

UNIVERSITY OF NIŠ
Faculty of Technology, Leskovac

BOOK OF ABSTRACTS

15th INTERNATIONAL SYMPOSIUM
„NOVEL TECHNOLOGIES AND SUSTAINABLE
DEVELOPMENT“

Leskovac, October, 20-21, 2023.

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ZEOLITE AND BENTONITE AS FORMALDEHYDE SCAVENGERS IN UREA-FORMALDEHYDE RESINS

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Urea-formaldehyde (UF) resins are the leading adhesive in the wood industry. Their disadvantages are low water resistance and formaldehyde (FA) emissions from wood panels due to the low stability of the amino-methylene bond. Since FA has a detrimental effect on the environment and human health, the main goal of the modern adhesives industry is to produce efficient UF adhesives with low amounts of emitted, if not without, FA. One way to achieve this is to add a formaldehyde scavenger. In this work, UF resins modified with zeolite type ZSM-5 and bentonite as free FA scavengers are analyzed and compared. A total of three UF resins were synthesized: pure UF resin (UF), UF composite containing zeolite (ZUF), and bentonite (BUF) under the same conditions. Specific surface area (SSA) and cation exchange capacity (CEC) for bentonite and zeolite were determined. SSA (Sears' method) for bentonite is 19.9 m²/g and for zeolite 39.1 m²/g. The CEC of bentonite is 0.68 mol/kg, and that of zeolite is 0.1 mol/kg. The disulfide method was used to determine free FA in modified UF resins. The amount of free FA in the ZUF composite is 0.06%, while in the BUF composite is 0.18%. The hydrolytic stability of modified UF resins was determined by measuring the amount of liberated FA in the modified UF resins after acid hydrolysis. The results show that the amount of released FA in the ZUF composite is 4.08%, while in the BUF resin, it is 4.8%. Based on the obtained results, it can be concluded that zeolite is a better scavenger of free FA than bentonite and that its ZUF composite is hydrolytically more stable than the BUF composite.