



KEMENTERIAN PENDIDIKAN TINGGI
JABATAN PENDIDIKAN POLITEKNIK DAN KOLEJ KOMUNITI

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

JABATAN KEJURUTERAAN PETROKIMIA

PEPERIKSAAN AKHIR

SESI II : 2025/2026

DGP10293 : APPLIED CHEMISTRY

TARIKH : 29 APRIL 2026

MASA : 8.30 PAGI - 10.30 PAGI (2 JAM)

Kertas soalan ini mengandungi **SEMBILAN (9)** halaman bercetak.

Struktur (4 soalan)

Dokumen sokongan yang disertakan : Tiada

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIARAHKAN

(CLO yang tertera hanya sebagai rujukan)

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**

- CLO1 (a) Name **P**, **R** and **S** in Diagram 1(a) with the correct subatomic particles.
*Namakan **P**, **R** dan **S** Rajah 1(a) dengan zarah subatom yang betul.*

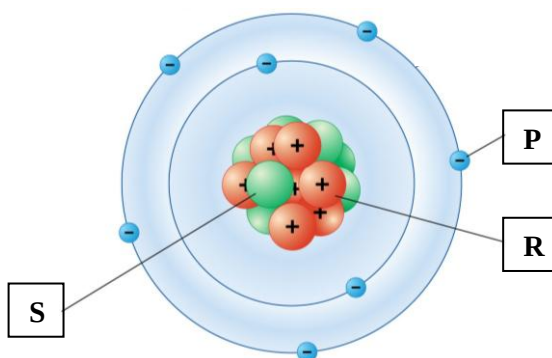


Diagram 1(a) / Rajah 1(a)

[3 marks]

[3 markah]

- CLO1 (b) A mystery liquid is found to contain 40.0% of carbon, 6.7% of hydrogen, and 53.3% of oxygen by mass. Its molar mass is determined to be 180.16 g/mol. (Atomic mass of C = 12, H = 1 and O = 16)
Satu cecair misteri didapati mengandungi peratusan jisim karbon 40.0%, hidrogen 6.7%, dan oksigen 53.3%. Jisim molar cecair tersebut telah ditentukan berjumlah 180.16 g/mol. (Jisim atom C = 12, H = 1 dan O = 16)
- i. Approximate the empirical formula of the mystery liquid.
Anggarkan formula empirik cecair misteri tersebut.

[4 marks]

[4 markah]

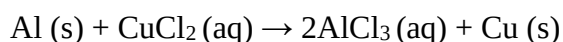
- ii. Approximate its molecular formula.
Anggarkan formula molekul cecair tersebut.

[3 marks]

[3 markah]

CLO1

- (c) Aluminum reacts with copper (II) chloride in following reaction.
Aluminium bertindakbalas dengan kuprum (II) klorida di dalam persamaan berikut.



- i. Write the balance equation of the reaction.
Tuliskan persamaan seimbang bagi tindakbalas tersebut.

[3 marks]

[3 markah]

- ii. Calculate the limiting reactant and excess reactant if 5.0 g of Al reacts with 15 g of CuCl₂. (Atomic mass Al = 27, Cu = 64, Cl = 35)
Kirakan reaktan mengehad dan reaktan lebihan jika 5.0 g Al bertindakbalas dengan 15 g CuCl₂. (Jisim atom Al = 27, Cu = 64, Cl = 35)

[8 marks]

[8 markah]

- iii. 0.08 mol of AlCl₃ was produced from the reaction. The process yields 88% of the theoretical data. Calculate the theoretical yield.
0.08 mol AlCl₃ dihasilkan dari tindakbalas. Proses tersebut menghasilkan 88% daripada data teori. Kirakan hasil teori.

[4 marks]

[4 markah]

QUESTION 2

SOALAN 2

- CLO1 (a) State the electron configuration, group, period and block for Scandium, Sc.
($Z_{\text{Sc}} = 21$)
Nyatakan konfigurasi elektron, kumpulan, kala dan blok bagi Scandium, Sc.
($Z_{\text{Sc}} = 21$)
- [4 marks]
[4 markah]
- CLO1 (b) The periodic table, also known as the periodic table of elements, is an ordered arrangement of the chemical elements into rows (periods) and columns (groups).
Jadual berkala, juga dikenali sebagai jadual berkala unsur, ialah susunan tertib unsur kimia ke dalam baris (tempoh) dan lajur (kumpulan).
- i. Compare Ca, Ca^+ and Ca^{2+} in terms of ionic radius.
Bandingkan Ca, Ca^+ dan Ca^{2+} dari segi jejari ion.
- [3 marks]
[3 markah]
- ii. Explain the trend of atomic radius according to the period and the group.
Terangkan 'trend' jejari atom mengikut kala dan kumpulan.
- [4 marks]
[4 markah]

CLO1 (c) Lewis dot structures (or Lewis's electron dot diagrams) are visual representations showing how atoms bond and arrange electrons.

Struktur titik Lewis (atau gambar rajah titik elektron Lewis) ialah gambaran visual yang menunjukkan bagaimana atom terikat dan susunan elektron.

- i. Draw Lewis dot structure for MgF_2 . ($Z_{\text{Mg}} = 12$, $Z_{\text{F}} = 9$)

Lukiskan struktur titik Lewis bagi MgF_2 . ($Z_{\text{Mg}} = 12$, $Z_{\text{F}} = 9$)

[4 marks]

[4 markah]

- ii. Draw Lewis dot structure for PCl_3 . ($Z_{\text{P}} = 15$, $Z_{\text{Cl}} = 17$)

Lukiskan struktur titik Lewis bagi PCl_3 . ($Z_{\text{P}} = 15$, $Z_{\text{Cl}} = 17$)

[4 marks]

[4 markah]

- iii. Calculate the formal charge of the following Lewis's dot structure compounds in Table 2(c). ($Z_{\text{O}} = 8$, $Z_{\text{C}} = 6$)

Kirakan caj formal bagi struktur titik Lewis sebatian-sebatian berikut di dalam Jadual 2(c). ($Z_{\text{O}} = 8$, $Z_{\text{C}} = 6$)

Table 2(c) / Jadual 2(c)

Structure A/Struktur A	Structure B/Struktur B

[6 marks]

[6 markah]

QUESTION 3

SOALAN 3

- CLO1 (a) Identify the Brønsted-Lowry acid, Brønsted-Lowry base, conjugate base and conjugate acid for the following reaction:
Tentukan asid Brønsted-Lowry, bes Brønsted-Lowry, asid konjugat dan bes konjugat bagi tindakbalas berikut:
- $$\text{HCO}_3^- + \text{HSO}_4^- \rightarrow \text{CO}_3^{2-} + \text{H}_2\text{SO}_4$$
- [4 marks]
[4 markah]
- CLO1 (b) Sodium hydroxide is a strong base. In an experiment, 450 g of sodium hydroxide pellets are dissolved to prepare 5000 ml of a concentrated sodium hydroxide solution, NaOH. (Atomic mass: Na = 23, O = 16, H = 1)
Natrium hidroksida adalah bes kuat. Dalam satu eksperimen, 450 g natrium hidroksida telah digunakan untuk penyediaan 5000 ml larutan natrium hidroksida pekat, NaOH. (Jisim atom: Na = 23, O = 16, H = 1)
- i. Express **THREE (3)** properties of sodium hydroxide as a strong base.
*Nyatakan **TIGA (3)** sifat natrium hidroksida sebagai bes kuat.*
- [3marks]
[3 markah]
- ii. Approximate the molarity of the concentrated sodium hydroxide solution.
Anggarkan kemolaran larutan natrium hidroksida pekat tersebut.
- [4marks]
[4 markah]

- iii. Approximate the volume of the concentrated sodium hydroxide solution required (in litres) to prepare 200 ml of a 0.8 M NaOH solution.

Anggarkan jumlah larutan natrium hidroksida pekat yang diperlukan (dalam liter) untuk menyediakan satu larutan 200ml NaOH dengan kepekatan 0.8 M.

[4 marks]

[4 markah]

- (c) Hydrofluoric acid, HF is a weak acid used in etching glass.

Asid hidroflorik, HF adalah asid lemah yang digunakan dalam punaran kaca.

- i. Calculate the pH of HF solution with an $[H^+]$ concentration of $2.8 \times 10^{-3} \text{ mol dm}^{-3}$.

Kirakan nilai pH bagi larutan HF dengan kepekatan $[H^+]$ $2.8 \times 10^{-3} \text{ mol dm}^{-3}$.

[2 marks]

[2 markah]

- ii. Calculate the pH of 18.6 g of hydrofluoric acid in 7500 ml of solution. Given the atomic mass H = 1 and F = 19.

Kirakan pH bagi 18.6 g asid hidroflorik di dalam larutan 7500 ml. Diberi jisim atom H = 1 and F = 19.

[4 marks]

[4 markah]

- iii. Calculate the concentration of 150 ml NaOH needed to neutralize 60 ml of hydrofluoric acid with a pH of 0.75.

Kirakan kepekatan larutan 150ml NaOH yang diperlukan untuk meneutralkan 60 ml larutan asid hidroflorik dengan pH 0.75.

[4 marks]

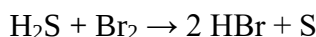
[4 markah]

QUESTION 4

SOALAN 4

- (a) Identify the oxidizing agent, reducing agent, oxidized compound and reduced compound for the following reaction:

Tentukan agen pengoksidaan, agen penurunan, sebatian yang teroksida dan sebatian yang terturun bagi tindakbalas berikut:



[4 marks]

[4 markah]

CLO1

- (b) Cell notation is a shorthand description of a galvanic cell. Diagram 4(b) below displays an example of galvanic cell between a magnesium and iron electrode. *Sel notasi merupakan diskripsi ringkas bagi sebuah sel galvanik. Rajah (b) di bawah menunjukkan contoh sel galvanik antara elektrod magnesium dan besi.*

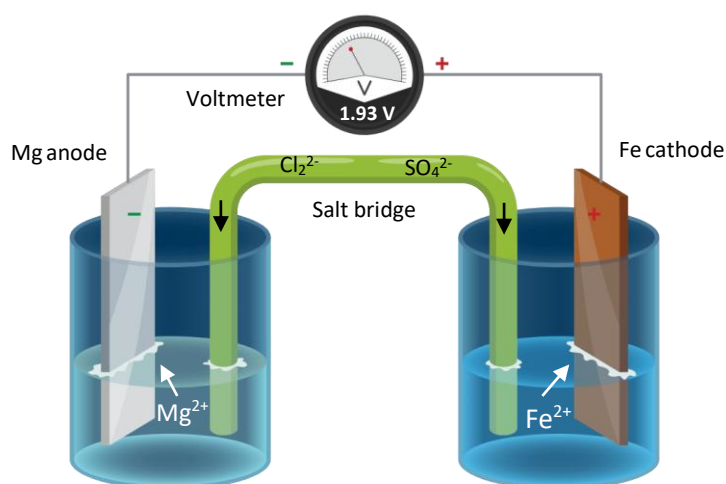


Diagram 4(b) / Rajah 4(b)

- i. From Diagram 4(b), express the half-cell reaction and overall chemical reaction that occurs at the galvanic cell.

Berdasarkan Rajah 4(b), nyatakan tindak balas sel separuh dan tindak balas keseluruhan kimia yang berlaku pada sel galvanik tersebut.

[6 marks]

[6 markah]

- ii. From Diagram 4(b), express the cell notation.

Berdasarkan Rajah 4(b), nyatakan sel notasi.

[4 marks]

[4 markah]

CLO1

- (c) Redox reactions can be used to convert chemical energy to electrical energy.
Tindak balas redoks boleh digunakan untuk mengubah tenaga kimia kepada tenaga elektrik.

Table 4(c) / Jadual 4(c)

Solution: 1M aqueous solution of lead (II) sulfate (PbSO ₄)	Solution: 1M aqueous solution of silver nitrate (AgNO ₃)
Electrode: <i>lead</i> bar Pb	Electrode: <i>silver</i> bar Ag
$\text{Pb}^{2+}(\text{aq}) + 2\text{e}^- \rightarrow \text{Pb}(\text{s}), E^\circ = -0.13 \text{ V}$	$\text{Ag}^+(\text{aq}) + 1\text{e}^- \rightarrow \text{Ag}(\text{s}), E^\circ = +0.80 \text{ V}$

- i. Draw the galvanic cell including anode, cathode, electrolyte and electron flow according to Table 4(c).

Lukiskan sel galvanik termasuk anod, katod, elektrolit dan pergerakan electron berpandukan Jadual 4(c).

[8 marks]

[8 markah]

- ii. Calculate the electrode potential from the given standard reduction potential.

Kirakan keupayaan elektrod daripada keupayaan elektrod piawai yang diberikan.

[3 marks]

[3 markah]

SOALAN TAMAT