



Soalan Objektif

1. Mengapakah karbon-12 dipilih sebagai rujukan piawai untuk jisim atom relatif?
Why is carbon-12 chosen as a standard reference for relative atomic mass?

- A Karbon mempunyai tiga isotop
Carbon has three isotopes
- B Karbon adalah unsur bukan logam
Carbon is a non-metal element
- C Karbon adalah pepejal dan mudah dikendali
Carbon is a solid and easier to handle
- D Karbon terletak di dalam Kumpulan 14
Carbon is in Group 14

2. Apakah yang dimaksudkan dengan pemalar Avogadro?

What is the meaning of Avogadro constant?

- A Jisim bagi satu mol bahan
Mass of one mole of substance
- B Tekanan bagi satu mol bahan
Pressure of one mole of substance
- C Isi padu yang dipenuhi oleh satu mol bahan
Volume occupied by one mole of substance
- D Bilangan zarah di dalam satu mol bahan
Number of particles in one mol of substance

3. Sebuah katrij penunu Bunsen mengandungi 2.75 kg gas butana, C_4H_{10} .

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Berapakah bilangan mol gas itu?

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

A Bunsen burner cartridge contains 2.75 kg butane gas, C_4H_{10} .

What is the number of moles of the gas?

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

- A 23.71
- B 24.55
- C 47.41
- D 49.11

4. Tindak balas di antara zink dan ferum(III)oksida menghasilkan ferum dan bahan X.

Apakah formula kimia bagi X?

Reaction between zinc dan iron(III) oxide produces iron and substance X.

What is the chemical formula of X? **KBAT** Menganalisis

- A ZnO
- B ZnO_2
- C Zn_2O
- D Zn_3O_2

5. Persamaan kimia berikut menunjukkan penguraian kalsium karbonat.

The chemical equation shows the decomposition of calcium carbonate.



Berapakah jisim kalsium karbonat yang diperlukan untuk menghasilkan 3.6 dm³ gas karbon dioksida pada keadaan bilik?

[Jisim atom relatif: $Ca = 40$, $C = 12$, $O = 16$; isi padu molar gas pada keadaan bilik = 24 dm³]

What is the mass of calcium carbonate needed to produce 3.6 dm³ of carbon dioxide gas at room condition?

[Relative atomic mass : $Ca = 40$, $C = 12$, $O = 16$; molar volume of gas at room condition = 24 dm³]

- A 15.0 g
- B 20.0 g
- C 30.0 g
- D 45.0 g

6. Rajah menunjukkan satu botol asid askorbik yang digunakan untuk merawat skurvi.

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Diagram shows a bottle of ascorbic acid used to treat scurvy.

Apakah formula empirik bagi asid askorbik?

What is the empirical formula of ascorbic acid?

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

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



- A $C_3H_4O_3$
- B $C_3H_5O_3$
- C $C_6H_4O_3$
- D C_8HO_{11}

7. Rajah menunjukkan peratusan mengikut jisim bagi unsur dalam alisin dalam bawang

Diagram shows the percentage by mass of elements in alliin in garlic. **KBAT** Mengaplikasi

*Alisin: C = 44.4%, H = 6.21%
Alliin S = 39.5%, O = 9.86%*



Apakah formula empirik bagi alisin?

[Jisim atom relatif: $H = 1$, $C = 12$, $O = 16$, $S = 32$]

What is the empirical formula of alliin?

[Relative atomic mass : $H = 1$, $C = 12$, $O = 16$, $S = 32$]

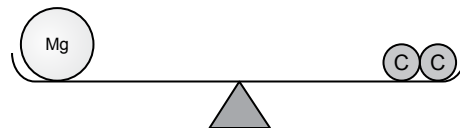
- A $CHSO$
- B $C_6H_{10}S_2O$
- C $C_{12}H_5S_2O$
- D $C_{12}H_{10}S_4O$

Soalan Struktur

Bahagian A

- 1.** Jisim atom sangat kecil. Oleh itu, ahli kimia menentukan jisim atom dengan membandingkan jisim atom tersebut dengan atom yang lain yang dipanggil jisim atom relatif. Rajah menunjukkan perbandingan jisim antara atom Mg dengan atom karbon-12.

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The mass of an atom is very small. Therefore, chemists determine the mass of an atom by comparing the mass of the atom with another atom which is called the relative atomic mass. Diagram shows the comparison of mass between Mg atom and carbon-12 atom.

- (a) Apakah yang dimaksudkan dengan jisim atom relatif?
What is the meaning of relative atomic mass?

[1 markah / mark]

- (b) Berikan satu sebab mengapa karbon-12 digunakan sebagai atom piawai untuk membandingkan jisim atom.
Give one reason why carbon-12 is used as the standard atom to compare the mass of atom.

[1 markah / mark]

- (c) Nyatakan jisim atom relatif bagi atom Mg. _____
State the relative atomic mass of Mg atom.

[1 markah / mark]

- (d) Dalam suatu eksperimen, serbuk magnesium bertindak balas dengan gas klorin.
In an experiment, magnesium powder reacts with chlorine gas.

- (i) Tuliskan persamaan kimia seimbang bagi tindak balas ini. _____
Write a balanced chemical equation for the reaction.

[2 markah / marks]

- (ii) Tafsirkan persamaan kimia di (d)(i) secara kuantitatif.
Interpret the chemical equation in (d)(i) in quantitative terms.

[1 markah / mark]

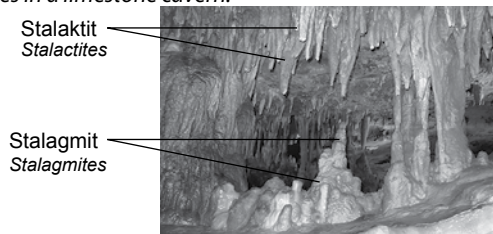
- (iii) Berdasarkan (c), hitung bilangan mol klorin yang diperlukan untuk bertindak balas secara lengkap dengan 2.4 g magnesium.
Based on (c), calculate the number of moles of chlorine needed to react completely with 2.4 g of Mg.

[2 markah / marks]



2. Rajah menunjukkan stalaktit dan stalagmit yang terdapat dalam gua batu kapur.

Diagram shows stalactites and stalagmites in a limestone cavern.



- (a) Batu kapur adalah sebatian kalsium karbonat. Tuliskan formula kimia sebatian ini. _____
Limestone is calcium carbonate compound. Write the chemical formula of this compound. [1 markah / mark]
- (b) Gua batu kapur terhasil daripada hakisan batu kapur oleh hujan asid dengan formula H_2SO_4 .
Limestone cavern is produced from the erosion of limestone by acid rain with the formula of H_2SO_4 .
- (i) Tuliskan persamaan kimia seimbang bagi tindak balas antara batu kapur dengan hujan asid yang menghasilkan kalsium sulfat, gas karbon dioksida dan air.
Write a balanced chemical equation for the reaction between limestone and the acid rain producing calcium sulphate, carbon dioxide and water.

[2 markah / marks]
- (ii) Hitungkan isi padu gas karbon dioksida yang terbebas jika 0.5 mol batu kapur bertindak balas dengan asid berlebihan pada suhu bilik. [Isi padu molar gas pada keadaan bilik = 24 dm^3]
Calculate the volume of the carbon dioxide gas released if 0.5 mol limestone reacts with excess acid at room condition. [Molar volume of gas at room condition = 24 dm^3]

[2 markah / marks]
- (c) Pemanasan kalsium karbonat dengan kuat menghasilkan kalsium oksida dan gas karbon dioksida.
Heating calcium carbonate strongly will produce calcium oxide and carbon dioxide gas.
Lukiskan susunan gambar rajah berlabel bagi penguraian kalsium karbonat. Dalam gambar rajah tersebut, tunjukkan kaedah untuk mengesahkan kehadiran gas karbon dioksida.
Draw a labelled apparatus set-up for the decomposition of calcium carbonate. In the drawing, show a method to prove the presence of carbon dioxide gas.

Bahagian B

3. (a) Jadual menunjukkan form
Table shows the molecular formula and empirical formula of two compounds.

Sebatian Compound	Formula molekul Molecular formula	Formula empirik Empirical formula
X	C_4H_8	
Y		CH_2O

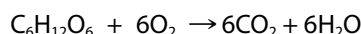
- Nyatakan maksud formula molekul.
State the meaning of molecular formula.
 - Tuliskan formula empirik bagi sebatian X.
Write the empirical formula of compound X.
 - Jisim molekul relatif sebatian Y adalah 180. Tentukan formula molekulnya.
The relative molecular mass of compound Y is 180. Determine its molecular formula.
- [Jisim atom relatif / *Relative atomic mass*: C = 12, H = 1]

[4 markah / marks]

- (b) Respirasi adalah satu tindak balas kimia yang berlaku dalam sel hidup, termasuk sel tumbuhan dan sel haiwan. Glukosa dalam badan bertindak balas dengan oksigen semasa pernafasan dan menghasilkan karbon dioksida dan air.

Respiration is a chemical reaction that happens in all living cells, including plant cells and animal cells. Glucose in the body reacts with oxygen during breathing and produces carbon dioxide and water.

Persamaan kimia untuk respirasi ialah
The chemical equation for respiration is



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

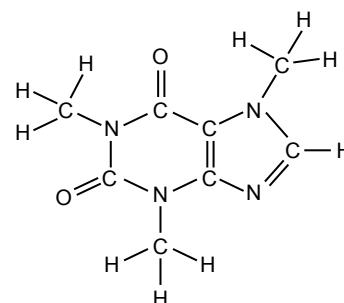
[3 markah / marks]

- (c) Rajah menunjukkan sebatian kafein yang terdapat dalam kopi.
Diagram shows the caffeine compound which is found in coffee.

- Tuliskan formula molekul dan formula empirik bagi kafein.
Write the molecular formula and empirical formula of caffeine.
- Banding dan bezakan formula empirik dan formula molekul kafein dari segi:
Compare and contrast between the empirical formula and molecular formula of caffeine in terms of:
 - Jenis zarah / *Type of particles*
 - Bilangan atom setiap unsur / *Number of atoms for each element*
 - Jisim molekul relatif / *Relative molecular mass*

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

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



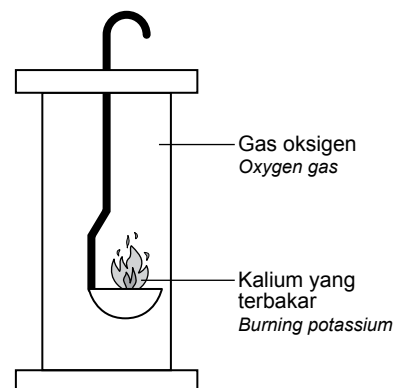
[8 markah / marks]

- (d) Rajah menunjukkan secebis kalium dibakar dan dimasukkan ke dalam balang gas yang mengandungi gas oksigen.
Diagram shows a piece of potassium is burned and placed in a gas jar containing oxygen gas.

- Tuliskan persamaan kimia seimbang bagi tindak balas dalam eksperimen tersebut.
Write a balanced chemical equation for the reaction in the experiment.
- 19.5 g pepejal kalium bertindak balas dengan gas oksigen yang berlebihan.
19.5 g of solid potassium reacts with the excess oxygen gas.
Hitungkan jisim hasil tindak balas yang terbentuk.
Calculate the mass of the product formed.

[Jisim atom relatif: K = 39, O = 16]

[*Relative atomic mass*: K = 39, O = 16]



[5 markah / marks]



Bahagian C

4. (a) Sebatian ion terdiri daripada kation dan anion.
Ionic compounds are made up of cations and anions.

Berdasarkan jadual, / Based on table,

Ion <i>Ion</i>	Formula <i>Formula</i>	Ion <i>Ion</i>	Formula <i>Formula</i>
Ion kalium <i>Potassium ion</i>	K^+	Ion zink <i>Zinc ion</i>	Zn^{2+}
Ion klorida <i>Chloride ion</i>	Cl^-	Ion nitrat <i>Nitrate ion</i>	NO_3^-

tuliskan formula bagi sebatian ion ini:
write the formula of the ionic compounds:

- (i) Kalium klorida
Potassium chloride
- (ii) Zink klorida
Zinc chloride
- (iii) Kalium nitrat
Potassium nitrate

[3 markah / marks]

- (b) Maklumat berikut adalah tentang sebatian T.
The information below is about compound T.

• Karbon <i>Carbon</i>	40.00%
• Hidrogen <i>Hydrogen</i>	6.66%
• Oksigen <i>Oxygen</i>	53.33%
• Jisim molekul relatif <i>Relative molecular mass</i>	180

Berdasarkan maklumat tentang sebatian T, tentukan:
Based on the information about compound T, determine the:

- (i) Formula empirik
Empirical formula
- (ii) Formula molekul
Molecular formula
[Jisim atom relatif: C = 12, H = 1, O = 16]
[Relative atomic mass: C = 12, H = 1, O = 16]

[5 markah / marks]

- (c) Huraikan satu eksperimen makmal untuk menentukan formula empirik bagi magnesium oksida.
Describe a laboratory experiment to determine the empirical formula of magnesium oxide.

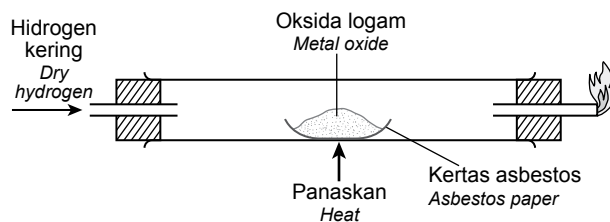
Sertakan dalam jawapan anda:
Include in your answer:

- Bahan dan Radas
Materials and Apparatus
- Prosedur
Procedure

- Gambar rajah berlabel
Labelled diagram
- Penjadualan data
Tabulation of data

[10 markah / marks]

- (d) Rajah menunjukkan susunan radas untuk menentukan formula empirik suatu sebatian.
Diagram shows the set-up of apparatus to determine the empirical formula of a compound.



Kaedah dalam rajah tidak sesuai bagi menentukan formula empirik bagi magnesium oksida. Jelaskan mengapa.
The method in diagram is not suitable to determine the empirical formula of magnesium oxide. Explain why.

[2 markah / marks]

