

CHEMISTRY DAILY PLAN

Class:

Date:

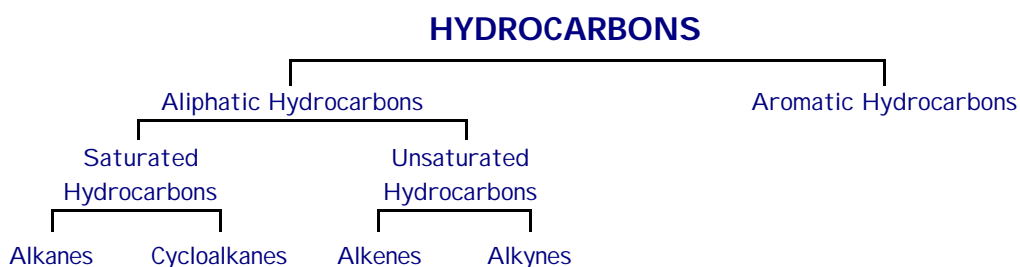
Subject: *Introduction to Alkanes*

Time:

The simplest organic compounds are hydrocarbons, which contain only the elements carbon and hydrogen. Although hydrocarbons contain only two elements, these elements may be combined in several ways. Therefore, hydrocarbons can be classified into several groups. There are two main classes of organic compounds:

Aliphatic Compounds and Aromatic Compounds.

Aliphatic compounds are all those compounds, which have an open chain of carbon atoms in their molecules. Aromatic hydrocarbons contain closed chain carbon structure.



Saturated Hydrocarbons (Alkanes)

The alkanes, as the name implies, contain only the elements carbon and hydrogen. The simplest alkane is methane, CH₄. Methane molecule has four equivalent carbon-hydrogen bonds arranged tetrahedrally. The carbon atom is joined to each hydrogen atom by a sigma(δ) bond. In methane, the sp³ hybrid orbitals of carbon atom and s orbital of hydrogen atoms overlap to form four sp³-s C-H sigma bonds.

Saturated hydrocarbons contain only carbon-carbon single bonds. The alkanes conform to the general formula C_nH_{2n+2}, where n is the number of carbon atoms. Alkanes with carbon chains that are unbranched are sometimes called normal alkanes. By increasing the number of carbon atoms in a chain, we can develop additional compounds in this series.

The boiling points and densities of these compounds increase, as the number of carbon atom increases.

Name	Molecular Formula	Condensed formula
Methane	CH ₄	CH ₄
Ethane	C ₂ H ₆	CH ₃ CH ₃
Propane	C ₃ H ₈	CH ₃ CH ₂ CH ₃
Butane	C ₄ H ₁₀	CH ₃ (CH ₂) ₂ CH ₃
Pentane	C ₅ H ₁₂	CH ₃ (CH ₂) ₃ CH ₃
Hexane	C ₆ H ₁₄	CH ₃ (CH ₂) ₄ CH ₃
Heptane	C ₇ H ₁₆	CH ₃ (CH ₂) ₅ CH ₃
Octane	C ₈ H ₁₈	CH ₃ (CH ₂) ₆ CH ₃
Nonane	C ₉ H ₂₀	CH ₃ (CH ₂) ₇ CH ₃
Decane	C ₁₀ H ₂₂	CH ₃ (CH ₂) ₈ CH ₃

Determining Molecular Formula

Problem: What is the molecular formula of an alkane with 14 carbon atoms?

Problem: 16% by mass of the organic compound C_nH_{2n+2} is hydrogen. What is the molecular formula of this compound?

Problem: The ratio of hydrogen to carbon by mass in the compound C_nH_{2n+2} is 8/45. What is the molecular formula of the compound?