

SINTESIS DAN KARAKTERISASI SURFAKTAN DIETANOLAMIDA DARI MINYAK GORENG BEKAS TERKATALISIS CaO/ZEOLIT

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INTISARI

Telah dilakukan sintesis surfaktan dietanolamida terkatalisis CaO/zeolit dari minyak goreng bekas sebagai surfaktan nonionik. Tujuan dari penelitian ini adalah melakukan preparasi dan karakterisasi katalis CaO/zeolit, mensintesis surfaktan dietanolamida dari minyak goreng bekas terkatalisis CaO/zeolit dengan mengkaji pengaruh konsentrasi CaO yang diimbangkan ke zeolit untuk sintesis surfaktan dietanolamida. Sintesis katalis CaO/zeolit dilakukan menggunakan metode impregnasi basah dengan variasi konsentrasi CaO 3%, 5% dan 7% (b/b). Katalis dikarakterisasi dengan *Fourier Transform InfraRed* (FT-IR) dan *X-Ray Diffraction* (XRD). Tahapan sintesis surfaktan dietanolamida melibatkan reaksi transesterifikasi antara minyak goreng bekas dengan metanol terkatalisis KOH 1% dan reaksi amidasi antara metil ester dengan dietanolamina terkatalisis CaO/zeolit. Metil ester hasil transesterifikasi dikarakterisasi dengan *Gas Chromatography Mass Spectrometry* (GC-MS) dan FT-IR, sedangkan hasil surfaktan dietanolamida dianalisis kestabilan emulsinya, kestabilan busa, penurunan tegangan muka, Konsentrasi Kritis Misel (KKM) dan nilai *Hydrophilic-Lypofilic Balance* (HLB) serta dikarakterisasi dengan FT-IR.

Reaksi transesterifikasi minyak goreng bekas menghasilkan campuran metil ester dengan rendemen 91,20%, sedangkan reaksi amidasi pembentukan surfaktan dietanolamida untuk variasi konsentrasi CaO yang diimbangkan 3%, 5% dan 7% diperoleh rendemen sebesar 64,47%; 92,91%; dan 87,05%. Hasil karakterisasi surfaktan menunjukkan bahwa semakin tinggi konsentrasi surfaktan, kemampuan menurunkan tegangan muka juga semakin besar, busa yang terbentuk cukup stabil selama 1 jam, indeks emulsi campuran air-surfaktan-pertalite 67% dan pembentukan emulsi stabil hingga 4 hari. Nilai KKM sebesar 1,5 g/L dan HLB surfaktan sebesar 10,59 sehingga surfaktan dapat dimanfaatkan sebagai larutan pembersih dan pelarut.

Kata Kunci: dietanolamida, katalis CaO/zeolit, minyak goreng bekas, surfaktan, amidasi

SYNTHESIS AND CHARACTERIZATION OF DIETHANOLAMIDE SURFACTANT FROM USED COOKING OIL CATALYZED BY CaO/ZEOLITE

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ABSTRACT

Synthesis of diethanolamide surfactant catalyzed by CaO/zeolite from used cooking oil as nonionic surfactant has been carried out. The aims of this study were to prepare and characterize of CaO/zeolite catalyst and to synthesize of diethanolamide surfactant from used cooking oil catalyzed by CaO/zeolite with investigate effect of CaO concentration assayed to zeolite for it. Synthesis of CaO/zeolite catalyst was performed using wet impregnation method with various concentrations of CaO were 3%, 5% and 7% (w/w). The catalyst characterized by Fourier Transform InfraRed (FT-IR) and X-Ray Diffraction (XRD). Synthesis steps of the diethanolamide surfactant involved transesterification between cooking used oil with methanol catalyzed by KOH 1% and amidation reaction between methyl ester with diethanolamine catalyzed by CaO/zeolite. Methyl ester from transesterification characterized by Gas Chromatography Mass Spectrometry (GC-MS) and FT-IR, while surfactant diethanolamide was analyzed for the emulsion stability, foam stability, surface tension, Critical Micelle Concentration (CMC) and Hydrophilic-Lypofilic Balance (HLB) value and characterized by FT-IR.

Used cooking oil produced of mixture methyl ester from transesterification reaction of with yield of 91.20%, while amidation reaction of surfactant diethanolamide for variation of CaO concentration were 3%, 5% and 7% produced yield were 64.47; 92.91; and 87.05%. The surfactant characterization showed that higher surfactant concentration, the greater surface tension decrease, foam formed was stable until 1 hour, water-surfactant-pertalite system has 67% emulsion index and the stabilized emulsion up to 4 days. The CMC value is 1.5 g/L and HLB value was 10.59 so that the surfactant can be used as cleaner solution and solvent.

Keywords: diethanolamide, CaO/zeolite catalyst, used cooking oil, surfactant, amidation