

LAPORAN

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**PENGEMBANGAN MODEL PENINGKATAN KUALITAS AIR SUNGAI BRANTAS
DENGAN FOTOKATALIS PADA LIMBAH INDUSTRI *NONBIODEGRADABLE*
UNTUK Mendukung AGROFORESTY**

Tahun ke satu dari rencana tiga tahun

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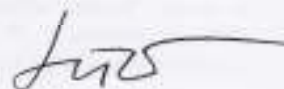
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ABSTRAK

Fotokatalis TiO_2 -zeolit telah dibuat dengan cara impregnasi TiO_2 pada zeolit teraktivasi asam. Berdasarkan data XRD menunjukkan bahwa zeolit alam mengandung jenis mordenit dan kliptonilolit dan TiO_2 jenis anastase. Berdasarkan data Surface Area analyzer metode BET menunjukkan luas permukaan spesifik dari TiO_2 -zeolit 10, 15 dan 20 mmol berturut-turut adalah 13,304; 12,423; 10,861 m^2/g . Energy band gap dari TiO_2 -zeolit adalah 3,15 eV. Fotokatalis ini diuji aktifitasnya untuk menderadasi methylen blue. Pada semua keadaan untuk mendegradasi MB menunjukkan bahwa degradasi merupakan reaksi dengan orde satu semu. Konstanta laju degradasi MB terbesar 0,019 menit^{-1} diperoleh pada konsentrasi TiO_2 15mmol/g. Lamanya penyinaran terhadap degradasi MB menunjukkan bahwa degradasi methylen blue semakin banyak bila penyinaran semakin lama. Semakin besar konsentrasi methylen blue semakin kecil konstanta lajunya. pH awal MB mempengaruhi konstanta laju degradasi. Konstanta laju degradasi MB terbesar diperoleh pada pH 11. Pengaturan pH awal pada pH 11 untuk MB meningkatkan persen degradasi begitu juga dengan penambahan H_2O_2 lebih meningkatkan persen degradasi. Pemakaian ulang fotokatalis pada pemakaian ke 4 terjadi penurunan degradasi 9,84%. Ini menunjukkan bahwa TiO_2 terikat kuat pada zeolit. Setelah degradasi MB, COD turun hingga 77,86 %. Penyinaran MB yang kedua menghasilkan penurunan sebesar 92,99%.

ABSTRACT

Photocatalyst TiO_2 - zeolite has been prepared by impregnation of TiO_2 on acid -activated zeolite . Based on the XRD data showed that natural zeolite -containing mordenite type and kliptonilolit , TiO_2 is anastase type . Based on data BET Surface Area analyzer method shows the specific surface area of TiO_2 - zeolite 10 , 15 and 20 mmol , respectively, 13.304 ; 12.423 ; 10.861 m^2 / g . Energy band gap of TiO_2 - zeolite is 3.15 eV . The photocatalytic activity was tested to degrade methylene blue . In all treatments to degrade MB indicate that the degradation is a pseudo first order reaction with . MB degradation rate constant of 0.019 min^{-1} the largest in TiO_2 concentration 10mmol / g . Duration of irradiation on the degradation of MB indicates that the degradation of methylene blue increased when the longer irradiation . The greater the concentration of methylene blue the less constant speed. MB initial pH affects the degradation rate constant . MB greatest degradation rate constants obtained at pH 11 . Initial pH adjustment to pH 11 percent degradation for MB increase with the addition of H_2O_2 as well as further enhancing the degradation percent . Reuse of photocatalyst on the use of 4 to decrease the degradation of 9.84 % , it indicates that TiO_2 strongly bound to the zeolite . After the first MB degradation , COD dropped to 77.86 % . Irradiation MB latter produces decrease of 92.99 % .

Keywords : TiO_2 -zeolite, methylen Blue, photocatalytic

SUMMARY

Photocatalyst TiO₂ - zeolite has been prepared by impregnation of TiO₂ on zeolite trending number that had been activated with HCl. The photocatalytic activity was tested models for processing waste methylene blue and phenol. Degradation conditions studied were the concentration of TiO₂ in the zeolite, the concentration of methylene blue and phenol, methylene blue and phenol pH, the addition of H₂O₂ oxidator, effective reuse of the photocatalyst. Based on the research result that the concentration of TiO₂ on zeolite produces a different reaction rate constant and degradation (%) of different too. At all concentrations of TiO₂ - zeolite were used for the degradation of methylene blue and phenol obtained results that the degradation is a pseudo first order reaction with that indicated by the linearity of the equation $y = ax + b$. Largest rate constants obtained on TiO₂ concentration 10mmol / g and 15mmol / g respectively for MB and phenol. Rate constants for phenol and methylene blue respectively 0.028 and 0.019 min⁻¹. Phenol rate constant greater than methylene blue because of the size of the phenol molecules smaller than methylene blue. The duration of exposure to degradation showed that the degradation of phenol and methylene blue when more and more the longer irradiation. At various concentrations of methylene blue and phenol shows pseudo first order reaction. The concentration of phenol and methylene blue are different produce different rate constants. The greater the concentration of phenol and methylene blue the less constant speed. initial pH phenol and MB affect the degradation rate constants. Largest rate constants obtained at pH 7 and pH 11 respectively for phenol and MB. Initial pH adjustment to pH 11 percent degradation for MB increase with the addition of H₂O₂ as well as further enhancing the degradation percent. Reuse of photocatalyst on the use of only 4 to a decline of 9.84%. This suggests that TiO₂ strongly bound to the degradation of both phenol and zeolit. Setelah MB COD impaired. In phenol and MB respectively TURT a decline of 94.07 and 77.86%. The second irradiation for MB caused a decline of 92.99%. Based on the XRD data showed that natural zeolite mordenite containing types and kinds anatase kriptinilit and TiO₂. Based on data BET Surface Area analyzer method shows the specific surface area of zeolite, TiO₂ - zeolite 10mmol, 15mmol and 20 mmol respectively are 13,304; 12,423; 10,861 m² / g. energy band gap of TiO₂ - zeolite is 3.15 eV.

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