

# A Solid Support for the Modular Synthesis of Molecular Wires

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**Background.** Calculations and preliminary experimental data suggest that metalloporphyrin complexes can be prototypical ‘molecular wires.’ Once experimentally verified, Koopmans’ Theorem-Generalized Mulliken-Hush theory will be used to predict metalloporphyrins of interest. The challenge lies in synthesizing the predicted compounds. Solution-phase synthesis of porphyrin chains results in symmetrical chains of uncontrolled length. However, solid-phase synthesis allows for the creation of chains of controlled length and composition. To this end, we propose to generate the resin-bound pyridine shown here.

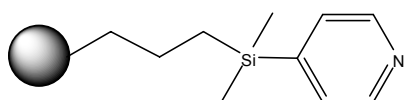


Figure 1. The desired resin-bound pyridine complex.

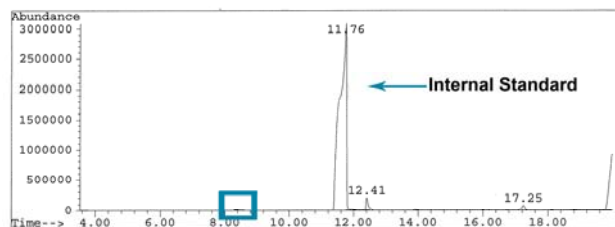


Figure 3. Total Ion Chromatogram of Resin Cleavage Product, showing nearly non-existent peak of 3-chloropyridine.



Image 1. Cannula Cooler, packed with dry ice/acetone slurry.

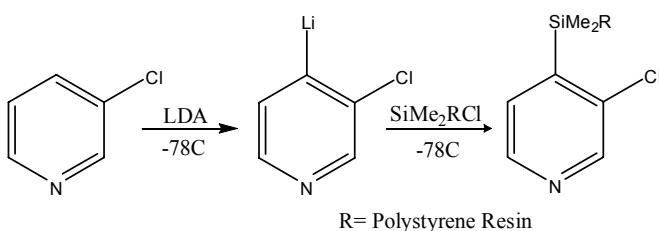


Figure 2. The proposed reaction scheme.

**Approach.** Solid phase organic synthesis is used to form the resin-bound pyridine via the reaction scheme shown above. Reaction products are characterized following tetrabutylammonium fluoride cleavage followed by gas chromatography-mass spectrometry. The modified resin is analyzed using infrared spectroscopy.

**Results.** As of yet, this synthesis scheme has not produced the desired product. Difficulties were encountered in activating the resin, forcing an alteration in the method that was previously relied upon. Also, the lithiated intermediate proved to be highly temperature sensitive, requiring the development of a new means of transfer. The ‘‘Cannula Cooler,’’ shown here, was devised for this purpose.

**Future Work.** Work has already begun on the development of a reaction scheme that begins with a different resin, eliminating the activation difficulties present with the current resin. Improved transfer technique and water exclusion should lead to the successful execution of the synthesis, producing the desired resin-bound pyridine.

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