



Slovak Society of Chemical Engineering
Institute of Chemical and Environmental Engineering
Slovak University of Technology in Bratislava

PROCEEDINGS

51st International Conference of the Slovak Society of Chemical Engineering SSCHE 2025

Hotel DRUŽBA
Jasná, Demänovská Dolina, Slovakia
May 27 - 30, 2025

Editors: Assoc. Prof. Mário Mihaľ

ISBN: 978-80-8208-158-2, EAN: 9788082081582

Published by the Faculty of Chemical and Food Technology Slovak Technical University in Bratislava in Slovak Chemistry Library for the Institute of Chemical and Environmental Engineering; Radlinského 9, 812 37 Bratislava, 2024

Klemencova, K., Grycová, B., Strakosova, J., Lestinsky, P.: Evaluation of the influence of additives in model mixtures on the quality of pyrolysis products , Editors: Mihaľ, M., In *51st International Conference of the Slovak Society of Chemical Engineering SSCHE 2025*, Jasná, Demänovská Dolina, Slovakia, 2025.

Evaluation of the influence of additives in model mixtures on the quality of pyrolysis products

Katerina Klemencova, Barbora Grycova, Jana Strakosova, Amer Inayat, Pavel Lestinsky

Institute of Environmental Technology, CEET, VSB - TUO, Ostrava, Czechia

e-mail: katerina.klemencova@vsb.cz

Keywords: Pyrolysis, plastics, catalyst, additives

With the growing world population and the increasing demands on living conditions, plastic production is also increasing, and plastic waste is becoming an increasingly pressing problem. Plastic waste contains various types of additives that can be released into the environment and negatively affect it. Additives are added to plastics to improve their properties; on the other hand, additives can affect chemical reactions and the quality of recycled products. In this study, the effect of naturally occurring additives on the chemical recycling of polyolefin model mixtures with additives was investigated. The additives facilitated the cracking of long polymer chains, which led to higher yields of light hydrocarbons during thermo-catalytic pyrolysis compared to fresh polymer. However, the additives generally reduced the formation of aromatic nuclei during thermo-catalytic pyrolysis, with carbon black being an exception, as they promoted the development of aromatics and increased the formation of xylene and toluene during thermo-catalytic pyrolysis. The type of additive in waste plastics significantly influenced both the yield and quality of the pyrolysis products. An appropriate combination of additives results in increased formation of aromatic hydrocarbons.

Acknowledgments

Experimental results were accomplished using REFRESH – Research Excellence For Region Sustainability and High-tech Industries, CZ.10.03.01/00/22_003/0000048 and Large Research Infrastructure - Energy Waste Recovery and Gas Treatment supported by the Ministry of Education, Youth and Sports of the Czech Republic under Project Number LM2023056.