Experimental Thermal Conductivity Measurements for the Hydrofluoroolefin R1225ye(Z)

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In the pursuit of a fourth generation of refrigerants characterized by zero Ozone Depletion Potential (ODP) and remarkably low Global Warming Potential (GWP), as mandated by EU Regulation No 517/2014 and the Kigali Amendment to the Montreal Protocol, natural refrigerants and hydrofluoroolefins (HFOs) have emerged as the most promising long-term alternatives.

Notably, the hydrofluoroolefin cis-1,2,3,3,3-pentafluoroprop-1-ene R1225ye(Z) and its isomers have been considered as environmentally friendly options to replace the widely used R410A in refrigeration applications, both in pure form and blends, due to their similar characteristic pressures and temperatures. However, despite its GWP being lower than 3, studies on the toxicological effects of R1225ye(Z) have prevented its application in industrial contexts, discouraging the study of its thermophysical properties.

To date, the available literature offers only a limited amount of experimental data on the thermophysical properties of R1225ye(Z), with none specifically addressing its thermal conductivity. Thus, this study addresses this gap by presenting a comprehensive dataset of 60 experimental thermal conductivity measurements, performed with a double transient hot-wire (THW) apparatus. The measurements were conducted along ten isotherms spanning temperatures from 253.15 K to 343.15 K, encompassing pressures ranging from close to the vapor pressure up to 10 MPa. The experimental thermal conductivity data were subjected to regression analysis using dedicated equations, demonstrating excellent agreement with correlated results.