SYNTHESIS OF GOLD NANOPARTICLES ON CERIUM OXIDE ($Au\text{-}CeO_2$) CATALYST FOR REDUCTION OF *p*-NITROPHENOL

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ABSTRACT

SYNTHESIS OF GOLD NANOPARTICLES ON CERIUM OXIDE (Au-CeO_2) CATALYST FOR REDUCTION OF *p*-NITROPHENOL

This study investigates the synthesis of gold (Au) nanoparticles supported on cerium oxide (Au-CeO_2) catalysts and their catalytic activity in the reduction of *p*-nitrophenol (*p*-NP) to *p*-aminophenol (*p*-AP). Cerium oxide was synthesized using two methods, chemical precipitation and sol-gel, and subsequently used as a support for gold nanoparticles via deposition-precipitation. Characterization techniques such as X-ray diffraction (XRD), Fourier Transform Infrared (FTIR), and Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES) confirmed the crystalline structure, gold nanoparticle distribution, and chemical composition of the Au-CeO_2 catalysts. The catalytic performance was evaluated through the reduction of *p*-NP using sodium borohydride ($NaBH_4$) at room temperature. The superior performance of the CP-derived catalyst is attributed to its smaller particle size and more uniform distribution of gold nanoparticles which enhance catalytic activity. The result significantly higher conversion rate of 59.03% compared to only 2.85% for the sol-gel synthesized catalyst. This difference in catalytic activity is attributed to the particle size, distribution of gold nanoparticles, and the presence of oxygen vacancies in the cerium oxide support. The findings highlight the potential of Au-CeO_2 catalysts in environmental applications, particularly in the remediation of hazardous pollutants.