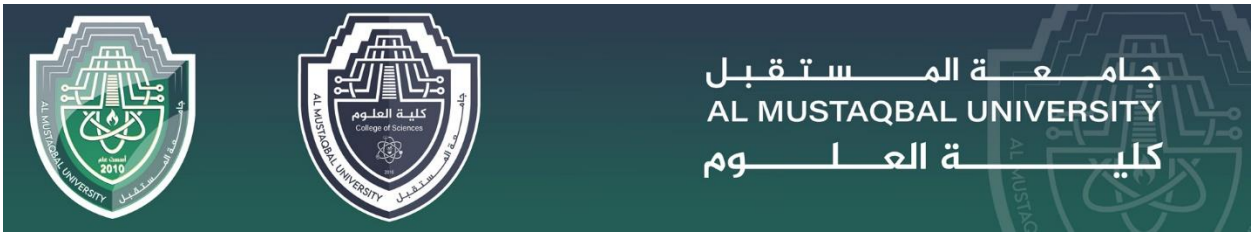


Organic Chemistry

1st stage

Asst. Lect.Zahraa Hazim Hamid

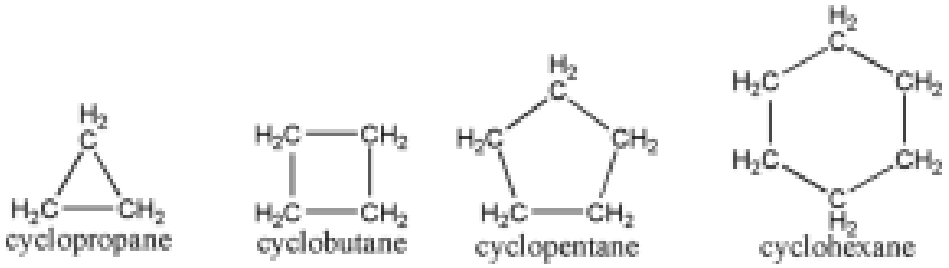
Lecture 5: Cycloalkanes

Department of Medical Biotechnology

2024-2025

Cycloalkanes

Cyclic alkanes (or cycloalkanes) have carbon and hydrogen atoms that are bonded together with single bonds.



In such bonds, the carbon atoms bond together to form a loop.

Physical and Chemical Properties of Alkanes

Physical Properties:

1. State at Room Temperature:

- 1-4 carbon atoms are gases (e.g., methane, ethane).
- 5-17 carbon atoms are liquids (e.g., pentane, heptane).
- 18 or more carbon atoms are solids (e.g., paraffin wax).

2. Boiling and Melting Points:

- Increases with the number of carbon atoms.

• Larger alkanes have higher boiling and melting points due to stronger van der Waals forces.

3. Solubility:

• Alkanes are insoluble in water but soluble in organic solvents like benzene and ether.

Chemical Properties of Alkanes

1. Combustion

Alkanes burn in oxygen to produce carbon dioxide and water.

(Methane burns to form CO_2 and H_2O)

$$CH_4 + 2\ O_2 \rightarrow CO_2 + 2\ H_2O$$

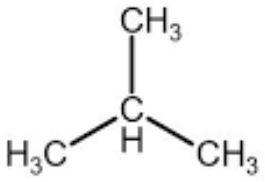
2. Inertness:

Alkanes are generally unreactive with most substances like acids, bases, and oxidizing agents under normal conditions due to their strong C-H and C-C bonds.

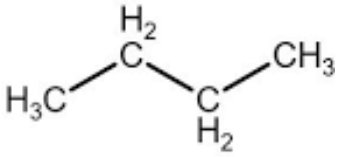
3. Isomerism:

Alkanes with 4 or more carbon atoms can have different structural forms (isomers).

Example: Butane (C_4H_{10}) has two isomers: n-butane and isobutane.



isobutane



n-butane
butane