SYNTHESIS OF CeO_2 NANOPARTICLE-SUPPORTED GOLD CATALYST (Au-CeO_2) FOR *p*-NITROPHENOL REDUCTION

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ABSTRACT

SYNTHESIS OF CeO_2 NANOPARTICLE-SUPPORTED GOLD CATALYST (Au-CeO_2) FOR *p*-NITROPHENOL REDUCTION

The reduction of p-nitrophenol (*p*-NP) is a well-studied reaction and serves as an important model for evaluating catalyst activity. This study used a simple synthesis method to prepare cerium oxide (CeO_2) support using chemical (A) and co-precipitation (B) methods. Gold (Au) was then deposited on the cerium oxide support using the deposition-precipitation (DP) method presented in the work. Cerium oxide support was prepared by mixing cerium nitrate with ammonia solution and potassium carbonate using chemical precipitation and co-precipitation techniques, respectively. The resulting particles were characterised using Fourier Transform Infrared spectroscopy (FTIR), which showed peaks at 3320, 1320, and 500 cm^{-1}, indicating O-H stretching, O-H bending, and Ce-O groups, respectively. Additionally, a small peak at 1630 cm^{-1} indicated the presence of CO_3^{2-} impurities from the preparation process. The X-ray diffraction (XRD) pattern for both samples indicated cerium oxide with a cubic fluorite crystalline structure (JCPDS No. 01-075-0076). Furthermore, the characterisation of Au-CeO_2-A and Au-CeO_2-B by FTIR confirmed the immobilisation of Au on the CeO_2 support due to band shifting of the support peaks. Both catalysts showed 100% conversion to p-aminophenol, with a rate constant (k) of 5.78 x 10-4 s^{-1} for Au-CeO_2-A and 4.37 x 10-4 s^{-1} for Au-CeO_2-B.

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