

# PENTAKSIRAN AKHIR TAHUN

**KERTAS 1**

**Skor**

**/140**

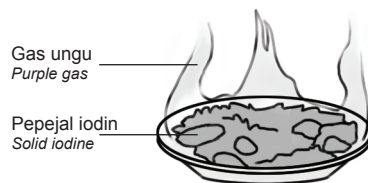
1 jam 15 minit  
1 hour 15 minutes

[40 markah / 40 marks]

**Soalan 1** sehingga **Soalan 40** mempunyai empat pilihan jawapan **A, B, C** dan **D**. Pilih **jawapan yang terbaik** bagi setiap soalan.

**Question 1 to Question 40** are followed by four options **A, B, C** and **D**. Choose **the best option** for each question.

1. Rajah 1 menunjukkan pemanasan pepejal iodine.  
Diagram 1 shows the heating of solid iodine.



Rajah 1 / Diagram 1

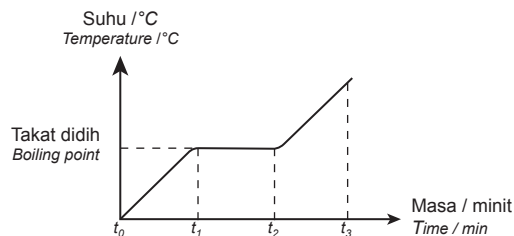
Apakah proses dan perubahan tenaga haba yang terlibat?

What is the process and the heat change involved?

|          | Proses<br>Process           | Perubahan tenaga haba<br>Heat energy change    |
|----------|-----------------------------|------------------------------------------------|
| <b>A</b> | Pemejalwapan<br>Sublimation | Tenaga haba diserap<br>Heat energy absorbed    |
| <b>B</b> | Pemejalwapan<br>Sublimation | Tenaga haba dibebaskan<br>Heat energy released |
| <b>C</b> | Penyejatan<br>Evaporation   | Tenaga haba diserap<br>Heat energy absorbed    |
| <b>D</b> | Penyejatan<br>Evaporation   | Tenaga haba dibebaskan<br>Heat energy released |

2. Rajah 2 menunjukkan graf lengkung pemanasan sebatian X.

Diagram 2 shows the graph of the heating curve of compound X.



Rajah 2 / Diagram 2

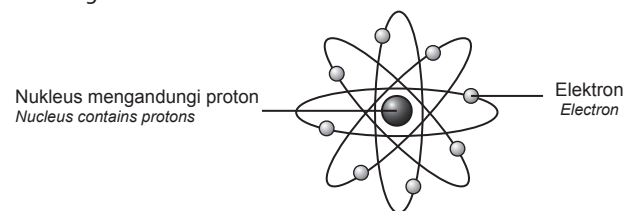
Apakah keadaan jirim dan susunan zarah pada masa  $t_1 - t_2$ ?

What is the state of matter and particle arrangement at time  $t_1 - t_2$ ?

|          | Keadaan jirim<br>State of matter | Susunan zarah<br>Particle arrangements                                                                                    |
|----------|----------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| <b>A</b> | Cecair<br>Liquid                 | Zarah disusun secara padat tetapi tidak teratur<br>Particles are closely packed but not in orderly manner                 |
| <b>B</b> | Cecair dan gas<br>Liquid and gas | Zarah tidak disusun secara padat dan tidak teratur<br>Particles are not closely packed and not in orderly manner          |
| <b>C</b> | Cecair dan gas<br>Liquid and gas | Sebahagian zarah disusun rapat dan sebahagian zarah berjauhan<br>Some particles are closely packed and some are far apart |
| <b>D</b> | Gas<br>Gas                       | Zarah berjauhan dan tidak teratur<br>Particles are far apart and not in orderly manner                                    |

3. Rajah 3 menunjukkan satu model atom.

Diagram 3 shows an atomic model.



Rajah 3 / Diagram 3

Antara saintis berikut, yang manakah menemui model ini?

Which of the following scientist discovered this model?

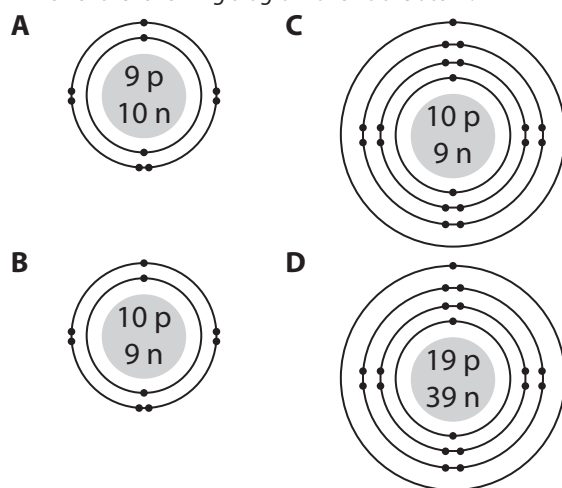
- A John Dalton
- B Ernest Rutherford
- C Niels Bohr
- D James Chadwick

4. Maklumat berikut adalah tentang suatu atom.  
The following information is about an atom.

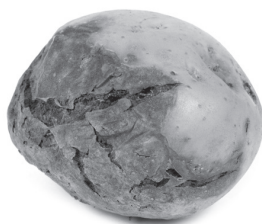
- Bilangan neutron ialah 10  
The number of neutrons is 10
- Nombor nukleon ialah 19  
The nucleon number is 19

Antara rajah berikut, yang manakah menunjukkan atom itu?

Which of the following diagram shows the atom?



5. Rajah 4 menunjukkan kentang yang mereput.  
Diagram 4 shows a rotting potato.



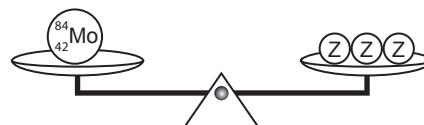
Rajah 4 / Diagram 4

Seorang ahli teknologi makanan berhasrat untuk memusnahkan bakteria yang menyebabkan kentang reput menggunakan radioisotop. Antara berikut, yang manakah sesuai untuk digunakan?

A food technologist intends to destroy bacteria that cause potatoes to rot using a radioisotope. Which of the following is suitable to be used?

- A Fosforus-32 / Phosphorus-32
- B Karbon-14 / Carbon-14
- C Kobalt-60 / Cobalt-60
- D Natrium-24 / Sodium-24

6. Rajah 5 menunjukkan perbandingan jisim atom relatif antara atom molibdenum dan atom Z.  
Diagram 5 shows the comparison of relative atomic mass between molybdenum atom and atom Z.



Rajah 5 / Diagram 5

Apakah perwakilan piawai Z?

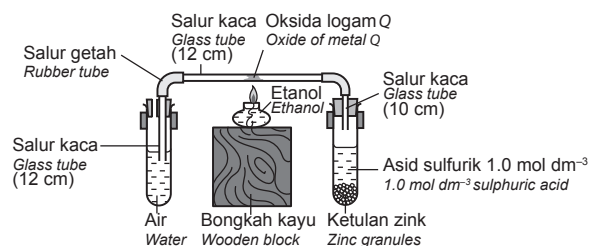
What is the standard representation of Z?

- A  $^{21}_{42}\text{Z}$
- B  $^{42}_{21}\text{Z}$
- C  $^{14}_{28}\text{Z}$
- D  $^{28}_{14}\text{Z}$

7. Antara berikut, yang manakah mempunyai bilangan atom yang sama dengan 1 mol sulfur trioksida,  $\text{SO}_3$ ?  
Which of the following has the same number of atoms as 1 mole of sulphur trioxide,  $\text{SO}_3$ ?

- A 2 mol hidrogen klorida, HCl  
2 moles of hydrogen chloride, HCl
- B 2 mol nitrogen dioksida,  $\text{NO}_2$   
2 moles of nitrogen dioxide,  $\text{NO}_2$
- C 2 mol ammonia,  $\text{NH}_3$   
2 moles of ammonia,  $\text{NH}_3$
- D 2 mol air,  $\text{H}_2\text{O}$   
2 moles of water,  $\text{H}_2\text{O}$

8. Rajah 6 menunjukkan susunan radas untuk menentukan formula empirik oksida logam Q.  
Diagram 6 shows the apparatus setup to determine the empirical formula of the oxide of metal Q.



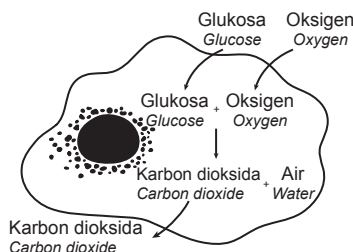
Rajah 6 / Diagram 6

Apakah logam Q?

What is metal Q?

- A Aluminium / Aluminium
- B Kuprum / Copper
- C Magnesium / Magnesium
- D Zink / Zinc

9. Rajah 7 menunjukkan respirasi aerobik di dalam sel badan kita untuk menghasilkan tenaga daripada glukosa,  $C_6H_{12}O_6$ .  
Diagram 7 shows the aerobic respiration in our body cell to produce energy from glucose,  $C_6H_{12}O_6$ .



Rajah 7 / Diagram 7

Antara berikut, yang manakah persamaan kimia untuk proses respirasi aerobik?

Which of the following is the chemical equation for the process of aerobic respiration?

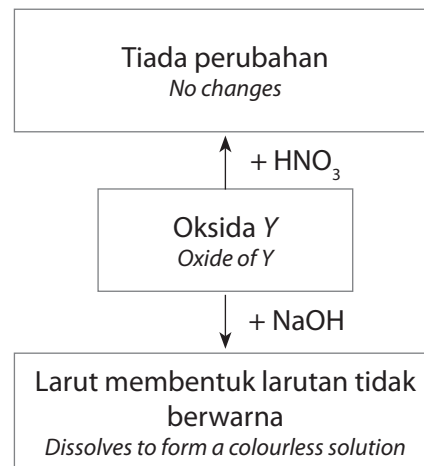
- A  $C_6H_{12}O_6 + O_2 \rightarrow CO_2 + H_2O$
- B  $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$
- C  $CO_2 + H_2O \rightarrow O_2 + C_6H_{12}O_6$
- D  $6CO_2 + H_2O \rightarrow 6O_2 + C_6H_{12}O_6$

10. Antara pasangan berikut, yang manakah dipadankan dengan betul?

Which of the following pairs is correctly matched?

|   | Unsur<br>Element | Kegunaan<br>Uses                                                                |
|---|------------------|---------------------------------------------------------------------------------|
| A | Argon<br>Argon   | Digunakan dalam lampu denyar kilat pada kamera<br>Used in flashlight of cameras |
| B | Neon<br>Neon     | Digunakan untuk merawat kanser<br>Used to treat cancer                          |
| C | Radon<br>Radon   | Digunakan di dalam lampu papan iklan<br>Used in advertising board lights        |
| D | Xenon<br>Xenon   | Digunakan di dalam lampu rumah api<br>Used in lighthouse lamps                  |

11. Rajah 8 menunjukkan tindak balas oksida suatu unsur dalam Kala 3 dalam Jadual Berkala Unsur.  
Diagram 8 shows the reactions of oxide of an element of Period 3 in the Periodic Table of Elements.



Rajah 8 / Diagram 8

Apakah oksida Y?

What is oxide of Y?

- A Aluminium oksida  
Aluminium oxide
- B Magnesium oksida  
Magnesium oxide
- C Silikon dioksida  
Silicon dioxide
- D Natrium oksida  
Sodium oxide

12. Jadual 1 menunjukkan nombor proton bagi unsur W, X, Y dan Z.

Table 1 shows the proton numbers of elements W, X, Y and Z.

| Unsur<br>Element               | W | X | Y  | Z  |
|--------------------------------|---|---|----|----|
| Nombor proton<br>Proton number | 3 | 8 | 13 | 17 |

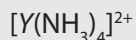
Jadual 1 / Table 1

Antara berikut, yang manakah menunjukkan susunan saiz atom yang semakin bertambah?

Which of the following shows the increasing order of atomic size?

- A Z, Y, X, W
- B X, W, Z, Y
- C W, X, Y, Z
- D Y, Z, W, X

13. Rajah 9 menunjukkan formula ion bagi unsur Y.  
Diagram 9 shows the ionic formula of element Y.



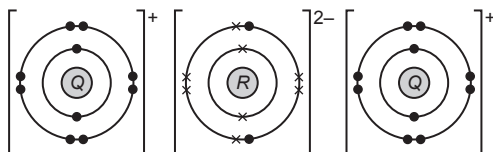
Rajah 9 / Diagram 9

Antara logam berikut, yang manakah unsur Y?  
Which of the following metals is element Y?

- A** Aluminium / Aluminium  
**B** Kalsium / Calcium  
**C** Kuprum / Copper  
**D** Zink / Zinc

14. Rajah 10 menunjukkan susunan elektron bagi sebatian W.  
Diagram 10 shows the electron arrangement of compound W.

Diagram 10 shows the electron arrangement of compound W.



Rajah 10 / Diagram 10

Antara pernyataan berikut, yang manakah betul?  
Which of the following statements is correct?

- A** Atom R menderma dua elektron untuk mencapai susunan elektron oktet  
Atom R donates two electrons to achieve an octet electron arrangement  
**B** Susunan elektron atom Q ialah 2.8.1  
The electron arrangement of atom Q is 2.8.1  
**C** Sebatian W larut di dalam pelarut organik  
Compound W dissolves in organic solvents  
**D** Ion  $Q^+$  dan  $R^{2-}$  tertarik untuk membentuk  $RQ_2$   
 $Q^+$  ion and  $R^{2-}$  ion are attracted to form  $RQ_2$

15. Jadual 2 menunjukkan maklumat tentang unsur P dan unsur Q.  
Table 2 shows the information about element P and element Q.

Table 2 shows the information about element P and element Q.

| P                                                                                                                                                                                                      | Q                                                                                                                                                                                                      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>Mempunyai 4 elektron valens<br/>Contains 4 valence electrons</li> <li>Mempunyai 3 petala berisi elektron<br/>Contains 3 shells filled with electrons</li> </ul> | <ul style="list-style-type: none"> <li>Mempunyai 6 elektron valens<br/>Contains 6 valence electrons</li> <li>Mempunyai 2 petala berisi elektron<br/>Contains 2 shells filled with electrons</li> </ul> |

Jadual 2 / Table 2

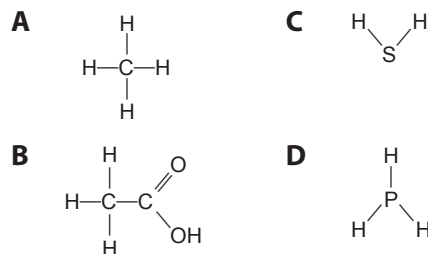
Apakah formula kimia dan jenis ikatan dalam sebatian yang terbentuk daripada tindak balas antara atom P dengan atom Q?

What is the chemical formula and the type of bond in the compound formed from the reaction between atom P and atom Q?

|          | Formula kimia<br>Chemical formula | Jenis ikatan<br>Type of bond |
|----------|-----------------------------------|------------------------------|
| <b>A</b> | $PQ_2$                            | Kovalen<br>Covalent          |
| <b>B</b> | $P_2Q$                            | Kovalen<br>Covalent          |
| <b>C</b> | $PQ_2$                            | Ion<br>Ionic                 |
| <b>D</b> | $P_2Q$                            | Ion<br>Ionic                 |

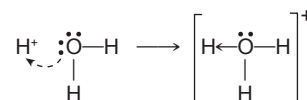
16. Antara molekul berikut, yang manakah mengandungi ikatan hidrogen?  
Which of the following molecules contains hydrogen bond?

Which of the following molecules contains hydrogen bond?



17. Rajah 11 menunjukkan pembentukan sejenis ikatan dalam suatu sebatian.  
Diagram 11 shows the formation of a type of bond in a compound.

Diagram 11 shows the formation of a type of bond in a compound.



Rajah 11 / Diagram 11

Apakah jenis ikatan yang ditunjukkan dalam rajah di atas?

What type of bond is shown in the diagram above?

- A** Ikatan datif  
Dative bond  
**B** Ikatan ion  
Ionic bond  
**C** Ikatan logam  
Metallic bond  
**D** Ikatan kovalen  
Covalent bond



18. Rajah 12 menunjukkan perbualan antara Adam dengan Jolin.

Diagram 12 shows a conversation between Adam and Jolin.



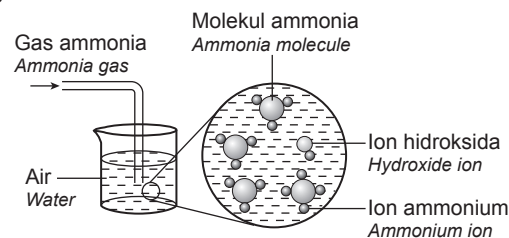
Rajah 12 / Diagram 12

Antara pernyataan berikut, yang manakah betul?  
Which of the following explanations are correct?

|          | <b>Zink</b><br><b>Zinc</b>                                                                                                           | <b>Zink klorida</b><br><b>Zinc chloride</b>                                                    |
|----------|--------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|
| <b>A</b> | Terdiri daripada ion<br><i>Consists of ions</i>                                                                                      | Terdiri daripada molekul<br><i>Consists of molecules</i>                                       |
| <b>B</b> | Mempunyai ikatan kovalen yang kuat<br><i>Has a strong covalent bond</i>                                                              | Mempunyai ikatan ion yang kuat<br><i>Has a strong ionic bond</i>                               |
| <b>C</b> | Atom-atom ditarik oleh daya tarikan elektrostatik yang kuat<br><i>Atoms are attracted by a strong electrostatic attraction force</i> | Ion-ion ditarik oleh ikatan logam yang kuat<br><i>Ions are held by a strong metallic bonds</i> |
| <b>D</b> | Elektron bergerak bebas dalam keadaan leburan<br><i>Electrons move freely in molten state</i>                                        | Ion-ion bergerak bebas dalam keadaan leburan<br><i>Ions move freely in molten state</i>        |

19. Rajah 13 menunjukkan pengionan ammonia dalam air.

Diagram 13 shows the ionisation of ammonia in water.



Rajah 13 / Diagram 13

Antara pernyataan berikut, manakah yang betul?  
Which of the following statements is correct?

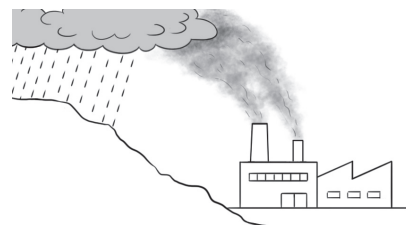
- A** Darjah penceraian di dalam air tinggi  
*High degree of ionisation in water*
- B** Kepekatan ion hidroksida yang rendah  
*Low concentration of hydroxide ions*
- C** Mempunyai nilai pH kurang daripada 7  
*Has a pH value less than 7*
- D** Penunjuk semesta menunjukkan warna merah  
*Universal indicator appears red*

20. Asid dengan kebesan asid yang manakah dipadankan dengan betul?  
Which acid is correctly matched to its basicity of acid?

|          | <b>Asid</b><br><b>Acid</b>                   | <b>Kebesasan asid</b><br><b>Basicity of acid</b> |
|----------|----------------------------------------------|--------------------------------------------------|
| <b>A</b> | Asid hidroklorik<br><i>Hydrochloric acid</i> | Asid monoprotik<br><i>Monoprotic acid</i>        |
| <b>B</b> | Asid nitrik<br><i>Nitric acid</i>            | Asid diprotik<br><i>Diprotic acid</i>            |
| <b>C</b> | Asid sulfurik<br><i>Sulphuric acid</i>       | Asid monoprotik<br><i>Monoprotic acid</i>        |
| <b>D</b> | Asid etanoik<br><i>Ethanoic acid</i>         | Asid diprotik<br><i>Diprotic acid</i>            |

21. Rajah 14 menunjukkan keadaan di bukit batu kapur.

Diagram 14 shows a situation at the limestone hill.



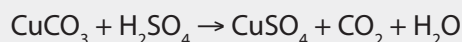
Rajah 14 / Diagram 14

Antara situasi berikut, yang manakah serupa dengan Rajah 14?

*Which of the following situations is similar to Diagram 14?*

- A** Pembentukan karies gigi  
*Formation of dental caries*
- B** Menghilangkan karat daripada pintu besi  
*Removing rust from an iron gate*
- C** Melarutkan garam biasa di dalam air  
*Dissolving common salt in water*
- D** Meletakkan kulit telur di dalam bikar yang mengandungi cuka  
*Placing an egg shell in a beaker containing vinegar*

- 22.** Persamaan berikut menunjukkan tindak balas antara kuprum(II) karbonat dengan asid sulfurik.  
*The following equation shows a reaction between copper(II) carbonate and sulphuric acid.*

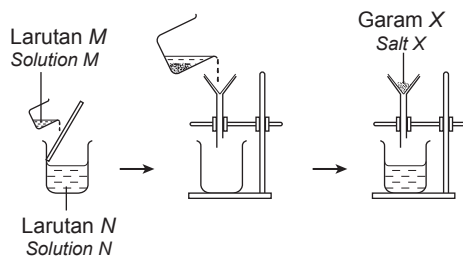


Apakah nama dan keterlarutan garam yang dihasilkan jika asid sulfurik digantikan dengan asid hidroklorik?

*What is the name and the solubility of salt produced if sulphuric acid is replaced by hydrochloric acid?*

|          | Nama garam<br><i>Name of salt</i>                | Keterlarutan<br><i>Solubility</i> |
|----------|--------------------------------------------------|-----------------------------------|
| <b>A</b> | Kuprum klorida<br><i>Copper chloride</i>         | Larut<br><i>Soluble</i>           |
| <b>B</b> | Kuprum klorida<br><i>Copper chloride</i>         | Tidak larut<br><i>Insoluble</i>   |
| <b>C</b> | Kuprum(II) klorida<br><i>Copper(II) chloride</i> | Larut<br><i>Soluble</i>           |
| <b>D</b> | Kuprum(II) klorida<br><i>Copper(II) chloride</i> | Tidak larut<br><i>Insoluble</i>   |

- 23.** Rajah 15 menunjukkan penyediaan garam X.  
*Diagram 15 shows the preparation of salt X.*



Rajah 15 / Diagram 15

Persamaan kimia manakah yang mewakili penyediaan garam dalam Rajah 15?

*Which chemical equation represents the preparation of salt in Diagram 15?*

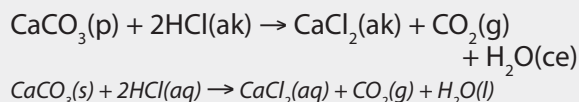
- A**  $\text{KOH} + \text{HCl} \rightarrow \text{KCl} + \text{H}_2\text{O}$
- B**  $\text{Na}_2\text{CO}_3 + \text{ZnCl}_2 \rightarrow \text{ZnCO}_3 + 2\text{NaCl}$
- C**  $2\text{CH}_3\text{COOH} + \text{ZnO} \rightarrow (\text{CH}_3\text{COO})_2\text{Zn} + \text{H}_2\text{O}$
- D**  $\text{Na}_2\text{SO}_4 + \text{MgCl}_2 \rightarrow \text{MgSO}_4 + 2\text{NaCl}$

- 24.** Asid sulfurik cair adalah salah satu bahan yang diperlukan bagi ujian pengesahan ion nitrat di dalam suatu larutan garam. Apakah bahan-bahan lain yang diperlukan untuk ujian tersebut?

*Sulphuric acid is one of the substances needed in the confirmatory test for nitrate ion in a salt solution. What are other substances required for the test?*

- I** Asid sulfurik pekat  
*Concentrated sulphuric acid*
- II** Larutan ferum(II) sulfat  
*Iron(II) sulphate solution*
- III** Asid hidroklorik pekat  
*Concentrated hydrochloric acid*
- IV** Larutan barium klorida  
*Barium chloride solution*
- A** I dan II / *I and II*
- B** I dan IV / *I and IV*
- C** II dan III / *II and III*
- D** III dan IV / *III and IV*

- 25.** Persamaan kimia berikut mewakili tindak balas antara kalsium karbonat dengan asid hidroklorik.  
*The following chemical equation represents the reaction between calcium carbonate and hydrochloric acid.*



Bagaimanakah kadar penghasilan gas karbon dioksida boleh ditingkatkan?

*How can the rate of production of carbon dioxide gas be increased?*

- A** Meningkatkan saiz kalsium karbonat  
*Increase the size of calcium carbonate*
- B** Meningkatkan suhu asid hidroklorik  
*Increase the temperature of hydrochloric acid*
- C** Mengurangkan isi padu asid hidroklorik  
*Reduce the volume of hydrochloric acid*
- D** Mengurangkan kepekatan asid hidroklorik  
*Reduce the concentration of hydrochloric acid*





26. Apakah mendakan kuning yang terbentuk apabila larutan natrium tiosulfat bertindak balas dengan asid hidroklorik?

*What is the yellow precipitate formed when sodium thiosulphate solution reacts with hydrochloric acid?*

- A Air  
Water
- B Natrium klorida  
Sodium chloride
- C Sulfur  
Sulphur
- D Sulfur dioksida  
Sulphur dioxide

27. Antara tindak balas berikut, yang manakah boleh dipengaruhi oleh perubahan tekanan?

*Which of the following reaction can be affected by the change of pressure?*

- A  $Mg(p) + 2HCl(ak) \rightarrow MgCl_2(ak) + H_2(g)$   
 $Mg(s) + 2HCl(aq) \rightarrow MgCl_2(aq) + H_2(g)$
- B  $2SO_2(g) + O_2(g) \rightarrow 2SO_3(g)$   
 $2SO_2(g) + O_2(g) \rightarrow 2SO_3(g)$
- C  $2H_2O_2(ak) \rightarrow 2H_2O(ce) + O_2(g)$   
 $2H_2O_2(aq) \rightarrow 2H_2O(l) + O_2(g)$
- D  $CaCO_3(p) + 2HCl(ak) \rightarrow CaCl_2(ak) + H_2O(ce) + CO_2(g)$   
 $CaCO_3(s) + 2HCl(aq) \rightarrow CaCl_2(aq) + H_2O(l) + CO_2(g)$

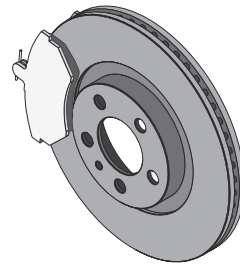
28. Kaca dengan sifat manakah yang dipadankan dengan betul?

*Which glass is correctly matched to its property?*

|   | Kaca<br>Glass                                        | Sifat<br>Property                                                                         |
|---|------------------------------------------------------|-------------------------------------------------------------------------------------------|
| A | Kaca silika<br>terlakur<br><i>Fused silica glass</i> | Mempunyai takat lebur<br>sangat tinggi<br><i>Has a high melting point</i>                 |
| B | Kaca borosilikat<br><i>Borosilicate glass</i>        | Tidak tahan haba<br><i>Not resistant to heat</i>                                          |
| C | Kaca plumbum<br><i>Lead crystal glass</i>            | Mempunyai pekali<br>pengembangan yang<br>rendah<br><i>Has a low expansion coefficient</i> |
| D | Kaca soda kapur<br><i>Soda-lime glass</i>            | Mempunyai indeks<br>biasan yang tinggi<br><i>Has a high refractive index</i>              |

29. Rajah 16 ialah kegunaan bahan T.

*Diagram 16 is the use of substance T.*



Rajah 16 / Diagram 16

Apakah ciri-ciri yang ada pada bahan T yang menjadikannya sesuai digunakan sebagai peralatan dalam Rajah 16?

*What is the properties of substance T that makes it suitable to be used as the equipment in Diagram 16?*

- A Mudah dibentuk  
*Malleable*
- B Tahan kejutan terma  
*Can withstand thermal shocks*
- C Tahan kepada lelasan  
*Resistant to abrasion*
- D Kekonduksian elektrik yang rendah  
*Low electrical conductivity*

30. Berikut ialah ciri-ciri bahan komposit X.

*The following are the characteristics of composite material X.*

- Memindahkan maklumat dengan kelajuan tinggi  
*Transfer information with high speed*
- Penghantaran data, suara dan imej dalam format digital  
*Transmission of data, voices and images in a digital format*

Apakah bahan komposit X?

*What is composite material X?*

- A Gentian optik  
*Optical fibre*
- B Kaca fotokromik  
*Photochromic glass*
- C Kaca gentian  
*Fibre glass*
- D Superkonduktor  
*Superconductor*

31. Rajah 17 menunjukkan sebungkus baja ammonium sulfat.

Diagram 17 shows a pack of ammonium sulphate fertiliser.



Rajah 17 / Diagram 17

Berapakah jumlah peratusan nitrogen dan sulfur di dalam baja itu?

[Jisim atom relatif: N = 14, H = 1, S = 32, O = 16]

What is the total percentage of nitrogen and sulphur in the fertiliser?

[Relative atomic mass: N = 14, H = 1, S = 32, O = 16]

- A 14.24%  
B 21.21%  
C 45.45%  
D 46.15%

32. Berapakah bilangan ion klorida yang terdapat di dalam 20.8 g barium klorida?

[Jisim atom relatif: Cl = 35.5, Ba = 137; Pemalar Avogadro =  $6.02 \times 10^{23} \text{ mol}^{-1}$ ]

What is the number of chloride ions in 20.8 g of barium chloride?

[Relative atomic mass: Cl = 35.5, Ba = 137; Avogadro constant =  $6.02 \times 10^{23} \text{ mol}^{-1}$ ]

- A  $6.020 \times 10^{23}$       C  $1.806 \times 10^{23}$   
B  $1.204 \times 10^{23}$       D  $2.408 \times 10^{23}$

33. Unsur X terdiri daripada isotop X-203 dan X-205. Jisim atom relatif X ialah 204.4. Berapakah peratusan X-205 di dalam campuran isotop?

Element X consists of isotopes X-203 and X-205. The relative atomic mass of X is 204.4. What is the percentage of X-205 in the isotopic mixture?

- A 3.0%      C 30.0%  
B 7.0%      D 70.0%

34. Kafein ialah komponen utama di dalam kopi. Rajah 18 menunjukkan peratusan berdasarkan jisim unsur-unsur di dalam kafein.

Caffeine is a major component in coffee. Diagram 18 shows the percentage by mass of elements in the caffeine.



| Unsur<br>Element | Peratusan (%)<br>Percentage (%) |
|------------------|---------------------------------|
| C                | 49.48                           |
| H                | 5.15                            |
| N                | 28.87                           |
| O                | 16.49                           |

Rajah 18 / Diagram 18

Apakah formula empirik bagi kafein?

[Jisim atom relatif: H = 1, C = 12, N = 14, O = 16]

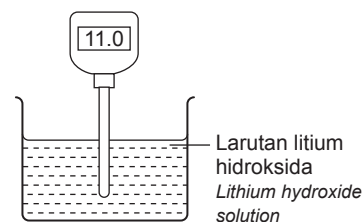
What is the empirical formula of caffeine?

[Relative atomic mass: H = 1, C = 12, N = 14, O = 16]

- A CHNO      C  $\text{C}_4\text{H}_5\text{N}_2\text{O}_2$   
B  $\text{C}_4\text{H}_5\text{N}_2\text{O}$       D  $\text{C}_8\text{H}_{10}\text{N}_4\text{O}_2$

35. Rajah 19 menunjukkan nilai pH bagi larutan litium hidroksida.

Diagram 19 shows the pH value of lithium hydroxide solution.



Rajah 19 / Diagram 19

Berapakah kemolaran larutan litium hidroksida?

What is the molarity of the lithium hydroxide solution?

- A  $1.0 \text{ mol dm}^{-3}$       C  $0.01 \text{ mol dm}^{-3}$   
B  $0.1 \text{ mol dm}^{-3}$       D  $0.001 \text{ mol dm}^{-3}$

36. Dalam suatu pentitratan,  $25.00 \text{ cm}^3$  XOH  $4.20 \text{ g dm}^{-3}$  memerlukan  $15.60 \text{ cm}^3$  asid hidroklorik  $0.12 \text{ mol dm}^{-3}$  untuk bertindak balas lengkap. Apakah logam X dengan jisim atom relatifnya?

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

In a titration,  $25.00 \text{ cm}^3$  of  $4.20 \text{ g dm}^{-3}$  XOH requires  $15.60 \text{ cm}^3$  of  $0.12 \text{ mol dm}^{-3}$  hydrochloric acid to react completely. What is metal X and its relative atomic mass?

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

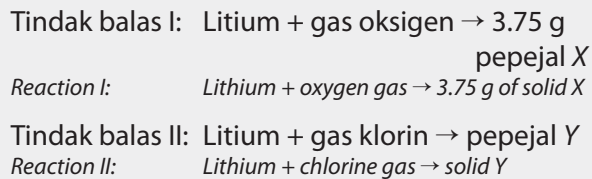
| Logam X<br>Metal X    | Jisim atom relatif<br>Relative atomic mass |
|-----------------------|--------------------------------------------|
| A Litium / Lithium    | 7                                          |
| B Natrium / Sodium    | 23                                         |
| C Kalium / Potassium  | 39                                         |
| D Rubidium / Rubidium | 86                                         |





37. Maklumat berikut adalah mengenai dua tindak balas yang melibatkan litium.

The following information is about two reactions that involve lithium.



Berapakah jisim pepejal Y yang terbentuk jika jisim litium yang sama digunakan dalam kedua-dua tindak balas?

[Jisim atom relatif: Li = 7, O = 16, Cl = 35.5]

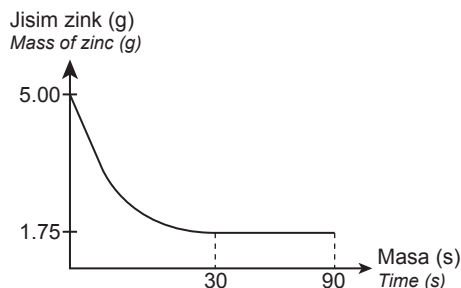
What is the mass of solid Y formed if the same mass of lithium is used in both reactions?

[Relative atomic mass: Li = 7, O = 16, Cl = 35.5]

- A 5.312 g  
 B 10.625 g  
 C 21.250 g  
 D 42.500 g

38. Rajah 20 menunjukkan graf jisim zink melawan masa bagi tindak balas antara asid hidroklorik dengan serbuk zink.

Diagram 20 shows the graph of mass of zinc against time for the reaction between hydrochloric acid and zinc powder.



Rajah 20 / Diagram 20

Berapakah kadar tindak balas purata bagi tindak balas ini?

What is the average rate of reaction?

- A  $0.035 \text{ g s}^{-1}$   
 B  $0.058 \text{ g s}^{-1}$   
 C  $0.167 \text{ g s}^{-1}$   
 D  $0.108 \text{ g s}^{-1}$

39. Jadual 3 menunjukkan kekonduksian elektrik bagi bahan X, Y dan Z.

Table 3 shows the electrical conductivity of substance X, Y and Z.

| Bahan<br>Substance | Keadaan mentol<br>Condition of bulb            |                                                |
|--------------------|------------------------------------------------|------------------------------------------------|
|                    | Keadaan pepejal<br>Solid state                 | Keadaan leburan<br>Molten state                |
| X                  | Mentol menyala<br>Bulb lights up               | Mentol menyala<br>Bulb lights up               |
| Y                  | Mentol tidak menyala<br>Bulb does not light up | Mentol tidak menyala<br>Bulb does not light up |
| Z                  | Mentol tidak menyala<br>Bulb does not light up | Mentol menyala<br>Bulb lights up               |

Jadual 3 / Table 3

Apakah bahan X, Y dan Z?

What are substances X, Y and Z?

|   | X                                       | Y                                       | X                                       |
|---|-----------------------------------------|-----------------------------------------|-----------------------------------------|
| A | Plumbum(II) bromida<br>Lead(II) bromide | Stanum<br>Tin                           | Naftalena<br>Naphthalene                |
| B | Plumbum(II) bromida<br>Lead(II) bromide | Plumbum(II) bromida<br>Lead(II) bromide | Stanum<br>Tin                           |
| C | Stanum<br>Tin                           | Plumbum(II) bromida<br>Lead(II) bromide | Naftalena<br>Naphthalene                |
| D | Stanum<br>Tin                           | Naftalena<br>Naphthalene                | Plumbum(II) bromida<br>Lead(II) bromide |

**40.** Jadual 4 menunjukkan pemerhatian ke atas tiga ujian kimia bagi larutan T.

*Table 4 shows the observations on three chemical tests for solution T.*

| Set Set | Ujian Test                                                                                                    | Pemerhatian Observation                                                                                                                                                         |
|---------|---------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| I       | Tambahkan larutan natrium hidroksida sehingga berlebihan<br><i>Add sodium hydroxide solution until excess</i> | Mendakan putih terbentuk dan tidak larut di dalam larutan natrium hidroksida berlebihan<br><i>White precipitate is formed and insoluble in excess sodium hydroxide solution</i> |
| II      | Tambahkan larutan ammonia sehingga berlebihan<br><i>Add ammonia solution until excess</i>                     | Tiada perubahan<br><i>No changes</i>                                                                                                                                            |

| Set Set | Ujian Test                                                                                              | Pemerhatian Observation                                        |
|---------|---------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|
| III     | Tambahkan asid nitrik dan larutan argentum nitrat<br><i>Add nitric acid and silver nitrate solution</i> | Mendakan putih terbentuk<br><i>White precipitate is formed</i> |

Jadual 4 / Table 4

Apakah larutan T?

*What is solution T?*

- A** Aluminium klorida  
*Aluminium chloride*
- B** Kalsium klorida  
*Calcium chloride*
- C** Magnesium klorida  
*Magnesium chloride*
- D** Zink klorida  
*Zinc chloride*

**KERTAS 2**2 jam 30 minit  
2 hours 30 minutes**Bahagian A**  
**Section A**

[60 markah / 60 marks]

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

1. Jadual 1 menunjukkan nombor proton dan nombor nukleon atom Y dan Z. Huruf Y dan Z bukan simbol sebenar atom.

Table 1 shows the proton numbers and nucleon numbers of atoms Y and Z. The letter Y and Z are not the actual symbols of the atoms.

| Atom<br>Atom | Nombor proton<br>Proton number | Nombor nukleon<br>Nucleon number |
|--------------|--------------------------------|----------------------------------|
| Y            | 11                             | 23                               |
| Z            | 8                              | 16                               |

Jadual 1 / Table 1

Berdasarkan Jadual 1,  
Based on Table 1,

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

---

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[1 markah / 1 mark]

- (b) Tulis perwakilan piawai bagi atom Y.  
Write the standard representation of atom Y.

---

---

[1 markah / 1 mark]

- (c) Atom Q ialah isotop bagi unsur Z. Nyatakan bilangan proton dalam atom Q.  
Atom Q is an isotope of element Z. State the number of protons in atom Q.

---

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[1 markah / 1 mark]

- (d) Y bertindak balas dengan Z membentuk sebatian  $Y_2Z$ . Sebatian  $Y_2Z$  mengalami proses peleburan pada  $801^\circ\text{C}$ .

Y reacts with Z to form compound  $Y_2Z$ . Compound  $Y_2Z$  undergoes the melting process at  $801^\circ\text{C}$ .

- (i) Nyatakan perubahan keadaan fizik  $Y_2Z$  semasa peleburan.  
State the change in the physical state of compound  $Y_2Z$  during melting.

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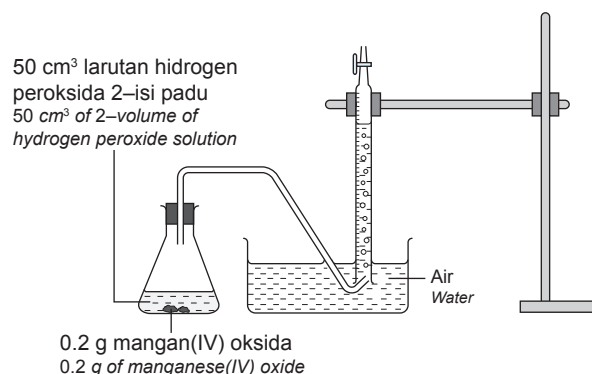
[1 markah / 1 mark]

- (ii) Nyatakan pergerakan zarah dalam  $Y_2Z$  pada suhu bilik.  
State the movement of particles in  $Y_2Z$  at room temperature.

[1 markah / 1 mark]

2. Rajah 1.1 menunjukkan susunan radas bagi satu eksperimen untuk mengkaji kadar tindak balas antara  $50 \text{ cm}^3$  larutan hidrogen peroksida 2-isi padu.

Diagram 1.1 shows the apparatus set-up for an experiment to study the rate of reaction between  $50 \text{ cm}^3$  of 2-volume of hydrogen peroxide solution.



Rajah 1.1 / Diagram 1.1

Jadual 2 menunjukkan keputusan yang diperoleh daripada eksperimen ini.

Table 2 shows the result obtained from this experiment.

| Masa (minit)<br>Time (minute)                                                                          | 0    | 0.5   | 1.0   | 1.5   | 2.0   | 2.5   | 3.0   | 3.5   | 4.0   |
|--------------------------------------------------------------------------------------------------------|------|-------|-------|-------|-------|-------|-------|-------|-------|
| Jumlah isi padu gas yang dikumpul ( $\text{cm}^3$ )<br>Total volume of gas collected ( $\text{cm}^3$ ) | 0.00 | 14.00 | 26.50 | 34.00 | 39.00 | 43.00 | 43.00 | 43.00 | 43.00 |

Jadual 2 / Table 2

- (a) Apakah fungsi mangan(IV) oksida dalam eksperimen ini?  
What is the function of manganese(IV) oxide in this experiment?

[1 markah / 1 mark]



- (b) Penguraian hidrogen peroksida berlaku apabila zarah-zarah bahan tindak balas berlanggar antara satu sama lain. Hanya perlanggaran berkesan menghasilkan hasil tindak balas.

Nyatakan **dua** syarat untuk perlanggaran berkesan berlaku.

*Decomposition of hydrogen peroxide occurs when the reactant particles collide with each other. Only effective collisions produce products.*

State **two** conditions for an effective collision to occur.

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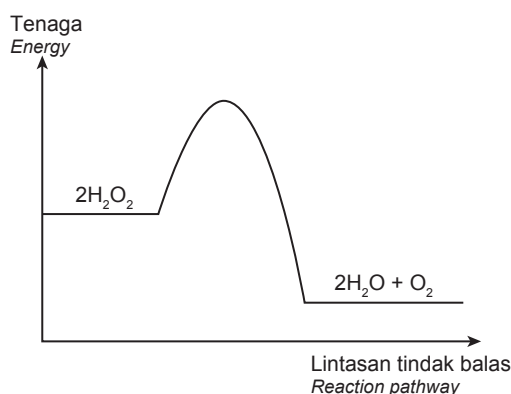


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[2 markah / 2 marks]

- (c) Rajah 1.2 menunjukkan gambarajah profil tenaga bagi tindak balas dalam eksperimen ini.

*Diagram 1.2 shows the energy profile diagram for the reaction in this experiment.*



Rajah 1.2 / Diagram 1.2

Lakarkan lengkung pada Rajah 1.2 apabila 0.2 g mangan(IV) oksida ditambah ke dalam larutan hidrogen peroksida.

*Sketch the curve on Diagram 1.2 when 0.2 g of manganese(IV) oxide is added into hydrogen peroxide solution.*

[1 markah / 1 mark]

- (d) Nyatakan isi padu gas yang terkumpul apabila eksperimen diulang dengan menambah 0.4 g mangan(IV) oksida.

*State the volume of gas collected if the experiment is repeated by adding 0.4 g of manganese(IV) oxide.*

---

[1 markah / 1 mark]

3. Rajah 2 menunjukkan sebuah periuk. Periuk tersebut diperbuat daripada keluli nirkarat yang merupakan sejenis aloi.

*Diagram 2 shows a pot. The pot is made of stainless steel which is an alloy.*



Rajah 2 / Diagram 2

- (a) (i) Nyatakan maksud aloi.  
*State the meaning of alloy.*

---



---

[1 markah / 1 mark]

- (ii) Besi adalah salah satu unsur dalam keluli nirkarat. Nyatakan **dua** unsur lain dalam keluli nirkarat.  
*Iron is one of the elements in stainless steel. State **two** other elements in stainless steel.*

---



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[2 markah / 2 marks]

- (iii) Keluli nirkarat yang digunakan untuk membuat periuk mengandungi 71.5% besi mengikut jisim. Jika jisim periuk ialah 2 kg, berapakah jisim besi di dalamnya?  
*Stainless steel used to make the pot contains 71.5% of iron by mass. If the mass of the pot is 2 kg, what is the mass of iron in it?*

[1 markah / 1 mark]

- (b) Cadangkan kaca yang paling sesuai untuk membuat penutup periuk. Berikan **satu** sebab.  
*Suggest the type of glass that is most suitable to make the lid of the pot. Give **one** reason.*

---



---

[2 markah / 2 marks]

4. Rajah 3 menunjukkan tapak pelupusan sampah. Aktiviti mikroorganisma di kawasan itu telah menghasilkan gas metana,  $\text{CH}_4$ .

*Diagram 3 shows a waste disposal site. The activity of microorganisms in the site produces methane gas,  $\text{CH}_4$ .*



Rajah 3 / Diagram 3

- (a) Nyatakan jenis zarah bagi metana,  $\text{CH}_4$ .  
*State the type of particles for methane,  $\text{CH}_4$ .*

---

[1 markah / 1 mark]



- (b) Hitung bilangan molekul dalam metana.

[Pemalar Avogadro =  $6.02 \times 10^{23} \text{ mol}^{-1}$ ; 1 mol gas menempati  $24 \text{ dm}^3$  pada keadaan bilik]

*Calculate the number molecules in methane.*

*[Avogadro constant =  $6.02 \times 10^{23} \text{ mol}^{-1}$ ; 1 mole of gas occupies  $24 \text{ dm}^3$  at room conditions]*

[2 markah / 2 marks]

- (c) Metana terbakar sepenuhnya dalam gas oksigen berlebihan untuk menghasilkan karbon dioksida dan air.

*Methane burns completely in excess oxygen gas to produce carbon dioxide and water.*

- (i) Tulis persamaan kimia yang seimbang bagi tindak balas ini.

*Write the balanced chemical equation for the reaction.*

[2 markah / 2 marks]

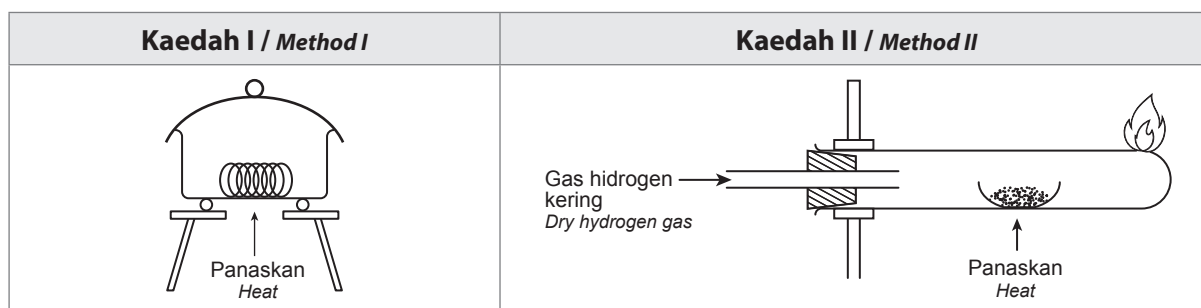
- (ii) Nyatakan **sat** maklumat kualitatif dan **sat** maklumat kuantitatif yang boleh diperoleh daripada persamaan kimia dalam 4(c)(i).

*State **one** qualitative information and **one** quantitative information that can be obtained from the chemical equation in 4(c)(i).*

[2 markah / 2 marks]

5. Rajah 4 menunjukkan susunan radas bagi dua kaedah yang digunakan untuk menentukan formula empirik logam oksida.

*Diagram 4 shows the apparatus setups for two methods used to determine the empirical formula of metal oxides.*



Rajah 4 / Diagram 4

- (a) Apakah yang dimaksudkan dengan formula empirik?

*What is meant by empirical formula?*

[1 markah / 1 mark]

(b) Cadangkan nama logam oksida yang digunakan dalam Kaedah I dan Kaedah II.

*Suggest the name of metal oxides used in Method I and Method II.*

(i) Kaedah I / Method I: \_\_\_\_\_

(ii) Kaedah II / Method II: \_\_\_\_\_

[2 markah / 2 marks]

(c) (i) Semasa menjalankan eksperimen dengan menggunakan Kaedah I, 2.60 g logam X bertindak balas dengan 0.64 g oksigen. Tentukan formula empirik bagi oksida X.

[Jisim atom relatif:  $X = 65$ ,  $O = 16$ ]

*When carrying out an experiment using Method I, 2.60 g of metal X reacts with 0.64 g of oxygen. Determine the empirical formula of oxide of X.*

[Relative atomic mass:  $X = 65$ ,  $O = 16$ ]

[2 markah / 2 marks]

(ii) Tulis persamaan kimia bagi tindak balas di 5(c)(i).

*Write the chemical equation for the reaction in 5(c)(i).*

\_\_\_\_\_

[1 markah / 1 mark]

(d) (i) Dalam kaedah II, gas hidrogen kering mesti dialirkan melalui radas selepas pemanasan logam oksida selesai. Apakah sebab tindakan ini diambil?

*In Method II, dry hydrogen gas must be flowed through the apparatus after heating of metal oxide has completed. What is the reason for this action to be taken?*

\_\_\_\_\_  
\_\_\_\_\_

[1 markah / 1 mark]

(ii) Apakah yang perlu dilakukan untuk memastikan tindak balas antara logam oksida dengan gas hidrogen telah lengkap?

*What should be done to ensure the reaction between metal oxide with hydrogen gas has completed?*

\_\_\_\_\_  
\_\_\_\_\_

[1 markah / 1 mark]

6. Garam halus ialah salah satu bahan kimia yang biasanya terdapat di rumah. Garam halus mengandungi lebih daripada 97% natrium klorida, NaCl.

*Table salt is one of the most common household chemicals. Table salt contains more than 97% of sodium chloride, NaCl.*

- (a) (i) Nyatakan jenis ikatan yang terbentuk dalam natrium klorida.

*State the type of bond formed in sodium chloride.*

[1 markah / 1 mark]

- (ii) Takat lebur natrium klorida ialah 801°C. Berikan **satu** sebab mengapa takat lebur natrium klorida tinggi.

*The melting point of sodium chloride is 801°C. Give **one** reason why the melting point of sodium chloride is high.*

[1 markah / 1 mark]

- (b) Rajah 5.1 menunjukkan perwakilan piawai bagi atom hidrogen, atom magnesium dan atom oksigen.

*Diagram 5.1 shows the standard representations of hydrogen atom, magnesium atom and oxygen atom.*



Rajah 5.1 / Diagram 5.1

Berdasarkan Rajah 5.1,

*Based on Diagram 5.1,*

- (i) Pilih **dua** unsur berbeza yang boleh bertindak balas untuk membentuk sebatian kovalen X.

*Choose **two** different elements that can react to form a covalent compound X.*

[1 markah / 1 mark]

- (ii) Lukis susunan elektron bagi sebatian kovalen X yang terbentuk di 6(b)(i).

*Draw the electron arrangement for the covalent compound X formed in 6(b)(i).*

[2 markah / 2 marks]

Diagram 5.2 shows ethanol is poured into covalent compound X solution.

Rajah 5.2 / Diagram 5.2

What can be observed? Explain your answer.

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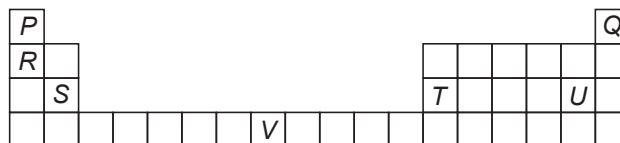
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- (c) Jadual 3 menunjukkan pemerhatian apabila dua oksida unsur ditambah ke dalam larutan kalium hidroksida dan asid nitrik.

Table 3 shows the observations when two oxides of elements are added into potassium hydroxide solution and nitric acid.

| Oksida<br>Oxide        | Ditambah dengan larutan kalium hidroksida<br>Added with potassium hydroxide solution | Ditambah dengan asid nitrik<br>Added with nitric acid |
|------------------------|--------------------------------------------------------------------------------------|-------------------------------------------------------|
| Oksida S<br>Oxide of S | Tiada perubahan<br>No changes                                                        | Pepejal putih melarut<br>White solid dissolves        |
| Oksida T<br>Oxide of T | Pepejal putih melarut<br>White solid dissolves                                       | Pepejal putih melarut<br>White solid dissolves        |

Jadual 3 / Table 3

Berdasarkan Jadual 3, nyatakan sifat oksida S dan oksida T.

Based on Table 3, state the properties of oxide of S and oxide of T.

(i) Oksida S / Oxide of S: \_\_\_\_\_

(ii) Oksida T / Oxide of T: \_\_\_\_\_

[2 markah / 2 marks]

- (d) Pepejal R hidroksida, ROH boleh digunakan untuk menyingkirkan karbon dioksida di dalam kapal angkasa. Tindak balas yang berlaku antara ROH dengan karbon dioksida akan menghasilkan  $R_2CO_3$  dan air.

Solid R hydroxide, ROH can be used to remove carbon dioxide in a spacecraft. Reaction that occurs between ROH and carbon dioxide will produce  $R_2CO_3$  and water.

- (i) Tulis persamaan kimia bagi tindak balas ini.

Write the chemical equation for the reaction.

[1 markah / 1 mark]

- (ii) Hitung jisim ROH yang diperlukan untuk menyingkirkan  $480000 \text{ cm}^3$  gas karbon dioksida.

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

Calculate the mass of ROH that is needed to remove  $480000 \text{ cm}^3$  of carbon dioxide gas.

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

[3 markah / 3 marks]

- (e) Rajah 6.2 menunjukkan belon kaji cuaca.

Diagram 6.2 shows a weather balloon.



Rajah 6.2 / Diagram 6.2

Antara unsur *P* dan unsur *Q*, yang manakah lebih sesuai digunakan di dalam belon kaji cuaca? Berikan **satu** sebab.

*Between element P and element Q, which one is more suitable to be used in the weather balloon? Give **one** reason.*

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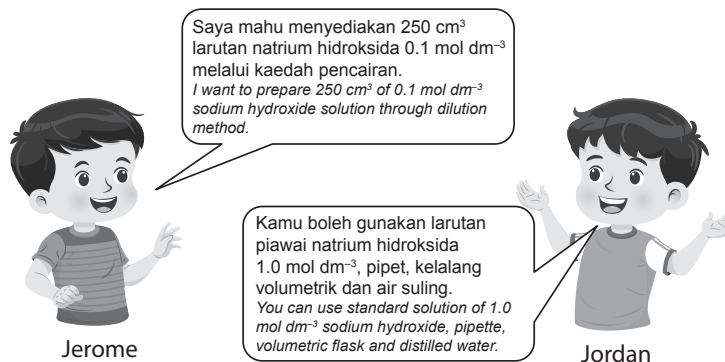


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[2 markah / 2 marks]

**8.** Rajah 7.1 menunjukkan perbualan antara Jerome dan Jordan.

*Diagram 7.1 shows a conversation between Jerome and Jordan.*



Rajah 7.1 / Diagram 7.1

- (a) (i) Apakah yang dimaksudkan dengan larutan piawai? / *What is meant by standard solution?*

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---

[1 markah / 1 mark]

- (ii) Hitung isi padu larutan natrium hidroksida  $1.0 \text{ mol dm}^{-3}$  yang diperlukan untuk menyediakan  $250 \text{ cm}^3$  larutan natrium hidroksida  $0.1 \text{ mol dm}^{-3}$ .

*Calculate the volume of  $1.0 \text{ mol dm}^{-3}$  sodium hydroxide solution needed to prepare  $250 \text{ cm}^3$  of  $0.1 \text{ mol dm}^{-3}$  of sodium hydroxide solution.*

[1 markah / 1 mark]

- (iii) Terangkan secara ringkas langkah-langkah untuk menyediakan  $250 \text{ cm}^3$  larutan natrium hidroksida  $0.1 \text{ mol dm}^{-3}$ .

*Describe briefly the steps to prepare  $250 \text{ cm}^3$  of  $0.1 \text{ mol dm}^{-3}$  sodium hydroxide solution.*

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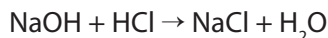
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[3 markah / 3 marks]



- (b) 25 cm<sup>3</sup> larutan natrium hidroksida 0.1 mol dm<sup>-3</sup> bertindak balas lengkap dengan asid hidroklorik 0.1 mol dm<sup>-3</sup>. Tindak balas antara larutan natrium hidroksida dengan asid hidroklorik diwakili oleh persamaan kimia berikut.

25 cm<sup>3</sup> of 0.1 mol dm<sup>-3</sup> sodium hydroxide solution reacts completely with 0.1 mol dm<sup>-3</sup> hydrochloric acid. The reaction between sodium hydroxide solution and hydrochloric acid is represented by the following chemical equation.



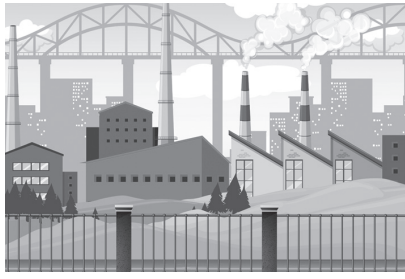
Hitung isi padu asid hidroklorik yang digunakan dalam tindak balas ini.

Calculate the volume of hydrochloric acid used in the reaction.

[3 markah / 3 marks]

- (c) Sebuah syarikat pemaju merancang untuk membangunkan sebuah kawasan kediaman. Rajah 7.2 menunjukkan dua pilihan kawasan untuk dibangunkan, sama ada berhampiran dengan kawasan A atau kawasan B.

A developer company plans to develop a residential area. Diagram 7.2 shows two options of areas to develop, either near to area A or area B.

| <b>Kawasan A: Luar bandar</b><br><b>Area A: Countryside</b>                                                                                                                                                                                                          | <b>Kawasan B: Kawasan perindustrian</b><br><b>Area B: Industrial area</b>                                                                                                                                                                                              |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  <ul style="list-style-type: none"> <li>Indeks Pencemaran Udara (IPU) = 40<br/><i>Air Pollutant Index (API)</i></li> <li>pH air hujan = 6.0<br/><i>pH of rainwater</i></li> </ul> |  <ul style="list-style-type: none"> <li>Indeks Pencemaran Udara (IPU) = 120<br/><i>Air Pollutant Index (API)</i></li> <li>pH air hujan = 4.9<br/><i>pH of rainwater</i></li> </ul> |

Rajah 7.2 / Diagram 7.2

Pada pendapat anda, kawasan manakah yang lebih sesuai untuk membangunkan kawasan kediaman? Wajarkan jawapan anda.

In your opinion, which is the more appropriate area to develop a residential area? Justify your answer.

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[2 markah / 2 marks]



**Bahagian B**  
**Section B**

[20 markah / 20 marks]

Jawab **mana-mana satu** soalan dalam bahagian ini.

Answer **any one** question in this section.

9. (a) Seorang murid menjalankan suatu eksperimen untuk mengkaji sifat keasidan bagi larutan A dan larutan B. Larutan A dan larutan B ialah campuran gas hidrogen klorida dengan dua pelarut yang berbeza, pelarut X dan pelarut Y.

A student carried out an experiment to study the acidic properties of solution A and solution B. Solution A and solution B are the mixture of hydrogen chloride gas with two different types of solvents, solvent X and solvent Y.

Larutan A: Gas hidrogen klorida + pelarut X

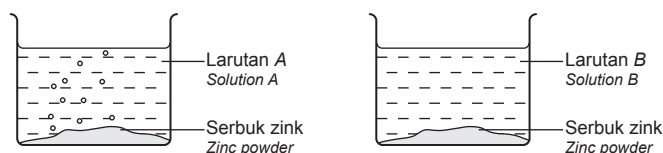
Solution A: Hydrogen chloride gas + solvent X

Larutan B: Gas hidrogen klorida + pelarut Y

Solution B: Hydrogen chloride gas + solvent Y

Serbuk zink dimasukkan ke dalam kedua-dua larutan. Rajah 8.1 menunjukkan pemerhatian bagi eksperimen itu.

Zinc powder is added into both solutions. Diagram 8.1 shows the observation for the experiment.



Rajah 8.1 / Diagram 8.1

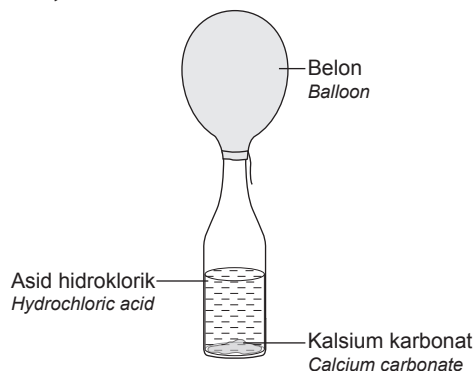
Kenal pasti pelarut X dan pelarut Y. Terangkan perbezaan dalam pemerhatian. Tulis **satu** persamaan ion untuk tindak balas ini.

Identify solvent X and solvent Y. Explain the differences in the observations. Write **one** ionic equation for the reaction.

[7 markah / 7 marks]

- (b) Rajah 8.2 menunjukkan tindak balas antara asid hidroklorik dengan kalsium karbonat di dalam botol plastik.

Diagram 8.2 shows the reaction between hydrochloric acid and calcium carbonate in a plastic bottle.



Rajah 8.2 / Diagram 8.2



Tulis persamaan kimia bagi tindak balas ini. Hitung jisim kalsium karbonat yang diperlukan untuk menghasilkan  $1.2 \text{ dm}^3$  gas karbon dioksida pada suhu bilik untuk mengembangkan belon itu.

[Jisim atom relatif: C = 12, O = 16, Ca = 40; 1 mol gas menempati  $24 \text{ dm}^3$  pada keadaan bilik]

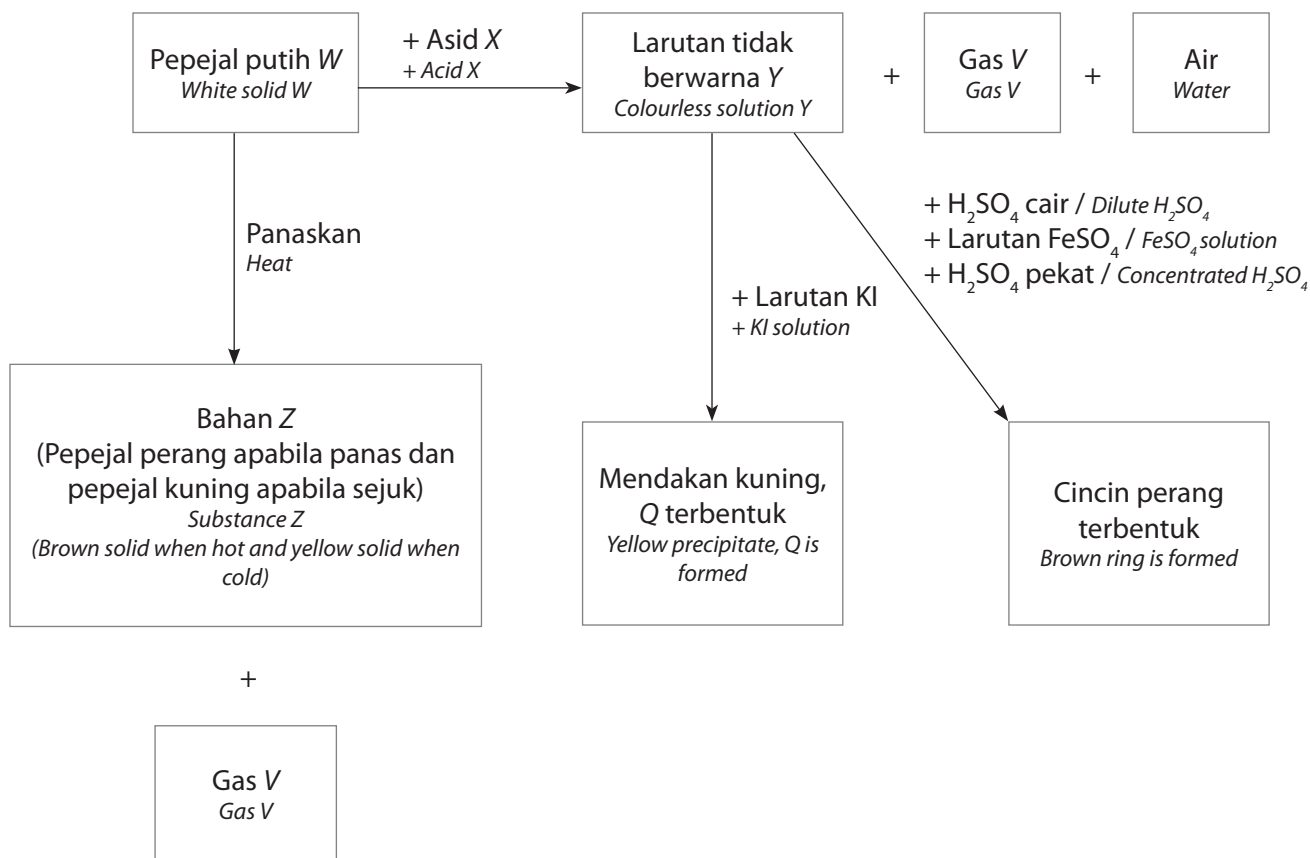
Write the chemical equation for the reaction. Calculate the mass of calcium carbonate required to produce  $1.2 \text{ dm}^3$  of carbon dioxide gas at room conditions to inflate the balloon.

[Relative atomic mass: C = 12, O = 16, Ca = 40; 1 mole of gas occupies  $24 \text{ dm}^3$  at room conditions]

[5 markah / 5 marks]

- (c) Rajah 8.3 menunjukkan penukaran pepejal W kepada larutan Y dan pepejal Z. Analisis ke atas larutan Y dilakukan untuk mengenal pasti kation dan anionnya.

Diagram 8.3 shows the conversion of solid W to solution Y and solid Z. Analysis on solution Y is carried out to identify its cation and anion.



Rajah 8.3 / Diagram 8.3

Berdasarkan Rajah 8.3,

Based on Diagram 8.3,

- (i) Kenal pasti bahan Q, V, W, X, Y dan Z.

Identify substances Q, V, W, X, Y and Z.

[6 markah / 6 marks]

- (ii) Pepejal W bertindak balas dengan asid X menghasilkan larutan Y, gas V dan air.

Huraikan ujian kimia bagi gas V.

Solid W reacts with acid X to produce solution Y, gas V and water. Describe a chemical test for gas V.

[2 markah / 2 marks]

**10. Maklumat berikut menunjukkan situasi yang berbeza untuk melarutkan garam batu di dalam air.**

*The following information shows different situations for dissolving rock salt in water.*

**Situasi I / Situation I:**

Serbuk garam batu lebih mudah larut di dalam air sejuk berbanding dengan emping garam batu.

*Rock salt powder is easier to dissolve in cold water compared to rock salt flakes.*

**Situasi II / Situation II:**

Serbuk garam batu lebih mudah larut di dalam air panas berbanding dengan air sejuk.

*Rock salt powder is easier to dissolve in hot water compared to cold water.*

- (a) Nyatakan **dua** faktor yang terlibat untuk melarutkan garam batu. Berdasarkan salah satu situasi, terangkan bagaimana salah satu faktor itu mempengaruhi keterlarutan garam batu.

*State **two** factors involved to dissolved the rock salt. Based on one of the situation, explain how the factor effect the solubility of the rock salt.*

[4 markah / 4 mark]

- (b) Jadual 4 menunjukkan keputusan bagi tiga set eksperimen yang dijalankan untuk mengkaji kadar tindak balas antara ketulan zink yang berlebihan dengan asid sulfurik.

*Table 4 shows the results from three sets of experiment that have been carried out to investigate the rate of reaction between excess zinc granules and sulphuric acid.*

| Set<br>Set | Bahan tindak balas<br>Reactants                                                                                                                                                                                                                                                   | Masa yang diambil untuk<br>mengumpul 50 cm <sup>3</sup> gas<br>hidrogen (s)<br>Time taken to collect 50 cm <sup>3</sup> of<br>hydrogen gas (s) |
|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| I          | 50 cm <sup>3</sup> asid sulfurik 0.1 mol dm <sup>-3</sup> + ketulan zink berlebihan<br><i>50 cm<sup>3</sup> of 0.1 mol dm<sup>-3</sup> sulphuric acid + excess zinc granules</i>                                                                                                  | 110                                                                                                                                            |
| II         | 50 cm <sup>3</sup> asid sulfurik 0.1 mol dm <sup>-3</sup> + ketulan zink berlebihan + 1 cm <sup>3</sup> larutan kuprum(II) sulfat<br><i>50 cm<sup>3</sup> of 0.1 mol dm<sup>-3</sup> sulphuric acid + excess zinc granules + 1 cm<sup>3</sup> of copper(II) sulphate solution</i> | 70                                                                                                                                             |
| III        | 50 cm <sup>3</sup> asid sulfurik 0.2 mol dm <sup>-3</sup> + ketulan zink berlebihan<br><i>50 cm<sup>3</sup> of 0.2 mol dm<sup>-3</sup> sulphuric acid + excess zinc granules</i>                                                                                                  | 90                                                                                                                                             |

Jadual 4 / Table 4

- (i) Tulis persamaan kimia bagi tindak balas yang berlaku di Set I. Hitung isi padu maksimum gas hidrogen yang dihasilkan pada keadaan bilik.

[1 mol gas menempati 24 dm<sup>3</sup> pada keadaan bilik]

*Write the chemical equation for the reaction that occurs in Set I. Calculate the maximum volume of hydrogen gas produced at room conditions.*

*[1 mole of gas occupies 24 dm<sup>3</sup> at room conditions]*

[3 markah / 3 marks]

- (ii) Lakarkan graf isi padu gas melawan masa untuk Set I, Set II dan Set III.

*Sketch the graph of volume of gas against time for Set I, Set II and Set III.*

[3 markah / 3 marks]

(iii) Bandingkan kadar tindak balas bagi

*Compare the rate of reaction for*

- Set I dan Set II / *Set I and Set II*
- Set I dan Set III / *Set I and Set III*

Terangkan jawapan anda berdasarkan teori perlanggaran.

*Explain your answer based on the collision theory.*

[10 markah / 10 marks]

### Bahagian C

#### Section C

[20 markah / 20 marks]

Jawab **semua** soalan dalam bahagian ini.

*Answer **all** questions in this section.*

11. (a) Jadual 5.1 menunjukkan maklumat mengenai dua jenis kaca, W dan X. Kedua-dua jenis kaca boleh digunakan sebagai kaca tingkap.

*Table 5.1 shows the information about two types of glasses, W and X. Both types of glasses can be used as window glass.*

| Kaca<br>Glass | Komposisi<br>Composition                                                                         |
|---------------|--------------------------------------------------------------------------------------------------|
| W             | Silika, kalsium karbonat, natrium karbonat<br><i>Silica, calcium carbonate, sodium carbonate</i> |
| X             | Silika, kalsium karbonat, argentum klorida<br><i>Silica, calcium carbonate, silver chloride</i>  |

Jadual 5.1 / Table 5.1

- (i) Kenal pasti kaca W dan kaca X. Nyatakan **dua** persamaan sifat kaca W dan kaca X.

*Identify glass W and glass X. State **two** similar properties of glass W and glass X.*

[4 markah / 4 marks]

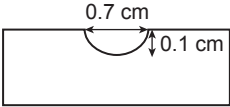
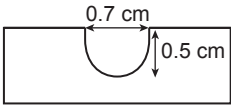
- (ii) Pn. Fatimah ingin memasang tingkap kaca di rumah untuk menghalang sinar ultraungu. Jenis kaca manakah yang akan dipilih? Berikan alasan anda.

*Mrs. Fatimah wants to install a glass window at her house to prevent ultraviolet rays. Which type of glass will be chosen? Give your reason.*

[3 markah / 3 marks]

- (b) Seorang murid menjalankan eksperimen untuk membandingkan kekerasan logam kuprum dengan aloinya, gangsa. Jadual 5.2 menunjukkan kedalaman lekuk selepas pemberat 1 kg dijatuhkan pada permukaan blok.

*A student carried out an experiment to compare the hardness of pure copper and its alloy, bronze. Table 5.2 shows the depth of dents after 1 kg of weight was dropped onto the surface of the blocks.*

| Bahan<br>Material                          | A                                                                                 | B                                                                                   |
|--------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Kedalaman lekuk (cm)<br>Depth of dent (cm) |  |  |

Rajah 9 / Diagram 9

Berdasarkan Rajah 9, kenal pasti bahan A dan bahan B. Kemudian, terangkan perbezaan pemerhatian.

*Based on Diagram 9, identify material A and material B. Then, explain the difference in the observations.*

[5 markah / 5 marks]

- (c) (i) Besi dan keluli ialah dua jenis bahan yang sering digunakan dalam pembinaan bangunan tinggi. Bahan manakah yang lebih banyak digunakan dalam pembinaan bangunan tinggi? Berikan sebab anda.

*Iron and steel are two types of materials frequently used in the construction of high-rise buildings. Which material is used more in the construction of high-rise buildings? Give your reason.*

[2 markah / 2 marks]

- (ii) Terangkan secara ringkas langkah-langkah untuk membandingkan kadar kakisan antara besi dengan keluli.

*Describe briefly the steps to compare the rate of corrosion between iron and steel.*

[6 markah / 6 marks]

**KERTAS SOALAN TAMAT**  
**END OF QUESTION PAPER**