PREPARATION OF Au NANOPARTICLES ON ANODIC ALUMINIUM OXIDE FOR CATALYTIC REDUCTION OF *p*-NITROPHENOL

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ABSTRACT

PREPARATION OF Au NANOPARTICLES ON ANODIC ALUMINIUM OXIDE FOR CATALYTIC REDUCTION OF *p*-NITROPHENOL

Au nanoparticles on anodic aluminium oxide (Au/AAO) have been synthesised to catalyse a variety of oxidation and reduction processes. However, not all of the Au is deposited on the AAO using the deposition-precipitation process. As a result, this study proposes evaluating the number of immersions in gold solution and reusing gold solution after immersion. The anodic aluminium oxide (AAO) was initially created using an electrochemical anodization approach followed by the deposition of gold solution on AAO to produce an Au/AAO catalyst. Au/AAO catalysts were prepared and characterized by Fourier transform infrared spectroscopy (FTIR), inductively coupled plasma-optical emission spectrometry (ICP-OES) and Field Emission Scanning Electron Microscopy (FE-SEM). Lastly, the activity of Au/AAO catalyst for reduction of *p*-nitrophenol were determined using ultraviolet-visible (UV–Vis) spectrophotometer. Two effects were investigated: the influence of the number of AAO immersed in the gold solution and the reuse of the gold solution. Meanwhile, the catalytic activity of the prepared catalysts was demonstrated via the reduction of *p*-nitrophenol (*p*-NP). From the result, FE-SEM, the pattern of Anodic Aluminium Oxide (AAO) membranes is closely packed like regular-shaped holes with 76±32 nm pore size. In the FE-SEM image also, the AuNPs can be seen as individual nanoparticles scattered on the surface of the AAO membrane. According to the FTIR spectra, the characteristic of bare AAO exhibits a broad band O-H at 3376 cm^{-1} and peak C=O at 1720 cm^{-1} while AAO-OH-Si has an additional peak Si-O at 1091 cm^{-1}**.** Among the three types of catalysts: (Au/AAO-1, Au/AAO-2, and Au/AAO-3), the Au/AAO-1 indicates the highest rate of constant (*k)* which is 0.0898 min^{-1}. The second effect (produces Au/AAO-a, Au/AAO-b and Au/AAO-c) catalysts and Au/AAO-b indicates the highest *k* which is 0.3947 min^{-1}. Therefore, future research should look at the reusability of membrane-based catalysts for catalytic study.

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