Temperature Hysteresis on Viscosity of Crude Oils at Constant Shear Rate

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The effect of temperature on the dynamic viscosity of crude oils has been widely investigated. In particular the heating process, where it is well known that viscosity of crude oils decreases when increasing temperature. However, there is a lack of information of what happens counterclockwise, namely cooling process. The cooling process phenomenon is the most important in different stages of crude oil production and the study of rheological parameters is fundamental to improve strategies in extraction and transportation of crude oil. Crude oil suffers considerable drops of temperature when it is extracted, i.e. using modern techniques in deep-water reserves. This decrease in temperature induces a more complex flow behavior of crude oils, which is necessary to investigate in order to ensure the correct and safe transportation of this material. Experimental data have shown that during the heating process at constant shear rate, the viscosities measured at any given temperature are higher than the ones measured during the cooling process. This effect may be explained by the structural changes occurring during the experiment. The ascending-descending curve presents a temperature hysteresis, which is more common in waxy oils. There is a critical temperature beyond which the viscosity is altered and it may depend on the composition of the oil. In this work we present the ascending-descending curve for some oils and the temperature hysteresis on viscosity.