

Preformed Au Colloidal Nanoparticles Immobilised on NiO as Highly Efficient Heterogeneous Catalysts for Reduction of 4-Nitrophenol to 4-Aminophenol

Authors : Khaled Alshammari

Abstract : A facile approach to synthesizing highly active and stable Au/NiO catalysts for the hydrogenation of nitro-aromatics is reported. Preformed gold nanoparticles have been immobilized onto NiO using a colloidal method. In this article, the reduction of 4-nitrophenol with NaBH₄ has been used as a model reaction to investigate the catalytic activity of synthesized Au/NiO catalysts. In addition, we report a systematic study of the reduction kinetics and the influence of specific reaction parameters such as (i) temperature, (ii) stirring rate, (iii) sodium borohydride concentration and (iv) substrate/metal molar ratio. The reaction has been performed at a substrate/metal molar ratio of 7.4, a ratio significantly higher than previously reported. The reusability of the catalyst has been examined, with little to no decrease in activity observed over 5 catalytic cycles. Systematic variation of Au loading reveals the successful synthesis of low-cost and efficient Au/NiO catalysts at very low Au content and using high substrate/metal molar ratios.

Keywords : nonochemistry, catalyst, nanoparticles supported, characterization of materials, colloidal nanoparticles

Conference Title : ICC 2024 : International Conference on Chemistry

Conference Location : Las Vegas, United States

Conference Dates : March 25-26, 2024