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INVESTIGATIONS ON THE SUSTAINABILITY OF A BIOFILTER WITH ACTIVATED PACKING MATERIALS OF DIFFERENT ORIGINS

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Abstract

Experimental tests used a biofilter, a biological air treatment device, filled with a packing material of different origins. With the aim of achieving a higher treatment effectiveness of the device the filter was filled with a packing material composed of zeolite granules, foam cubes, wood chips and barks. Pollutant adsorption, absorption and biodegradation processes take place during biological air cleaning by applying different packing materials. As tests have shown, microorganisms predominant in the process of biocleaning can also propagate in the packing materials of inorganic origin composed of natural zeolite and foam. Through the cultivation of spontaneous microorganism associations the research determined the dependences of biofilter packing material's humidity, porosity, pressure drop and treatment effectiveness on the device's operation time. As proved by tests, when applying these packing materials a high air cleaning efficiency remains for quite a long period of time and varies from 88 to 98 %. As the tests have shown, the acetone adsorbed in zeolite pores was not discharged into the ambient air within the entire period of 900 days. This allows a conclusion that the desorbed acetone was degraded by microorganisms. After 900 days of device's operation effectiveness fell to 88%. A decrease in effectiveness resulted from diminished water retention of the packing material. Such a decrease was predetermined by a reduced fraction of the packing material, which results from pollutant degradation and the impact of microorganisms.

Key words: biodegradation, biofilter, sustainability of a packing material, microorganisms, porosity, zeolite

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