

Evaluation of a naturally derived waste brown oil extract for demulsification of crude oil emulsion

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Abstract

Conventional methods of eliminating water from crude oil such as the chemical injection have both economic and environmental impacts; thus, this study proposed an economic and environmentally friendly demulsifier. The bottle test method was used to study the performance of the natural extract and commercial demulsifier on a crude oil sample. The GC-MS profile of the extract was in agreement with previous reports on composition of oil extracted from rice bran using hexane, ultrasound assisted extraction and conventional solvent extraction with ethanol. Varying degrees of saturated and unsaturated fatty acids as well as retention times as observed, was a function of total time of scanning, according to NIST08 library of mass spectra. The performance of the demulsifier was expressed in terms of percentage of water separated from 100 ml samples of the oil samples. For both the demulsifiers, the performance increased with increase in volume of the demulsifier, separation time and operating temperature. The extracted demulsifier performed better than the chemical demulsifier under all the experimental conditions adopted in this study. Based on the parametric evaluation, it was observed the results from software corroborated the results obtained from experiments in terms of the observations of the combined effect of temperature and volume which showed the most significant influence on demulsification of the emulsified crude. The highest efficiency of the bio-demulsifier was obtained with a volume of 5 mL of the extract, at a temperature of 70°C and separation time of 60 min.

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