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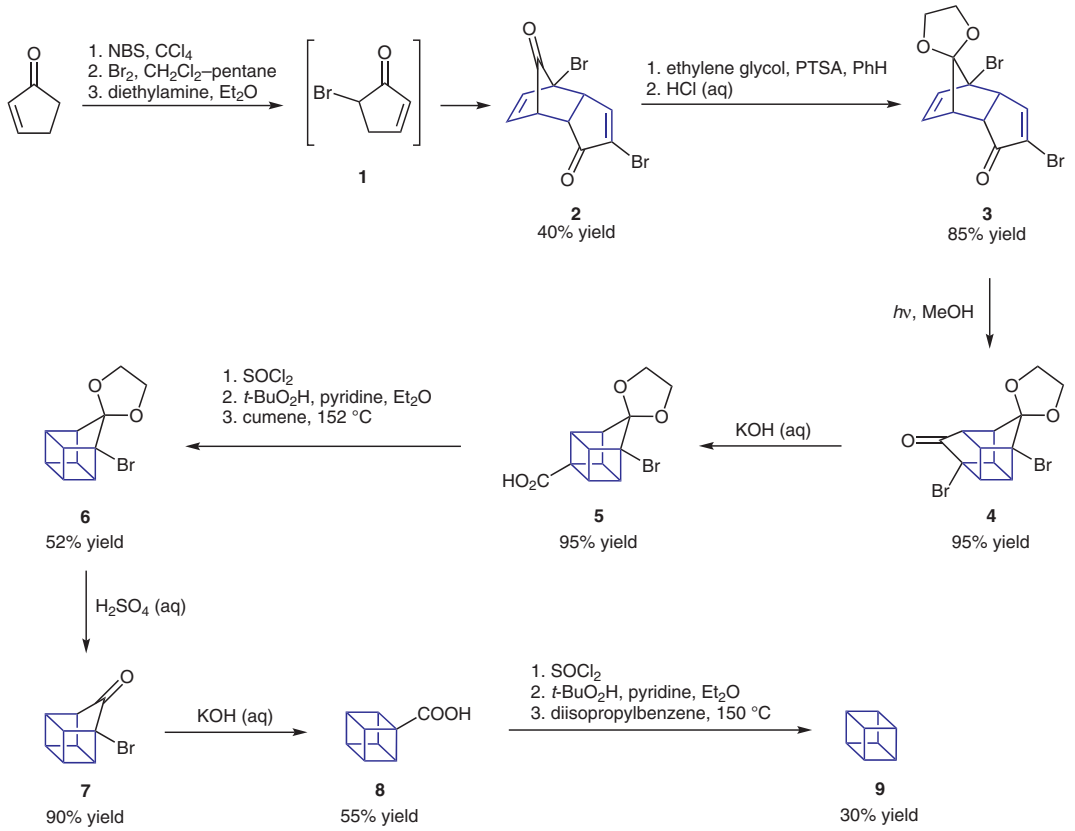
Cubane
*J. Am. Chem. Soc.* **1964**, *86*, 3157–3158.

# Cook Me and Call Me the Molecular Dice!




**Significance:** Cubane (**9**) is a highly strained hydrocarbon in which eight carbon atoms are arranged at the corners of a cube, adopting unusually 90° bonding angles. Before it was first synthesized in 1964 by Eaton and Cole, researchers believed that such cubic carbon-based molecule would be too unstable to exist. Initially, cubane was considered just a laboratory curiosity of interest only to academics, however, over time this remarkable hydrocarbon and derivatives have found applications in controlled energy storage, the explosives industry, pharmaceuticals, and polymer science.

**Comment:** The classic synthesis of cubane starts from 2-cyclopentenone and consists of fifteen discrete steps with an overall yield of about 5%. There are three key synthetic elements: (a) the highly endo-selective Diels–Alder reaction of 2-bromocyclopentadienone (**1**) generated in situ, producing the endo-dimer **2** (*J. Am. Chem. Soc.***1964**, *86*, 962); (b) the [2+2] photocyclization of **3**, obtaining **4**; and (c) the double Favorskii ring contraction of the cage diones **4** and **7**, producing **5** and **8**, respectively. Nowadays, the chemistry of cubane is well developed and it can be easily obtained on a multi-gram scale (see Review below).

**Review:** K. F. Biegasiewicz, J. R. Griffiths, G. P. Savage, J. Tsanaktsidis, R. Priefer *Chem. Rev.* **2015**, *115*, 6719–6745.

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Synthesis of Materials and Unnatural Products

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strained structures