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CHM 3140 Organic Chemistry I, Dr. Laurie S. Starkey

Chapter 5 Summary (Klein 4th ed. textbook): **Stereochemistry**

I. Stereoisomerism (5.1) and Chirality (5.2, 5.8, 5.9) **SkillBuilders 5.1, 5.2**
- A) chiral center = tetrahedral carbon with four different groups attached
- B) chiral object
  - i) has no plane of symmetry (rare exceptions)
  - ii) has a non-superimposable mirror image (called its enantiomer)
- C) achiral object
  - i) has a plane of symmetry
  - ii) is identical (superimposable) with its mirror image
  - iii) has no enantiomer

II. Nomenclature (5.3) **SkillBuilder 5.3**
- A) assign priorities to groups
- B) determine (R) or (S) configuration
- C) be able to draw a compound, given its name

III. Fischer Projections (5.7) **SkillBuilder 5.8**
- A) definition
- B) gaining the proper perspective to convert a line drawing to a Fischer Projection
- C) using Fischer Projections to help determine R/S if group #4 is in the plane

IV. Molecules with Multiple Chiral Carbons (5.5, 5.6) **SkillBuilders 5.6, 5.7**
- A) diastereomers
- B) maximum of 2^n stereoisomers possible
- C) achiral molecules which contain chiral carbons are called meso (5.6)
- D) determining the relationship between two compounds

V. Optical Activity and other Physical Properties (5.4)
- A) plane polarized light; polarimeter
- B) levorotatory ($-\alpha$, counterclockwise) and dextrorotatory ($+\alpha$, clockwise) rotations
- C) enantiomers have equal and opposite specific rotations [α]
- D) diastereomers have different physical properties

VI. Mixtures of Enantiomers
- A) Racemic mixtures, racemates (5.5)
  - i) 1:1 mixture of enantiomers
  - ii) optically inactive ($\alpha = 0^\circ$)
  - iii) can be separated by a resolution (5.10)
- B) unequal mixtures (5.4) **SkillBuilder 5.5**
  - i) enantiomeric excess (e.e.), optical purity

VII. Stereochemistry Designation of Alkenes (5.11) **SkillBuilder 5.9**
- A) cis, trans, *E, Z* ***Skip SkillBuilder 5.4***

Extra Stereochemistry Practice: Quizzes in Blackboard

- Two drill-type quizzes available: R/S, Compare
- Questions are different every time you take the quiz, take as many as you'd like!
- Click on any Attempt number to see your results and to read the feedback for each question
- 2 course points for each Bb quiz with a score of at least 50% (highest attempt is saved)