Chapter 5- Stereoisomerism Worksheet
Chemistry 220

1. For each of the compounds below, draw the two chair conformations and circle the most stable conformer.

(a) (b) (c) (d)

2,4-dimethylcyclohexanamine

2. Some of the compounds in problem #1 are chiral.
(a) Assign R or S to each stereocenter from problem #1.
(b) Draw the enantiomer of each chiral compound and assign R or S to all stereocenters.
(c) Draw all of the stereoisomers of 3,4-dimethylcyclohexanamine (structure. #1b). (Don’t try and do this with chair conformations.)
(d) The compounds below are isomers of 4-chloro-2methylpiperidine drawn in #1c. Indicate the relationship by labeling each one as; “same”, enantiomer, diastereomer, or structureal isomer. (For practice, try ring flipping these structures!)

(i) (ii) (iii) (iv)

(v) (vi) (vii) (viii) (2S, 4S)-4-chloro-2methylpiperidine
(2R, 4S)-4-chloro-2methylpiperidine

3. Draw the structures of all the monochlorination products from the reaction of (a) pentane and (b) 2-methylbutane with Cl₂ and light. Indicate which products are enantiomers and which are achiral. Be careful to not repeat any products and calculate the percent of each product formed.

4. Draw the following compounds: (a) (2S, 3R, 4R)-2-bromo-4-chloro-3-methylhexane; (b) (1R, 3S, 4R)-1-chloro-3-isopropyl-1,4-dimethylcyclopentane; (c) (1R, 3S, 5S)-1-((R)-2-bromopropyl)-3-tert-butyl-5-isopropylcyclohexane.

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5. Draw all of the products of monochlorination (with Cl₂ and light) of the following compounds. Be sure to indicate stereochemistry, and indicate which products (if any) are enantiomers and which are diastereomers. Also label all stereocenters.

(a) \((S)-2\text{-chloropentane}\)

(b) 1,1-dimethylcyclobutane

c) \(1\text{-}\text{tert}-\text{butyl-1-methylcyclobutane}\)

Draw the monobromination (Br₂ and light) products for the following alkanes. Be sure to label the products as enantiomers or diastereomers and also indicate stereochemistry.

d) \((1R, 2S)-1,2\text{-dimethylcyclopentane}\)

e) \((1S, 2S)-1,2\text{-dimethylcyclopentane}\)