

Microbial Reduction of Terpenes from Pine Wood Material

Authors : Bernhard Widhalm, Cornelia Rieder-Gradinger, Thomas Ters, Ewald Srebotnik, Thomas Kuncinger

Abstract : Terpenes are natural components in softwoods and rank among the most frequently emitted volatile organic compounds (VOC) in the wood-processing industry. In this study, the main focus was on α - and β -pinene as well as Δ 3-carene, which are the major terpenes in softwoods. To lower the total emission level of wood composites, defined terpene degrading microorganisms were applied to basic raw materials (e.g. pine wood particles and strands) in an optimised and industry-compatible testing procedure. In preliminary laboratory tests, bacterial species suitable for the utilisation of α -pinene as single carbon source in liquid culture were selected and then subjected to wood material inoculation. The two species *Pseudomonas putida* and *Pseudomonas fluorescens* were inoculated onto wood particles and strands and incubated at room temperature. Applying specific pre-cultivation and daily ventilation of the samples enabled a reduction of incubation time from six days to one day. SPME measurements and subsequent GC-MS analysis indicated a complete absence of α - and β -pinene emissions after 24 hours from pine wood particles. When using pine wood strands rather than particles, bacterial treatment resulted in a reduction of α - and β -pinene by 50%, while Δ 3-carene emissions were reduced by 30% in comparison to untreated strands. Other terpenes were also reduced in the course of the microbial treatment. The method developed here appears to be feasible for industrial application. However, growth parameters such as time and temperature as well as the technical implementation of the inoculation step will have to be adapted for the production process.

Keywords : GC-MS, pseudomonas, SPME, terpenes

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