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Major Research Interests: **Synthetic Organic Chemistry;**
Organometallic Chemistry

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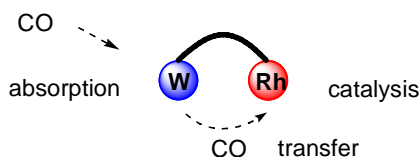


New Catalysts in Organic Synthesis

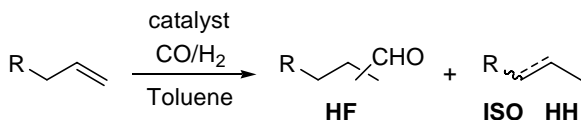
We are interested in developing synthetic reactions based on activation of no reactive compounds mainly by using group VIII metal catalysts.

Bimetallic Catalysis

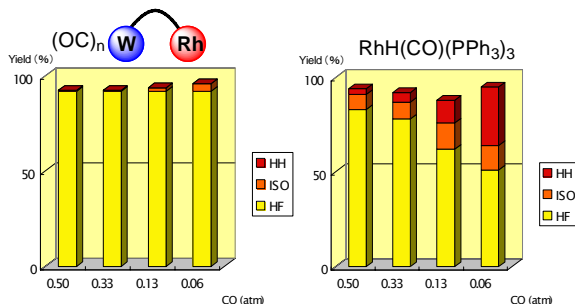
Bimetallic catalysis has now been employed in organic synthesis because it is expected that two metal centers collaboratively take part in a reaction. However, there has not been reported on bimetallic catalysis which surpasses conventional monometallic catalysis. While, we found that a W-Rh bimetallic complex was an efficient catalyst for the chemoselective hydroformylation of monosubstituted alkenes. The reaction proceeded efficiently at room temperature under atmospheric pressure of CO/H₂.



Collaborative Activity of Bimetallic Centers

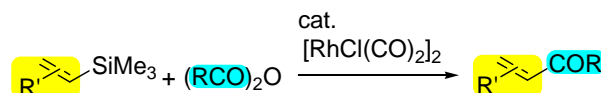


catalyst	ratio of CO / H ₂	HF	ISO	HH
(OC) _n W-Rh	1 / 7	92	2	0
(OC) _n W-Rh	1 / 15	92	4	0
RhH(CO)(PPh ₃) ₃	1 / 7	62	14	12
RhH(CO)(PPh ₃) ₃	1 / 15	51	13	31



Efficient CO Incorporation in Hydroformylation Electron Deficient Low Valent Metal Catalyst

Low valent transition metals have attracted synthetic organic chemists due to their ability of chemical bond cleavage and construction. Among them, electron rich transition metal catalysts such as Wilkinson's catalysts and palladium (0) catalysts are widely used in organic synthesis. On the contrary, electron deficient ones rarely used and their catalytic property have not completely surveyed yet. We found that rhodium(I) carbonyl complex had a unique property to cleave inert carbon-silicon bonds of tetraorganosilicon compounds. The key metal exchange provides synthetic transformation of vinylsilane into synthetically useful α,β -unsaturated ketones. The developed metal exchange is expected to develop variety of cross coupling reactions by using organosilicon compounds, which has been considered as inert to use in catalytic reactions. The methodology will open the door of synthetic utility of organosilicon compounds in catalytic reactions taking the place of conventional organoboron compounds.



Activation of Inert Organosilicon Compounds

Selected Publications

M. Yamane, N. Yukimura, and K. Narasaka, Hydroformylation of Monosubstituted Alkenes Catalyzed by W-Rh Bimetallic Complex. *Chemistry Letters*, 35, 540-541 (2006).

M. Yamane, Y. Kubota, and K. Narasaka, Palladium-Catalyzed Carboacylation of Alkenes by Using Acylchromates as Acyl Donors. *Bulletin of the Chemical Society of Japan*, 78, 331-340 (2005)

M. Yamane, K. Uera, and K. Narasaka, Rhodium-Catalyzed Acylation of Vinylsilanes with Acid Anhydrides. *Bulletin of the Chemical Society of Japan*, 78, 477-486 (2005)

M. Yamane, K. Uera, and K. Narasaka, Rhodium-Catalyzed Acylation of Vinylsilanes with Acid Anhydrides: Application to the Transformation of α -Acyloxy Vinylsilanes to Unsymmetrical 1,2-Diketones. *Chemistry Letters*, 33, 424-425 (2004).

M. Yamane, T. Amemiya, and K. Narasaka, Rhodium-(I)-Catalyzed Acylation of Alkyne with Acylsilane: Transformation of 5- or 6-Alkynoylsilanes to Alkylidenecycloalkanone. *Chemistry Letters*, 1210-1211 (2001).