

# Catalytic dehydrogenation of ethane using titanium alkylidynes

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## Abstract.

The selective activation of C-H bonds of volatile alkanes to yield commodity products is increasingly important as a result of the quest for alternative energy sources. The latter is emphasized by the fact that the methane and ethane, which account for over 90% of the vast supply of hydrocarbons, are largely underutilized: a consequence of their extremely low reactivity. Although intermolecular 1,2-CH addition of hydrocarbons across M=C bonds is fairly common, it's only until very recently that the first evidence of M≡C bonds engaging in similar reactions has been provided by the group of Mindiola.<sup>1</sup> Ongoing work by his group has also demonstrated the preparation of the methyl derivative, [(PNP)Ti=CH<sup>t</sup>Bu(CH<sub>3</sub>)] (PNP = N[2-P(CHMe<sub>2</sub>)<sub>2</sub>-4-methylphenyl]<sub>2</sub><sup>-</sup>), which can be obtained from direct addition of methane to transient [(PNP)Ti≡C<sup>t</sup>Bu]. The same compound was also prepared independently from [(PNP)Ti=CH<sup>t</sup>Bu(OTf)] using [Mg(CH<sub>3</sub>)<sub>2</sub>(OEt<sub>2</sub>)]. The current work presents new findings on the use of ethane as the hydrocarbon source.

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<sup>1</sup> (a) B. C. Bailey, H. Fan, E. W. Baum, J. C. Huffman, M.-H. Baik, D. J. Mindiola, *J. Am. Chem. Soc.* **2005**, *127*, 16016-7. (b) Bailey, B. C.; Fan, H.; Huffman, J. C.; Baik, M.-H.; Mindiola, D. J. *J. Am. Chem. Soc.* **2007**, *129*, 8781-93.