World Academy of Science, Engineering and Technology
International Journal of Chemical and Materials Engineering
Vol:14, No:04, 2020

Effect of Naphtha on the Composition of a Heavy Crude, in Addition to a Cycle Steam Stimulation Process

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Abstract : The addition of solvent to cyclic steam stimulation is done in order to reduce the solvent-vapor ratio at late stages of the process, the moment in which this relationship increases significantly. The study of the use of naphtha in addition to the cyclic steam stimulation has been mainly oriented to the effect it achieves on the incremental recovery compared to the application of steam only. However, the effect of naphtha on the reactivity of crude oil components under conditions of cyclic steam stimulation or if its effect is the only dilution has not yet been considered, to author's best knowledge. The present study aims to evaluate and understand the effect of naphtha and the conditions of cyclic steam stimulation, on the remaining composition of the improved oil, as well as the main mechanisms present in the heavy crude - naphtha interaction. Tests were carried out with the system solvent (naphtha)-oil (12.5° API, 4216 cP @ 40° C)- steam, in a batch micro-reactor, under conditions of cyclic steam stimulation (250-300 °C, 400 psi). The characterization of the samples obtained was carried out by MALDI-TOF MS (matrix-assisted laser desorption/ionization time-of-flight mass spectrometry) and NMR (Nuclear Magnetic Resonance) techniques. The results indicate that there is a rearrangement of the microstructure of asphaltenes, resulting in a decrease in these and an increase in lighter components such as resins.

Keywords : composition change, cyclic steam stimulation, interaction mechanism, naphtha
Conference Title : ICPPI 2020 : International Conference on Petrochemistry and Petrochemical Industry
Conference Location : Paris, France
Conference Dates : April 16-17, 2020