Synthesis and Study of Monodispersed Oligophenyl Lactones

Nick J. Sortedahl and Bart J. Dahl

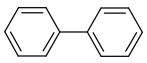
Department of Chemistry ❖ University of Wisconsin-Eau Claire

Eau Claire, WI 54702

Objective

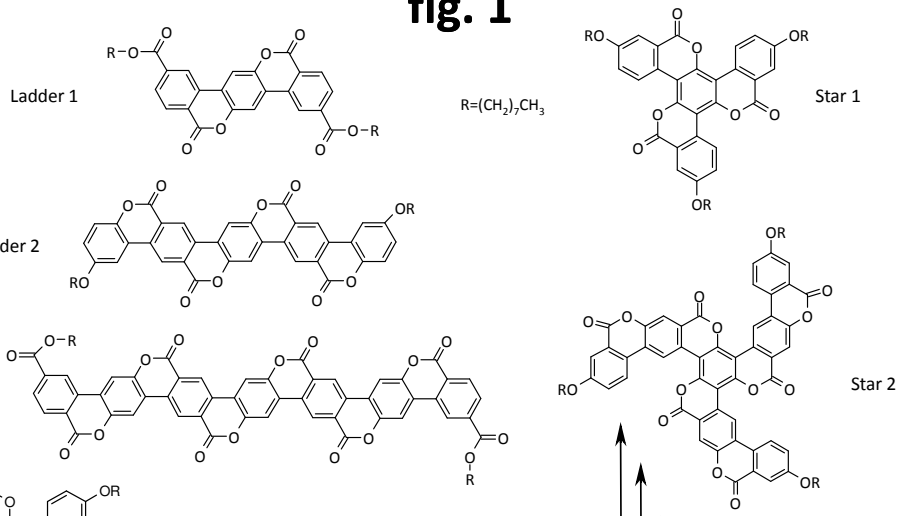
The goal of this project is to create and study different oligophenyl lactones that vary in both shape and size (fig 1). We are interested in these compounds because they should prove to be useful in applications such as solar cells, light emitting diodes, and semiconductors in thin film transistors. Our approach is to solve two problems associated with polyphenylenes. The first is an unfavorable dihedral angle between each phenyl group (fig. 2). The lowest energy conformation of biphenyl is 30-40°. The twist between phenyl groups keeps electrons from moving easily from one end of the molecule to the other. The second and more difficult problem is poor solubility due to strong π stacking. This model suggests that longer oligophenyl lactones will be useful for absorption, and emission of longer wavelength light. Conversely the shorter molecules will absorb, and emit shorter wavelengths.

Biphenyl fig. 2

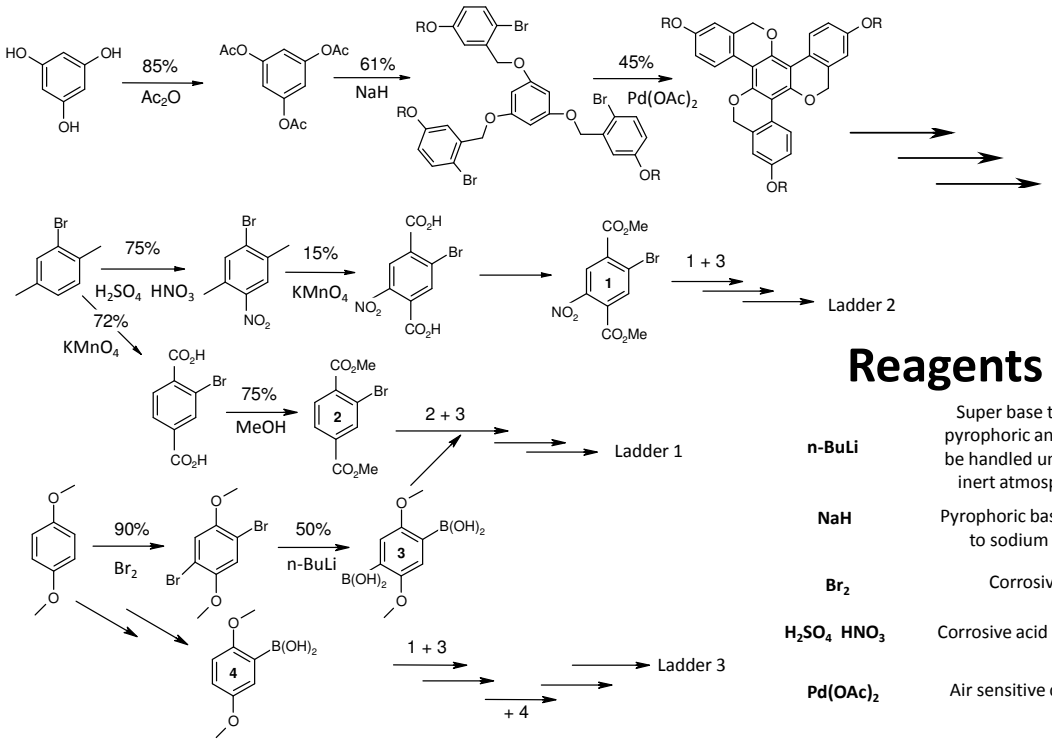


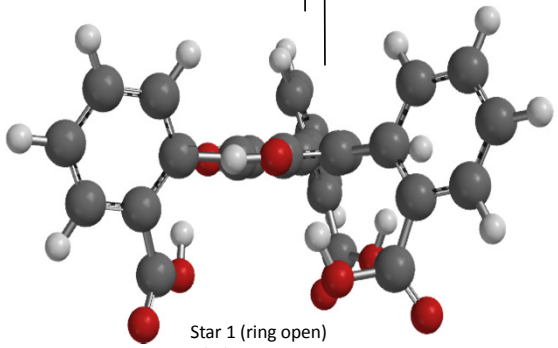
Compounds of Interest

fig. 1



Synthesis





Star 1 (ring open) chelation center

Reagents

n-BuLi	Super base that is pyrophoric and must be handled under an inert atmosphere
NaH	Pyrophoric base similar to sodium metal
Br_2	Corrosive
H_2SO_4 HNO_3	Corrosive acid mixture
$Pd(OAc)_2$	Air sensitive catalyst

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