Thermal Conductivity of Different Organic Liquids at Temperatures up to 500-600 K

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The thermal conductivity was measured for different classes of organic compounds (n-alkanes,1-alkenes, organic acids and alcohols, aromatic hydrocarbons, polymethyl silicon liquid PMS-200, and others) at temperatures from 290 K up to 500-600 K and pressures up to 30 MPa. The transient hot-wire technique was used (platinum wire with $d = 5 \cdot 10^{-6}$ m and l = 0.040-0.065 m). The duration of heating impulse did not exceed 0.1 s. The measured data are practically free from radiative contributions λ_R.

The comparison of experimental data with the reference data [1], show the data of the new effective value of thermal conductivity λ_{EF}, are in all cases, except for PMS-200, lower. It is explained because all these liquids (except PMS-200) are semitransparent media for infrared radiation. At the higher temperatures, the influence of re-radiation for associated liquids (alcohols and acids) is nearly 3% (T = 400 K) and for normal liquids is up to 12-20% (T = 500-600 K). The calculated data of λ_R, using the infrared spectrum of absorption, confirmed that PMS-200 is very much an absorptive liquid.

[1] V.B. Vargaftik, L. P. Filippov, A.A. Tarzimanov, E. E. Totskii. Handbook of Thermal Cnductivity of Lquids and Gses, CRC Press, Boca Raton, 1994.