Recyclable and Reusable Co-Salen Complexes for Catalytic Use (#3409)

A polymer-supported salen ligand that is recyclable and reusable

Georgia Tech inventors have synthesized a polymer-supported salen ligand that is recyclable and reusable. The polymers, poly(norbornene) and poly(styrene), can be metallated with cobalt to yield a co-salen complex that is as active and effective as its non-supported analogous. The complex can also be reused with almost identical reactivity and enantioselectivity, given proper procedure of isolation and reactivation. The polymeric cobalt complexes were successfully used as supported catalysts for hydrolytic kinetic resolution (HKR) of epoxides as well as asymmetric epoxidation of olefins. The complexes showed catalytic activity and selectivity comparative to that of the original Jacobsen catalysts. Cobalt-based copolymers were found to be more active and selective than their homopolymer analogues. The catalysts demonstrated possibility of easy metal removal from the product as the catalysts were easily removed from the reaction mixtures and with proper recycling, the catalyst retained activity and selectivity for further use.

Benefits/Advantages

- Recyclability
- Retention of activity and selectivity
- Ease of separation from reaction product
- Cost-effective solution

Potential Commercial Applications

- Catalysis
- Pharmaceuticals
- Drug synthesis
- Agricultural chemical synthesis

Background/Context for This Invention

Metalated chiral salen ligands have been successfully used as catalysts since their introduction in the 1990s. Their first use was in asymmetric epoxidation of unfunctionalized olefins, but in the past decade, their use has extended to a variety of asymmetric transformations such as ring-opening of epoxides, Pictet-Spengler reactions, and hydrolytic kinetic resolution of racemic epoxide mixtures. Though vast in use, the co-salen complexes currently available are lacking in properties vital in the growing chemical industry. Most complexes are difficult to separate from reaction products, have low selectivity, and are either non-reusable or have poor reuse ability due to decomposition under reactions condition. These and other challenges can

contribute to higher cost of manufacturing and prevent broad industrial applications.

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More Information

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Publications

For more information about this technology, please visit:
https://licensing.research.gatech.edu/technology/recyclable-and-reusable-co-salen-complexes-catalytic-use

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