SULIT

KEMENTERIAN PENDIDIKAN TINGGI
JABATAN PENDIDIKAN POLITEKNIK DAN KOLEJ KOMUNITI

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

JABATAN MATEMATIK, SAINS & KOMPUTER

PEPERIKSAAN AKHIR

SEMESTER II : 2023/2024

FB20074 : CHEMISTRY 2

TARIKH : 27 MEI 2024
MASA : 11.30 PAGI – 1.30 PETANG (2 JAM)

Kertas ini mengandungi **SEBELAS (11)** halaman bercetak.

Struktur (5 soalan)

Dokumen sokongan yang disertakan : Tiada

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIARAHKAN

(CLO yang tertera hanya sebagai rujukan)

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) Define exothermic and endothermic reactions.

Takrifkan tindakbalas eksoterma dan endoterma.

[4 marks]

[4 *markah*]

CLO1 (b) The rate law for the following reaction is given as:

Diberi kadar bagi tindak balas adalah seperi berikut:

$$2NO\ (g) + 2H_2\ (g) \rightarrow N_2\ (g) + 2H_2O\ (g)$$

$$\text{Rate} = k\,[NO]^2[H_2]$$

Express the **differential rate equation** and **order of reaction** for each reactant.

*Nyatakan **persamaan kadar tindak balas** dan **tertib tindak balas** untuk setiap bahan tindak balas.*

[4 marks]

[*4 markah*]

CLO2 (c) Given the enthalpy changes of the reactions :

Diberi nilai perubahan entalpi tindakbalas :

$2H_2O\ (l) \rightarrow 2H_2\ (g) + O_2\ (g)$ $\quad \Delta H = +571$ kJ/mol

$2\ HF\ (g) \rightarrow H_2\ (g) + F_2\ (g)$ $\quad \Delta H = +543$ kJ/mol

Express ΔH for the following reaction using algebraic method.

Nyatakan ΔH untuk tindakbalas berikut menggunakan kaedah algebraik.

$$2\ F_2\ (g) + 2H_2O\ (l) \rightarrow 4HF\ (aq) + O_2\ (g)$$

[4 marks]

[*4 markah*]

CLO2 (d) Draw and label an electrolytic cell for the electrolysis of the molten sodium chloride ($NaCl_2$) using graphite as electrode.

Lukis dan label sel elektrolitik untuk elektrolisis leburan natrium klorida ($NaCl_2$) menggunakan elektrod grafit.

[8 marks]

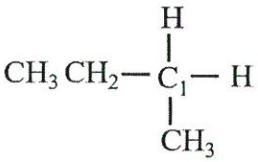
[*8 markah*]

QUESTION 2

SOALAN 2

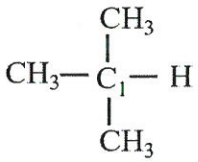
CLO1 (a) The structure of **TWO (2)** alkanes are shown below. Identify the carbon atom, C_1 as primary, secondary or tertiary carbon for alkane A and alkane B.

*Struktur **DUA (2)** alkana adalah seperti dibawah. Kenalpasti atom karbon, C_1 sebagai karbon primer, sekunder atau tertier untuk alkana A dan alkana B.*



Alkane A

Alkana A



Alkane B

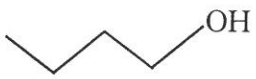
Alkana B

[2 marks]

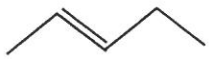
[*2 markah*]

CLO1 (b) Convert skeletal structure for compound **C** and **D** to **expanded structure** and **condensed structure**.

*Tukarkan struktur rangka untuk sebatian **C** dan **D** kepada **struktur kembang** dan **struktur padat.***



Compound C
Sebatian C



Compound D
Sebatian D

[4 marks]
[*4 markah*]

CLO1 (c) Cis-trans isomerism commonly occurs in alkenes due to the presence of the C=C bond in alkenes. State the **cis** and **trans** isomers in **structural formula form** for the following compounds.

*Keisomeran cis-trans biasanya wujud dalam alkena kerana ikatan C = C. Nyatakan isomer **cis** dan **trans** dalam **bentuk formula struktur** bagi sebatian berikut.*

i) $CH_3\ CH_2\ CH = CH\ CH_3$
ii) $Cl\ CH = CH\ Cl$

[4 marks]
[*4 markah*]

CLO2 (d) i) Visualize **TWO (2)** possible structural isomers for hexane with a molecular formula C_6H_{14} .

*Gambarkan **DUA (2)** isomer struktur untuk hexane dengan formula molekul C_6H_{14} .*

[4 marks]
[*4 markah*]

CLO2

ii) Draw **THREE (3)** structural isomers with the molecular formula of C_4H_9Br
*Lukiskan **TIGA (3)** isomer struktur dengan formula molekul C_4H_9Br .*

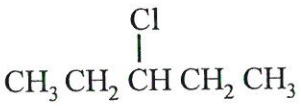
[6 marks]
[*6 markah*]

QUESTION 3
SOALAN 3

CLO1

(a) Identify the class of the haloalkane given below as methyl, primary, secondary or tertiary.
Kenalpasti kelas haloalkana di bawah samada metil, primer, sekunder atau tertier.

i) $CH_3\,CH_2\,CH_2\,F$

ii)


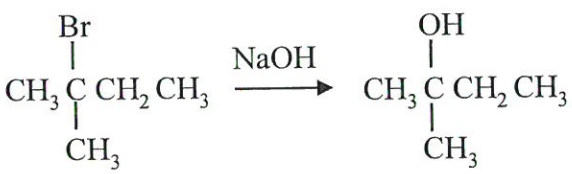
iii) $CH_3\,Br$

iv) $(CH_3)_3\,C\,Br$

[4 marks]
[*4 markah*]

CLO2

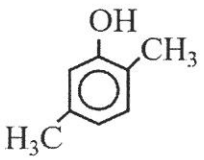
(b) 2-Bromo-2-methylbutane can undergo nucleophilic substitution reaction with sodium hydroxide (NaOH) via SN1 mechanism. Write the **mechanism** for this reaction.
*2-Bromo-2-metilbutana boleh menjalankan tindakbalas penukargantian neukleofil dengan natrium hidroksida (NaOH) melalui mekanisma SN1. Tuliskan **mekanisma** untuk tindakbalas ini.*



[8 marks]
[*8 markah*]

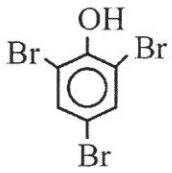
CLO1 (c) i) Give the complete IUPAC name for compound X and Y.
Berikan nama IUPAC yang lengkap bagi sebatian X dan Y.

Compound X
Sebatian X



IUPAC Name : 2,5 - .....phenol
Nama IUPAC : 2,5 - .....fenol

Compound Y
Sebatian Y



IUPAC Name : ..... – tribromophenol
Nama IUPAC : ..... – tribromofenol

[4 marks]
[*4 markah*]

CLO1 ii) The oxidation of primary alcohols will produce aldehydes or carboxylic acids depending on the reaction condition or reagent used. Express the reaction equation for 1-butanol to react with hot acidified $KMnO_4$.
Pengoksidaan alkohol primer akan menghasilkan aldehid atau asid karboksilik bergantung kepada keadaan tindakbalas atau reagen yang digunakan. Nyatakan persamaan tindakbalas untuk 1-butanol yang bertindak balas dengan $KMnO_4$ panas berasid.

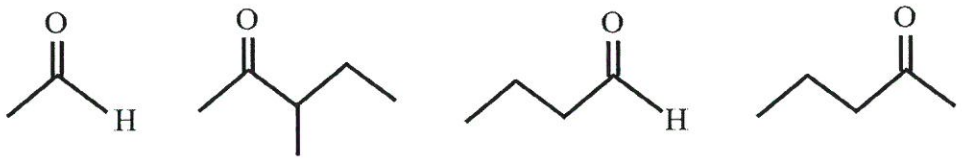
[4 marks]
[*4 markah*]

QUESTION 4

SOALAN 4

CLO1 (a) Aldehydes and ketones are organic compounds which incorporate a carbonyl functional group. Identify aldehyde or ketone in the compound **P**, **Q**, **R** and **S**.

*Aldehid dan keton ialah sebatian organik yang menggabungkan kumpulan berfungsi karbonil. Kenalpasti aldehid atau keton dalam sebatian **P**, **Q**, **R** dan **S**.*



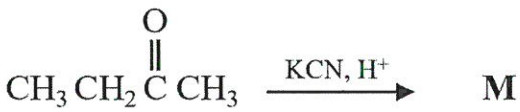
p **Q** **R** **S**

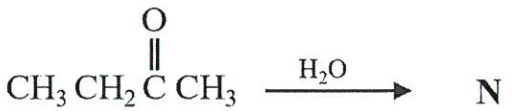
[4 marks]

[*4 markah*]

CLO1 (b) 2-butanone is reacted with different nucleophiles. Visualize the structures of compound **M** and **N.**

*2-butanon bertindak balas dengan nukleofil yang berbeza. Gambarkan struktur sebatian **M** dan **N.***





[4 marks]

[*4 markah*]

CLO2 (c) Carboxylic acids are weak acids and undergo neutralization with base such as sodium hydroxide to produce a water soluble salt and water. Provide the equation for the reaction of butanoic acid with sodium hydroxide.

Asid karboksilik merupakan asid lemah yang boleh melalui tindakbalas peneutralan dengan bes seperti natrium hidroksida untuk menghasilkan garam yang larut di dalam air dan air. Ungkapkan persamaan bagi tindakbalas asid butanoik dengan natrium hidroksida.

[8 marks]

[*8 markah*]

CLO1 (d) Convert carboxylic acid **K** and **L** in Table 1 according to the IUPAC nomenclature or structural formula.

*Tukarkan asid karboksilik **K** dan **L** dalam Jadual 1 mengikut tatanama IUPAC atau formula struktur.*

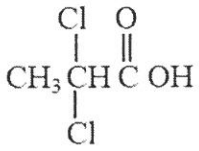
IUPAC nomenclature *Tatanama IUPAC*	Structural Formula *Formula Struktur*
K	
4-methylhexanoic acid *4-metilheksanoik asid*	**L**

Table 1 / Jadual 1

[4 marks]

[*4 markah*]

QUESTION 5
SOALAN 5

CLO1 (a) Identify the following amines given below as primary (1˚), secondary (2˚) or tertiary amines (3˚).
Kenalpasti amina yang berikut sebagai amina primer (1˚), sekunder (2˚) atau tertier (3˚).

i. $C_6H_5CH(CH_3)\ CH_2NH_2$

ii. $C_6H_5\,N\,CH_2\,CH_3$
$\quad\quad\quad |$
$\quad\quad\ CH_2\,CH_2\,CH_3$

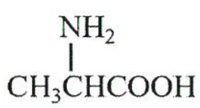
iii. $CH_3CH_2\,NH\,CH\,(CH_3)_2$

iv. $(CH_3)_2\,CH\,CH_2\,NH_2$

[4 marks]
[4 markah]

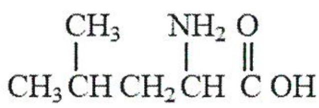
CLO1 (b) i) Give the complete name of amino acids **J** and **K** according to the IUPAC nomenclature.
*Berikan nama yang lengkap untuk amino asid **J** dan **K** mengikut tatanama IUPAC.*

Compound J
Sebatian J



IUPAC Name : ....propanoic acid
Nama IUPAC : asid........propanoik

Compound K
Sebatian K



IUPAC Name : 2-amino......pentanoic acid
Nama IUPAC : asid 2-amino.......pentanoik

[4 marks]
[4 markah]

CLO1

ii) Convert amino acid **L** and **M** to structural formula.
*Tukarkan amino asid **L** dan **M** kepada formula struktur.*

2-amino-3-methylpentanoic acid	2-amino-3-hydroxybutanoic acid
asid 2-amino-3-metilpentanoik	*asid 2-amino-3-hidroksibutanoik*
L	**M**

[4 marks]
[*4 markah*]

CLO2

(c) Arrange the following compounds in order of increasing solubility in water.

i) Ethanamine , 1-pentanamine, 1-propanamine, 1-butanamine

ii) Methylamine, trimethylamine, dimethylamine, ethyldimethylamine

Susun sebatian berikut dalam susunan mengikut turutan peningkatan keterlarutan dalam air

i) Etanamina , 1-pentanamina, 1-propanamina, 1-butanamina

ii) Metilamina, trimetilamina, dimetilamina, etildimetilamina

[4 marks]
[*4 markah*]

CLO2

(d) Table 2 shows the comparison of boiling points between isomeric amines.
Jadual 2 menunjukkan perbandingan takat didih antara isomer amina.

Amine *Amina*	Class *Kelas*	Molecular Weight *Jisim molekul*	Boiling point (°C) *Takat didih (°C)*
1-propanamine *1-propanamina*	Primary *Primer*	59	49
N-methylethanamine *N-metiletanamina*	Secondary *Sekunder*	59	37
N,N-dimethylmethanamine *N,N-dimetilmetanamina*	Tertiary *Tertier*	59	4

Table 2 / Jadual 2

Explain why the boiling point of 1-propanamine is 49°C while N,N-dimethylmethanamine is 4°C.
Terangkan kenapa takat didih 1-propanamina ialah 49°C manakala N,N-dimetilmetanamina ialah 4°C.

[4 marks]
[*4 markah*]

SOALAN TAMAT