

**Saturated Phase Density Measurements of CO₂ + Toluene and CO₂ + n-heptane systems at
Temperatures from (300 to 450) K and Pressures up to 20 MPa**

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The understanding of the density for CO₂ + hydrocarbons systems at reservoir conditions is very important for the correct design and the optimisation of carbon storage and enhanced oil recovery processes. While the densities of such mixtures have been reported in single-phase regions, data for the saturated phase density are very limited, especially at the reservoir condition. In this work, new saturated phase density measurements of (CO₂ + toluene) and (CO₂ + n-heptane) systems have been made at temperatures from 300 to 450 K and pressures up to 20 MPa, with an estimated relative uncertainty of 0.1 %. The measurements have been carried out in an apparatus consisting of an equilibrium cell connected to two high-pressure vibrating-tube densimeters and two syringe pumps. Both densimeters were calibrated with pure water and vacuum over the ranges of pressure and temperature. The results of the measurements are compared with the unsaturated densities of (CO₂ + toluene) and (CO₂ + heptane) at the same temperatures and pressures as well as data existing in the literature for similar systems. Finally, the new density data are compared with predictions made using theoretical and empirical models appropriate to the particular mixture.