

REMOVAL OF VOCS FROM AIR – CIRCULAR ECONOMY APPROACH

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Abstract

Biotrickling filtration is an approved technology for the removal of volatile pollutants from air, especially volatile organic compounds (VOCs). Biotrickling filtration consists in passing of a polluted gas through a packed layer of inert materials, inoculated either with selected microorganisms. These microbes form a biofilm over the packing elements and the packed bed is trickled with a liquid, containing mineral salts. The air pollutants serve as energy (carbon) source for microorganisms and undergo biodegradation in the biofilm. As a result, clean air leaves the biofilter. Biotrickling filtration is regarded as a sustainable air treatment method, however its potential is still discovered and developed. An interesting solution is proposed to design a biofilter to work as a microbial fuel cell. In such a configuration, it is possible to treat waste air and produce electric energy in one time. Additionally, in order to meet the requirements of circular economy and zero waste approaches, a waste trickling liquid is proposed to be valorized as an additive to the substrates for plant cultivation. In such a way, biotrickling filtration can be profitably combined with other processes, e.g. phytoremediation of polluted soils. A brief overview is presented on the current research issues in biotrickling filtration and its coupling with microbial fuel cells.

Keywords: biotrickling filtration, waste air, energy, plants, circular economy