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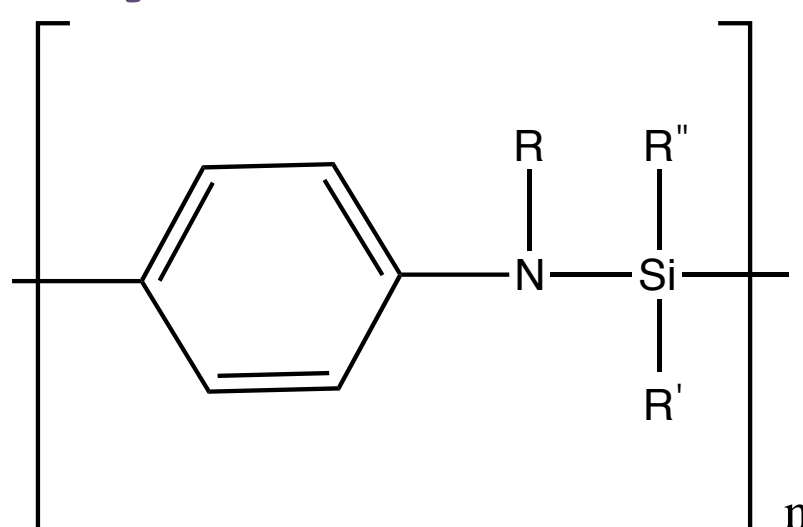
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Abstract

The Neilson research group focuses on developing synthetic routes to new organic-inorganic hybrid polymers. Specifically, one class of potential polymers contain silicon-nitrogen bonds, alternating with organic spacer groups along the polymer backbone. These two elements were chosen in order to obtain a system whose stability is similar to that of organic (carbon-based) polymers. Organic polymers are very stable and can be found in everyday life. In addition, silicon-oxygen polymers are used in several commercial applications. Silicon-nitrogen polymers could possibly serve as precursors to other new polymeric and/or solid state materials.

Experiments were conducted to produce a variety of small molecule precursors to the new silicon-nitrogen polymer system. Seven silicon-nitrogen small molecules were synthesized, in fairly good yield, and characterized using ^1H NMR Spectroscopy.

Synthetic Goal



A phenylene group, used as a spacer between alternating N-Si bonds, represents our target polymeric system. The synthesis of poly(silylanilines) would have similar electronics to poly(phenylenes) and be quite novel, if achieved.

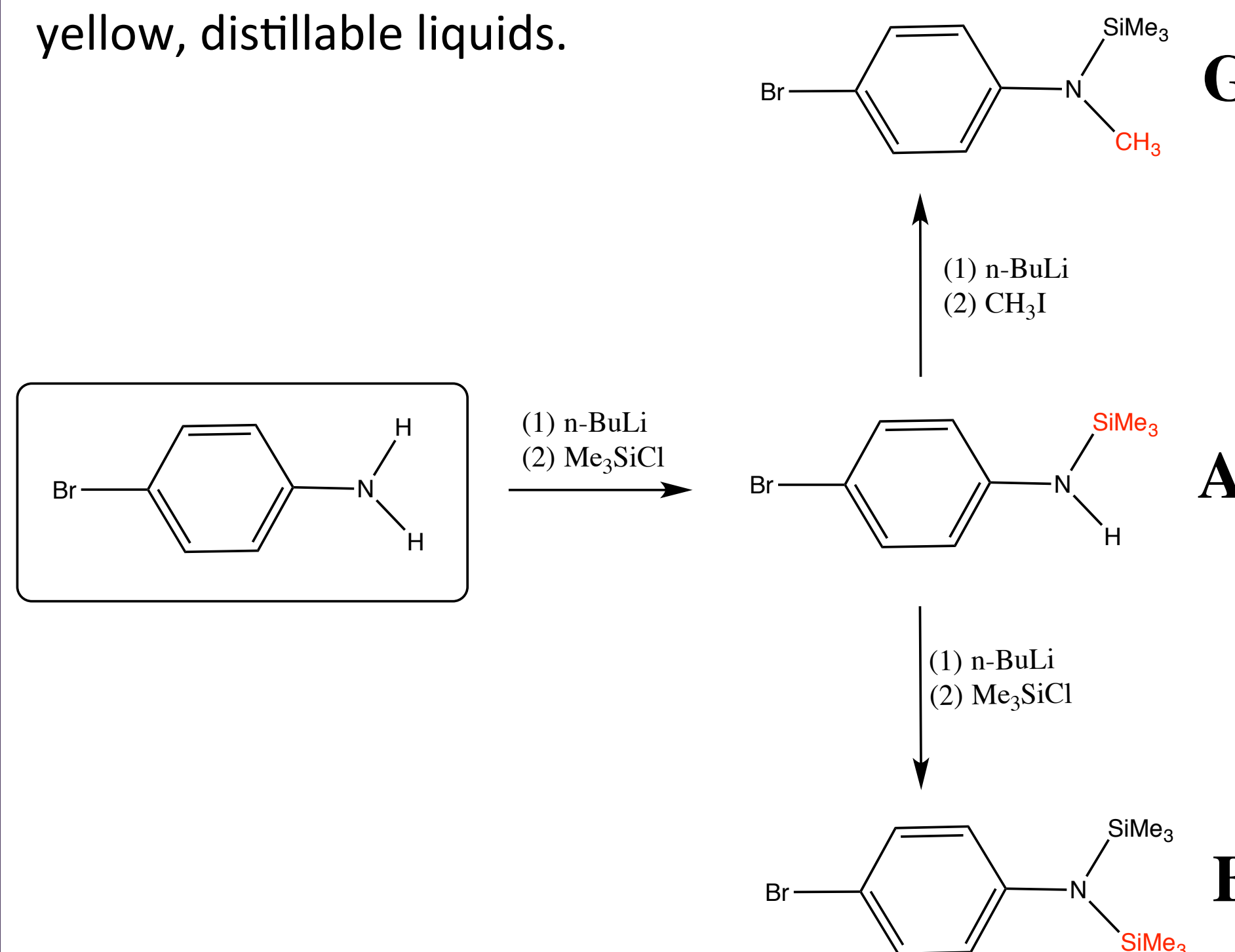
Silylaniline Reagents

The compounds reported here are ultimately obtained from derivatives of 4-bromoaniline following the initial preparation of various mono- or di-silylated derivatives.

This simple, high-yield preparative chemistry involves three main types of reactions:

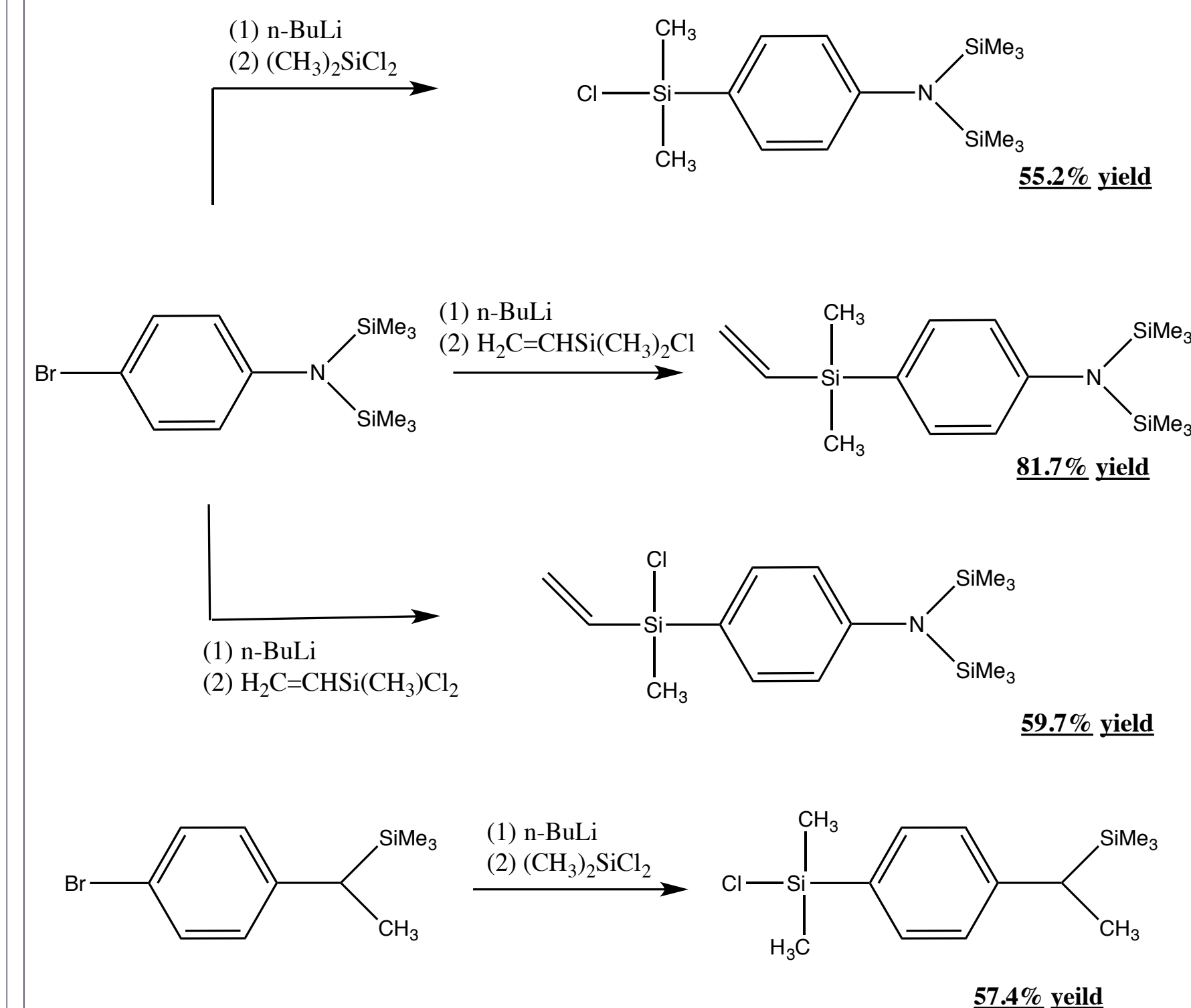
- (1) Deprotonation-substitution at the N-H site
- (2) Metal-halogen exchange at the aryl bromide site
- (3) Silicon-nitrogen bond cleavage

All products are moisture sensitive, colorless to pale yellow, distillable liquids.



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Si-N Derivatives



From reagent **B**, three compounds were synthesized as distillable, moisture sensitive liquids via metal halogen-exchange reactions.

From reagent **G**, one compound was synthesized as a distillable, moisture sensitive liquid via a metal halogen-exchange reaction.

Future Work

When attempting to purify some of these small molecules, there was some thermal decomposition, possibly leading to the desired polymer. Future experiments will investigate the synthetic potential of these new compounds.