Synthesis of Diludine, a 1,4-Dihydropyridine Compound

Pre-lab Reading: Mohrig 21.10 “Sources of Confusion in NMR”

Procedure

Place 960 µL of ethyl acetoacetate in a 25 mL roundbottom flask with a stirbar. Add 430 mg of ammonium acetate and 280 µL of 36% wt. aqueous formaldehyde. Attach an air condensor, and place in a room temperature water bath. Gradually heat the bath to 80 °C with vigorous stirring. After about 10 minutes at 80 °C, the solid formed will stop the stirring. Once this happens, remove the flask form the water bath and add 5 mL of distilled water. Use a glass stirrod to finely grind up the solid. Collect the solid with suction filtration, and wash the product with about 10 mL of water. Place the mainly dry product in a 50 mL beaker and recrystallize from 95% ethanol. Collect the purified product by suction filtration. Obtain melting point and 13C NMR.

Notebook Guidelines

Comments and observations of reaction, product

All data, including table of NMR

Discuss the purity and identity of the product based on the data you collected.

Formal Report guidelines Refer to the handout “How to Write a formal report” for general information. The guidelines below are specific to this lab and are necessary for full credit.

1. Abstract figure: Use ChemDraw to make a synthetic scheme for the reaction you performed.
   a. Include a figure that has a general structure of 1,4-dihydropyridines and specific labeled structures of nifedipine and diludine.
   b. At least one paragraph discussing the biochemical activity and binding targets of this class of molecules.
c. At least one paragraph explaining the medicinal uses of this class of molecules, with reference to their biochemical activity.
d. At least one paragraph outlining the necessary structural features that are necessary in this class of molecules to make them effective calcium channel blockers. Explain why diludine is not a good calcium channel blocker.

3. Discussion
   a. Include a figure for the mechanism of formation of this compound, with reference to J. Chem. Rev., 1972, 72, 1-42. What is the name reaction?
b. Did you isolate your intended product, and was it pure? Make reference to primary literature references for melting point and carbon NMR if possible.
c. How effective was your reaction in terms of yield? How could it be improved in the future?
d. Compare your synthetic procedure to another recent synthesis (either Tetrahedron 2008, 64, 3477-3482, or J. Heterocycl. Chem. 2008, 45, 737-739.) Was your procedure “better” or “worse” and what criteria did you use? Which was more environmentally friendly, and explain.

Make a photocopy of the lab notebook and attach it to the hardcopy of the formal report you turn in.