
Removal of Hydraulic Fracturing Fluids from Petroleum Wastewater Using Sorption Techniques

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ABSTRACT

Hydraulic fracturing is a drilling method that uses large volumes of high-pressure, chemically treated water to free oil and natural gas trapped deep in underground strata. The chemical-enriched water and some groundwater are recovered from the well along with oil and gas. Major disadvantages of hydraulic fracturing are that it requires millions of gallons of relatively clean water, and the process may impart significant impacts on local ecosystems (e.g., water loss and pollution). Additionally, a common disposal method of petroleum-related wastewater is deep well injection, which is a costly and ineffective solution. Alternatively, petroleum-related wastewater is evaporated in open pits. Water recycling is not a mainstream practice among oil and gas companies because the procedure is expensive and, until recently, most oil and gas companies ‘disposed’ of all wastewater; i.e., it was treated as a waste. Presently, some companies are treating the wastewater to use again for drilling. Recycling of hydraulic fracking water is an engineering best practice and the proposed research project focuses on water recycling/cleaning techniques using sorption processes. Specifically, this research will test different sorbent materials for their effectiveness in removing synthetic fracking fluids from water. Different fracking fluid formulations will be prepared and reacted with selected sorbent materials (both natural and synthetic). The resultant fracturing fluid leachate will be tested for both toxicity and chemical properties. The proposed study may be of significant practical value to oil and gas production industries.