Sintesis polimerik surfaktan anionik berbasis asam oleat untuk aplikasi enhanced oil recovery (EOR) = Synthesis of an anionic surfactant polymeris based on oleic acid for enhanced oil recovery (EOR)

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Abstrak

Teknik Enhanced Oil Recovery EOR menggunakan injeksi kimia dengan surfaktan anionik berperan dalam meningkatkan perolehan residu minyak, khususnya di daerah reservoar yang memiliki karakteristik tertentu. Penelitian ini bertujuan untuk mengembangkan produk surfaktan anionik dari asam oleat dan polietilen glikol 400, sesuai dengan karakteristik yang diperlukan pada teknik EOR. Surfaktan anionik dihasilkan melalui esterifikasi asam oleat dan polietilen glikol 400 pada berbagai suhu 120 C; 140 C; dan 150 C . Setelah esterifikasi, proses dilanjutkan dengan reaksi sulfonasi pada perbandingan mol 1 : 1; 1 : 1,05; dan 1 : 1,5 dan waktu pencampuran 2 jam; 4 jam; dan 6 jam . Karakterisasi kimia dan fisik dilakukan dengan metode titrasi dan melalui pengukuran : Fourier Transform Infra Red FTIR ; Nuclear Magnetic Resonance NMR ; Particle Size Analyzer PSA ; dan Spinning Drop Interfacial Tensiometer TX 500.
Hasil optimum esterifikasi Polietilen glikol dioleat PDO adalah pada suhu 150 C dan waktu 6 jam, dengan hasil bilangan asam, ester, penyabunan, dan iod, masing-masing 61,78 mgKOH/g sampel; 56,28 mg HCl/g sampel; 105,73 mgKOH/g sampel; dan 63,21 gr I2/100 g sampel. Sedangkan optimasi sulfonasi PDOS diperoleh dari perbandingan mol 1:1 dan waktu pencampuran 4 jam, dengan hasil analisa bilangan asam, ester, penyabunan, iod masing-masing sebesar 23,95 mgKOH/g sampel; 144,42 mgHCl/g sampel; 89,19 mgHCl/g sampel; dan 33,80 g I2/100 g sampel. Spektrum FTIR dan hasil analisa H-NMR menunjukkan bahwa senyawa ester dan sulfonasi telah terbentuk. Karakterisasi partikel PDOS menghasilkan ukuran partikel 4,723 ?m, potensial zeta -78,8 mV, dan tegangan antar muka IFT sebesar 0,0031 mN/m.
.....Enhanced Oil Recovery EOR technique through chemical injection using an anionic surfactant improves the recovery of oil residues, particularly in a reservoir area that has certain characteristics. The present study aimed to develop an aninoic surfactant producted by oleic acid and polyethylene glycol 400, which corresponds to the characteristics required in the EOR technique. The anionic surfactant was synthesized by esterification of oleic acid and polyethylene glycol 400 at various temperatures 120 C 140 C and 150 C . After esterification, the process was then continued by sulfonation at various mole ratios 1 0,5 1 1 and 1 1,5 and mixing times 2 hours 4 hours and 6 hours . Chemical and physical characterization were performed by titration method and a number of measurements Fourier Transform Infra Red FTIR Nuclear Magnetic Resonance NMR Particle Size Analyzer PSA and Interfacial Tensiometer TX 500.
The optimum results of the esterification of Polyethylene glycol dioleate PDO were achieved at the temperature of 150 C and time of 6 hours, with acid number, ester, saponification, and iod yields 61,78mgKOH g sample 56,28 mgHCl g sample 105,73 mgKOH g sample 63,21 g I2 100 g sample respectively. While sulfonation optimization PDOS was obtained at 1 1 mole ratio and 4 hours mixing time, with the results of acid number, ester, saponification, and iod yields 23,95 mgKOH g sample 144,42 mgHCl g sample and 89,19 mgKOH g sample and 33,80 gr I2 100 g sample respectively. FTIR spectra and H NMR analysis showed that ester and sulfonation compounds were formed. Characterization of PDOS particles showed that the particle size was 4,723 m, zeta potential was 78,8 mV, and interfacial tension IFT was

0,0031 mN m.Key words EOR, polymer injection, anionic surfactant, oleic acid, polyethylene glycol 400, esterification, sulfonation.