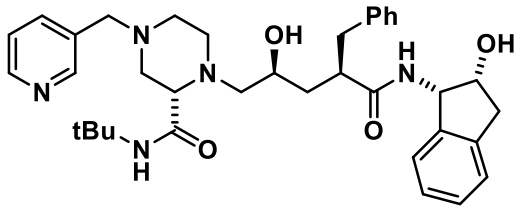
THE UNIVERSITY OF TOLEDO 1872

Mid-Term Exam 2

Time: 10:00 am – 10:00 am
Date: 03-30 until 04-03
Room: Take Home

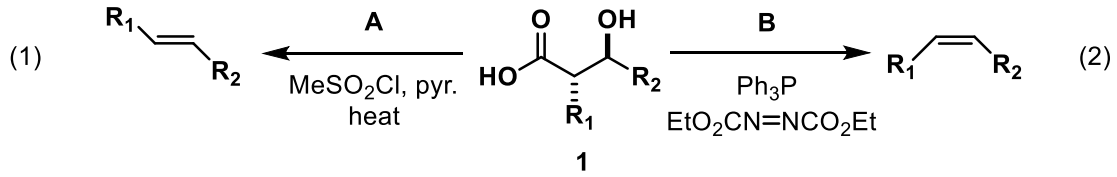
100 Points - Total

Problem 1: Please use your knowledge from CHEM 8410, plus knowledge gained elsewhere to stitch together a total synthesis of the compound noted. Once you've completed a retrosynthetic scheme, move forward to show the mechanism of every single reaction in great detail. Account for the stereochemistry in your synthesis. You are only allowed to use synthons of 6 carbons or less; heteroatoms are limitless. Provide the name of this molecule. (**25 Points**)



Answer(s):

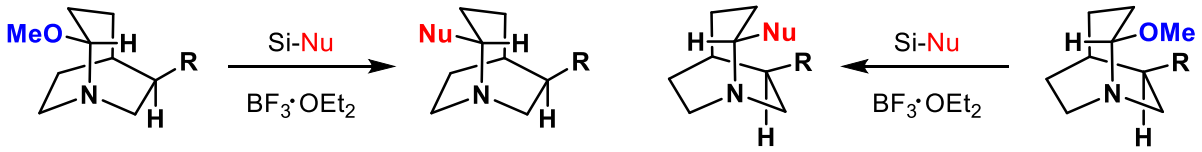
Problem 2: Anti beta-hydroxy acids 1 are excellent precursors for the stereospecific formation of 1,2-disubstituted olefins. Conditions A and B convert these acids to the corresponding (E) and (Z) olefins through the indicated reaction conditions. (**15 Points**)



Part A: Provide a mechanism for the transformation of **1**, under conditions **A**, to the (E) olefin (eq 1)
Part B: Provide a mechanism for the transformation of **1**, under conditions **B**, to the (Z) olefin (eq 2)

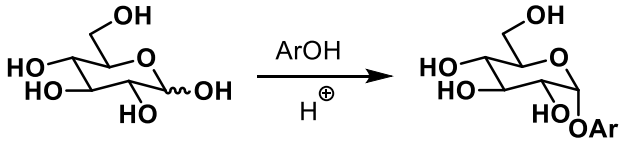
Answer:

Problem 3: A stereospecific substitution process has been reported by a prominent synthetic organic chemist. Both 1 and 2 undergo stereospecific replacement of the methoxyl substituent upon treatment with a Lewis acid catalyst and a silyl nucleophile (Nu = CN, N_3, alkyne, etc). Provide a plausible mechanism for the indicated transformations. (**15 Points**)



Answer:

Problem 4: Stereoselective formation of the glycosidic linkage is the principal challenge in the synthesis of biologically important oligosaccharides. For the following α-selective glycosylation, please provide a clear mechanism, using three-dimensional representations, that accounts for the observed stereochemical outcome. Indicate all relevant orbital interactions. (**15 Points**)

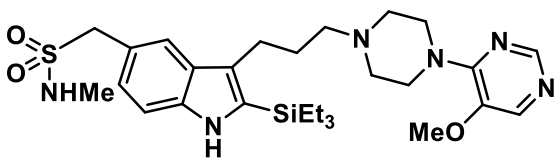


Answer:

Problem 5: "Caustic soda" (NaOH) was used to clean ovens and clear blocked drains. Many commercial products for these jobs with fancy names still contain NaOH. Even concentrated sodium carbonate (Na_2CO_3) does quite a good job. How do these cleaners work? Why is NaOH so dangerous to humans, particularly if it gets in the eye? Use chemical formulas and little to no writing as possible. (**10 PTS**)

Answer:

Problem 6: The synthesis of the BMS anti-migraine drug (a 5-HT1D receptor antagonist) involves quite a few synthetic steps. Please use your knowledge from CHEM 8410, plus knowledge gained elsewhere to stitch together a total synthesis of the compound noted. Once you've completed a retrosynthetic scheme, move forward to show the mechanism of every single reaction in great detail. You are only allowed to use synthons of 6 carbons or less; heteroatoms are limitless. (**20 PTS**)



Answer: