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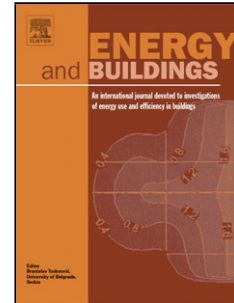
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Experimental Studies on Removal of Airborne Haloanisoles by Non-thermal Plasma Air Purifiers

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ABSTRACT

A laboratory study was conducted to test the performance of non-thermal plasma air purifiers on its removal effectiveness of two haloanisoles - 2,4,6-trichloroanisole (TCA) and 2,4,6-Tribromoanisole (TBA). TCA and TBA are the two major compounds found in wine cellars that can contaminate wine to produce unpalatable mouldy and musty tastes. The test was first conducted in a climate chamber. The plasma air purifier was installed in a test rig developed for the testing and challenged by airflow with certain concentrations of TCA and TBA. Air samples upstream and downstream of the air purifier was collected by Tenax tubes and the concentration of TCA and TBA were analyzed by thermal desorption GC-MS. The results showed that the plasma air purifier was effective on removing TCA and TBA with a single pass efficiency of better than 82%. The effect was further validated in a wine cellar under a realistic condition. The concentrations of TCA and TBA in the wine cellar decreased 94% and 50% respectively after running two plasma air purifiers for 5 days. The non-thermal plasma air purification technology may be used in wine cellar to remove the two airborne contaminants and prevent the wine from being contaminated during storage.

Keywords: Air purification, Non-thermal plasma, Close coupled field technology, Wine cellar, Haloanisoles and Cork taint

INTRODUCTION

The most frequent wine fault is the musty taint or cork taint, which makes wine mostly unpalatable. The main compounds which are responsible for this off-flavour are haloanisoles and their respective precursors, known as halophenols, which are transformed by microbial-induced methoxylation. Among the haloanisoles, 2,4,6-trichloroanisole (TCA) is the first member identified and the most relevant. Wineries over the world, especially in Europe, are seriously affected by this unpleasant organoleptic defect [1]. In accordance with the EU Commissioner for agriculture [2], this mouldy and musty off-odour, unacceptable by consumers, affects 13% of bottles causing financial losses of around one billion Euros in the wine sector.

Traditionally, cork stoppers contaminated with these compounds were assumed to be responsible for this defect, and thus, European cork industries have made strong efforts counting with EC support. As result, some projects [3] were developed to avoid the

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