

Scientists reduce viscosity of heavy oil by 90 percent

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Miguel Ángel Vázquez Guevara

A multidisciplinary scientific team improved such physical properties of heavy and extra heavy oil as viscosity, surface tension and density by applying chemicals. The purpose is to facilitate its management and profitability during the stages of extraction, transportation and processing, says the head of research, Miguel Ángel Vázquez Guevara, at the Laboratory of Organic Synthesis, of the Department of Chemistry, at the University of Guanajuato, in center Mexico.

"60 percent of the oil extracted in Mexico has characteristics of heavy and extra-heavy, generating different economic problems by the high costs of extraction, transportation and processing. The participation of the research group at the University of Guanajuato was to meet this demand. We focus on the design, synthesis, optimization and scaling of organic compounds, which are applied at the end of the synthesis to reduce the viscosity of heavy and extra-heavy crude oil," says Vázquez Guevara.

The specialist said that this design took into account the conditions of some crude oil wells in which the compounds were applied in order to be certain of its functionality.

Likewise, security and availability of raw materials in Mexico were considered to reduce costs; product stability and the reduction or elimination of waste from the synthesis process are essential challenges to meet the functional need of the product and protect the environment.

In the research scientists from the Mexican Petroleum Institute, the Autonomous University of San Luis Potosi, the Institute of Ciudad Madero Tamaulipas and from the Guanajuato Technological University participated.

"The work began in 2010 and concluded in 2013, resulting in the design and synthesis of organic molecules for laboratory and industrial scale

with economic and safe raw material. No byproducts are generated by the design, which beneficially impacts the environment," says Guevara Vázquez adding that the compounds were excellent viscosity reducers at laboratory level and well (reservoir) in pipe, where a reduction greater than 90 percent of viscosity was observed.

Decreasing the viscosity of heavy oil during transport was also achieved, via the dispersion of the asphaltenes which prevents caking and negative consequences in the operation; for example, stopping production because of plugging and additional operating costs (pipelines, pumping systems and storage tanks, etc.).

Vázquez Guevara says that when analyzing the process in the field, where a downhole oil transportation study was conducted during the 8:00 am production, 1.50 cubic meters of extracted oil (9.43 barrels of oil) were obtained.

"Previously, we treated it with the chemical compound from 10 a.m. until 18hrs when there is an average extraction of 3.62 cubic meters of oil, this translates into 13.34 barrels of [oil](#) per day yielding an average of one hundred thousand dollars a day on average per field."

Provided by Investigación y Desarrollo

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