Minnesota State University Moorhead

CHEM 350: Organic Chemistry I

A. COURSE DESCRIPTION

Credits: 3

Lecture Hours/Week: 3

Lab Hours/Week: 0

OJT Hours/Week: *.*

Prerequisites:
CHEM 210 - General Chemistry II

Corequisites: None

MnTC Goals: None

Introduction to the classification, structure, reactions, and reaction mechanisms of carbon compounds.

B. COURSE EFFECTIVE DATES: 08/25/2008 - Present

C. OUTLINE OF MAJOR CONTENT AREAS

1. Structure and Properties of Organic Molecules
2. Alkyl Halides: Nucleophilic Substitution and Elimination
3. Alkenes: Structure, Synthesis, and Reactions
   Either
4. Conjugated Systems and Aromatic Compounds
5. Alcohols: Structure, Synthesis, and Reactions and Organometallics
6. Structure and Stereochemistry of Alkanes
7. The Study of Chemical Reactions
8. Stereochemistry

D. LEARNING OUTCOMES (General)

1. Apply Resonance and Conjugation. Predict and explain patterns in stability, shape, hybridization, reactivity, and product formation when resonance or conjugation applies to a reactant, intermediate, or final product.
2. Apply Stability-Reactivity Principles. Predict, explain, and rank the relative speeds of different chemical reactions by applying structure-dependent patterns in stability combined with application of mechanism recognition.
3. Classify, explain, and apply fundamental reactions. Be able to recognize, classify, explain, and apply fundamental organic reactions such as SN2, SN1, E2, E1, alkene addition, electrophilic aromatic substitution, 1,2/1,4-additions, ring-opening, and radical halogenation. Be able to apply concepts associated with these general reaction types to product prediction, synthesis design, and reaction mechanism.
4. Demonstrate Understanding in Scenarios Involving Alkanes, Alkenes, Alkyl Halides, and either Arenes or Alcohols. Answer questions and explain/predict/apply physical properties, nomenclature, synthesis, reactions, mechanisms, and synthesis design/retrosynthesis to scenarios involving alkanes, alkenes, alkyl halides, and either arenes or alcohols.
5. Draw Mechanisms. Draw logical and detailed mechanisms for various fundamental reactions of alkanes, halocarbons, alkenes, and either arenes or alcohols.
6. Predict and explain Patterns and Properties. Demonstrate the ability to predict and explain patterns in shape, structure, bonding, hybridization, formal charge, stability, acidity, basicity, solubility, and reactivity for hydrocarbons, halocarbons, alkenes, and either arenes or alcohols, by understanding and applying concepts of organic chemical structure and bonding and stability.
7. Predict reaction products. Demonstrate the ability to predict products, including stereochemistry, in the reactions of alkanes, halocarbons, alkenes, and either arenes or alcohols.
8. Recognize Stereochemistry. Classify molecules as chiral or achiral, identify chiral carbons as (R) or (S), identify relationships between pairs of molecules as enantiomers, diastereomers, or equivalent, and identify when a solution is racemic versus optically active.
9. Recognize Structure Relationships Between Chemicals. Be able to recognize relationships between two chemical structures as the same structures, resonance structures, structural isomers, enantiomers, or diastereomers.
10. Recognize and Apply Functional Groups. Classify organic molecules by their functional groups, and identify fundamental properties associates with those functional groups.
11. Retrosynthetic analysis and Synthesis Design. Use retrosynthetic analysis to design efficient multi-step syntheses involving halocarbons, alkenes, and either arenes or alcohols as intermediates or final products.
12. Use Nomenclature. Provide correct IUPAC names for alkanes, halocarbons, alkenes, and either arenes or alcohols, including cyclic molecules and including stereochemistry.

E. Minnesota Transfer Curriculum Goal Area(s) and Competencies

None

F. LEARNER OUTCOMES ASSESSMENT

As noted on course syllabus

G. SPECIAL INFORMATION

None noted