

Accepted Manuscript

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PII: S0022-328X(18)30278-X

DOI: [10.1016/j.jorganchem.2018.04.028](https://doi.org/10.1016/j.jorganchem.2018.04.028)

Reference: JOM 20420

To appear in: *Journal of Organometallic Chemistry*

Received Date: 5 February 2018

Revised Date: 12 April 2018

Accepted Date: 20 April 2018

Please cite this article as: N.U. Din Reshi, D. Senthurpandi, A.G. Samuelson, A mechanistic study of transfer hydrogenation catalyzed by cyclometallated ruthenium half-sandwich complexes, *Journal of Organometallic Chemistry* (2018), doi: 10.1016/j.jorganchem.2018.04.028.

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A Mechanistic Study of Transfer Hydrogenation Catalyzed by Cyclometallated Ruthenium Half-sandwich Complexes

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Abstract

Transfer hydrogenation of aromatic ketones catalysed by eight cyclometallated ruthenium half-sandwich complexes, including three new complexes, was examined. The catalytic process was studied using different ratios of substrate to base and base to catalyst and using a deuterated reductant. Optimum conditions for catalysis were shown to be in the presence of higher amounts of base in refluxing isopropanol. Under these conditions, the complexes were reduced *in situ* to give Ru(0) nanoparticles invisible to the naked eye. The nanoparticles were characterized by TEM, DLS and XPS. The catalytic transfer hydrogenation, under conditions in which nanoparticles were generated, was found to be far greater than the transfer hydrogenation by the molecular catalyst. Complete characterization of the three new complexes, including the X-ray crystallographic characterization of these complexes was carried out.

Keywords:

Cyclometallation
Ruthenium half-sandwich complexes
Transfer hydrogenation
Mechanistic Studies
Heterogeneous catalysts
Nanoparticles

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