Metode demulsifikasi untuk pemisahan air dalam emulsi slop oil = Demulsification method for water separation in slop oil emulsions

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Abstrak

ABSTRAK
Metode slop oil recovery dilakukan dengan memisahkan air dan sludge agar diperoleh minyak mentah dengan % Basic Sediment & Water (% BS&W) kurang dari 0,5%. Pada penelitian ini emulsi slop oil dipisahkan melalui metode demulsifikasi dengan demulsifier berbasis surfaktan multikomponen yang diformulasikan dari surfaktan nonionik dengan nilai Relative Solubility Number (RSN) yang berbeda pada kondisi operasi yang dipengaruhi oleh konsentrasi demulsifier, waktu interaksi (settling time), dan pH free water. Penentuan kondisi optimum demulsifikasi slop oil ditentukan berdasarkan pengukuran % air yang terpisah dan % BS&W dengan metode bottle test (pengujian banyaknya air yang terpisah dengan gravitasi dan pemanasan), analisis tegangan antarmuka dan analisis turbiscan untuk mengetahui kestabilan fasa minyak setelah demulsifikasi. Hasil karakterisasi terhadap ketiga sampel slop oil yang digunakan menunjukan bahwa slop oil tangki B (TB), tangki E (TE) dan tangki G (TG) mengandung % (w/w) asphaltene 4,505%, 8,370% dan 8,314%, mengandung masingmasing % BS&W 90%, 36% dan 43%, terdiri dari komponen minyak fraksi berat (Heavy crude oil) dengan nilai API gravity masingmasing 11,8, 19,4 dan 18,5, mengandung logam Ni, V, Si, Na, dan Al, viskositas kinematik pada suhu 40 0C masingmasing 2318,35 cSt, 31,73 cSt, dan 62,45 cSt, dan membentuk emulsi air dalam minyak. Kondisi demulsifikasi optimum yang diperoleh adalah menggunakan demulsifier DM A dengan konsentrasi 1%, pH free water 7 ? 7,5, waktu interaksi 30 menit, dan dilakukan pada suhu konstan 60 0C. Dari ketiga faktor operasi tersebut menghasilkan % pemisahan air untuk slop oil TB, TE dan TG masingmasing 80%, 38%, dan 40% serta penurunan % BS&W sebesar 69,44% hingga 94,44%. Hasil penelitian ini menunjukan bahwa metode pemisahan air dengan demulsifier multikomponen yang mengandung persentase surfaktan oil soluble yang lebih besar dapat mensolvasi agregat asphalteneresin pada antarmuka lebih efektif sehingga menghasilkan % pemisahan air yang lebih baik. Selain itu, efek penambahan asam dan basa dapat menambah kestabilan emulsi slop oil karena adanya protonasi gugus amina dan berubahnya affinitas gugus asam pada bagian hidrofilik agregat asphaltene¬resin.
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ABSTRACT
Slop oil recovery method was done by separating the water and sludge to obtain the crude oil with the percentage of Basic Sediment & Water (% BS&W) which should be less than 0.5%. In this study, slop oil emulsion was separated by demulsification method with surfactantbased multicomponent as demulsifier. The demulsifier was formulated from a nonionic surfactant which had a relative solubility number (RSN) that differs. The demulsification of slop oil was affected by the concentration of demulsifier, the interaction time (settling time), and pH of free water. The determination of the optimum conditions for slop oil demulsification was determined on the basis of the percentage of the separated water and the % BS&W by bottle test method (A method based on quantity of the separated water by gravity and heating), interfacial

tension analysis, and turbiscan analysis. The characterization results of three samples of slop oil showed that the slop oil of tank B (TB), tank E (TE), and tank G (TG) containing % (w/w) asphaltene 4.505%, 8.370%, and 8.314%, kinematic viscosity 2318.35 cSt, 31.73 cSt, and 62.45 cSt at 40 0C respectively, % BS&W 90%, 36%, and 43%, consisting of heavy crude oil components with API gravity values 11.8, 19.4, and 18.5 respectively. The slop oils containe metals (Ni, V, Si, Na, and Al) and form a water in oil emulsion. The optimum condition of slop oil demulsification was obtained using 1% DM A demulsifier, pH 7,0 ? 7,5 of free water, interaction time 30 minutes, and was performed at a constant temperature, 60 0C. Based on the three factors produced the percentage of separated water for slop oil of TB, T?E, and TG 80%, 38%, and 40% and also decreased % BS&W by 69.44% to 94.44%, respectively. The results of this research indicated that the method of water separation with multicomponent of demulsifier containing oil soluble surfactant can solvate asphalteneresin aggregates at the interface more effectively, so it produce higher water separation. In addition, the addition effect of acid and base in slop oil emulsion can enhance the emulsion stability due to the protonation of amine group and the change of affinity at the hydrophilic acid group in asphalteneresin aggregates.