

Removal of complex mixtures of VOC (thinner) from waste air and establishment of the evolution of microbial consortium during biofiltration process

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Abstract

Biofiltration is a biotechnological process used to treat air polluted with volatile organic compounds (VOC). Paint thinner is a commercial mixture of VOC used in many industrial processes. In this study a microbial consortium adapted to consume paint thinner as sole carbon and energy source was selected. Conventional microbiological techniques were conducted to identify *Bacillus subtilis*, *B. sphaericus*, *B. schleggelli*, *B. brevis*, *Micrococcus luteus* and *Pseudomonas pseudoalcaligenes* as constituents of the consortium. The compatibility between support material (rice hulls) and microbial consortium was evaluated by microcosms experiments. Biodegradation studies were conducted in microcosms in liquid as well as solid medium and biofilters, using rice hulls as support. The microbial consortium evolution was established in winter and summer temperature conditions submitted biofilters. Compatibility between support and consortium was excellent. In microcosm studies with liquid medium, the period of degradation became negligible after 9 days, but in solid medium was maintained until 90 days. Elimination capacity of winter submitted biofilter was 339 g of carbon/m³ Reactor *h in presence of variations from 5000 to 20000 carbon ppmv and 264 g of carbon/m³ R *h in summer submitted biofilter in presence of variations from 700 to 11400 carbon ppmv. Nevertheless, both biofilters showed good thinner degradation capacity with total carbon feed as reference. The microbial consortium kept its degradation activity in spite of variations in thinner concentrations, temperature and exogenous microorganisms.