SULIT

KEMENTERIAN PENDIDIKAN TINGGI
JABATAN PENDIDIKAN POLITEKNIK DAN KOLEJ KOMUNITI

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

JABATAN TEKNOLOGI KIMIA DAN MAKANAN

PEPERIKSAAN AKHIR

SESI II : 2022 / 2023

DMT20043: ORGANIC CHEMISTRY

TARIKH : 7 JUN 2023
MASA : 2.30 PTG – 4.30 PTG (2 JAM)

Kertas ini mengandungi **EMPAT BELAS (14)** 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)** subjective questions. Answer **ALL** questions.

ARAHAN:

*Bahagian ini mengandungi **LIMA (5)** soalan subjektif. Jawab **SEMUA** soalan.*

QUESTION 1

SOALAN 1

CLO1

(a) Figure 1(a) shows the hydrocarbon structural molecule. Identify the marked carbon (i), (ii), (iii), (iv) and (v) as a carbon primary (1°), secondary (2°), tertiary (3°) or quaternary (4°) carbon.

Rajah 1(a) menunjukkan struktur molekul hydrocarbon. Kenalpasti karbon yang bertanda (i), (ii), (iii), (iv) dan (v) sebagai karbon primer (1°), sekunder (2°), tertiar (3°) atau kuaterner (4°).

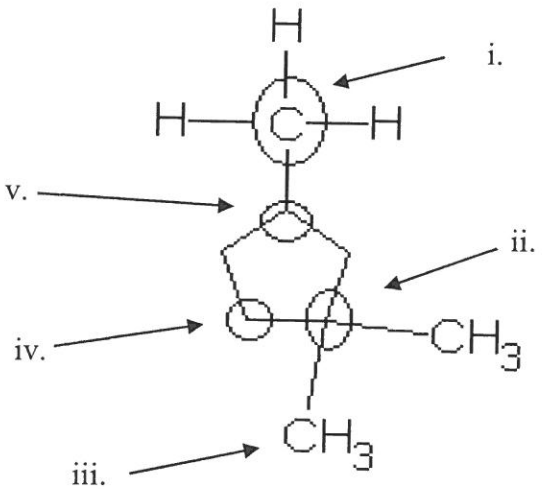


Figure 1(a) : Hydrocarbon structural molecule

Rajah 1(a): Struktur molekul hidrokarbon

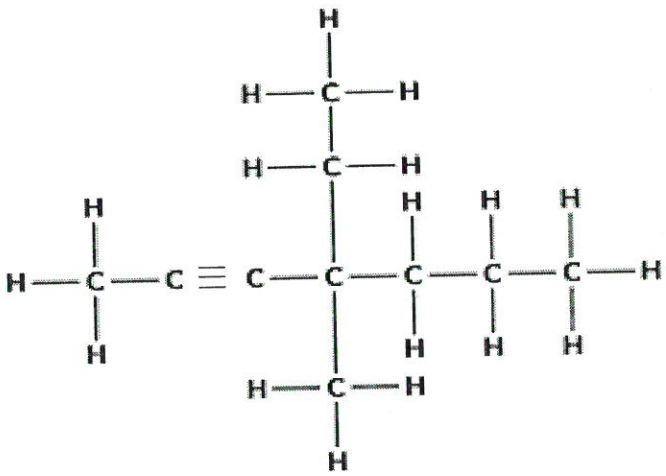
[5 marks]
[*5 markah*]

CLO1 (b) In the IUPAC nomenclature system, identifying a functional group is the first step in the nomenclature rule. Explain the other **FIVE (5)** steps in that rule.
*Dalam sistem penamaan IUPAC, mengenalpasti kumpulan berfungsi adalah langkah pertama dalam hukum tatanama. Terangkan **LIMA (5)** langkah lain di dalam hukum tersebut.*

[5 marks]
[*5 markah*]

CLO1 (c) Name the following compounds according to the IUPAC nomenclature system.
Namakan sebatian berikut mengikut sistem penamaan IUPAC.

i.



[2 marks]
[*2 markah*]

ii. $CH_3 - C(CH_3) = C(C_2H_5) - CH_3$

[3 marks]
[*3 markah*]

CLO1

(d) Sketch the structural formula for the following compounds.
Lakarkan formula struktur bagi sebatian di bawah.

i. 3-cyclobutylpent-1-yne
3-siklobutilpent-1-una

[2 marks]
[*2 markah*]

ii. 2-ethyl-3-methylhex-2-ene
2-etil-3-metilheks-2-ena

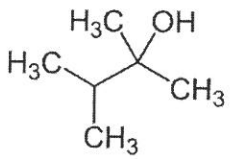
[3 marks]
[*3 markah*]

QUESTION 2
SOALAN 2

CLO1

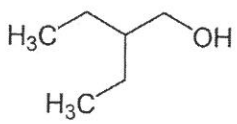
(a) Identify the class for each compound as primary (1°), secondary (2°) or tertiary (3°) alcohol.
Kenalpasti kelas untuk setiap sebatian sebagai alkohol premier (1°), sekunder (2°) atau tertier (3°).

i.

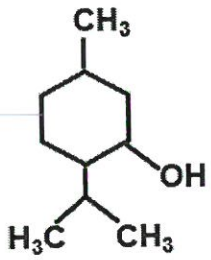


ii.

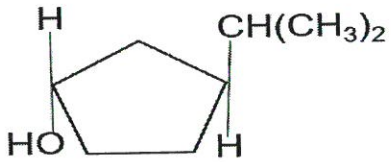
iii.



iv.



v.



[5 marks]

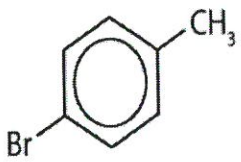
[*5 markah*]

CLO1

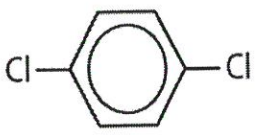
(b) Express the name for the following compound by using the IUPAC nomenclature system.

Tafsirkan nama sebatian berikut dengan menggunakan sistem penamaan IUPAC.

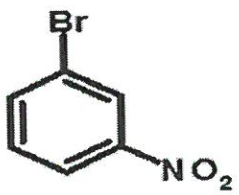
i.



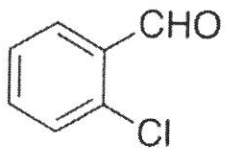
ii.



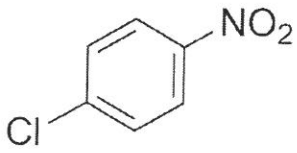
iii.



iv.



v.



[5 marks]
[*5 markah*]

CLO1 (c) Categorize **FIVE (5)** types of benzene derivatives.
*Kategorikan **LIMA (5)** jenis-jenis terbitan benzana.*

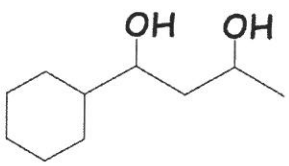
[5 marks]
[*5 markah*]

CLO1 (d) Express the correct names for the following molecules by using the IUPAC nomenclature system.
Zahirkan nama yang betul bagi sebatian berikut dengan menggunakan sistem penamaan IUPAC.

i. $(CH_3)_2C(OH)CH_2CH(CH_3)CH_3$

[2 marks]
[*2 markah*]

ii.



[3 marks]
[*3 markah*]

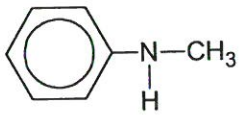
QUESTION 3

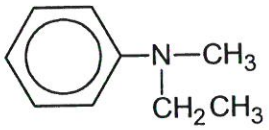
SOALAN 3

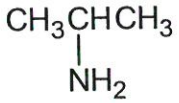
CLO1 (a) Identify the classes for the following amines below.

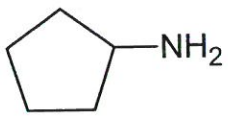
Kenalpasti kelas bagi sebatian amin di bawah.

i. $CH_3CH_2CH_2NH_2$

ii. 

iii. 

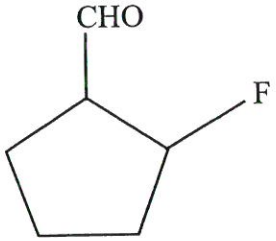
iv. 

v. 

[5 marks]
[*5 markah*]

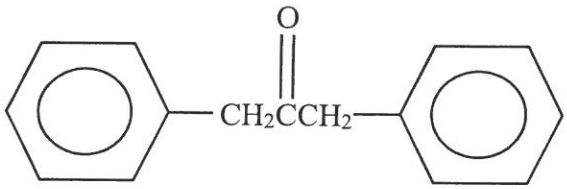
CLO1 (b) Express the correct IUPAC names for the following compounds.

Nyatakan nama IUPAC yang betul bagi sebatian berikut.

i. 

[2 marks]
[*2 markah*]

ii.



[3 marks]
[*3 markah*]

CLO1 (c) Visualize the structure for the following compounds based on the IUPAC nomenclature system.
Gambarkan struktur sebatian berikut mengikut sistem penamaan IUPAC.

i. 4-chlorobenzoic acid
Acid *4-klorobenzoik*

[2 marks]
[*2 markah*]

ii. 6-chloro-2,2-dimethylhexanoic acid
Acid *6-kloro-2,2-dimetilheksanoik*

[3 marks]
[*3 markah*]

CLO1 (d) Figure 3(d) shows the structure of isoleucine, one of the basic units of protein.
Rajah 3(d) menunjukkan struktur isoleusin, salah satu unit asas untuk protein.

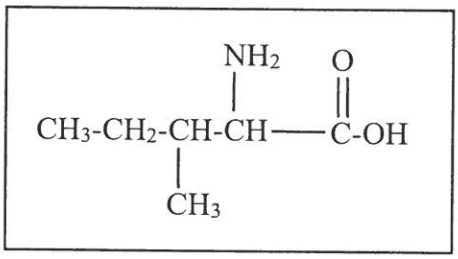


Figure 3 (d): Isoleucin structure
Rajah 3(d): Struktur Isoleusin

i. Choose **THREE (3)** functional groups present in the isoleucine molecule.
*Pilih **TIGA (3)** kumpulan fungsi yang terdapat dalam sebatan isoleusin.*

[3 marks]
[*3 markah*]

ii. Express the name of the compound in Figure 3(d) according to the IUPAC naming system.
Zahirkan nama sebatian dalam Rajah 3(d) mengikut sistem penamaan IUPAC.

[2 marks]
[*2 markah*]

QUESTION 4

SOALAN 4

CLO1 (a) Identify whether the statements below are **TRUE** or **FALSE**.
*Kenalpasti samada penyataan di bawah **BETUL** atau **SALAH**.*

i. Electrophiles are electron rich.
Elektrofil kaya dengan elektron.

ii. Nucleophiles have nonbonding electron pairs.
Nukleofil mempunyai pasangan elektron tidak terikat.

iii. The strongest nucleophile is $NH4^+$.
Nukleofil terkuat ialah $NH4^+$.

iv. Tertiary alkyl halides react the fastest in S_N1 reactions.
Alkil halida tertier bertindak balas paling cepat dalam tindak balas S_N1.

v. Elimination reactions involving tertiary alkyl halides result in alkyl alcohols.
Tindak balas penyingkiran yang melibatkan alkil halida tertier menghasilkan alkil alkohol.

[5 marks]
[*5 markah*]

CLO1 (b)

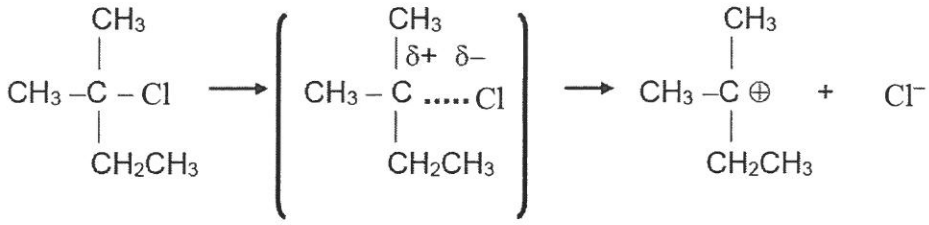


Figure 4(b): Reaction mechanism of 2-chloro-2-methylbutane

Rajah 4(b) : Mekanisma tindakbalas 2-kloro-2-metilbutana

Figure 4(b) shows the mechanism of 2-chloro-2-methylbutane undergoes nucleophilic substitution reaction with hydroxide ion, OH^-.

Rajah 4(b) menunjukkan mekanisme 2-kloro-2-metilbutana mengalami tindak balas penukargantian nukleofilik dengan ion hidroksida, OH^-.

i. Categorize whether the compound undergoes S_N1 or S_N2 reaction.

Kategorikan sama ada sebatian tersebut menjalani tindakbalas S_N1 atau S_N2.

[2 marks]
[*2 markah*]

ii. Explain **ONE (1)** reason for your answer in b (i).

*Terangkan **SATU (1)** alasan bagi jawapan anda di b (i).*

[2 marks]
[*2 markah*]

iii. Visualize the reaction mechanism of carbocation with hydroxide (OH-) ion and express the name products obtained.

Gambarkan mekanisma tindak balas karbokation dengan ion hidroksida (OH-) dan zahirkan nama produk yang diperolehi..

[3 marks]
[*3 markah*]

CLO1 (c)

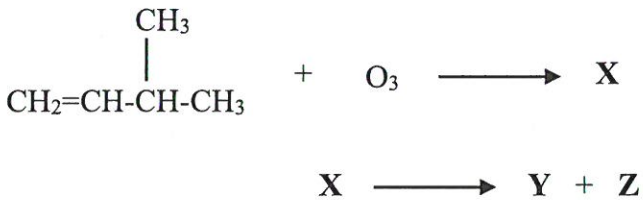


Figure 4 (c): Mechanism of 3-methylbutene with ozone

Rajah 4(c): Mekanisma 3-metilbutena dengan ozon

Figure 4 (c) shows the mechanism of 3-methylbutene with ozone produce **X** as ozonide compound.

*Rajah 4(c) menunjukkan mekanisma 3-metilbutena dengan ozon menghasilkan **X** sebagai sebatian ozonid.*

i. Categorize the type of reaction involved.

Kategorikan jenis tindak balas yang terlibat.

[2 marks]
[*2 markah*]

ii. Write the structural formula for the compound **X**.

*Tuliskan formula struktur sebatian **X**.*

[2 marks]
[*2 markah*]

iii. When **X** is reduced with hydrogen and (Pt) as catalyst, the products formed are **Y** and **Z**. Sketch the structural formula for the compound **Y** and **Z**.

*Apabila **X** melalui proses penurunan bersama hydrogen dan (Pt) sebagai mangkin, produk yang terhasil adalan **Y** dan **Z**. Lakarkan formula struktur sebatian **Y** dan **Z**.*

[4 marks]
[*4 markah*]

QUESTION 5

SOALAN 5

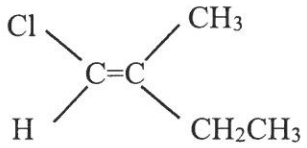
CLO1 (a) Identify the following compounds as cis, trans, Z or E isomer based on the Cahn-Ingold Prelog system.

Given atomic number : H= 1, C = 6, O = 8 , Cl = 17 , Br = 35, F = 9

Kenalpasti sebatian berikut sebagai cis, trans, Z atau E isomer berdasarkan sistem Cahn-Ingold Prelog.

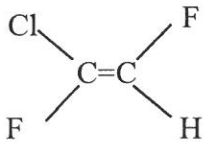
Diberi atomic number : H= 1, C = 6, O = 8 , Cl = 17 , Br = 35, F = 9

i.



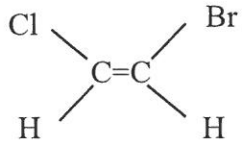
[1 mark]
[*1 markah*]

ii.



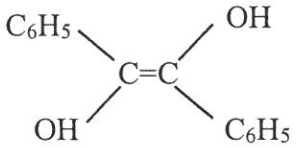
[1 mark]
[*1 markah*]

iii.

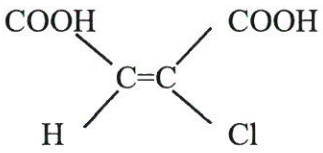


[1 mark]
[*1 markah*]

iv.



[1 mark]
[*1 markah*]

v. 

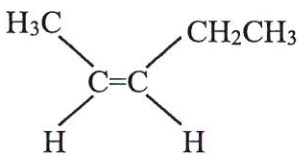
[1 mark]
[1 markah]

CLO1 (b) Express the IUPAC name the following geometrical isomers according to the Cahn-Ingold-Prelog Naming System.

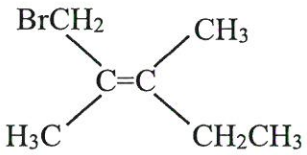
Given atomic number: H= 1, C = 6, O = 8 , Br = 35

Tafsirkan nama IUPAC isomer geometri berikut mengikut Sistem Penamaan Cahn-Ingold Prelog.

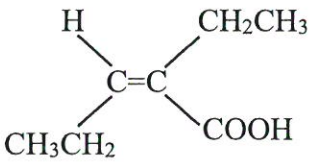
Diberi nombor atom: H= 1, C = 6, O = 8 , Br = 35,

i. 

[2 marks]
[*2 markah*]

ii. 

[2 marks]
[*2 markah*]

iii. 

[3 marks]
[*3 markah*]

CLO1 (c) Sketch the structural formula for the following compounds.

Given atomic number : H= 1, C = 6, O = 8 , Cl = 17 , Br = 35

Lakarkan formula struktur untuk sebatian di bawah.

Diberi nombor atom : H= 1, C = 6, O = 8 , Cl = 17 , Br = 35

i. (E)-2-pentene

(E)-2-pentena

[2 marks]
[*2 markah*]

ii. (Z)-2-bromo-2-pentene

(Z)-2-bromo-2-pentena

[3 marks]
[*3 markah*]

iii. (Z)-1-chloro-3-methylbutene

(Z)-1-kloro-3-metilbutena

[3 marks]
[*3 markah*]

SOALAN TAMAT