

KATHMANDU UNIVERSITY
End Semester Examination [C]
December, 2024

Marks Scored:

Level : B.Pharm.

Course : CHEM 104

Year : I

Semester : II

Exam Roll No. :

Time: 30 mins.

F. M. : 20

Registration No.:

Date : 16 DEC 2024

SECTION "A"

[20Q. × 1 = 20 marks]

Choose and mark [X] the most appropriate option from each set of choices

1. List the substituents in order of priority from highest to lowest on the basis of Cahn-Ingold-Prelog rule.

I. -OH II. -COOH III. -CH₃ IV. -CH₂CH₃

I > II > III > IV

IV > III > II > I

II > IV > I > III

I > II > IV > III

2. When 0.30 g of sucrose is dissolved in 10.0 ml of water and placed in a sample tube 10.0 cm in length, the observed rotation is +1.99° (using the D line of sodium at 20°C). What is the specific rotation of sucrose?

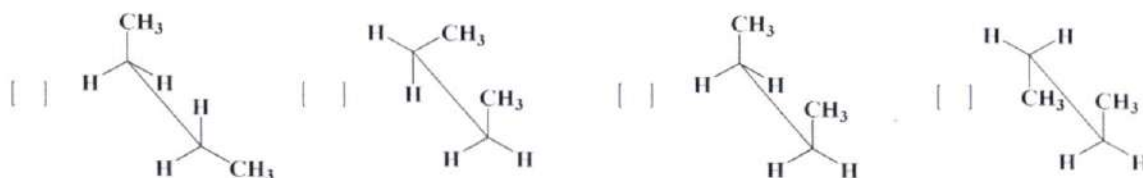
+66.3

-66.3

+6.63

+0.663

3. Which of the following conformations is most stable?



4. In the chair conformation, substituents on cyclohexane prefer the equatorial position because:

It reduces torsional strain

It reduces steric hindrance

It maximizes hydrogen bonding

It minimizes angle strain

5. Which mechanism below is a single step mechanism?

E1

E2

S_N1

E1CB

6. Which of the following statements about nucleophilic substitution is **CORRECT**?

S_N2 reactions involve a carbocation intermediate.

S_N1 reactions proceed faster in polar aprotic solvents.

S_N2 reactions proceed via a one-step mechanism.

S_N1 reactions involve inversion of configuration.

7. Which of the following substituted aromatic compound is the least reactive toward nitration?

Benzene

Nitrobenzene

Chlorobenzene

Toluene

KATHMANDU UNIVERSITY
End Semester Examination [C]
December, 2024

Level : B.Pharm.

Year : I

Time : 2 hrs. 30mins.

Course : CHEM 104

Semester : II

F. M. : 55

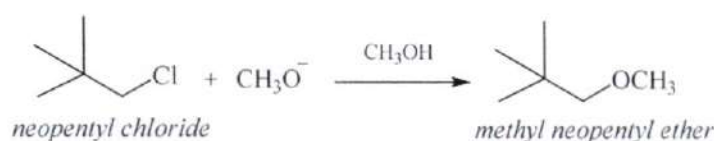
16 DEC 2024

SECTION "B"

Attempt ALL questions.

1.

- a. Write structures of all the possible stereoisomers of 2,3-dibromopentane and assign RS configuration for each chirality center of all structure. Also, mention the relationship among the structure drawn. [2+2+1=5]
- b. Consider the following S_N1 reaction.

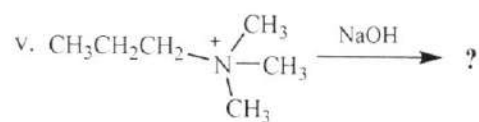
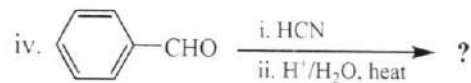
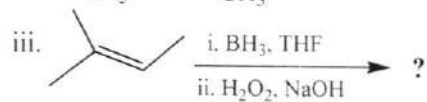
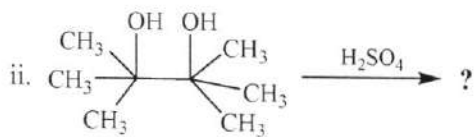


- i. Draw an energy diagram, label the axes, the reactants, products, E_a . Assume that the reaction is exothermic. [3]
- ii. What happens to the reaction rate in each of the following case? [5]
- The leaving group is changed from Cl^- to Br^- .
 - The solvent is changed from methanol to HMPTA.
 - The alkyl halide is changed from neopentylchloride to tert-butylchloride.
 - The concentration of methoxide ion is increased by a factor of two.
 - The nucleophile i.e. methoxide ion is changed to hydroxide ion
2. Write short notes on (ANY FOUR) [4×3=12]
- Role of polar aprotic solvents on nucleophilic substitution
 - Resonance of reactive intermediates in organic reactions
 - Rearrangement of carbocation
 - Resolution of racemic mixture
 - Conformational analysis of n-butane
3. Give the appropriate reasons (ANY FIVE) [5×3=15]
- Free radical bromination is more selective than that of chlorination.
 - Inversion of configuration is often found in S_N2 reaction.
 - Addition of HBr on propene yields 2-bromopropane.
 - Generation of a chiral center from achiral compound yields optically inactive compound.
 - OH is an activating group for electrophilic aromatic substitution.
 - Chair conformation of cyclohexane is most stable
 - Benzene is more stable than expected stability of cyclohexatriene.

P.T.O.

4. Give the major product/s for the following reactions.

[5]



5. Propose possible mechanism for each of the following reactions.

[5×2=10]

