

STUDY GUIDE FOR MODULE NO. 4

HYDROCARBON CHAINS AND RINGS



MODULE OVERVIEW

Many hydrocarbons occur in nature. In addition to making up fossil fuels, they are present in trees and plants, as, for example, in the form of pigments called carotenes that occur in carrots and green leaves. More than 98 percent of natural crude rubber is a hydrocarbon polymer, a chainlike molecule consisting of many units linked together. The structures and chemistry of individual hydrocarbons depend in large part on the types of chemical bonds that link together the atoms of their constituent molecules.

Nineteenth-century chemists classified hydrocarbons as either aliphatic or aromatic on the basis of their sources and properties. Aliphatic (from Greek *aleiphar*, "fat") described hydrocarbons derived by chemical degradation of fats or oils. Aromatic hydrocarbons constituted a group of related substances obtained by chemical degradation of certain pleasant-smelling plant extracts. The terms *aliphatic* and *aromatic* are retained in modern terminology, but the compounds they describe are distinguished on the basis of structure rather than origin.



MODULE LEARNING OBJECTIVES

At the end of the unit, the student should be able to:

1. Identify the structures and homologous members of alkene, alkane and alkyne families
2. Describe the structure of benzene and the substituted aromatics
3. Name the organic compounds using IUPAC
4. Differentiate the types of structural compounds



LESSON 1: HYDROCARBONS: REPRESENTATIVE ALKANES, ALKENES, ALKYNES, AND AROMATIC COMPOUNDS

HYDROCARBONS

The simplest organic compounds are those composed of only two elements: carbon and hydrogen. These compounds are called hydrocarbons. Hydrocarbons themselves are separated into two types: aliphatic hydrocarbons and aromatic hydrocarbons. Aliphatic hydrocarbons are hydrocarbons based on chains of C atoms. There are three types of aliphatic hydrocarbons. Alkanes are aliphatic hydrocarbons with only single covalent bonds. Alkenes are aliphatic hydrocarbons that contain at least one C=C double bond, and alkynes are aliphatic hydrocarbons that contain a C-C triple bond. Occasionally, we find an aliphatic hydrocarbon with a ring of C atoms; these hydrocarbons are called cycloalkanes (or cycloalkenes or cycloalkynes).

The general molecular formulas and molecular structures of the alkanes, alkenes, and alkynes:

Group	General Molecular Formula	Example Compound	Molecular Structure
Alkanes	C_nH_{2n+2}	Ethane	
Alkenes	C_nH_{2n}	Ethene	
Alkynes	C_nH_{2n-2}	Ethyne	

Hydrocarbons Alkanes Study Guide Answers

Jane M. Cram, Donald J. Cram



Hydrocarbons Alkanes Study Guide Answers:

Student Study Guide/Solutions Manual for Essentials of General, Organic, and Biochemistry Denise Guinn, Rebecca Brewer, Rachel C. Lum, 2009-09-15 The Student Study Guide and Solutions Manual provides students with a combined manual designed to help them avoid common mistakes and understand key concepts After a brief review of each section's critical ideas students are taken through stepped out worked examples try it yourself examples and chapter quizzes all structured to reinforce chapter objectives and build problem solving techniques The solutions manual includes detailed solutions to all odd numbered exercises in the text

Hazmat Chemistry Study Guide (Second Edition) Jill Meryl Levy, 2011

Chemical Principles Study Guide/Solutions Manual John Krenos, Joseph Potenza, Carl Hoeger, 2007-01-18 Written for general chemistry courses Chemical Principles helps students develop chemical insight by showing the connection between chemical principles and their applications

Organic Chemistry Study Guide and Solutions Manual Marc Loudon, Jim Parise, Lisa Bonner, 2024-08-09 The Study Guide and Solutions Manual offers several study tools for students Study Guide Links are brief supplements to text material and provide hints for study shortcuts approaches to problem solving or additional explanations of topics that typically cause difficulty Further Explorations are short discussions that provide additional depth on content in the text Reaction Reviews present the reactions in the chapter in detailed outline form This summary consolidates the reactions of the chapter in one place and presents not only the reactions themselves but also the essential features of their mechanisms and stereochemistry for cases in which these issues are discussed in the text Solutions are provided for all of the over 1600 problems in the text Many include worked out examples in which not only the answer is given but also the detailed approach to the solution is discussed

Chemical Principles Student's Study Guide & Solutions Manual John Krenos, Joseph Potenza, Loretta Jones, Lynn Koplitz, Thomas Spence, 2004-03-19 This combination manual is designed to help students avoid common mistakes and understand the material better The solutions manual section includes detailed answers and explanations to the odd numbered exercises in the text

[Study Guide and Solutions Manual to Accompany The Essence of Organic Chemistry](#) Jane M. Cram, Donald J. Cram, 1978

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