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Improved Heavy Oil Recovery by VAPEX Process in the Presence of Vertical and Horizontal Fractures

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Vapor extraction (VAPEX) is an important process for recovery of heavy oil and bitumen. In this work, the VAPEX process is studied experimentally in a rectangular physical model. The setup was constructed in a manner allowing experiments in both fractured and non-fractured systems. Propane was used as the solvent in all experiments. The experiments were conducted with pure solvent and different configurations of fracture-matrix contacts. Effects of pressure and number of side fractures were studied in this work. Results showed that the oil recovery increased with pressure. In addition, we found for the first time that there is a pressure range below the solvent dew point that the process can be performed efficiently. This has an advantage to the process and prevents any pore space blocking in the system due to solvent condensation caused by sudden pressure drops in the connecting lines, as the solvent has the tendency for condensation at conditions near to its dew point pressure. It was also found that the fractures can enhance heavy oil recovery during VAPEX process by improving the contact between solvent and oil contained in the matrix block, increasing the cross flow of solvent and oil between matrix and fracture, and also by providing more area for solvent diffusion into the heavy oil. These findings increase industry confidence for application of VAPEX process in both conventional and fractured reservoirs for exploitation of heavy oil resources.

Keywords: [VAPEX](#), [Fractured reservoir](#), [Conventional reservoir](#), [Solvent](#), [Heavy oil](#), [Fracture-matrix contact](#)

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