

THE HYPOPHOSPHITE ION AS A HYDROGEN SOURCE IN HOMOGENEOUS CATALYTIC  
HYDROGENATION

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Transition metal complexes catalyze hydrogen transfer reactions under homogeneous conditions from various organic donors to unsaturated compounds [1]. We have discovered the first examples of such homogeneous catalytic reactions using an inorganic hydrogen donor, namely, hypophosphite salts. Ruthenium and rhodium complexes may be used as the catalysts. Thus, the reaction of  $6 \cdot 10^{-4}$  M 1-octene with  $\text{KH}_2\text{PO}_2$  in the presence of  $\text{RuCl}_2(\text{PPh}_3)_3$  (the mole ratio of this mixture was 30:300:1) at  $50^\circ\text{C}$  in alkaline aqueous methanol (1:1 N KOH-MeOH) gives octane in 50% yield after 1 h and 85% yield after 4 h. In addition to hydrogen transfer, there is a slight amount of isomerization of 1-octene to 2-octene. Octane formation does not occur upon running this reaction in the presence of only  $\text{KH}_2\text{PO}_2$  without catalyst or in the presence of the transition metal complex without  $\text{KH}_2\text{PO}_2$ . When using  $\text{RhCl}(\text{PPh}_3)_3$  as the catalyst, the octane yield is 21% after 1 h and the amount of 2-octene is increased to 45%. There have been only a few reports in the literature on the use of hypophosphorous acid and its salts for the reduction of unsaturated compounds under heterogeneous catalysis conditions. Various palladium compounds are usually employed as catalysts, while platinum, ruthenium, and rhodium derivatives are inactive under such conditions [2-4].

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