

Characterization of Candlenut Shells and Its Application to Remove Oil and Fine Solids of Produced Water in Nutshell Filters of Water Cleaning Plant

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Abstract : Oilfields under waterflood often face the problem of plugging injectors either by internal filtration or external filter cake built up inside pore throats. The content of suspended solids shall be reduced to required level of filtration since corrective action of plugging is costly expensive. The performance of nutshell filters, where filtration takes place, is good using pecan and walnut shells. Candlenut shells were used instead of pecan and walnut shells since they were abundant in Indonesia, Malaysia, and East Africa. Physical and chemical properties of walnut, pecan, and candlenut shells were tested and the results were compared. Testing, using full-scale nutshell filters, was conducted to determine the oil content, turbidity, and suspended solid removal, which was based on designed flux rate. The performance of candlenut shells, which were deeply bedded in nutshell filters for filtration process, was monitored. Cleaned water outgoing nutshell filters had total suspended solids of 17 ppm, while oil content could be reduced to 15.1 ppm. Turbidity, using candlenut shells, was below the specification for injection water, which was less than 10 Nephelometric Turbidity Unit (NTU). Turbidity of water, outgoing nutshell filter, was ranged from 1.7-5.0 NTU at various dates of operation. Walnut, pecan, and candlenut shells had moisture content of 8.98 wt%, 10.95 wt%, and 9.95 wt%, respectively. The porosity of walnut, pecan, and candlenut shells was significantly affected by moisture content. Candlenut shells had property of toluene solubility of 7.68 wt%, which was much higher than walnut shells, reflecting more crude oil adsorption. The hardness of candlenut shells was 2.5-3 Mohs, which was close to walnut shells' hardness. It was advantage to guarantee the cleaning filter cake by fluidization process during backwashing.

Keywords : candlenut shells, filtration, nutshell filter, pecan shells, walnut shells

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