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Editorial

Characteristics of Waxy Crude Oil and their Physical Properties on the Heat Transfer

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DESCRIPTION

The thermal characteristics of waxy crude oil under different physical properties and to explore their quantitative relationship, which is a promotion to the accurate temperature prediction, optimal design of heating and temperature monitoring for different kinds of waxy crude oil. Additional specific heat capacity and momentum source terms methods are employed to simulate the changing physical properties of waxy crude oil related to the paraffin crystallization. The general performance of thermal, convection and their coupling with the gelling behavior is scrutinized. The correlation analysis and grey relational analysis methods are utilized. Our outcomes reveal that the effect of viscosity on the cooling is more significant and multifaceted than that of specific heat capacity. Viscosity has the strong and regular correlation with the velocity and temperature distribution and further impacts the cooling rate. The influence of viscosity on the gelling layer at sidewall is more significant than that at top wall, and two opposite performances are observed on the development of gelling layer. On the contrary, specific heat capacity has more direct and simpler impact on temperature. In addition, the ranking of the correlation degree and its detailed information are indicated.

Waxy crude oils are, at low temperatures, exceedingly non-Newtonian fluids. The crystallization of wax appears to be the motive in their non-Newtonian conduct. Moreover, the go with the drift residences display time-dependence indicating an evolution of the shape with endured shear. The bodily version attempts to explain the low temperature conduct of waxy crudes in laboratory experimental loops. The correspondent mathematical hassle has been investigated appearing a quasi-steady approximation which we've got proven to be bodily consistent.

Crude oil performs a vital role in global energy supply. Waxy crude oil is the most common type of crude oil, for example, accounting for 90% of the total production in China. The presence of paraffin is responsible for the waxy behavior of crude oil. Paraffin refers back to the combination of n-alkanes and iso-alkanes with the carbon range starting from C20 to C50. It precipitates from crude oil when the temperature is below the wax look temperature (WAT), and such precipitation can cause an increase of viscosity and a decrease of flow ability throughout the transportation process. The relationship between the content material of paraffin and the properties of crude oil has been previously investigated experimentally. Multiple factors can influence viscosity changes in oil and oil/water emulsions, for example, paraffin crystallization, aggregation of nanoparticles, and so forth. However, very little is known approximately molecular level mechanisms that lead to WAT and changes in viscosity. Therefore, recently, the understanding of crude oil on the micro scale has attracted attention from researchers, including the application of Molecular Dynamics (MD) simulations which have been used to take a look at hydrocarbons and organic molecules. With the improvements in high-overall performance computing, an increased number of simulation researches of alkanes, paraffins, and crude oil had been reported. The simulated diffusion coefficients were observed to be higher than experimental values while the predicted viscosity was lower as compared to the experiment. Used MD simulations to study the rotational rest time and viscosity of 9-octylheptadecane and accurately predicted the transition from Newtonian to non-Newtonian behavior.

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