

**TERMODINAMIČKA ANALIZA DVOKOMPONENTNOG SISTEMA
 γ -VALEROLAKTON + 2-METILTETRAHIDROFURAN
OD ZNAČAJA ZA PROIZVODNJU BIOGORIVA****THERMODYNAMIC ANALYSIS OF BINARY SYSTEM
 γ -VALEROLACTONE + 2-METHYLTETRAHYDROFURAN
RELEVANT FOR THE PRODUCTION OF BIOFUEL****Gorica R. Ivaniš, Ana Kostić, Ivona R. Radović, Mirjana Lj. Kijevčanin***

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Upotreba biomase kao zamene za fosilna goriva pokazala se kao veoma dobra ideja, kako sa ekološke tako i sa ekonomske tačke gledišta. Lignocelulozna biomasa je široko dostupan otpad, uglavnom iz poljoprivredne i drvoprerađivačke industrije, za koji je potrebno pronaći optimalan način rukovanja i uklanjanja. Upotreba takvog biootpada kao sirovine u proizvodnji energije, hemikalija i materijala predstavlja važan korak u tranziciji sa ekonomije zasnovane na fosilnim gorivima na cirkularnu bioekonomiju. Valorizacija biomase je izazovan proces zbog složene strukture same sirovine i velikog broja reakcionih mehanizama. Zbog toga je za dobijanje željenih proizvoda neophodno razviti pouzdane kinetičke modele uz primenu termodinamičkih modela za predviđanje fizičko-hemijskih osobina razmatrane reakcione smeše.

γ -Valerolakton (GVL) je prirodna platformna hemikalija, koja je privukla pažnju kao održiva tečnost široke primene, koja se može efikasno proizvesti iz lignoceluloze. GVL se može koristiti kao tečno gorivo, zeleni rastvarač ili kao organski intermedijer u sintezi drugih hemikalija. Jedno od jedinjenja dobijenih hemijskom konverzijom GVL-a je 2-metiltetrahidrofuran (2-MeTHF), koji se smatra obnovljivom komponentom alternativnog goriva. Zbog svega navedenog, termodinamička i transportna svojstva smeše GVL + 2-MeTHF su ispitivana u čitavom opsegu koncentracija (0,1-0,9). Gustina, brzina zvuka, viskozitet i indeks refrakcije mereni su u temperaturnom opsegu (288,15 - 333,15) K pri atmosferskom pritisku. Dobijeni rezultati su pokazali da ponašanje ispitivane smeše odstupa od ponašanja koje bi se očekivalo za idealnu smešu. Negativne vrednosti dopunske molarne zapremine ispitivane smeše ukazuju da postoje privlačne interakcije između komponenata smeše.

Ključne reči: *gustina; viskoznost; valorizacija biomase; biogoriva; modelovanje*

The use of biomass as a substitute for fossil fuels has proven to be a very good idea, both from an environmental and an economic point of view. Lignocellulosic biomass is a widely available waste, mostly from the agricultural and wood processing industry, for which an optimal way of handling and removal needs to be found. The use of such biowaste as a raw material in the production of energy, chemicals and materials represents an important step in the transition from a fossil-based economy to a circular bioeconomy. Biomass valorisation is a challenging process due to the complex

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structure of the raw material itself and a large number of reaction mechanisms. Therefore, in order to obtain the desired products, it is necessary to develop reliable kinetic models applying the thermodynamic models to predict the physicochemical properties of the reaction mixture.

γ -Valerolactone (GVL) is a natural platform chemical that has gained attention as a versatile sustainable liquid that can be efficiently produced from lignocellulose. GVL can be used as a liquid fuel, green solvent or an organic intermediate in the synthesis of other chemicals. One of the compounds obtained by chemical conversion of GVL is 2-methyltetrahydrofuran (2-MeTHF), which is considered a renewable component of alternative fuel. Therefore, the thermodynamic and transport properties of the GVL + 2-MeTHF mixture were investigated in the entire range of concentrations (0.1-0.9). Density, speed of sound, viscosity and refractive index were measured in the temperature range of (288.15 - 333.15) K at atmospheric pressure. The obtained results showed that the behaviour of the investigated mixture deviates from the behaviour that would be expected for an ideal mixture. The negative values of excess molar volume of the studied mixture indicated the existence of attractive interactions between the components of the mixture.

Key words: *density; viscosity; biomass valorisation; biofuel; modelling*