UNIVERSITY OF NIŠ
Faculty of Technology, Leskovac

BOOK OF ABSTRACTS

15th INTERNATIONAL SYMPOSIUM „NOVEL TECHNOLOGIES AND SUSTAINABLE DEVELOPMENT“

Leskovac, October, 20-21, 2023.

UNIVERSITY OF NIŠ
Faculty of Technology, Leskovac

BOOK OF ABSTRACTS 15th INTERNATIONAL SYMPOSIUM „NOVEL TECHNOLOGIES AND SUSTAINABLE DEVELOPMENT“
Leskovac, 2023.

Faculty of Technology, Leskovac

Publisher: Faculty of Technology, Leskovac
For the Publisher: Prof. Dragiša Savić
Editor: Prof. Marija Tasić

CIP - Каталогизација у публикацији Народна библиотека Србије, Београд

6(048)(0.034.2)

INTERNATIONAL Symposium "Novel Technologies and Sustainable Development" (15 ; 2023 ; Leskovac)
Book of abstracts [Elektronski izvor] / 15th International Symposium "Novel Technologies and Sustainable Development" Leskovac, October, 20-21, 2023. ; editor Marija Tasić. - Leskovac : Faculty of Technology, 2023 (Leskovac : Faculty of Technology). - 1 elektronski optički disk (CD-ROM) ; 12 cm

Sistemski zahtevi: Nisu navedeni. - Nasl. sa naslovne strane dokumenta. - Na vrhu nasl. str.: University of Niš. - Tiraž 30.

ISBN 978-86-89429-56-5

a) Технологија -- Апстракти b) Технолошки прогрес -- Привредни развој -- Апстракти

COBISS.SR-ID 127014409

Printing by: Faculty of Technology, Leskovac
Impression: 30

Proofreader: Jovana Nikolić
Paging and graphical design: Vesna Marinković

ISBN-978-86-89429-56-5

15th International Symposium with international participation "Novel Technologies and Sustainable Development" was also supported by Ministry of Science, Technological Development and Innovation, Republic of Serbia.

15th International Symposium
"Novel Technologies and Sustainable Development"
Organized by: Faculty of Technology, Leskovac
Co-organizer: Serbian Academy of Sciences and Arts (SASA) - Branch in Niš,
Department of Technical Sciences, Belgrade

This work has been funded by the Republic of Serbia – The Ministry of Science, Technological Development and Innovation, Program for financing scientific research work, number 451-03-47/2023-01/ 200133. It is also a part of the Project 0-14-18 of the SASA Branch in Nis, Serbia.

KINETIC MODELING OF THE BIODIESEL PRODUCTION FROM SUNFLOWER OIL OVER CORN COB ASH

Milan D. Kostić[1], Biljana S. Đorđević[1], Stefan M. Pavlović[2], Marija R. Miladinović[1], Olivera S. Stamenković[1]

[1]University of Niš, Faculty of Technology, Leskovac, Serbia

[2]University of Belgrade, Institute of Chemistry, Technology and Metallurgy, Belgrade, Serbia

In recent years, researchers have focused on obtaining sustainable and low-cost catalysts from agricultural and industrial waste to be applied in biodiesel production. Such biomass waste is corn cobs that can be utilized for heat generation by combustion, and the remaining ash can be tested for catalytic activity in biodiesel production. Therefore, this study deals with the refined sunflower oil methanolysis over corn cob ash obtained by the combustion of corn cobs in a solid fuel stove. The aim is to analyze the reaction kinetics. The reactions were carried out in a batch reactor with a magnetic stirrer under atmospheric pressure and at the following reaction conditions: temperature of 60 °C, a methanol-to-oil molar ratio of 9:1, and a catalyst amount from 4 to 10% of the oil weight. The variations of fatty acid methyl esters (FAMEs) content with the reaction time showed no mass transfer limitations in the initial reaction period. Therefore, the simple pseudo-first-order model was employed to describe the kinetics of the oil methanolysis. The determined reaction rate constants increased with the increase in catalyst amount from 4 to 10%, and the corresponding values were 0.095 min^{-1}, 0.291 min^{-1}, and 0.307 min^{-1}. A low mean relative percentage deviation of ±5,63% (based on 21 data) between the calculated and experimental values of the conversion degree of triacylglycerols confirmed that the kinetic model of the irreversible pseudo-first-order reaction fitted the experimental data satisfactorily.

The present work has been funded by the Ministry of Science, Technological Development and Innovation of the Republic of Serbia, Program for financing scientific research work, No. 451-03-47/2023-01/200133. It is also a part of the Project 0-14-18 of the SASA Branch in Niš, Serbia.

A KINETIC ANALYSIS OF THE RADISH OIL/CASTOR OIL BLEND METHANOLYSIS OVER CALCIUM OXIDE

Milica Z. Petković[1], Marija R. Miladinović[2], Ivana B. Banković-Ilić[2], Biljana S. Djordjević[2], Milan D. Kostić[2], Olivera S. Stamenković[2], Vlada B. Veljković[3]

[1]Scholar of the Ministry of Education, Science and Technological Development of the Republic of Serbia, Faculty of Technology, University of Niš, Leskovac, Serbia

[2]University of Niš, Faculty of Technology, Leskovac, Serbia

[3]Serbian Academy of Sciences and Arts, SASA Branch of Niš, Belgrade, Serbia

The investigation of reaction kinetics is crucial for practical implications in process equipment design and scaling up. In this study, a kinetic analysis of the methanolysis of a blend of radish and castor oil catalyzed by calcium oxide was carried out. The objectives were to propose a comprehensive model for describing the kinetics of this methanolysis reaction and determine its activation energy. The methanolysis was conducted in a batch reactor under atmospheric pressure with the following reaction conditions: a radish-to-castor oil blend mass ratio of 1:1, a methanol-to-oil molar ratio of 12:1, a catalyst amount of 5% of the oil blend weight, and reaction temperatures of 30 °C, 45 °C, and 60 °C. The model involving the changing reaction mechanism and the triacylglycerol (TAG) mass transfer limitation was first simplified to a pseudo-first-order model regarding TAGs and fatty acid methyl esters, which was then used to calculate the apparent reaction rate constant. A good agreement between the calculated and experimental values of the TAG conversion degree was proved by a low mean relative percentage deviation of ±6.1% (based on 66 data), thus validating the applied simple kinetic model. A positive effect of the reaction temperature on the apparent reaction rate constant was observed. Using the Arrhenius equation, the activation energy of methanolysis was determined to be 46.12 kJ/mol. The obtained value of activation energy is much lower than values of activation energy determined for the calcium oxide-catalyzed methanolysis of single oil feedstocks, such as soybean, canola, Jatropha, and waste frying oils. The lower activation energy suggests the potential for enhanced efficiency and feasibility of utilizing this blend as a feedstock for biodiesel production compared to the individual oily feedstocks previously studied.