

SULIT



**KEMENTERIAN PENDIDIKAN TINGGI
JABATAN PENDIDIKAN POLITEKNIK DAN KOLEJ KOMUNITI**

**BAHAGIAN PEPERIKSAAN DAN PENILAIAN
JABATAN PENDIDIKAN POLITEKNIK DAN KOLEJ KOMUNITI
KEMENTERIAN PENDIDIKAN TINGGI**

JABATAN TEKNOLOGI KIMIA DAN MAKANAN

PEPERIKSAAN AKHIR

SESI II : 2024/2025

DMK10023 : BASIC PHYSICAL CHEMISTRY

TARIKH : 19 MEI 2025

MASA : 11.30 PAGI - 1.30 PETANG (2 JAM)

Kertas ini mengandungi **LAPAN (8)** halaman bercetak.

Struktur (5 soalan)

Dokumen sokongan yang disertakan : Formula

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIARAHKAN

(CLO yang tertera hanya sebagai rujukan)

SULIT



INSTRUCTION:

This section consists of **FIVE (5)** structured questions. Answer **ALL** questions.

ARAHAN:

Bahagian ini mengandungi LIMA (5) soalan berstruktur. Jawab SEMUA soalan.

QUESTION 1**SOALAN 1**

- CLO1 (a) Based on Figure 1 (a), identify atom, molecule, cation and anion.

Berdasarkan Rajah 1 (a), kenal pasti atom, molekul, anion dan cation.

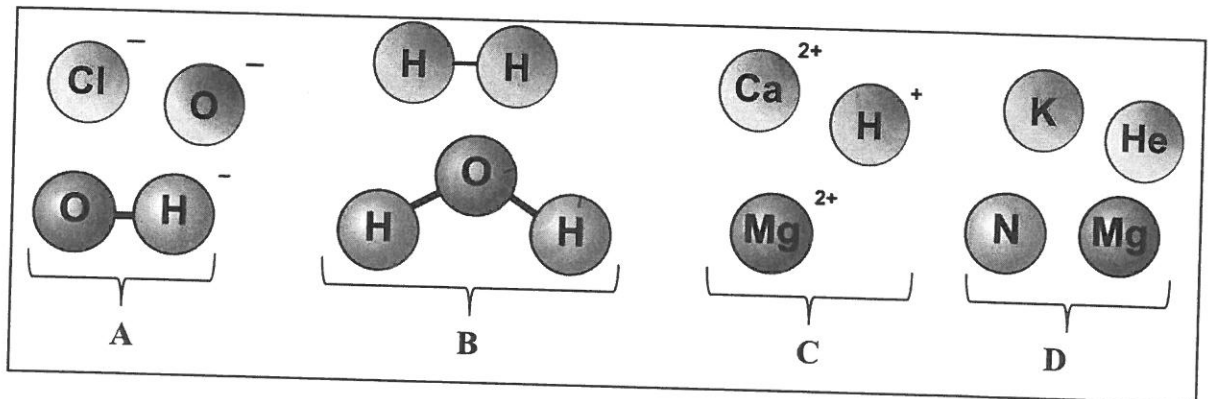


Figure 1 (a) / Rajah 1 (a)

[4 marks]

[4 markah]

- CLO1 (b) Compare **THREE (3)** properties of water in the form of ice and vapour.

Bandingkan TIGA (3) ciri bagi air dalam keadaan ais dan juga wap.

[6 marks]

[6 markah]

- (c) Fermentation of grapes will produce an organic compound (Compound E) consisting of 52.2% of carbon, 13% of hydrogen and the rest is oxygen.

Penapaian anggur akan menghasilkan sebatian organik (Sebatian E) yang mengandungi 52.2 % karbon, 13 % hydrogen dan selebihnya adalah oksigen.

- CLO1 i) Calculate the number of moles for carbon, hydrogen and oxygen of Compound E.
Kirakan bilangan mol bagi karbon, hydrogen dan oksigen bagi Sebatian E.
- [4 marks]
[4 markah]

- CLO1 ii) Given the molar mass of Compound E is 138 g/mole. Find the empirical and molecular formula of Compound E.
Diberi jisim molar bagi Sebatian E adalah 138 g/mol. Cari formula empirik dan formula molekul bagi Sebatian E.
- [6 marks]
[6 markah]

QUESTION 2**SOALAN 2**

- CLO1 (a) Based on Figure 2 (a), name K, L, M and N.
Berdasarkan Rajah 2 (a), namakan K, L, M dan N.

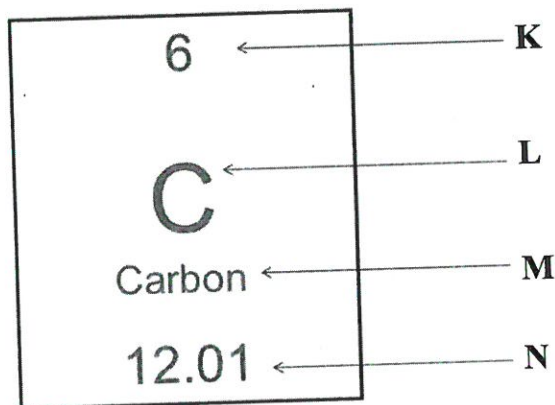


Figure 2 (a) / Rajah 2 (a)

[4 marks]

[4 markah]

QUESTION 3

SOALAN 3

- CLO1 (a) Define covalent bond and give **TWO (2)** examples of compounds that consist of covalent bond.
- Takrifkan ikatan kovalen dan berikan DUA (2) contoh sebatian yang mengandungi ikatan kovalen.*
- [4 marks]
[4 markah]
- (b) Generally, chemical compounds are divided into ionic and covalent compounds.
- Secara amnya, sebatian kimia dibahagikan kepada sebatian ionik dan kovalen.*
- CLO1 i) Write **TWO (2)** physical properties of ionic compounds.
- Nyatakan DUA (2) sifat fizikal sebatian ionik.*
- [4 marks]
[4 markah]
- CLO1 ii) Element X has a proton number of 8 and forms a diatomic molecule itself. By drawing the Lewis structure of this diatomic molecule, explain the concept of valence electron together with the type of bond present between the two atoms.
- Unsur X mempunyai nombor proton 8 dan membentuk molekul diatomik dengan sendirinya. Dengan melukis struktur Lewis bagi molekul diatomik ini, terangkan tentang konsep electron valens beserta dengan jenis ikatan yang terbentuk antara dua atom tersebut.*
- [6 marks]
[6 markah]

- CLO1 (c) A student is preparing a solution by dissolving 7.89 g of solid R in distilled water in 450 cm³ volumetric flask. The solid R is a chemical compound with relative molecular mass (RMM) of 40 g/mol. Calculate the molarity of the resulting solution.

Seorang pelajar sedang menyediakan satu larutan dengan melarutkan 7.89 g pepejal R dalam air suling menggunakan 450 cm³ kelalang isipadu. Pepejal R ialah sebatian kimia dengan jisim molekul relatif (RMM) 40 g/mol. Kira kemolaran larutan yang terhasil.

[6 marks]

[6 markah]

QUESTION 4

SOALAN 4

- CLO1 (a) Define acid and base according to Arrhenius and Brønsted-Lowry theory, respectively.

Takrifkan asid dan bes mengikut teori Arrhenius dan teori Brønsted-Lowry.

[4 marks]

[4 markah]

- (b) Figure 4(b) shows the equation for acid-base reaction.

Rajah 4 (b) menunjukkan persamaan bagi tindak balas asid-bes.

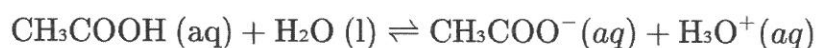


Figure 4 (b) / Rajah 4(b)

- CLO1 i) Determine the acid, base, base conjugate and acid conjugate.

Tentukan asid, bes, konjugat bes dan konjugat asid.

[4 marks]

[4 markah]

- CLO1 ii) Explain your answer in Question 4(b)(i) according to Brønsted-Lowry theory of acid and base.
- Terangkan jawapan anda bagi Soalan 4(b)(i) mengikut teori asid dan bes Brønsted-Lowry.*

[6 marks]

[6 markah]

- CLO1 (c) Given the concentration of a potassium hydroxide solution, KOH is 0.3M. Calculate the pOH and the pH of the solution.
- Diberi kepekatan satu larutan potasium hidroksida, KOH adalah 0.3M. Kira pOH dan juga pH bagi larutan tersebut.*

[6 marks]

[6 markah]

QUESTION 5**SOALAN 5**

- CLO1 (a) State **FOUR (4)** factors that affect the rate of reaction.
- Nyatakan **EMPAT (4)** faktor yang mempengaruhi kadar tindak balas.*

[4 marks]

[4 markah]

- (b) Figure 5 (b)(i) shows the chemical reaction of ammonia gas (NH₃) formation.
- Rajah 5(b)(i) menunjukkan persamaan kimia bagi pembentukan gas ammonia (NH₃).*

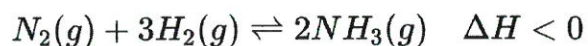


Figure 5 (b) (i) / Rajah 5(b) (i)

- CLO1 i) Explain the equilibrium shift for the reaction in Figure 5(b)(i) when the temperature is increased and decreased.

Terangkan anjakan keseimbangan untuk tindak balas dalam Rajah 5(b)(i) apabila suhu dinaikkan dan diturunkan.

[4 marks]

[4 markah]

- CLO1 ii) Elaborate **THREE (3)** factors that affect the equilibration shift of the reactants and products.

Huraikan TIGA (3) faktor yang mempengaruhi peralihan keseimbangan bagi bahan tindak balas dan juga hasil tindak balas.

[6 marks]

[6 markah]

- CLO1 (c) Figure 5 (c) shows an endothermic reaction to produce carbon monoxide, CO and bromine gases (Br₂). Predict the change of the equilibrium position if CO is removed, temperature of the system is decreased and the volume of the system is increased, respectively.

Rajah 5 (c) meunjukkan satu tindak balas endotermik untuk menghasilkan gas karbon monoksida, CO dan gas bromin, Br₂. Jangkakan setiap perubahan keseimbangan sekiranya CO disingkirkan, suhu sistem dikurangkan dan isipadu sistem tersebut ditingkatkan.



Figure 5(c) / Rajah 5(c)

[6 marks]

[6 markah]

SOALAN TAMAT



GIVEN FORMULA:

$\text{Mole} = \frac{\text{mass}}{\text{molar mass}}$	$\text{Avogadro Constant, } N_A = 6.02 \times 10^{23}$	$1 \text{ mole particles} = 6.02 \times 10^{23}$
$\text{Molarity} = \frac{\text{mole}}{\text{Volume (L)}}$	$\text{Molality} = \frac{\text{mole}}{\text{mass (kg)}}$	$\frac{M_a V_a}{M_b V_b} = \frac{a}{b}$
$C_1 V_1 = C_2 V_2$ $M_1 V_1 = M_2 V_2$	$pH = -\log[H^+]$ $pOH = -\log[OH^-]$ $pH + pOH = 14$	$1 \text{ ppm} = 1 \text{ mg/L}$
$1 \text{ m} = 1 \times 10^2 \text{ cm}$ $1 \text{ mm} = 1 \times 10^{-1} \text{ cm}$ $1 \mu\text{m} = 1 \times 10^{-4} \text{ cm}$ $1 \text{ nm} = 1 \times 10^{-7} \text{ cm}$	$1 \text{ L} = 1000 \text{ mL}$ $1 \text{ mL} = 1000 \mu\text{L}$	$1 \text{ kg} = 1000 \text{ g}$ $1 \text{ g} = 1000 \text{ mg}$
Molecular formula = $n \times$ (Empirical formula)		
$n = \frac{\text{molar mass}}{\text{mass of empirical formula}}$		
$\text{Percentage, \% w/w} = \frac{\text{mass of solute (g)}}{\text{mass of solution (g)}} \times 100$		
$\text{Percentage, \% w/v} = \frac{\text{mass of solute (g)}}{\text{volume of solution (mL)}} \times 100$		
$\text{Percentage, \% v/v} = \frac{\text{volume of solute (mL)}}{\text{volume of solution (mL)}} \times 100$		

