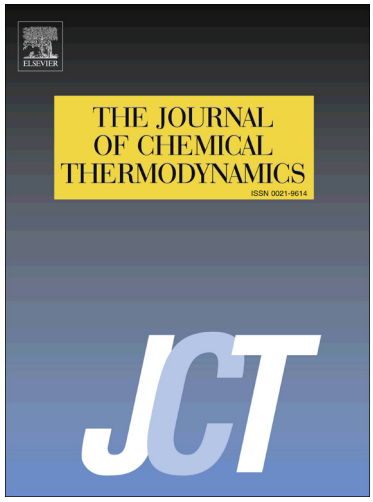

Speed of sound and density of water + 1,5-pentanediol mixtures in a wide temperature range. Comparison with mixtures of water with diethylene glycol, propoxyethanol and diethylene glycol dimethyl ether.

Krzysztof Klimaszewski, Ewa Stronka-Lewkowska, Adam Bald

PII: S0021-9614(17)30205-7
DOI: http://dx.doi.org/10.1016/j.jct.2017.06.001
Reference: YJCHT 5099

To appear in: *J. Chem. Thermodynamics*

Received Date: 17 October 2016
Revised Date: 1 June 2017
Accepted Date: 4 June 2017

Please cite this article as: K. Klimaszewski, E. Stronka-Lewkowska, A. Bald, Speed of sound and density of water + 1,5-pentanediol mixtures in a wide temperature range. Comparison with mixtures of water with diethylene glycol, propoxyethanol and diethylene glycol dimethyl ether., *J. Chem. Thermodynamics* (2017), doi: http://dx.doi.org/10.1016/j.jct.2017.06.001

Speed of sound and density of water + 1,5-pentanediol mixtures in a wide temperature range. Comparison with mixtures of water with diethylene glycol, propoxyethanol and diethylene glycol dimethyl ether.

Krzysztof Klimaszewski[*]*, Ewa Stronka-Lewkowska, Adam Bald*

Department of Physical Chemistry, Faculty of Chemistry, University of Łódź, Pomorska 163/165, 90-236 Łódź, Poland

*Corresponding author. Tel: +48 426355846. E–mail: krzyklim@chemia.uni.lodz.pl.

Abstract

Densities (ρ) and speed of sound (u) were measured in the binary liquid mixture of water and 1,5-pentanediol (PD) over the entire mixture composition range. Densitometric measurement were conducted in a temperature range of 278.15-333.15K under atmospheric pressure, using a precise sealed vibrating-tube densimeter. Acoustic study was carried out in a range of 288.15-318.15K. The values of molar volume (V_m), adiabatic compressibility coefficient (β_s), temperature coefficients of these parameters, excess of compressibility coefficient (β_s^E), excess molar volume (V_m^E) and derivatives (∂H/∂p), (∂S/∂p) and (∂Cp/∂p) were determined from the experimental data. The values of molar volume were used to determine the values of partial molar volumes of the mixture components. Changes in the measured and calculated values of the physicochemical parameters as a function of temperature and composition of the mixture were analysed in terms of interactions in two-component systems. The obtained results were compared with those received in our earlier investigations of the mixtures of water with diethylene glycol and propoxyethanol as well as with those found in the literature survey concerning water – diethylene glycol dimethyl ether mixtures.

Keywords

density, speed of sound, 1,5-pentanediol, molecular interactions in liquids

Introduction