

# Viscosity and Density of 1,1,1,3,3-pentafluoropropane (HFC-245fa): Measurements and Modeling

Xianyang Meng, Xiaoduan Tang, Jiangtao Wu\*

*State Key Laboratory of Multiphase Flow in Power Engineering, Xi'an Jiaotong University,*

*Xi'an, Shaanxi 710049, People's Republic of China*

\*Author to whom correspondence should be addressed

86-29-82666875 (Tel)

86-29-82668789 (FAX)

E-mail: jtwu@mail.xjtu.edu.cn

## Abstract

The chemical and thermophysical properties of 1,1,1,3,3-pentafluoropropane (HFC-245fa) have made it an industrially important compound with many applications. Recently, HFC-245fa has been given increasing consideration as an alternative blowing agent and as an ozone-safe refrigerant as a substitute for trichloromonofluoromethane (CFC-11), dichloro-1,2-tetrafluoro-1,1,2,2-ethane (CFC-114), and dichlorofluoroethane (HCFC-141b). Accurate thermophysical properties will be essential to design and develop efficient processes that use this compound. A literature search reveals that certain properties, notably viscosity, were quite scarce and covered only limited ranges of temperature and pressure. Thus, the viscosity and density of 1,1,1,3,3-pentafluoropropane (HFC-245fa) were measured at wide range of temperature and pressure. The measurements were performed both at saturated line and Compressed liquid region. A vibrating wire viscometer, with a wire diameter of about 0.1 mm, was used for the viscosity measurements with an uncertainty of  $\pm 2\%$ . The density was obtained from vibrating tube densimeters with an uncertainty of about  $\pm 0.2\%$ . The densities were correlated by means of a Tait equation, while the viscosities were correlated both with the theory of hard-sphere scheme and free volume model. Comparisons were performed between literatures and this work when possible.