

Selective hydrogenation using 3d-transition metals

Problem Statement: Selective hydrogenations are very important reactions in organic synthetic chemistry. The procedure is a key method for synthesising valuable intermediates in pharmaceutical, polymer, fine chemicals industries and biomass valorisation processes. The advantage of selective hydrogenation includes avoiding the possible side product formation and elimination of impurities. Traditionally, hydrogenation is accomplished by using precious-metal-based catalysts such as Pt, Pd, Ru, Rh, Ir and Os in both homogeneous and heterogeneous ways. However, though efficient for hydrogenation, these catalytic methods have drawbacks such as the use of expensive precursors, toxic metal as active metal centres for hydrogenation, disposal issues after completion of the reaction, handling complications, and pyrophoric nature of the catalyst.

Uniqueness of the Solution: The present invention relates to hydrogenation

catalysts for cost-effective, simple and selective hydrogenation of α,β -unsaturated carbonyl compounds and nitroarenes. The present invention, in particular, relates to hydrogenation catalysts such as Cobalt-Nickel bimetallic nanocatalyst supported on g-C₃N₄ for selective hydrogenation of α,β -unsaturated carbonyl compounds and nitroarenes under mild reaction conditions. The present invention also further relates to the preparation of Cobalt-Nickel bimetallic nanocatalyst supported on g-C₃N₄.

Current Status of Technology: A proof of concept and several examples are successfully tested in the lab.

Societal Impact: The cost of the product decreases significantly, and heavy metals usage would also come down. Further, disposal issues after completion of the reaction are also more minor.

Patent(s): In progress.

Relevant Industries: Pharmaceutical Companies and Petrochemical Industries.

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