

THE USE OF BIOFILTERS FOR ODOROUS GAS CONTROL IN WOOD HEAT TREATMENT

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INTRODUCTION

The objective of this study was to determine if a biofilter could be an applicable solution for odour control in wood heat treatment plants. It is believed that 2-furaldehyde or furfural, and other furan derivatives, are the ones that play a central role in the generation of odours characteristic of heat treatment plants. This research project focused on studying the furfural removal efficiency of two compost / wood chip (filling ratio 1:2) biofilters of laboratory size. Also was studied how the removal efficiency is affected by high terpene content levels and by periodic loads, which are typical of heat treatment plants.



Figure 1. Wood heat treatment plant

MATERIALS AND METHODS

In laboratory tests, furfural and wood turpentine (containing 60% of delta-3-carene) were evaporated and sucked through two identical biofilter units. Sampling was done through four instrument mounting details installed on the biofilter, by MIRAN 1A gas analyser (CVF, Foxboro). During testing, one of the two filters (filter A) was loaded on a continual basis while the other (filter B) was loaded for three hours daily with the aid of a timer. The total test duration was 72 days. The test was divided into three phases. During the initial phase (days 0-34), only furfural was fed into the biofilters. During the second phase (days 35-52), wood turpentine was also fed into the filters. The turpentine content was gradually increased as testing progressed. During the third (final) phase (days 53-72), only wood turpentine was fed into the filters. The Empty Bed Residence Time (EBRT) was about 39 seconds, throughout the test duration.

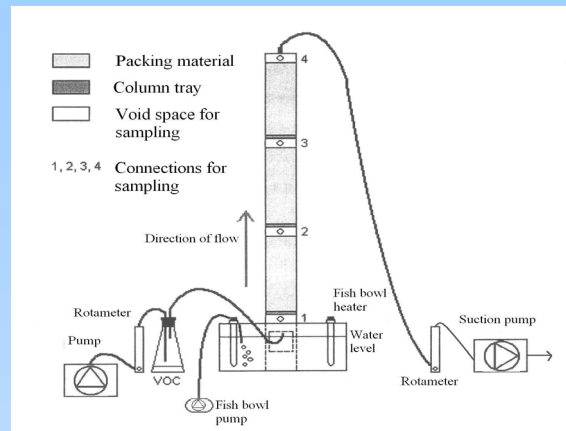


Figure 2. A Schematic diagram of testing arrangements

RESULTS AND DISCUSSION

The average furfural removal efficiency of biofilter (A), with the mass load value being about 18 g/m³/h, was established to be about 35%. The average wood turpentine removal efficiency, at an EBRT value of 39 seconds, with the mass load value being about 35 g/m³/h, was established to be about 38%. The average furfural removal efficiency of filter B using periodic loads was about 98%.

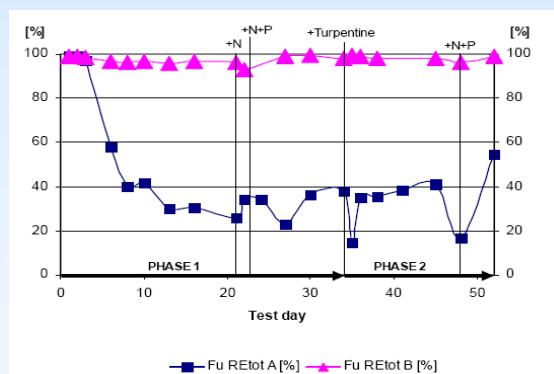


Figure 3. Total removal efficiencies of furfural for biofilters A and B. +N means addition of nitrogen, +P addition of phosphorous and +turpentine the beginning of turpentine feed.

The research results indicate that the periodisation of loads improves the biofilter's furfural removal efficiency to a significant degree (figure 3). Also high terpene content levels do not seem to affect the furfural removal efficiency in the long term. Based on these results, correctly dimensioned and appropriately constructed biofilter may be an applicable solution for odour control in wood heat treatment plants. Still further testing (pilot-scale) is needed.

