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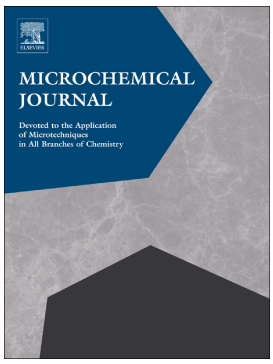

A comparative photoacoustic study of multi gases from human respiration: mouth breathing vs. nasal breathing

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A comparative photoacoustic study of multi gases from human respiration: mouth breathing vs. nasal breathing.

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Abstract Mouth breathing *vs.* nasal breathing was investigated using a CO_2 laser photoacoustic system (LPAS), a well known method in the field of trace gas detection, used in our study for multi component determination.
The mission of this research is to closely examine the respiration using the photoacoustic detection of carbon dioxide, ethylene, methanol, ethanol and ammonia, known as volatile organic compounds (VOCs).
The levels of all five trace gases are much lower for nose breathing compared with mouth breathing: for nose breathing with 8% for carbon dioxide, 6.9% for ethylene, 6.3% for methanol, 8% for ethanol and 19.5% for ammonia compared to mouth breathing.
The measurements should be carried out of both nasal-breathing route and mouth-breathing route, to identify the major sources of carbon dioxide, ethylene, ammonia, ethanol and methanol compounds.

Keywords: carbon dioxide, ethylene, ammonia, ethanol, methanol, spectroscopy

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1. Introduction

Breath analysis continues to be an attractive field for noninvasively diagnosis of serious illnesses. Biomarker analysis in exhaled breath may be the most simple, rapid and safest way to accurately determine the stage or the severity of a disease. Although numerous biomarkers have been identified so far, very little is known about their origin, if they are metabolic or not [1-6].

The field of analysis of the volatile organic compounds has attracted a considerable amount of scientific interest during the last decade but one of the challenges in the field of analysis of the volatile trace gas in exhaled breath is to be able to relate their concentrations to the corresponding plasma levels [1-3]. In contrast to NO, which is predominantly generated in the bronchial system, volatile organic compounds (VOCs) are mainly blood borne and therefore enable monitoring of different processes in the body.