

- I. Nomenclature (4.2, 7.2) **SkillBuilders 4.1, 4.2, 4.3, 4.4**
 - A) alkane names $C_1 - C_{10}$ (methane – decane)
 - B) IUPAC rules, naming complex substituents
 - C) common names (*n*-Pr, *i*-Pr, *n*-Bu, *s*-Bu, *i*-Bu, *t*-Bu)
 - D) identifying primary (1°), secondary (2°), tertiary (3°), and quaternary (4°) carbons
- II. Degrees of Unsaturation (DU) or Hydrogen Deficiency Index (HDI) (14.16)
 - A) C_nH_{2n+2} is the formula for a saturated hydrocarbon (alkane)
 - i) halogens (F, Cl, Br, I) count as a hydrogen; oxygens are ignored
 - B) every 2 "missing" hydrogens means 1 site/degree of unsaturation (1 DU)
 - C) each site of unsaturation can be a ring or a π bond
 - D) use DU to help draw isomers of a given formula **SkillBuilder 4.6**
- III. Sources, Uses and Physical Properties of Alkanes (4.5)
 - A) nonpolar, hydrophobic
 - B) used as fuels
 - C) boiling point (bp) increases with MW (larger surface area; more van der Waals)
- IV. Conformations of Alkanes (4.6 – 4.8) **SkillBuilders 4.7, 4.8**
 - A) staggered vs. eclipsed conformations
 - B) Newman Projections
 - C) Energy diagrams, relative stability of conformers (torsional strain, sterics)
- V. Cycloalkanes (4.9, 4.15)
 - A) ring strain in cyclopropane, cyclobutane (torsional + angle strain)
 - B) cis-trans isomerism in cycloalkanes (4.14)
 - C) conformations of cyclohexane (4.10 – 4.13) **SkillBuilders 4.9, 4.10, 4.11, 4.12, 4.13**
 - i) chair vs. boat
 - ii) axial and equatorial positions
 - iii) chair flips
 - iv) predicting stability of chairs for substituted cyclohexanes
 - a) axial positions have sterics called 1,3-diaxial interactions
 - b) larger groups prefer equatorial position

skip: section 4.4 and SB 4.5, and problems 11-13, 39, 44,

add: Ch. 7: 7.17, 7.47, 7.48g; Ch. 14: 14.30 (all but c), 14.32, 14.48 (all but f and g).

Physical Properties of Alkanes

Formula	C_3H_8	C_4H_{10}	C_4H_{10}	C_5H_{12}	C_5H_{12}
bp ($^\circ C$)	-42.1	-11.7	-0.6	27.9	36.1
	propane	2-methylpropane	butane	2-methylbutane	pentane

Summary: \uparrow Molecular weight, \uparrow bp. Only if MW is same, **THEN** \uparrow branching, \downarrow bp