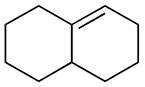
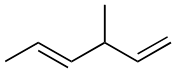
KJM3200/KJM4200, spring 2007

Problem set 1 (for discussion on April 18, 2007)

1) What is the major product from addition of HBr to the following alkenes:



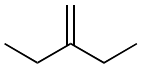


2) Kevlar is made by polymerization of 1,4-benzenedicarboxylic acid and 1,4-diaminobenzene. Draw the structure of a segment of Kevlar. What would be the result if a small amount of 1,3,5-triaminobenzene were added to the reaction mixture?

3 a) Show how 3-ethylpentane-3-ol can be prepared from 3-pentanone via a Grignard reaction. Elimination of water yields a single product. Explain.

b) Show how 3-methylpentane-3-ol can be prepared in a similar manner. Elimination of water produces a mixture of isomers. Which?

c) How could the following compound be synthesized in a regiospecific manner starting from 3-pentanone. Show every step of the reaction sequence.

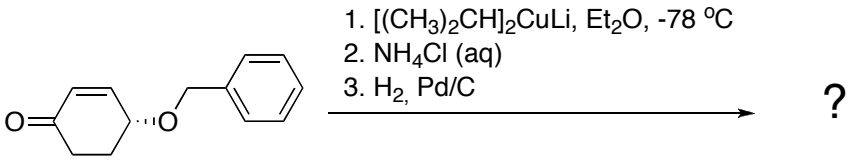


d) The alkene mixture from b) is treated with HBr at low temperature in the absence of light. What is formed?

e) The same mixture is treated with HBr in the presence of a strong light source or a radical initiator such as dibenzoylperoxide. What are the major products?

4) The natural abundancy of the NMR active ^{15}N isotope is only 0.37% which in most cases is too low to run NMR. Device a synthetic route starting with benzoic acid for the synthesis of ^{15}N labeled aniline. Use pure 15NH3 as the source of ^{15}N.

5)


1. [(CH3)2CH]2CuLi, Et2O, -78 °C
2. NH4Cl (aq)
3. H2, Pd/C
O
O
?