

Thermal Conductivity Measurements of Ternary Mixtures Containing Methane, Propane, and Heptane

Sofia Mylona^S and Amina Saeed

Fluid Science and Resources Division, School of Mechanical and Chemical Engineering, University of Western Australia, Perth, WA, Australia

Thomas Hughes

Department of Civil Engineering, Monash University, Melbourne, VIC, Australia

Eric May^C

Fluid Science and Resources Division, School of Mechanical and Chemical Engineering, University of Western Australia, Perth, WA, Australia
eric.may@uwa.edu.au

Thermal conductivity is a transport property that plays a critical role in designing heat transfer equipment and other unit operations in natural gas processing. [1],[2],[3] Previous measurements of thermal conductivity in binary mixtures of natural gas components were utilized to generate predictive correlations. [1],[3],[4] In this work, thermal conductivity measurements of methane-propane-heptane ternary mixtures with different compositions will be reported. The ternary mixtures were prepared volumetrically or gravimetrically, and the transient hot wire method was used to determine the thermal conductivity for a wide range of temperatures and pressures. The measurements were taken in the temperature range (200 to 422) K and in the pressure range of (10 to 31) MPa. Our thermal conductivity results were compared with the transport property models within NIST REFPROP [5], with average fractional deviations of around -2 %, which is comparable with the estimated experimental uncertainty.

References:

- [1] A. Jarrahan, E. Heidaryan, Journal of Natural Gas Science and Engineering 18 (2014) 446-450.
- [2] Transport properties of fluids : their correlation, prediction, and estimation, Digitally printed 1st pbk. version. ed., Cambridge ; 2005.
- [3] Engineering data book, 13th ed., FPS. ed., Tulsa, Okla., 2012.
- [4] W.J.S. Smith, L.D. Durbin, R. Kobayashi, Journal of Chemical & Engineering Data 5 (1960) 316-321.
- [5] Chichester J. C., Huber M. L., Documentation and Assessment of Transport Property Model for Mixtures Implemented in NIST REFPROP, version 8.0; US Department of Commerce, Technology Administration, National Institute of Standards and Technology: 2008.