UNIVERSITY OF JAFFNA, SRI LANKA

FACULTY OF ALLIED HEALTH SCIENCES

FIRST YEAR FIRST SEMESTER EXAMINATION IN BPharmHons– 2023

PHACH 1173 PHARMACEUTICAL CHEMISTRY I

Date: 2 0 DEC 2024   **Time: 2 Hours**

ANSWER <u>ALL</u> THE FOUR QUESTIONS

1. **1.1** **1.1.1** Define isomerism.   **(10 Marks)**

    1.1.2 Diagrammatically illustrate the possible isomerism of

    1.1.2.1 $[Pt(NH_3)_2NO_2Cl]$ **(20 Marks)**

    1.1.2.2 $[Co(NH_3)_4Cl_2]^+$ **(20 Marks)**

    1.1.3 Briefly explain the administration of chelating agents to remove the
    heavy metals from body with an example.   **(10 Marks)**

    1.2 **1.2.1** Define conformational isomers.   **(10 Marks)**

    1.2.2 Explain why equilibrium constant (K) of methoxy cyclohexane is   **(30 Marks)**
    lower than methylcyclohexane.

2. **2.1** **2.1.1** Define reversible and irreversible processes.   **(10 Marks)**

    2.1.2 An amount of 2 mole of an ideal gas at 300 K and 6 atm pressure
    undergoes expansion isothermally to half the initial pressure. If this
    expansion takes place; calculate the work done by the gas on the
    surrounding in each of the following cases (R-8.314 $JK^{-1}mol^{-1}$).

    2.1.2.1 Irreversibly against zero external pressure.   **(10 Marks)**

    2.1.2.2 Irreversibly against the 3 atm external pressure.   **(15 Marks)**

    2.1.2.3 Reversibly against the 3 atm external pressure..   **(15 Marks)**

    2.2 **2.2.1** Define phase diagram.   **(10 Marks)**

    2.2.2 Briefly discuss the temperature-composition phase diagram of a   **(30 Marks)**
    partially miscible liquid.

    2.2.3 List the applications of eustatic mixtures in the pharmaceutical
    industry.   **(10 Marks)**

3. **3.1** 3.1.1 Define half-life of a drug.   **(05 Marks)**

        3.1.2 Define shelf life of a drug.   **(05 Marks)**

    3.2 Consider the following reaction,

$$A + B \longrightarrow Product$$
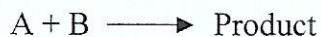
        3.2.1 The initial concentration of B is much higher than that of A ($[B]_o \gg [A]_o$). Derive the integrated rate equation for a pseudo first-order reaction and half-life.   **(40 Marks)**

        3.2.2 Draw the graph for concentration against time of the reaction mention in 3.2.1.   **(10 Marks)**

    3.3 In a particular experiment it was found that the concentration of N_2O_5 in liquid Bromine varied with time as follows:

Time (s)	0	200	400	600	1000
$[N_2O_5]/$ ($moldm^{-3}$)	0.110	0.073	0.048	0.032	0.014

        3.3.1 Confirm that the reaction obeys first order in N_2O_5.   **(20 Marks)**

        3.3.2 Determine the rate constant and half-life of the above reaction.   **(20 Marks)**

4. **4.1** Define the followings.
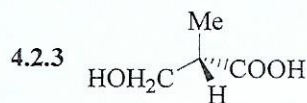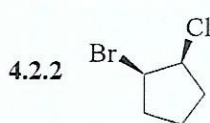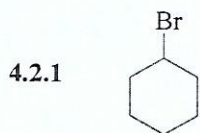
        4.1.1 Chirality   **(05 Marks)**

        4.1.2 Enantiomer   **(05 Marks)**
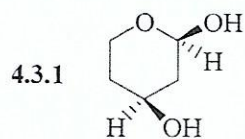
        4.1.3 Diastereomer   **(05 Marks)**

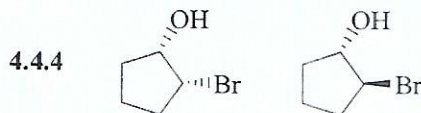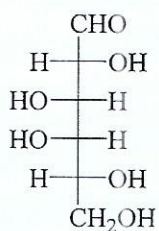   **4.2** Indicate which of the following compounds are the chiral or achiral with **(15 Marks)** justification.
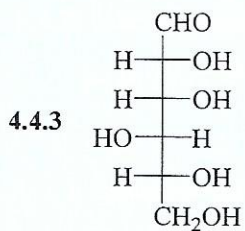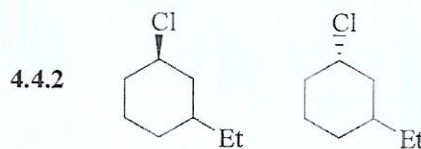
4.2.1   4.2.2   4.2.3

4.3 Assign a configuration, R or S, to each of the following compounds. **(30 Marks)**

4.3.1

O OH
//H

H OH

4.3.2

CHOHCOOH

HOOC —OH
H

4.4 State the stereochemical relationship between the following molecules with justification.

4.4.1

CHO
H——OH
HO——H
CH₂OH

OH
H//,
HOH₂C   CHO
H   OH

4.4.2

Cl

Et

Cl

Et

4.4.3

CHO
H——OH
H——OH
HO——H
H——OH
CH₂OH

CHO
H——OH
HO——H
HO——H
H——OH
CH₂OH

4.4.4

OH

Br

OH

Br

(40 Marks)