Nomenclature (continued):





2,3,3-trimethylpentane

3,5-diethyl-4-methyloctane

General Molecular Formula of Alkanes

- No rings: general formula is C_NH_{2N+2}
- Each deviation of 2 hydrogens from the C_NH_{2N+2} formula is a degree of unsaturation
- 1 Degree of unsaturation : C_NH_{2N} Alkanes with one ring or double bond
- 2 Degrees of unsaturation : C_NH_{2N-2} Alkanes with two rings or double bonds, or one each

-

Examples



C₆H₁₀ 2 Degrees of unsaturation

The above three are structural (constitutional) isomers

Ring Structures and Naming:

- Prefix with "cyclo"
- Start with numbering at point of maximum branching/most important functional group -
- Number so as to give next branch/functional group lowest number -

Cycloalkanes

Ex #1) Cyclopropane, C_3H_6



- One degree of unsaturation (n-propane is C₃H₈)
 C-C-C bond angle (60 °)
- Highly reactive due to ring strain.

Ex #2) Cyclobutane, C₄H₈







Cyclopentane







cis-1,3-dimethylcyclobutane

trans-1,3-dimethylcyclobutane



nonsuperimposable mirror images





1,1-dimethyl-2-ethylcyclopentane





Physical Properties of Alkanes:

- Intermolecular forces are dominated by London forces _
- Alkanes are non-polar because H and C have similar electronegativity _
- Low m.p., b.p. _
- Low density ($\rho = \text{rho} = \text{g/cm}^3$) $\circ \rho$ water $\sim 1 \text{ g/cm}^3$ _

 - $\circ \rho$ alkanes ~ 0.7 g/cm^3
- Not miscible with water \rightarrow floats due to lower density _
- Soluble in other organic solvents (like dissolves like) -

