C-Scorpionate Gold(III) Catalysts in Nitroarene Reduction: A Novel Strategy

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The reduction of nitroarenes is of great interest in both industrial and environmental contexts. These compounds are essential in various synthetic processes, yet their release into the environment poses significant risks to both ecosystems and human health. Thus, developing efficient, selective, and environmentally friendly catalytic processes for nitroarene reduction is crucial for sustainable chemical manufacturing. This work explores the effect of catalysts, solvents, and reducing agents on the reaction kinetics of nitroarenes reduction. For the first time, C-scorpionate complexes are used as catalysts for this reaction: gold(III) complexes bearing different C-scorpionate ligands $[AuCl_2(\kappa^2\text{-}RCpz_3)]^{n+}$ (pz = pyrazol-1-yl, R = SO_3^- (**1**), n = 0; R = H (**2**) or CH_2OH (**3**), n = 1) were applied as catalysts under very mild reaction conditions, evaluating their efficiency and stability. Complexes **1** and **3** exhibited outstanding catalytic performance, achieving near complete nitroarene reduction in ca. 5 min of reaction. Solvent–catalyst interactions appear to affect significantly their catalytic activity. A wide range of substituted nitroarenes was successfully reduced with high efficiency, demonstrating the broad applicability of the catalysts. The findings highlight the potential of these ambient water-prepared C-scorpionate gold(III) complexes as highly effective catalysts for fast reduction of nitroarene.

Słowa kluczowe

Coordination chemistry, C-scorpionate complex, Gold catalysis, Green chemistry, Nitroarene reduction

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