**General Instructional Objectives**

**Materials That you should be familier by taking CHEM 120 or 100, 101 &102**

* Be able to write Lewis symbols of elements and predict the number covalent bonds and ionic charge
* Be able to tell polarity (non-polar/polar/ionic) based on electronegativity of a covalent bond
* Be able to draw Lewis structures of organic molecules
* Be able to label the hybridization of carbon, oxygen and nitrogen in compounds
* Be able to identify functional groups and types of organic compounds

**Chapter 12. Saturated Hydrocarbons.**

**12. 1 Organic and Inorganic Compounds.**

* Know the difference between organic and inorganic compounds

**12. 2 Bonding Characteristics of the Carbon Atom.**

* Describe the bonding characteristics of the carbon atom

**12. 3 Hydrocarbons and Hydrocarbon Derivatives.**

**12. 4 Alkanes: Acyclic Saturated Hydrocarbons.**

**12. 5 Structural Formulas.**

**12. 6 Alkane Isomerism.**

**12. 7 Conformations of Alkanes.**

**12. 8 IUPAC Nomenclature for Alkanes.**

**12. 9 Line-Angle Structural Formulas for Alkanes.**

**CHEMISTRY AT A GLANCE:**

**Structural Representations for Alkane Molecules.**

**12. 10 Classification of Carbon Atoms.**

**12. 11 Branched-Chain Alkyl Groups.**

**12. 12 Cycloalkanes.**

**12. 13 IUPAC Nomenclature for Cycloalkanes.**

**12. 14 Isomerism in Cycloalkanes.**

**12. 15 Sources of Alkanes and Cycloalkanes.**

**12. 16 Physical Properties of Alkanes and Cycloalkanes.**

**12. 17 Chemical Properties of Alkanes and Cycloalkanes.**

**CHEMISTRY AT A GLANCE: Properties of Alkanes and Cycloalkanes.**

**12. 18 Nomenclature and Properties of Halogenated Alkanes.**

**CHEMICAL CONNECTIONS:**

**The Occurrence of Methane; The Physiological Effects of Alkanes; Chlorofluorocarbons and the Ozone Layer.**

* 12.2 Describe the bonding characteristics of the carbon atom
* 12.3 Describe and select hydrocarbons and hydrocarbon derivatives
* 12.4 Know the types of alkanes: acyclic saturated hydrocarbons: normal and branced
* 12.5 Structural Formulas
* 12.6 Alkane Isomerism
* 12.7 Conformations of Alkanes
* 12.8 IUPAC Nomenclature for Alkanes
* 12.9 Line-Angle Formulas for Alkanes
* 12.10 Classification of Carbon Atoms
* 12.11 Branched-Chain Alkyl Groups
* 12.12 Cycloalkanes
* 12.13 IUPAC Nomenclature for Cycloalkanes
* 12.14 Isomerism in Cycloalkanes
* 12.15 Sources of Alkanes and Cycloalkanes
* 12.16 Physical Properties of Alkanes and Cycloalkanes
* 12.17 Chemical Properties of Alkanes and Cycloalkanes
* Be able to determine molecular formula from, condensed, structural, a line-angle formula Know IUPAC nomenclature for simple (unbranched) alkanes
* Be able to draw constitutional isomers (Lewis structures or condensed formulas as specified) given the molecular formula
* Know the names of common alkyl groups found on branched alkanes
* Know IUPAC nomenclature for normal alkanes
* Know IUPAC nomenclature for complex (branched) alkanes
* Be able to identify primary, secondary and tertiary carbons on a organic compound
* Know what a Newman projection (staggered/ecliped) is and what it represents along with the most and least stable conformers
* Know the naming of simple and substituted cycloalknes
* Know cyclepentane and cyclohexane conformations (most stable and least stable)
* Know cis/trans geometric isomerism in cycloalakne compounds
* Know structure and physical property trends (you do not need to know the exact melting point or boiling point for a specific alkane).
* Know combustion and substation reactions of alkanes and cycloalkanes.

**Chapter 13**

13. Unsaturated Hydrocarbons

13.1 Unsaturated Hydrocarbons

13.2 Characteristics of Alkenes and Cycloalkenes

13.3 Names for Alkenes and Cycloalkenes

13.4 Line-Angle Formulas for Alkenes

13.5 Isomerism in Alkenes

13.6 Naturally Occurring Alkenes

13.7 Physical Properties of Alkenes

13.8 Chemical Reactions of Alkenes

13.9 Polymerization of Alkenes: Addition Polymers

13.10 Alkynes

Chemistry at a Glance: Chemical Reactions of Alkenes

Chemistry at a Glance: IUPAC Nomenclature for Alkanes, Alkenes, and Alkynes

13.11 Aromatic Hydrocarbons

13.12 Names for Aromatic Hydrocarbons

13.13 Aromatic Hydrocarbons: Physical Properties and Sources

13.14 Chemical Reactions of Aromatic Hydrocarbons

* Know IUPAC nomenclature for alkenes and alkynes
* Be able to determine different types of isomerism: constitutional, conformational and stereo ismoers
* Know cis/trans geometric isomerism (stereo ismoers ) in alkenes
* Be able to determine the number of units of unsaturation in a compound
* Be able to identify isoprene units in terpenes
* Know combustion and addition reactions of alkanes and cycloalkanes.
* Know nomenclature for simple aromatic compounds

**Chapter 14**

* Be able to classify reactions as substitution, rearrangement, addition or elimination (**like chapter 5 slides 5 and HW4 problem 3**).
* Be able to identify the steps on a potential diagram for a chemical reaction (**pg. 121-122**).
* Be able to identify the polarity [nucleophiles (Nu:-)/eletrophiles (E+)], identify Lewis acid (E+)/base (Nu:-) sites and thus determine the reactive sites in a molecule to predict mechanistic steps (**like 4.8, 4.9 and 4.11 pgs.100 and 102**).
* Know the mechanism of electrophilic addition (**see general mechanism pg.120**).
* Be able to determine the most stable carbocation (**like 5.3 pg.128**).
* Know preparations of alkenes by dehydrohalogenation and alkenes by dehydration of alcohols. This includes knowing the reagents necessary to carry out these reactions (**Like key reactions given in page 137**).
* Know the products of electrophilic addition to an alkene depending on the reagents ((**Like key reactions given in page 137** a**nd stability of carbocation)**
* Be able to recognize the correctly written mechanism for hydration of an alkene to an alcohol (**Like 5.6 pg.130**).
* Be able to recognize the correctly written mechanism for hydrohalogenation an alkene to an haloalkane(**5.4 pg. 128**).
* Be able to identify regio- and stereo-selective electrophilic addition reactions (**5.23 pg. 139**).
* Be able to apply Markovnikov's rule(**Like 5.5 pg.129**).