Experimental Study of the Thermodynamic Properties of Microemulsions

N.G. Polikhronidi,1 G.V. Stepanov,1 I.M. Abdulagatov,2,C,S and R.G. Batyrova1

1Institute of Physics of the Dagestan Scientific Center of the Russian Academy of Sciences, Makhachkala, Dagestan, Russia

2Institute for Geothermal Problems of the Dagestan Scientific Center of the Russian Academy of Sciences, Makhachkala, Dagestan, Russia

ilmudin@boulder.nist.gov

Thermodynamic properties (PVT, C_vVT, and dP/dT) of three microemulsions (water n-octane sodium dodecylsulfate 1-pentanol, 0.0777 : 0.0777 : 0.1449 : 0.6997; 0.6220 : 0.0777 : 0.1448 : 0.1555; and 0.2720 : 0.0777 : 0.1449 : 0.5054) were studied. Sodium dodecylsulfate was used as surface-active agent, and 1-pentanol as stabilizer. A high-temperature, high-pressure, adiabatic, and nearly constant-volume calorimeter was used for the measurements. The direct measured values of the derivative and pressure, P, were used to calculate the internal pressure. Measurements were made at 12 densities between 476 and 756 kg·m^{-3}. The temperature range was from 283 to 525 K. Uncertainty in the heat capacity measurements is estimated to be 2 %. The temperature on the liquid-gas phase transition curve (isochore), T_\text{s}, for each measured density was determined using a quasi-static thermogram technique. The uncertainty in the phase transition temperature measurements is about 0.02 K. The effect of temperature, density, and concentration on the heat capacity of microemulsions of C(C_{12}H_{25}NaSO_4) will be discussed.