Dynamic Viscosity and Interfacial Tension of Heptane, Tetradecane, Eicosane Dissolved with Carbon Dioxide

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As a primary greenhouse gas, the optimal utilization and emission reduction of CO_2 is gaining widespread interest. The CO_2 can be used as an injection gas in the enhanced oil recovery (EOR) processes. Meanwhile, the CO_2 can also be captured. In the EOR processes, the dynamic viscosity and interfacial tension have an impact on the costs and efficiencies. The dynamic viscosity influences the heat as well as mass transfer, while the interfacial tension affects the phase wettability, capillary pressure, and relative permeability. To be an injection gas, CO_2 is superior to water in reducing the dynamic viscosity and interfacial tension of crude oil. In this work, the dynamic viscosity and interfacial tension of heptane (n-C_7H_{16}), tetradecane (n-$C_{14}H_{30}$), and eicosane (n-$C_{20}H_{42}$) with CO_2 were simultaneously measured by a surface light scattering (SLS) method over a temperature range up to 473 K and pressure range up to 50 bar. The expanded uncertainties of liquid dynamic viscosity and interfacial tension are estimated to be 3 % and 1.5 % with a confidence level of more than 95 % (k = 2), respectively. The dynamic viscosity and interfacial tension were correlated as an empirical function of temperature and pressure. The deviations between experimental results and correlation are within the stated uncertainty.