

# Organic Chemistry - CHEM 231A

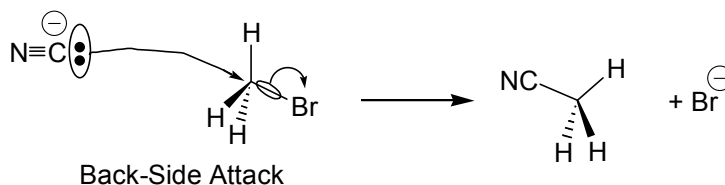
## Problem Set #3

Due November 2, 2001

1. Draw the most stable conformation(s) for the following molecules and explain briefly why the conformation you depicted is the most stable. It may be beneficial to compare and contrast the different conformers.
  - 1a. *cis* 4-methyl-1-propylcyclohexane
  - 1b. [1R,3R] 1-ethyl-3-methylcyclohexane
  - 1c. [1S,3S,4S] 1-cyano-4-methyl-2-isopropylcyclohexane
2. Consider when optically pure 2,3-dimethylpentane is reacted with chlorine and light:
  - 2a. What products are formed as discovered by isolation by silica gel chromatography and identified by NMR?
  - 2b. What are the ratios of the products formed?
  - 2c. Of the products, which are optically pure? Optically active? Racemic? Achiral? Explain.
3. Given the following NMR data for a molecule with molecular formula  $C_9H_{19}Br$  and with the experimental fact the optical rotation is 0 (zero), answer the following questions:

Triplet	0.85 ppm	int 6	Doublet	0.93 ppm	int 6
Quintet	1.25 ppm	int 4	Multiplet	1.92 ppm	int 2
Triplet	4.11 ppm	int 1			

  - 3a. What is(are) the structure of the molecule(s)?
  - 3b. Is (are) the molecule(s) chiral?
  - 3c. What does it mean that the optical rotation is zero?
4. Consider the following general substitution reaction:



The  $S_N2$  reaction occurs via back-side attack of the nucleophile onto the electrophile causing substitution of the bromide with the cyanide.

Explain the following experimental results:



Compound A Reacts significantly faster than Compound B in the presence of NaCN.