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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 (H₂S) 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 m³ 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 H₂S in air. For an H₂S 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 H₂S and the cellular concrete components (mainly CaO, CaCO₃ and Fe₂O₃). However, interactions between cellular concrete and H₂S are not yet fully understood. Used as a packing material for H₂S biofiltration (biotic conditions), cellular concrete waste efficiently

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