

Assessment of Mineralogy Effect on Catalytic Aquathermolysis in Steam Injection Process Based on High Field Nuclear Magnetic Resonance



Sofia Mecon, Paola Leon, Samuel Munoz, and Adan Leon

Universidad Industrial de Santander, Recobro Mejorado Research Group, Colombia

Abstract

During Steam Injection, the viscosity reduction and light oil fraction distillation are the most evident physical modifications. Nevertheless, once steam is injected, the occurrence of chemical reactions between organic petroleum compounds, injected steam and formation minerals called aquathermolysis have also been evidenced. Under controlled conditions, like the addition of a catalyst, these reactions generate changes in the molecular structure of the oil, producing an in situ upgrading. Therefore, this research was focused on the analysis and assessment of the in situ upgrading of a Colombian heavy oil under different mineralogical conditions. The influence of two lithologies in the presence of iron naphthenate as a catalyst at 270 ° C and 800 psi into a batch microreactor was studied. The oil physical variations were quantified through density and viscosity measurements, the elucidation of the oil molecular structure, molecular weight and modifications on aromatic and saturated fractions were quantified based on nuclear magnetic resonance spectroscopy (^1H -NMR). The results showed that clay minerals such as kaolinite, illite and montmorillonite act as catalytic agents in steam injection processes, reducing oil viscosity up to 80%. This effect is associated with the presence of metals and metalloids as iron, aluminum and silicon in the minerals. The changes in the properties of the oil are directly associated with modifications of the chemical structure, due to dealkylation, hydrogenation and condensation reactions, related to the variation of average molecular parameters as the aromaticity factor and the number of substituted rings.

Biography:

Sofía Mecón is a fourth-year petroleum engineering student at Universidad Industrial de Santander in Colombia. She is a member of the Recobro Mejorado research group from the Universidad Industrial de Santander working on thermal recovery processes research line as steam injection with catalytic projects and development a research with emphasis on the mineralogy effect of aquathermolysis catalytic and the use and analysis of nuclear magnetic resonance.

[7th International Congress on chemical Engineering and Catalysis 2020](#) Webinar– July 22-23, 2020.

Abstract Citation:

Sofía Mecón, Assessment of Mineralogy Effect on Catalytic Aquathermolysis in Steam Injection Process Based on High Field Nuclear Magnetic Resonance, Chemical Engineering Congress 2020, 7th International Congress on Chemical Engineering and Catalysis Webinar July 22-23, 2020.

(<https://chemicalengineering.annualcongress.com/abstract/2020/assessment-of-mineralogy-effect-on-catalytic-aquathermolysis-in-steam-injection-process-based-on-high-field-nuclear-magnetic-resonance>)

