

ABSTRACT

THE INTRODUCTION ACTIVITY TEST OF $\text{Ni}_{0,8}\text{Fe}_2\text{Mo}_{0,2}\text{O}_4$ NANOCATALYST FOR REMAZOL GOLDEN YELLOW PHOTODEGRADATION

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$\text{Ni}_{0,8}\text{Fe}_2\text{Mo}_{0,2}\text{O}_4$ nanocatalyst has been prepared using a sol-gel method. Preparation of the materials was carried out by dissolving nitrate salts of iron and nickel, and hydrates of ammonium molybdate in pectin solution and then the sample was stirred thoroughly using magnetic stirrer while adjusting pH to 11. After freeze-drying process, the sample was subjected to calcination treatment at 600 and 800°C, respectively, and then characterized using the techniques of X-ray diffraction (XRD), PSA, SEM and UV-Vis spectrophotometer analysis. The result of XRD characterization indicated that material consists of a majority crystalline phase of spinel $\text{Ni}_{0,8}\text{Fe}_2\text{Mo}_{0,2}\text{O}_4$ for both calcinations. Then, grain size distribution of the nanocatalyst calcined at 600°C using PSA, is 30.44 nm (13%) and calcined at 800°C is 51.46 nm (2%). Acidic properties analysis of catalyst calcined at 600°C and 800°C, respectively, using gravimetric method resulted 6.92 and 6.03 mmol pyridine/g catalyst. Then, SEM analysis proved that $\text{Ni}_{0,8}\text{Fe}_2\text{Mo}_{0,2}\text{O}_4$ nanocatalyst is formed based on the atomic ratio of O, Fe, Ni, and Mo. Photodegradation experiments for Rhemazol Golden Yellow dye were conducted using UV and Sunlight irradiation, and its performance was evaluated by measuring the absorbance at 407 nm using UV-Vis spectrometer. The experimental result demonstrate that the concentration of the Rhemazol Golden Yellow was reduced into 22 and 25% for catalyst calcined at 600°C, and then 18.5 and 22% for catalyst calcined at 800°C.

Keyword: Nanocatalyst, Pectin, Photodegradation, Dye

ABSTRAK

STUDI PENDAHULUAN Uji AKTIVITAS NANOKATALIS $\text{Ni}_{0,8}\text{Fe}_2\text{Mo}_{0,2}\text{O}_4$ UNTUK FOTODEGRADASI REMAZOL GOLDEN YELLOW

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Telah dilakukan pembuatan nanokatalis $\text{Ni}_{0,8}\text{Fe}_2\text{Mo}_{0,2}\text{O}_4$ dengan metode sol-gel menggunakan pektin sebagai agen pengemulsi. Katalis dikalsinasi pada 600°C dan 800°C selama delapan jam, dan kemudian dilakukan uji fotodegradasi remazol *golden yellow*. Uji fotodegradasi dilakukan dengan bantuan lampu UV dan sinar matahari sumber cahaya. Hasil fotodegradasi diukur absorbansinya pada λ_{maks} 407 nm menggunakan spektrometer UV-Vis. Konsentrasi remazol *golden yellow* setelah didegradasi menggunakan lampu UV dengan bantuan katalis pada kalsinasi 600°C dan 800°C secara berturut-turut berkurang sekitar 22 dan 25% dan dengan sinar matahari 18,5 dan 22%. Analisis keasaman katalis pada suhu kalsinasi 600°C memiliki keasaman 6,92 mmol piridin/g katalis dan pada kalsinasi 800°C sebesar 6,03 mmol piridin/g katalis. Karakterisasi dengan XRD dan PSA diperoleh ukuran partikel rata-rata nanokatalis 30,44 nm dengan distribusi ukuran partikel 13 % pada kalsinasi 600°C dan 51,46 nm dengan distribusi ukuran partikel 2% untuk nanokatalis dikalsinasi pada 800°C . Analisis SEM-EDS menunjukkan adanya unsur yaitu O, Fe, Ni dan Mo pada struktur $\text{Ni}_{0,8}\text{Fe}_2\text{Mo}_{0,2}\text{O}_4$

Kata Kunci: Nanokatalis, Pektin, Fotodegradasi, zat warna