

UNIVERSITY OF JAFFNA, SRILANKA
BACHELOR OF PHARMACY
SECOND YEAR FIRST SEMESTER EXAMINATION – SEPTEMBER 2018
PHARMACEUTICAL CHEMISTRY II - PHACH 2124

DATE: 20.09.2018

TIME: 3 Hours.

ANSWER ALL QUESTIONS.

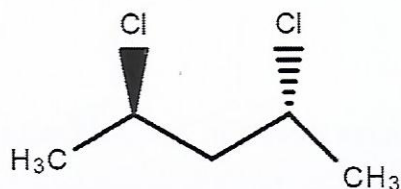
1.

1.1. Define the followings and state two examples for each.

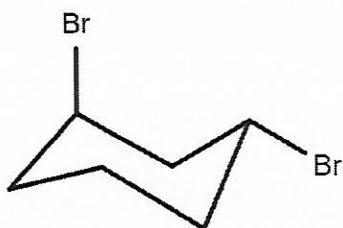
- 1.1.1. Diastereomers. (10 Marks)
1.1.2. Constitutional isomers. (10 Marks)
1.1.3. Meso compound. (10 Marks)

1.2. State whether the following molecules are chiral or achiral.

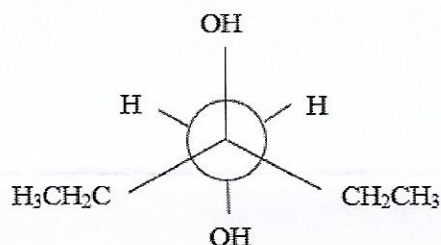
1.2.1.



1.2.2.

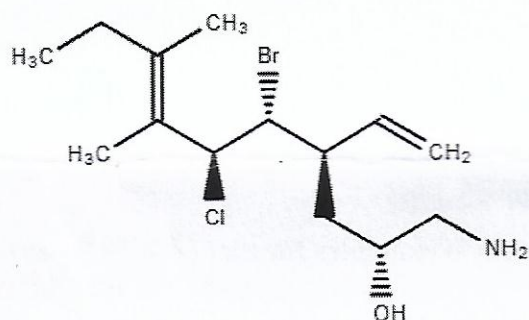


1.2.3.



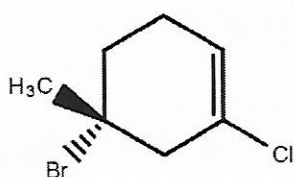
1.3. Identify the chiral centres and assign R/S configuration in the following molecule.

1.3.1.



(30 Marks)

1.3.2.



(10 Marks)

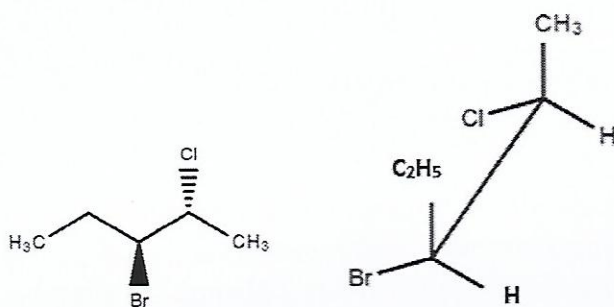
1.4. Indicate the possible symmetry elements present in 1,4-dichlorobenzene, H₂O and BF₂Cl.

(15 Marks)

2.

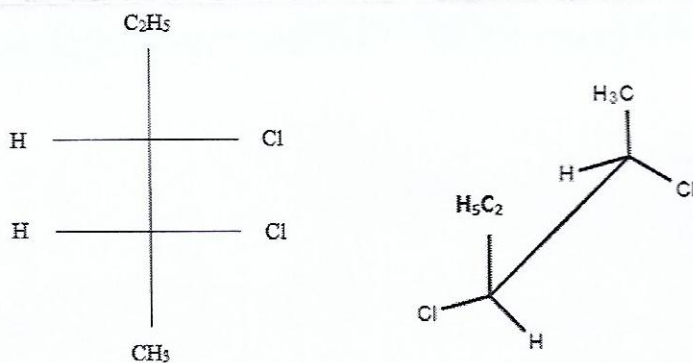
2.1. Classify the following pairs of compounds based on the stereochemical relationship as identical compounds, enantiomers or diastereomers and give the reason for your answer.

2.1.1.



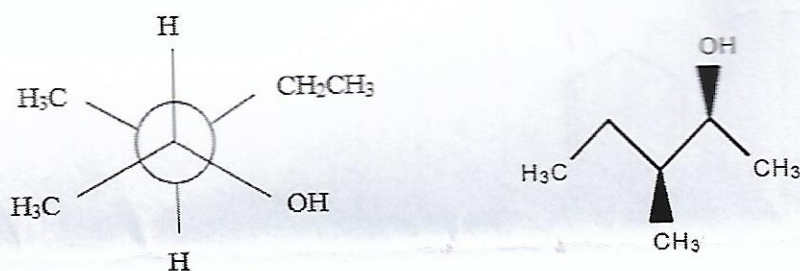
(15 Marks)

2.1.2.



(15 Marks)

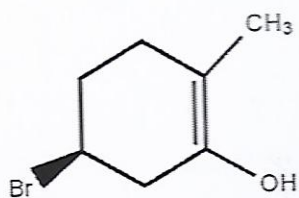
2.1.3.



(15 Marks)

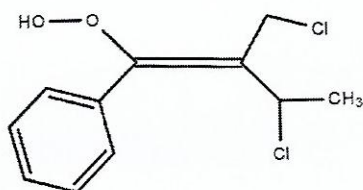
2.2. Specify the configuration as E or Z for the following molecules.

2.2.1.



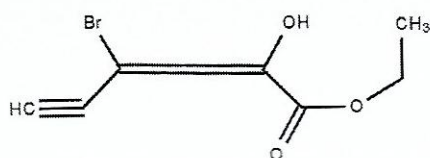
(10 Marks)

2.2.2.



(10 Marks)

2.2.3.



(10 Marks)

2.3. State the Huckel's rule for aromaticity.

(10 Marks)

2.4. State whether the following chemical species are aromatic, non aromatic or anti aromatic and give the reasons for your answers.

2.4.1.



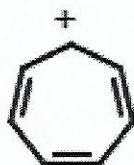
(05 Marks)

2.4.2.



(05 Marks)

2.4.3.

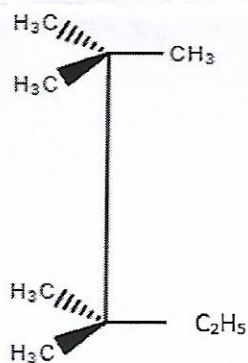


(05 Marks)

3.

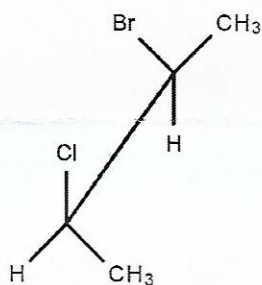
3.1. Draw the Fischer projection for the following molecules.

3.1.1.



(10 Marks)

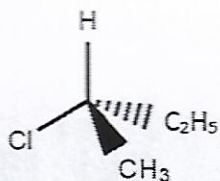
3.1.2.



(10 marks)

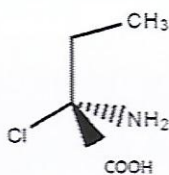
3.2. Assign D/L configurations for the following molecules.

3.2.1.



(15 Marks)

3.2.2.



(15 Marks)

3.3.

3.3.1. Define the terms optical purity and specific rotation.

(20 Marks)

3.3.2. Briefly explain the separation of racemic modification.

(30 Marks)

4.

4.1. Briefly explain the factors that affecting the acidity of organic compounds.

(30 Marks)

4.2. Arrange the following species in the order of decreasing pK_a and give the reason/s.

4.2.1.

- O₂NCH₂COOH,
- CH₃OCH₂COOH,
- FCH₂COOH,
- Me₃CCOOH,
- CH₃COOH

(15 Marks)

4.2.2.

- o*-NO₂C₆H₄NH₂,
- o*-MeC₆H₄ NH₂,
- PhOH,
- m*-MeC₆H₄OH,
- p*-NO₂C₆H₅OH

(15 Marks)

4.2.3.

- Pyridine,
- Pyrrole,
- Aniline

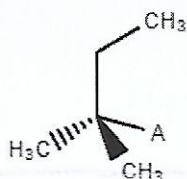
(15 Marks)

4.3. Define the reactive intermediates and give the common structure of the carbon intermediates.

(25 Marks)

5.

5.1. Consider the following substrate which undergoes S_N1 reaction with a nucleophile (Nu^-) and answer the following questions.



(A is the leaving group)

- 5.1.1. Write the step/s involving in this reaction and stereo specific products of this reaction. (15 Marks)
- 5.1.2. Indicate which step is the rate limiting step. (05 Marks)
- 5.1.3. Draw the structures of transition states and intermediates. (10 Marks)
- 5.1.4. Briefly explain the factors that determine the S_N1 reaction characteristics. (20 Marks)
- 5.2. Explain the mechanism through which the following exothermic reactions are occur, write the end product/s and draw the labelled energy profile diagrams.
- 5.2.1. Benzene + $Br_2 \xrightarrow{FeBr_3}$ (20 Marks)
- 5.2.2. $(CH_3)_3CCH=CH_2 + HBr \xrightarrow{\hspace{2cm}}$ (30 Marks)

6.

- 6.1. Give the chemical structure and one medicinal use for each of the following drugs.
- 6.1.1. Carbamazepine. (7.5 Marks)
- 6.1.2. Chloral hydrate. (7.5 Marks)
- 6.1.3. Diphenhydramine hydrochloride. (7.5 Marks)
- 6.1.4. Paracetamol. (7.5 Marks)
- 6.2. Sketch the synthetic route of the following medicinal substances.
- 6.2.1. Phenytoin sodium. (15 Marks)
- 6.2.2. Tolbutamide. (15 Marks)
- 6.3.
- 6.3.1. Draw the Newman projection structure for the cyclohexane. (10 Marks)
- 6.3.2. Draw the planar and corresponding chair conformations for both cis and trans 1,2-dimethylcyclohexane and indicate the most stable chair conformation among them (30 Marks)