A Study of the Surface Tension of Refrigerant Mixtures: Experiment and Prediction

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This report presents experimental data for the capillary constant, surface tension, and vapor pressure for the refrigerant mixture R134a + R143a over a wide range of temperatures and concentrations. The experimental data were obtained in the temperature range from 293 K to 353 K and at pressures up to 3.8 MPa. The values of average concentration of R143a were as follows: 36.65 %, 49.96 % and 65.92 wt. %. Changes in the concentration of the liquid phase of the mixture have been examined. It was revealed that the mass content of the mixture differs from that of the liquid phase in the experimental cell up to 3 %. This difference may be explained by redistribution between the liquid and vapor phases of the components of an azeotropic mixture in the experimental cell. We assume that correct determination of the liquid phase content for the investigated mixture is possible only at availability of experimental data for the volume of the sample phases in experimental cell and data on vapour pressure of the mixture. Data obtained in the experiment were successfully described by proposed correlations. The concepts of parachor at the critical point and reduced parachor were introduced. The approach based on scaling principles and the assumption of a universal character of changes in crossover functions at critical exponents was used to obtain the universal temperature dependence of the reduced parachor. The dependence of the parachor at the critical point on the critical molar volume was obtained.