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Removal of hydrogen sulfide in air using cellular concrete waste: biotic and abiotic filtrations

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Abstract

The objective of this study was to investigate the removal of hydrogen sulfide (H_2S) present in air using cellular concrete waste as the packing material. Air filtration was performed under biotic and abiotic conditions. Experiments were carried out in a laboratory-scale PVC column (internal diameter of 300 mm) filled with a volume of 70 L of cellular concrete (1 m height). The polluted air flow was generated at 4 m^3 h^{-1} corresponding to an Empty Bed Residence Time (EBRT) of 63 s. In dry conditions without biomass (abiotic conditions), cellular concrete can be an effective medium for the treatment of H_2S in air. For an H_2S concentration of 100 ppmv, the removal efficiency was around 70 % (Elimination Capacity (EC) of 5.6 g m^{-3} h^{-1}). This finding can be explained by the physicochemical reactions that can take place between H_2S and the cellular concrete components (mainly CaO, $CaCO_3$ and Fe_2O_3). However, interactions between cellular concrete and H_2S are not yet fully understood. Used as a packing material for H_2S biofiltration (biotic conditions), cellular concrete waste efficiently