataan itu. Jawapan anda mesti menunjukkan ikatan dalam molekul air,  $H_2O$ .

*When ice cubes are added into a glass of syrup, the ice will float because ice is less dense than syrup. This is because the water molecules in the ice form hydrogen bonds. Draw and label a diagram to explain the statement. Your answer must include the bonds in the water molecule,  $H_2O$ .*



[2 markah / marks]

- (d) Rajah 7.3 menunjukkan skala kekerasan Mohs yang berskala dari 1 hingga 10.  
*Diagram 7.3 shows the Mohs scale of hardness that ranks from 1 to 10.*



Rajah / Diagram 7.3

Berlian adalah satu alotrop karbon. Terangkan mengapa berlian berada pada skala 10 pada skala Mohs?

*Diamond is an allotrope of carbon. Explain why diamond ranks 10<sup>th</sup> on the Mohs scale?*

.....

.....

[1 markah / *mark*]

- (e) Jessica ingin menghilangkan pengilat kuku pada jarinya. Antara air dan aseton, yang manakah lebih sesuai digunakan untuk menanggalkan pengilat kuku? Wajarkan pilihan Jessica.

*Jessica wants to remove the nail polish on her fingers. Between water and acetone, which one is more suitable to be used to remove the nail polish? Justify Jessica's choice.*

.....

.....

.....

.....

[3 markah / *marks*]

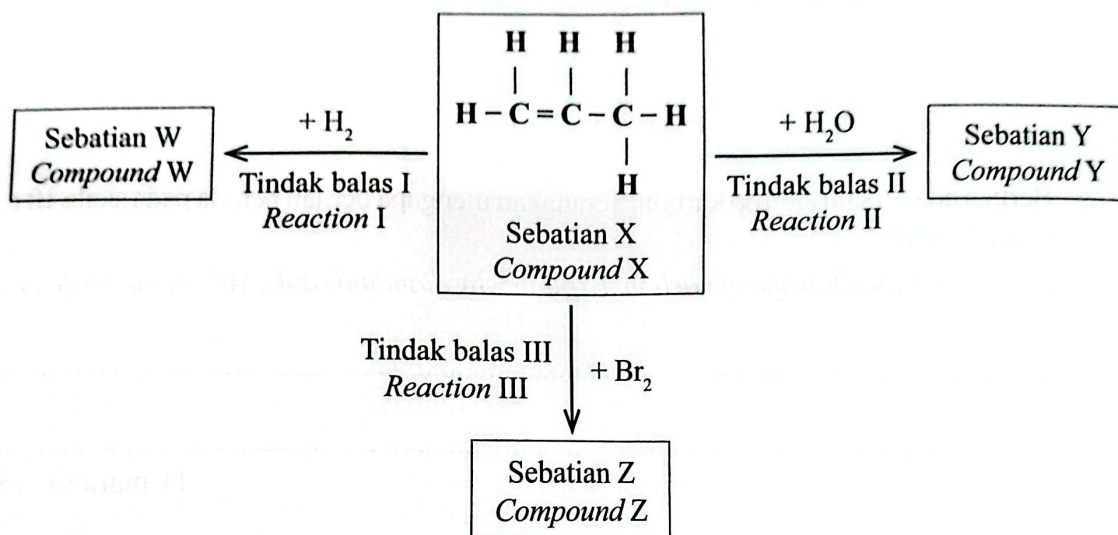
**Bahagian B**

[20 markah]

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

- 9 Rajah 8 menunjukkan carta alir pertukaran sebatian X kepada sebatian W, sebatian Y dan sebatian Z.

Diagram 8 shows a flow chart for the conversion of compound X to compounds W, Y and Z.



Rajah / Diagram 8

- (a) Nyatakan maksud hidrokarbon tak tepu.  
 State the meaning of unsaturated hydrocarbon.

[1 markah / mark]

Berdasarkan Rajah 8,  
 Based on Diagram 8,

- (b) Namakan tindak balas I, tindak balas II, sebatian W, sebatian X dan sebatian Y.  
 Nyatakan siri homolog dan formula am bagi sebatian W, sebatian X dan sebatian Y.  
 Name the reactions I and II, compounds W, X and Y.  
 State the homologous series and general formula of compounds W, X and Y.

[11 markah / marks]

- (c) Tuliskan persamaan kimia bagi tindak balas II. Nyatakan keadaan bagi tindak balas ini. Jika 4.2 g sebatian X digunakan, hitung jisim sebatian Y yang terhasil.

[Jisim atom relatif: C = 12, O = 16, H = 1]

*Write the chemical equation for reaction II. State the conditions used in the reaction.*

*If 4.2 g of compound X is used, calculate the mass of compound Y produced.*

[Relative atomic mass: C = 12, O = 16, H = 1]

[5 markah / marks]

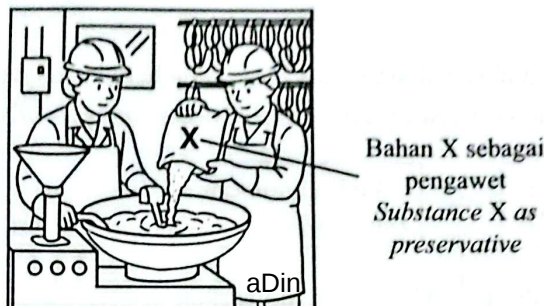
- (d) Nyatakan pemerhatian bagi tindak balas III. Lukiskan formula struktur dan namakan sebatian Z mengikut sistem penamaan IUPAC.

*State the observation for reaction III. Draw the structural formula and name compound Z according to the IUPAC nomenclature.*

[3 markah / marks]

- 10 Rajah 9.1 menunjukkan dua orang pekerja di sebuah kilang sosej sedang menambah bahan X ke dalam adunan untuk menghasilkan sosej.

Diagram 9.1 shows two workers at a sausage factory adding substance X into a mixture to make sausages.



Rajah / Diagram 9.1

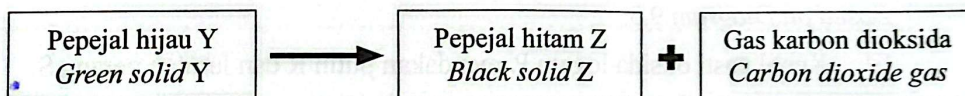
- (a) Bahan X yang ditambahkan ke dalam adunan itu merupakan sejenis garam. Nyatakan maksud garam dan namakan bahan X.

Substance X that is added into the mixture is a type of salt. State the meaning of salt and name the substance X.

[2 markah / marks]

- (b) Rajah 9.2 menunjukkan satu tindak balas pemanasan bagi pepejal Y.

Diagram 9.2 shows a heating reaction of solid Y.



Rajah / Diagram 9.2

- (i) Nyatakan Y dan Z.  
State Y and Z.

[2 markah / marks]

- (ii) Tuliskan persamaan kimia seimbang bagi tindak balas pemanasan pepejal hijau Y. Hitung isi padu gas karbon dioksida yang dihasilkan pada suhu bilik jika 74.4 g pepejal hijau Y dipanaskan.

[Jisim molar pepejal hijau Y =  $124 \text{ g mol}^{-1}$ ; 1 mol gas menempati  $24 \text{ dm}^3$  pada keadaan bilik]

Write a balanced chemical equation for the heating reaction of green solid Y. Calculate the volume of carbon dioxide gas released at room temperature if 74.4 g of green solid Y is heated.

[Molar mass of green solid Y =  $124 \text{ g mol}^{-1}$ ; 1 mole of gas occupies  $24 \text{ dm}^3$  at room conditions]

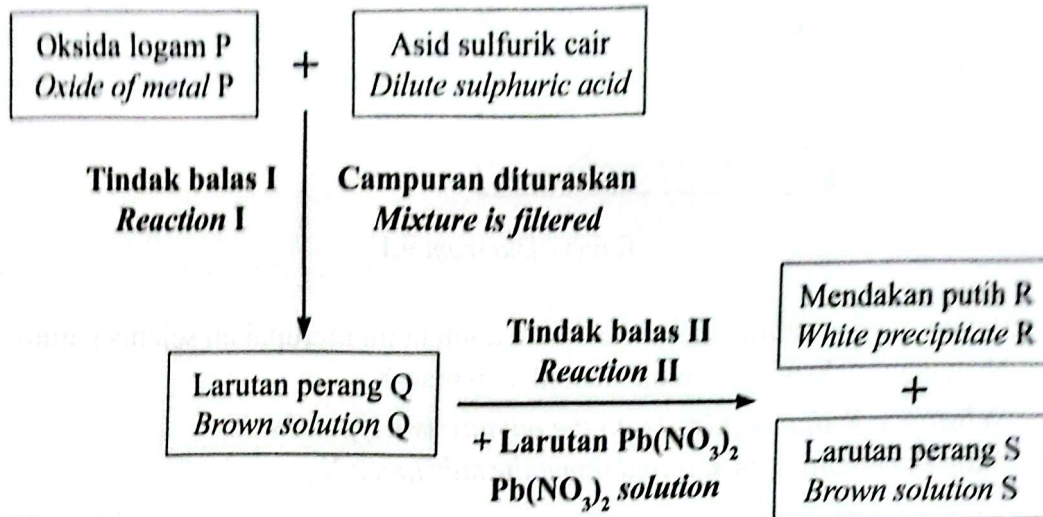
[5 markah / marks]

- (iii) Apabila pepejal Z ditambahkan ke dalam asid hidroklorik, satu larutan terbentuk. Namakan larutan yang terhasil dan nyatakan warna larutan itu.

*When solid Z added into hydrochloric acid, a solution is formed. Name the solution formed and state the colour of the solution.*

[2 markah / marks]

- (e) Rajah 9.3 menunjukkan aliran tindak balas yang berlaku ke atas oksida logam P.  
Diagram 9.3 shows a flow of reactions that occur on oxide of metal P.



Rajah / Diagram 9.3

Berdasarkan Rajah 9.3,  
Based on Diagram 9.3,

- (i) Kenal pasti oksida logam P, mendakan putih R dan larutan perang S.  
*Identify oxide of metal P, white precipitate R and brown solution S.*

[3 markah / marks]

- (ii) Huraikan ujian kimia untuk mengesahkan kehadiran anion dan kation dalam larutan perang Q.  
*Describe a chemical test to verify the presence anion and cation in brown solution Q.*

[6 markah / marks]

**Bahagian C**

[20 markah]

*Jawab semua soalan.*

- 11 (a) Jadual 3 menunjukkan persamaan termokimia bagi dua set eksperimen.  
*Table 3 shows thermochemical equations for two sets of experiment.*

| Set | Persamaan termokimia<br><i>Thermochemical equation</i>                                                                                                 |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| I   | $\text{Zn (p/s)} + 2\text{HCl (ak/aq)} \rightarrow \text{ZnCl}_2 \text{ (ak/aq)} + \text{H}_2 \text{ (g/g)} \quad \Delta H = -126 \text{ kJ mol}^{-1}$ |
| II  | $\text{CaCO}_3 \text{ (p/s)} \rightarrow \text{CaO (p/s)} + \text{CO}_2 \text{ (g/g)} \quad \Delta H = +178 \text{ kJ mol}^{-1}$                       |

Jadual / Table 3

Berdasarkan Jadual 3,

*Based on Table 3,*

- (i) Tentukan jenis tindak balas bagi Set I dan Set II.  
*Determine the type of reaction for Set I and Set II.*

[2 markah / marks]

- (ii) Lukiskan gambar rajah aras tenaga bagi Set I dan Set II.  
*Draw energy level diagram for Set I and Set II.*

Bandingkan dari segi:

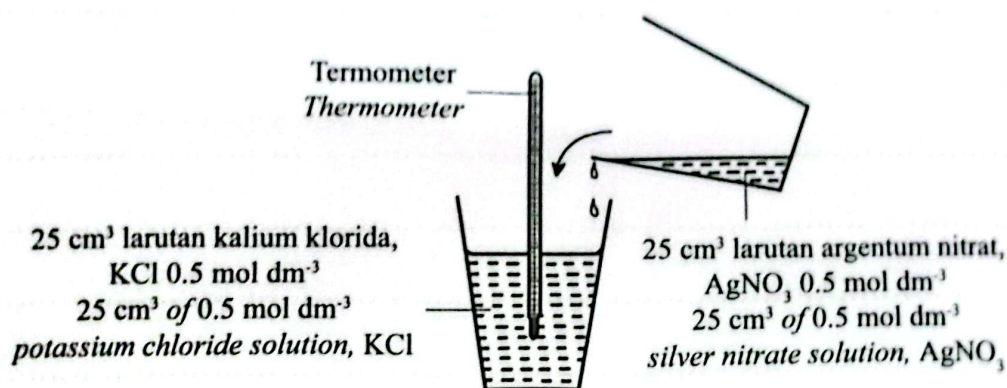
*Compare in terms of:*

- perubahan haba  
*heat change*
- perubahan jumlah kandungan tenaga bahan tindak balas dan hasil tindak balas  
*change in total energy content of reactants and products*
- perubahan tenaga semasa pembentukan dan pemecahan ikatan  
*energy change during formation and breaking of bond*

[5 markah / marks]

- (b) Rajah 10 menunjukkan satu eksperimen untuk menentukan haba pemendakan argentum klorida, AgCl.

*Diagram 10 shows an experiment to determine the heat of precipitation of silver chloride, AgCl.*



Rajah / Diagram 10

Dalam eksperimen ini, suhu meningkat sebanyak 3.0°C.

Hitung haba pemendakan bagi eksperimen ini. Tulis persamaan ion bagi tindak balas yang berlaku. Nyatakan **satu** langkah berjaga-jaga dalam eksperimen ini.

*In this experiment, temperature increased by 3.0°C.*

*Calculate the heat of precipitation for this experiment. Write the ionic equation for the reaction that occurred. State **one** precaution step in this experiment.*

[5 markah / marks]

- (c) Maklumat berikut adalah tentang penggunaan pek sejuk dalam kehidupan seharian.

*The following information is about the use of cold packs in daily life.*

Pek sejuk digunakan dalam pertolongan cemas untuk mengurangkan bengkak atau kesakitan akibat kecederaan. Pek sejuk boleh dihasilkan dengan mengaplikasikan tindak balas antara serbuk penaik dengan asid lemah.

*Cold packs are used in first aid to reduce swelling or pain from injuries. Cold packs can be produced by applying a reaction between baking soda and a weak acid.*

Berdasarkan pernyataan tersebut, cadangkan **satu** bahan di rumah yang boleh digunakan untuk bertindak balas dengan serbuk penaik. Huraikan kaedah untuk menghasilkan pek sejuk menggunakan kedua-dua bahan tersebut untuk mengurangkan bengkak pada lutut. Nyatakan **dua** kelebihan pek sejuk yang dihasilkan.

*Based on the statement, suggest **one** household substance that can be used to react with baking soda. Describe a method to produce the cold pack using both substances to reduce swelling at the knee. State **two** advantages of the cold pack produced.*

[8 markah / marks]

### SOALAN MODUL TAMAT END OF MODULE QUESTION