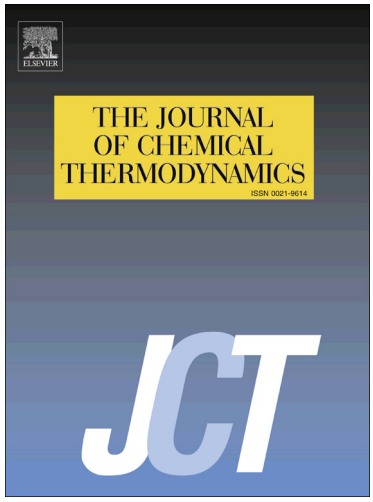

Measurement of speed of sound, density compressibility and viscosity in liquid Methyl Laurate and Ethyl Laurate up to 200 MPa by using acoustic wave sensors

Matthieu Habrioux, Djamel Nasri, Jean Luc Daridon

PII: S0021-9614(17)30456-1
DOI: https://doi.org/10.1016/j.jct.2017.12.020
Reference: YJCHT 5290

To appear in: *J. Chem. Thermodynamics*

Received Date: 22 September 2016
Revised Date: 13 December 2017
Accepted Date: 28 December 2017

Please cite this article as: M. Habrioux, D. Nasri, J.L. Daridon, Measurement of speed of sound, density compressibility and viscosity in liquid Methyl Laurate and Ethyl Laurate up to 200 MPa by using acoustic wave sensors, *J. Chem. Thermodynamics* (2017), doi: https://doi.org/10.1016/j.jct.2017.12.020

Measurement of speed of sound, density compressibility and viscosity in liquid Methyl Laurate and Ethyl Laurate up to 200 MPa by using acoustic wave sensors

Matthieu HABRIOUX, Djamel NASRI, Jean Luc DARIDON*

Laboratoire des Fluides Complexes et leurs Réservoirs-IPRA, UMR5150, CNRS/TOTAL/Univ Pau & Pays Adour, 64000, Pau, France.

***Corresponding author .** jean-luc.daridon@univ-pau.fr

ABSTRACT

This paper presents measurements of speed of sound, density, viscosity and compressibility in liquid ethyl laurate and methyl laurate along isotherms ranging from (293.15 to 353.15) K at pressures that cover the pressure range of common rail direct fuel injection systems (up to 200 MPa). Measurements have been carried out by two different acoustic wave sensors assembled within a single device. The former works in the longitudinal mode to determine speed of sound whereas the latter acts in the thickness shear mode in order to measure the density viscosity product. The measurement principle of sound speed is based on pulse-echo technique whereas density is evaluated by integration of speed of sound measurement using Newton Laplace equation. Viscosity is determined from measurement of the resonance behavior of the thickness shear wave sensor. Finally both isothermal and isentropic compressibilities are obtained from density and speed of sound data.

GRAPHICAL ABSTRACT