Compressed Liquid Densities of Binary Mixtures of 2,3,3,3-Tetrafluor-oprop-1-ene (R1234yf) and Difluoromethane (R32) from (283 to 363) K at Pressures up to 100 MPa

Xinyue Jia^s, Jian Yang, Xianyang Meng and Jiangtao Wu^c Key Laboratory of Thermo-Fluid Science and Engineering of Ministry of Education, Xi'an Jiaotong University, Xi'an, Shaanxi, China jtwu@mail.xjtu.edu.cn

Due to global warming and depletion of the ozone layer, chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs) and hydrofluorocarbons (HFCs) were scheduled to phase out by the Montreal Protocol and Kyoto Protocol. As an alternative refrigerant, 2,3,3,3-Tetrafluor-oprop-1-ene (R1234yf) has a low GWP of 4 and ODP of zero. But pure R1234yf can't be used because it operates at lower pressures and has smaller latent heat. One approach to balance both the environment and performance requirements is to use a refrigerant mixture of R1234yf and R32 to get a high system coefficient of performance ^[1]. However, to the author's knowledge, only one mixed liquid density set was found in literature with limited temperature and pressure range ^[2]. In the present work, the compressed liquid densities of binary mixtures R1234yf and R32 were measured using a high pressure vibrating-tube densimeter over the temperature range from (283 to 363) K and at pressures up to 100 MPa covering the whole mole fraction of $x_{R1234yf} = (0.10, 0.30, 0.50, 0.70, 0.90)$. The measurements were carried out using a high pressure vibrating-tube densimeter with a combined expanded uncertainty (k = 2) of 0.6 kg·m⁻³. The experimental data were correlated using the modified Tait equation with an absolute average percentage deviation lower than 0.02 % for each composition of the mixtures.

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References:

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