CHARACTERIZATION OF GOLD NANOPARTICLES AUGMENTED CELLULOSIC MICROCAPSULES BY ALGINATE ENCAPSULATION METHOD FOR P-NITROPHENOL DEGRADATION

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AUTHOR'S DECLARATION

I I declare that the work in the thesis was carried out in accordance with the regulation of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as reference work.

I, hereby acknowledge that I have been supplied with the Academic Rules and Regulations, Universiti Teknologi MARA, regulating the conduct of my study and research.

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SUPERVISOR'S CERTIFICATION

We declared that we read this thesis and in our point of view this thesis is qualified in terms of scope and quality for the purpose of awarding the Bachelor of Chemical Engineering (Environment) with Honours.

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ABSTRACT

The aim of this work was to synthesise and characterize the physical and chemical properties of the AuNPs and to investigate the feasibility of p-nitrophenol (PNP) degradation by AuNPs augmented cellulosic microcapsules in the catalytic reduction of PNP. The AuNPs was synthesized by using citrate reduction method where the citrate solution will act as the reducing agent. In order to investigate the feasibility of the p-nitrophenol degradation, the chemical and physical properties of the AuNPs had been characterized. Scanning electron microscopy (SEM) was used to determine the size, shape and morphology of the microcapsules while the absorption spectra that give the information about the surface plasmon band was determined by Ultraviolet-visible Spectroscopy (UV-*vis*). Brunaeur-Emmet-Teller (BET) analyser was used to determine the surface area of gold nanoparticles augmented cellulosic microcapsules. The AuNPs microcapsule had been produced by using alginate encapsulation method. Since p-nitrophenol was considered as a priority pollutant due to its toxicity, AuNPs microcapsules was used to degrade the PNP into PAP. The size of the microcapsule produced was in the range of 1-2 mm with the surface area 3.8821 m^2/g and the wavelength of the AuNPs was determined at 522 nm. The microcapsules had porous structure which can provide accessible active sites. The absorbance peak for the PNP and the mixture of PNP and $NaBH_4$ were 383 nm and 457 nm respectively. The PNP were degraded into p-aminophenol (PAP) with the presence of $NaBH_4$ and AuNPs microcapsules. Almost half of the PNP were degrade in 3 hours. Therefore, the degradation of the PNP to PAP was achieved by 48.33%.