



High Performance Phosphite Ligands Containing Various Numbers of Structural Units for n-Regioselective Hydroformylation of olefins

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Abstract:

In comparison to phosphines, phosphates are stubborn ligands towards oxidation and therefore find numerous catalytic applications at each scale. Especially in Rh-catalysed regioselective hydroformylation of internal olefins, they are indispensable in the isomerization in favor of linear products. Starting from a prototype of all monophosphites tris(2,4-di-tert-butylphenyl) phosphite, which has already been applied in an industrial scale, a new type of polyphosphites containing two and four the similar structural units were prepared. Their catalytic

performances as well as hydrolytic stabilities were compared. In Rh-catalysed hydroformylation of n-octenes, when the phosphite unit of the ligands was increased, the best yield was obtained from the reaction with the biphosphite. The n-selectivity is improved with the increased phosphite moiety, whilst the activity decreases. The regioselectivity is kinetically controlled. Lowering syngas pressure benefits the n-selectivity but decreases the catalyst activity. Besides, the hydrolysis pathway of one of the prepared biphosphites was clarified with in situ NMR spectroscopy. Surprisingly, its first step degradation was conducted simultaneously through three routes. The biphosphite cannot build a metal complex in a chelating manner. Instead, a binuclear Rh-complex was formed, which can further stabilize the ligand towards hydrolysis.

Biography:

Baoxin Zhang has completed his PhD majoring organometallic chemistry from Technical University of Darmstadt in Germany under the direction of Prof. Jörg J. Schneider. He is now a research fellow at Leibniz Institute for Catalysis (LIKAT) in Rostock. In the laboratory of Evonik Advanced Catalysis he is doing research in homogeneous catalysis for hydroformylation and development of phosphorus ligands.