

Organic Chemistry Portal
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Further Information

[Literature](#)

Related Reactions

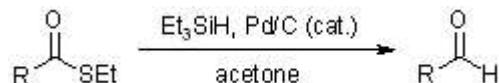
[Fukuyama Coupling](#)

[Rosenmund Reduction](#)

[Reduction of carboxylic compounds](#)

Fukuyama Reduction

The conversion of carboxylic acids to aldehydes is normally conducted in two steps by reduction of the acids or their derivatives to the corresponding alcohols followed by mild oxidation.

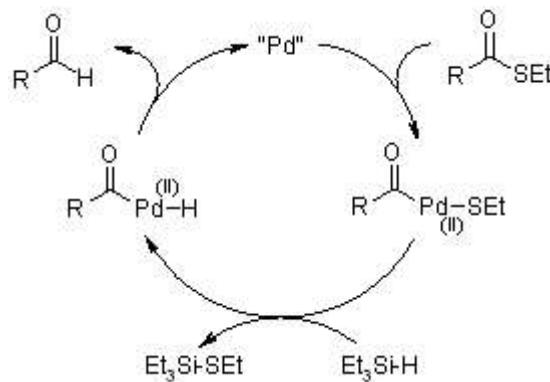


The Fukuyama Reduction allows the convenient and selective reduction of [thioesters](#), which are easily prepared from the corresponding carboxylic acids, for example by the [Steglich Esterification](#).

Mechanism of the Fukuyama Reduction

Compared to other direct reductions of carboxylic acids or carboxylic acid derivatives such as using DIBAL-H or [Rosenmund conditions](#), the Fukuyama Reduction is a mild alternative, offering outstanding functional group tolerance (see recent literature).

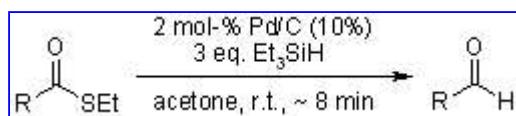
An initial oxidative addition of Pd(0) to the C(sp²)-S bond is followed by transmetalation of the resultant acylpalladium species with Et₃SiH. Reductive elimination from the acylpalladium hydride leads to the desired aldehyde.



On the basis of this mechanism, it was surmised that substitution of Et₃SiH by an appropriate organometallic reagent would provide access to ketones. Extensive screening of various transition metal catalysts and organometallic reagents have revealed suitable conditions, which are currently used in the [Fukuyama-Coupling](#).

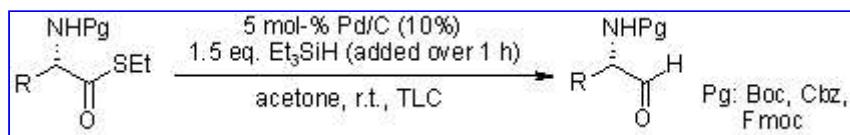
For a review see: T. Fukuyama, H. Tokuyama, *Aldrichimica Acta* **2004**, 37, 87.

Recent Literature



Facile Palladium-Mediated Conversion of Ethanethiol Esters to Aldehydes and Ketones

H. Tokuyama, S. Yokoshima, T. Yamashita, S.-C. Lin, L. Li, T. Fukuyama, *J. Braz. Chem. Soc.*, **1998**, 9, 381-387.



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