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

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Final Year Project Report Submitted In
Partial Fulfilment Of The Requirements For The
Degree Of Bachelor Of Science (Hons.)
Chemistry With Management
Faculty Of Applied Sciences
Universiti Teknologi Mara

FEBRUARY 2024

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ABSTRACT

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

In this study, the catalytic potential of monometallic nanoparticles—gold (Au), is investigated. The Au is well-known for its remarkable activity in organic processes. Binding Au on ceria (CeO_2) is the first step towards developing an active, stable, and recyclable catalyst for the reduction of *p*-nitrophenol (*p*-NP). Both CeO_2 and Au/CeO_2 were synthesized using distinct methods: CeO_2 through the chemical precipitation method, and Au/CeO_2 through the deposition-precipitation method. Through techniques such as inductively coupled plasma optical emission spectroscopy (ICP-OES), Field Emission Scanning Electron Microscopy (FESEM), and Fourier transform infrared spectroscopy (FTIR), the resulting particles were analyzed. This examination aimed to identify the presence of CeO_2 bands and determine the Au loading in the catalyst, respectively. UV-visible spectroscopy was used to track the reaction kinetics. High conversion rates and selectivity towards the intended product were displayed by both catalysts, which showed good catalytic activity. By monitoring the value of the rate constant (*k*), several catalyst masses were applied to ascertain the ideal dose for the reduction of *p*-NP. After that, *p*-NP was reduced to *p*-aminophenol (*p*-AP) at different concentrations using this chosen mass. Both investigations were carried out well and offered insightful information about the catalytic process. The k value for 6 mg Au/CeO2 catalyst is 2.2×10^{-3} s^{-1}, and the peak shift at 3140 cm^{-1} and 507 cm^{-1} shows that the alterations in the peak positions and intensities were evident, signifying the interaction between Au nanoparticles and the CeO_2 support.