THERMAM 2021 09.-10.Sept.

10th Rostocker International Conference
Technical Thermodynamics
Thermophysical Properties and Energy Systems

Book of Abstracts

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THERMODYNAMIC AND THERMOPHYSICAL PROPERTIES FOR GREEN COMPOUNDS AT HIGH PRESSURES

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The harmful impact of the fossil fuels consumption on the environment and their limited reserves have prompted a reaction from both researchers and government officials. New environmental protection measures have been adopted and the research for renewable energy sources is strongly supported. The goal is to find the renewable, non-toxic, biodegradable, environment-friendly substitutes for fossil fuels and optimize their use. Within our research various green solvents and biofuels, such as biodiesels, terpenes, ionic liquids, and deep eutectic solvents have been studied. Biodiesels are widely known substitutes for fossil fuels; they can be applied in diesel engines, pure or mixed with a petro-diesel in various proportions, without corrections in engine design [1]. Terpenes found a promising role as an alternative fuel for aviation transport where fuel of high energy density is required due to small volume-limited fuel tanks [2]. Ionic liquids have shown a great potential in CO_2 absorption from air or exhaust gas. These salts are very attractive for industrial purposes, because of their specific properties, changed based on selected combination of anion and cation [3]. Further, for more efficient energy production and consumption, investigation on improving the properties of the heat transfer fluid was performed, adding nanoparticles to ethylene glycol (EG) [4].

The data on thermophysical properties of various chemical compounds and their mixtures under different conditions of pressure and temperature are essential for various processes. For example, the fuel injection and combustion in diesel engines are performed at high pressures and temperatures and are greatly influenced by the fuel's density and viscosity [1].

Densities of sunflower oil biodiesels and their mixtures with diesel fuel, a group of terpenes and ionic liquids, and EG with caffeine were measured at temperatures in the range (298.15–413.15) K and at pressures up to 60 MPa [1-4]. The experimental data were successfully correlated using the modified Tammann–Tait equation. That enabled the calculation of the derived properties, such as the isothermal compressibility, the isobaric thermal expansivity, the internal pressure and the difference between the specific heat capacity at constant pressure and at constant volume.

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