

## UPOTREBA ZELENOG RASTVARAČA METIL LAURATA ZA EKSTRAKCIJU ACETONA IZ OTPADNIH VODENIH TOKOVA

### THE USE OF GREEN SOLVENT METHYL LAURATE FOR THE EXTRACTION OF ACETONE FROM WASTEWATER STREAMS

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*Jedan od vodećih problema današnjice, kako u Srbiji tako i u svetu, predstavlja tretman otpadnih voda, odnosno ekstrakcija polutanata koji se u njima nalaze. Zamena klasičnih industrijskih rastvarača koji se u ovim procesima koriste novim, zelenim rastvaračima i zamena standardnih energetske intenzivnih procesa separacije predstavlja jedan od glavnih izazova u oblasti industrije. U ovom radu je ispitivana mogućnost ekstrakcije acetona primenom zelenog rastvarača metil laurata koji se koristi u kozmetici. Prikazani su podaci o ravnoteži tečnost-tečnost za trokomponentnu smešu voda + aceton + metil laurat na  $T = 298\text{ K}$  i atmosferskom pritisku, koji nam daju neophodne termodinamičke podatke za projektovanje procesa separacije. Podaci o ravnoteži tečnost-tečnost ternarnog sistema voda + aceton + metil laurat su određeni eksperimentalno na temperaturi od  $298,15\text{ K}$  i atmosferskom pritisku. Binodalne krive su dobijene metodom sintetičkog zamućenja koristeći tehniku titracije dok su ravnotežne linije određene preko indeksa refrakcije. Distribucionni koeficijenti i separacioni faktori su izračunati za oblast nemešljivosti. Korelacije Hand i Othmer-Tobias korišćene su kako bi se ispitala pouzdanost eksperimentalnih podataka. Dobijeni eksperimentalni podaci su korišćeni pri određivanju kompletnog faznog dijagrama pomenutog sistema.*

**Ključne reči:** otpadne vode; zelena hemija; ravnoteža tečnost-tečnost; indeks refrakcije

*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 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.*

*One of the leading issues of today, both in Serbia and worldwide, is the treatment of wastewater, i.e., the extraction of pollutants found in it. Replacing conventional industrial solvents used in these*

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*processes with new, green solvents and replacing standard energy-intensive separation processes represents one of the main challenges in the field of industry. This study examines the possibility of acetone extraction using the green solvent methyl laurate, which is used in cosmetics. Liquid-liquid equilibrium data for the ternary mixture water + acetone + methyl laurate at  $T = 298$  K and atmospheric pressure are presented, providing necessary thermodynamic data for process separation design. Liquid-liquid equilibrium data for the ternary system water + acetone + methyl laurate were experimentally determined at a temperature of 298.15 K and atmospheric pressure. Binodal curves were obtained using the cloud point titration method, while tie lines were determined through refractive index measurements. Distribution coefficients and separation factors were calculated for the immiscibility region. Othmer-Tobias and Hand correlations were used to assess the reliability of experimental data. The obtained experimental data were utilized in determining the complete phase diagram of the mentioned system.*

**Key words:** wastewater; green chemistry; liquid-liquid equilibria; refractive index