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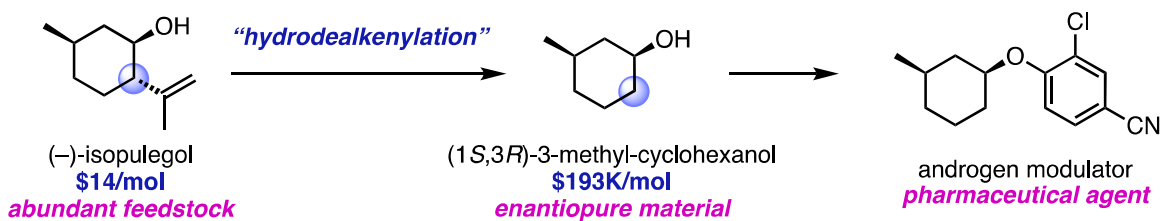
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Title: Synthesis Through C–C Scission

The topic of this talk is the radical chemistry based on C–C bond scission. The presentation will begin with another area of research endeavors in my group—**phosphorus organocatalysis**. It then will present how our need to create chiral phosphines, CarvoPhos, of particular configuration inspired our invention of a series of new reactions based on C–C bond cleavage. To be specific, we have implemented one-pot processes to oxidize alkenes into α -methoxyhydroperoxides, for subsequent Fe(II)-mediated reductive fragmentations that yield alkyl radical intermediates. Various radical trapping agents are capable of seizing the alkyl radical, enabling the conversion of the alkene C(sp³)–C(sp²) bond to C(sp³)–H, C(sp³)–S, C(sp³)–O, C=O, C(sp³)–C(sp²), and C(sp³)–C(sp) bonds, the last of which was facilitated by catalytic Fe(II) with vitamin C as the stoichiometric reductant. Most recently, we have implemented a pathway for the Cu(I)-catalyzed dealkenylative amination for the late-stage modification of hormones, pharmaceutical reagents, peptides, and nucleosides. A commodity chemical, α -methylstyrene—a by-product in the cumene process—served as the methylation reagent to prepare methylated nucleosides directly from canonical nucleosides in a single-step synthesis. In turn, we synthesized several non-trivial primary amines from readily-accessible terpenoids.

Utilities of our inventions, particularly of “hydrodealkenylation” and “aminodealkenylation” are illustrated by facile production of medically relevant molecules.

A rapid generation of non-trivial compounds from readily-accessible sources



B rapid synthesis of methylated nucleosides

