

# Estimation of Nitrogen Requirement in Peat and Perlite Biofilters Removing Hexane from Air

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## Abstract

Biofiltration experiments to remove hexane from air were conducted in column reactors packed with peat, perlite and their mixture. The particle size of the solid medium ranged from 1.70 to 4.75 mm, and the average empty bed superficial velocity was 20 m/h. To achieve and maintain a high rate of hexane removal, addition of nutrient solution was necessary. Adding a nutrient solution of a commercial fertilizer containing 1000 g of nitrogen for the first two weeks, followed by a weekly addition of 280 g of nitrogen per m<sup>3</sup> of filter bed was found to be effective in maintaining a high hexane removal rate between 20 and 30 g/m<sup>3</sup>.h. The hexane removal rate decreased gradually to less than 15 g/m<sup>3</sup>.h in 50 days due to an accumulation of biomass in the reactors. Pressure drop, which varied depending on the type of packing, also increased drastically to maximum values of 120 Pa/m for 100% perlite and 2930 Pa/m for the mixture. For long-term operation and low energy cost, prevention of biomass accumulation and maintenance of low pressure drop is essential. When the frequency of nutrients addition was reduced excessive biomass growth, and increase in pressure drop with time were controlled. Our observations showed that addition of a nitrogen source of approximately 1 kg of nitrogen per m<sup>3</sup> of filter bed for the first and second weeks, and every 30 days (approximately) resulted in an extended life and slightly lower hexane removal. The columns packed with peat and the mixture showed a better hexane removal than the column packed with perlite alone. However, the column packed with perlite had the lowest pressure drop.

## Keywords