

Department of Chemistry

Julia C. Tolentino

Mentor: Dina C. Merrer

The Synthesis and Carbene Reactions of Adamantene

Adamantene, or tricyclo[3.3.1.1^{3,7}]dec-1-ene, is a strained cyclic olefin that has a lifetime of microseconds in solution at room temperature. It has a moderately high strain energy of 37 kcal/mol, which may be near the threshold of strain energy needed for dynamic control in carbene addition reactions. Adamantene is generated through the photolysis of 3-noradamantyl diazirine. In order to determine the products that result from dihalocarbene addition to adamantene, 3-noradamantyl diazirine will be co-irradiated with a photochemical carbene source.

3-Noradamantyl diazirine is synthesized in three steps from 3-noradamantylcarboxylic acid. Reduction of 3-noradamantylcarboxylic acid with lithium aluminum hydride, followed by the Dess-Martin oxidation of the resulting primary alcohol, 3-noradamantyl alcohol, yields the corresponding aldehyde, 3-noradamantylcarboxaldehyde. The aldehyde is treated with lithium bis(trimethylsilyl)amide, followed by hydroxylamine-*O*-sulfonic acid, and *t*-butyl hypochlorite to afford 3-noradamantyl diazirine, the precursor to the strained bridgehead olefin adamantene. Adamantene can be trapped through the irradiation of 3-noradamantyl diazirine in dry methanol and dimerizes when the diazirine is photolyzed in methycyclohexane at 77 K.