SYNTHESIS OF Au-CeO_2 AND ITS CATALYTIC ACTIVITY FOR REDUCTION OF *p*-NITROPHENOL

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ABSTRACT

SYNTHESIS OF Au-CeO_2 AND ITS CATALYTIC ACTIVITY FOR REDUCTION OF *p*-NITROPHENOL

Cerium oxides (CeO_2) possess remarkable optical properties, high warm solidity, good electrical conductivity, and diffusivity. They are widely used in sensors, absorbents, and catalytic materials. Specifically for catalysis, the CeO_2 are used as support for gold (Au) nanocatalyst to improve the stability of the gold and prevent it from agglomeration. Various method for producing CeO_2 in form of nanoparticles has been investigated including hydrothermal, sol-gel, co-precipitation and mechanochemical. However, these methods are expensive, lengthy preparation procedures and requires the use of surfactant. Therefore, this work proposed a simple and low-cost co-precipitation method that uses cerium nitrate and potassium carbonate as precursors. This work aims to optimize the preparation of CeO_2 in terms of cerium nitrate pH and calcination temperature. Furthermore, the optimized CeO_2 were used as support for the gold catalyst (Au-CeO_2). The Au-CeO_2 was prepared by deposition and precipitation (DP) method and this catalyst was tested for the reduction of *p*-nitrophenol (*p*-NP). Characterization of CeO_2 by FTIR showed the optimized cerium nitrate pH at 6 and calcination temperature of 800 ^oC produced a pure CeO_2 without impurities. Moreover, the characterization of Au-CeO_2 catalyst by FTIR confirmed the immobilization of Au on CeO_2 support as the shifting from 3394 to 3412 cm^{-1} for the O-H band and 570 to 548 cm^{-1} for Ce-O band occurred respectively. The catalytic activity of *p*-NP reduction achieved 58.22% conversion to *p*-aminophenol (*p*-AP) with the rate constant (*k*) of 0.0359 min^{-1}. The successful reduction of *p*-nitrophenol over Au-CeO_2 catalyst proved the CeO_2 prepared by co-precipitation method is a good support for Au catalyst.

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