

INSTRUCTION:

This section consists of **FOUR (4)** structured questions. Answer **ALL** questions.

ARAHAN:

Bahagian ini mengandungi **EMPAT (4)** soalan berstruktur. Jawab **SEMUA** soalan.

QUESTION 1**SOALAN 1**

- (a) An atom FOR element Y has 17 protons, 17 electrons and 18 neutrons.

Atom bagi elemen Y mempunyai 17 proton, 17 elektron dan 18 neutron.

CLO1

- (i) Give the name of element Y and its isotopic notation (A_ZY)

Berikan nama elemen Y dan notasi isotop (A_ZY).

[2 marks]

[2 markah]

CLO1

- (ii) Element Y can form the Y^- ion. State the number of proton, electron, neutron and nucleon for this ion.

Elemen Y dapat membentuk ion Y^- . Nyatakan nombor proton, elektron, neutron dan nukleon bagi ion tersebut.

[2 marks]

[2 markah]

CLO1

- (b) Table **1(b)(i)** below shows elements and their respective electronic configuration.

Jadual 1(b)(i) di bawah menunjukkan unsur dan setiap konfigurasi elektronnya.

Table 1(b)(i) Electronic configuration of element

Jadual 1(b)(i) Konfigurasi elektron unsur

Element / Unsur	Electronic Configuration / Konfigurasi Elektron
W	$1s^2 2s^2 2p^6 3s^2 3p^2$
X	$1s^2 2s^2 2p^5$
Y	$1s^2 2s^2 2p^6 3s^2$
Z	$1s^2 2s^2 2p^6 3s^2 3p^5$
Q	$1s^2 2s^2 2p^6 3s^2 3p^6$

CLO1

- (i) Choose the element(s) that,

Pilihkan unsur yang,

- a. belongs to the same group
tergolong dalam kumpulan yang sama
- b. has the highest melting point.
mempunyai takat lebur tertinggi
- c. exists as a noble gas group.
wujud sebagai kumpulan gas adi.

[3 marks]

[3 markah]

- (ii) Visualize the orbital diagram for the following ions.

Gambarkan gambar rajah orbit bagi setiap ion di bawah.

(1) Fe^{2+}

(2) F^-

(3) K^+

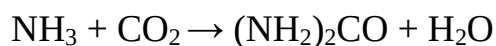
[Proton Number; *Nombor Proton*; Fe = 26, F = 9, K = 19]

[6 marks]

[6 markah]

- (c) The urea fertilizer, $(\text{NH}_2)_2\text{CO}$ is prepared with a sample of ammonia with carbon dioxide reaction:

Baja urea, $(\text{NH}_2)_2\text{CO}$ dihasilkan daripada tindak balas satu sampel ammonia dengan karbon dioksida:



If 12.5 g of NH_3 is allowed to react with 25.0 g of CO_2 ,

Jika 12.5 g NH_3 diperuntukkan untuk bertindak balas dengan 25.0 g CO_2 ,

- CLO1 (i) Calculate the limiting and excess reactant by balancing the chemical equation above.

Kirakan bahan tindak balas terhad dan bahan tindak balas berlebihan dengan seimbangkan persamaan bagi tindakbalas kimia di atas.

[8 marks]

[8 markah]

- CLO1 (ii) Calculate the amount of $(\text{NH}_2)_2\text{CO}$ (in grams) produced.

Kirakan jisim $(\text{NH}_2)_2\text{CO}$ (dalam gram) yang terhasil.

[4 marks]

[4 markah]

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

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

QUESTION 2

SOALAN 2

- CLO 1 (a) (i) Highlight the Lewis dot symbols to represent the formation of lithium fluoride (LiF).

Tunjukkan simbol titik Lewis untuk mewakili pembentukan litium florida (LiF).

[Proton Number; Nombor Proton; Li = 3, F = 9]

[4 marks]

[4 markah]

- CLO 1 (ii) Describe **THREE (3)** properties of covalent bond.

*Jelaskan **TIGA (3)** sifat ikatan kovalen.*

[3 marks]

[3 markah]

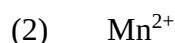
CLO 1	(b)	(i)	Express ground state, excited state and hybridized state of the central atom in AlI_3 . <i>Tentukan 'ground state', 'excited state' dan 'hybridized state' bagi atom pusat untuk AlI_3.</i> [4 marks] [4 markah] Given: Proton number, Al = 13, I = 53 Diberi: Nombor proton, Al = 13, I = 53
CLO 1		(ii)	Draw the molecular geometry of AlI_3 with related naming. <i>Lukiskan geometri molekul bagi AlI_3 serta penamaan yang berkaitan.</i> [2 marks] [2 markah]
CLO 1	(c)	(i)	Elaborate the definition of acid and base according to the Arrhenius Theory. <i>Huraikan definisi asid dan alkali berdasarkan teori Arrhenius.</i> [4 marks] [4 markah]
CLO 1		(ii)	Assign TWO (2) examples for each strong acid and strong base. <i>Berikan DUA (2) contoh bagi setiap asid kuat dan alkali kuat.</i> [4 marks] [4 markah]
CLO 1		(iii)	The concentration of H^+ in a sample of orange juice is 0.0025 M. Calculate the pH and pOH of the solution. Given, $K_w = 1 \times 10^{-14}$. <i>Kepekatan H^+ dalam satu sampel jus oren ialah 0.0025 M. Kirakan pH dan pOH larutan tersebut. Diberi, $K_w = 1 \times 10^{-14}$.</i> [4 marks] [4 markah]

QUESTION 3

SOALAN 3

CLO 2

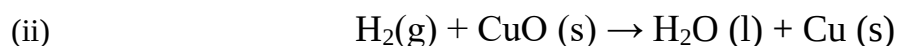
- (a) (i) Identify the oxidation number of Mn in the following ion,
Kenalpasti nombor pengoksidaan bagi Mn bagi sebatian di bawah:



[2 marks]

[2 markah]

CLO 2



Based on the equation above, choose the element that undergoes oxidation and reduction.

Berdasarkan pada persamaan di atas, pilih elemen yang mengalami pengoksidaan dan penurunan.

[2 marks]

[2 markah]

CLO 2

- (b) (i) Compare **THREE (3)** differences between oxidation and reduction.
*Bandingkan **TIGA (3)** perbezaan antara pengoksidaan dan penurunan.*

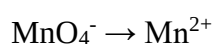
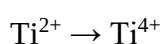
[3 marks]

[3 markah]

CLO 2

- (ii) Titanium(II) ions, Ti^{2+} can be oxidized by acidified manganate(VII) ions to Ti^{4+} ions. The half equations are given as follows:

Ion Titanium(II), Ti^{2+} boleh teroksida melalui ion manganat(VII) berasid kepada ion Ti^{4+} . Persamaan setengah diberi seperti di bawah:



Detail the above balanced redox equation in an acidic medium.

Perincikan persamaan seimbang redoks di atas dalam medium berasid.

[4 marks]

[4 markah]

- (c) By referring to the half-cell equations below,

Berpandukan persamaan setengah di bawah,



CLO 2

- (i) Draw a labelled galvanic cell diagram including the direction of its ions and electron flow.

Lukis rajah sel galvanik berlabel termasuk arah ion-ionnya dan pergerakan elektron.

[8 marks]

[8 markah]

CLO 2

- (ii) Write the chemical equations for the reactions at the anode, cathode and overall reaction.

Berikan persamaan kimia yang berlaku di anod, katod dan keseluruhan tindak balas.

[3 marks]

[3 markah]

CLO 2

- (iii) Calculate the value of E°_{cell} for the galvanic cell.

Kirakan nilai E°_{cell} bagi sel galvanik ini.

[3 marks]

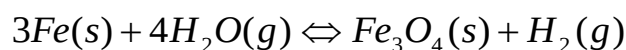
[3 markah]

QUESTION 4

SOALAN 4

CLO 2

- (a) Highlight the equilibrium constant expression, K_c and K_p for the reaction below:
Tunjukkan ungkapan pemalar keseimbangan, K_c dan K_p bagi tindak balas di bawah:



[2 marks]

[2 markah]

CLO 2

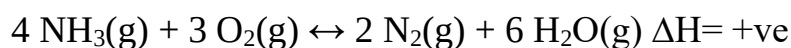
- (b) (i) Express **THREE (3)** factors that influenced the rates of reaction.
*Tentukan **TIGA (3)** faktor yang mempengaruhi kadar tindak balas.*

[3 marks]

[3 markah]

CLO 2

- (ii) Consider the following equilibrium system:
Pertimbangkan sistem keseimbangan berikut:



Explain the direction of the equilibrium if the system is disturbed by adding O_2 .

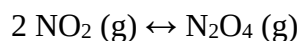
Terangkan arah keseimbangan jika sistem diganggu oleh penambahan O_2 .

[3 marks]

[3 markah]

CLO 2

- (iii) At 25°C , $K_p = 7.13$ for the reaction:
Pada 25°C , $K_p = 7.13$ untuk tindak balas:



At equilibrium, the partial pressure of NO_2 in a container is 0.15 atm. Locate the partial pressure of N_2O_4 in the mixture.

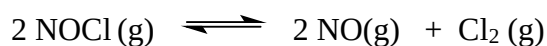
Pada keadaan keseimbangan, tekanan separa NO_2 di dalam bekas ialah 0.15 atm. Carikan tekanan separa N_2O_4 dalam campuran tersebut.

[3 marks]

[3 markah]

- (c) Consider the reaction below,

Dengan mengambil kira tindak balas di bawah,



If a 1.0 L flask containing 5.0 mol NOCl was heated to 120°C, 1.25 mol Cl₂ was collected at equilibrium,

Jika sebuah kelalang berisipadu 1.0 L yang mengandungi 5.0 mol NOCl telah dipanaskan kepada 120°C, dan 1.25 mol Cl₂ telah diperolehi pada keseimbangan,

CLO 2

- (i) Calculate the molarity of NOCl and Cl₂.

Kirakan kemolaran bagi NOCl dan Cl₂.

[4 marks]

[4 markah]

CLO 2

- (iii) Calculate the molarity of NOCl, NO and Cl₂ at equilibrium and the value of equilibrium constant, K_c at 120°C.

kirakan kemolaran bagi NOCl, NO dan Cl₂ pada keseimbangan dan nilai pemalar keseimbangan, K_c pada 120°C.

[10 marks]

[10 markah]

SOALAN TAMAT