

Pengaruh Waktu Penyinaran, pH dan Konsentrasi Reaktan pada Proses Foto-Fenton dengan Sinar Tampak terhadap Fotodegradasi Amoksisilin

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INTISARI

Pada penelitian ini telah dipelajari efektivitas foto-Fenton di bawah sinar tampak terhadap fotodegradasi amoksisilin sehingga konsentrasi amoksisilin berkurang dan memenuhi syarat baku mutu. Proses foto-Fenton dilakukan dengan teknik batch di bawah sinar tampak. Pada proses ini dipelajari pengaruh waktu penyinaran, pH, konsentrasi Fe^{2+} dan H_2O_2 serta konsentrasi awal amoksisilin terhadap efektivitas proses foto-Fenton. Efektivitas foto-Fenton ditentukan berdasarkan pengurangan konsentrasi amoksisilin. Konsentrasi amoksisilin ditentukan dengan metode spektrofotometri UV-Visibel.

Hasil penelitian menunjukkan bahwa proses foto-Fenton di bawah sinar tampak mampu menurunkan konsentrasi amoksisilin dengan cukup efektif. Efektivitas degradasi amoksisilin paling tinggi diperoleh pada waktu penyinaran selama 24 jam, pH 3, konsentrasi Fe^{2+} dan H_2O_2 masing-masing sebesar 5 mM dan 50 mM. Penurunan konsentrasi amoksisilin dapat mencapai 0,08 mg/L dari 10 mg/L dengan tiga kali tahap proses foto-Fenton. Fotodegradasi amoksisilin melalui proses foto-Fenton di bawah sinar tampak mengikuti reaksi orde satu semu dengan laju reaksi sebesar $0,001 \text{ menit}^{-1}$.

Kata kunci: amoksisilin, fotodegradasi, foto-Fenton, konsentrasi

The Effect of Irradiation Time, pH and Concentration of Reactant in the Photo-Fenton Process with Visible Light for Amoxicillin Photodegradation

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ABSTRACT

In this research, the effectiveness of visible light in the photo-Fenton process to photodegradation of amoxicillin has been studied, so that the concentration of amoxicillin was reduced and meet to quality standards. Photo-Fenton process was conducted by batch system equipped by tubular lamp. In this process, the influences of irradiation time, pH, concentration of Fe^{2+} and H_2O_2 and initial concentration of amoxicillin on the photo-Fenton effectiveness were evaluated. The photo-Fenton effectiveness was determined based on a reduction in the concentration of amoxicillin. Concentration of amoxicillin was determined by UV-Visible spectrophotometric method.

The results of the research demonstrated that by photo-Fenton process with visible light was able to reduce the concentration of amoxicillin quite effectively. The highest effectiveness of amoxicillin degradation was obtained at conditions i.e the visible irradiation time of 24 h, pH 3 and Fe^{2+} and H_2O_2 concentration were 5 mM and 50 mM, respectively. The decreasing of amoxicillin concentration can reach 0.08 mg/L from 10 mg/L, by three-stage process of photo-Fenton. Photodegradation of amoxicillin through a photo-Fenton process with visible light fits to the pseudo-first order reaction with the rate of the reaction is 0.001 min^{-1} .

Keywords: amoxicillin, photodegradation, photo-Fenton, concentration