

Investigation of the Possible Effect of Sampling on Human Exhaled Breath Sample Integrity

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Based on the volatile organic compounds (VOCs) contained in human breath, it is believed that it could be possible to establish an early stage non-invasive diagnostic of certain diseases [1]. Indeed, there are some differences in the VOC profile between healthy and unhealthy patients. Usually, breath analysis is performed off-line, patient exhaled air is trapped by devices or inside an inert bag (Tedlar bag) before being analyzed, most of the time, by 1D-GC-MS [2].

In this study, we investigate off-line breath analysis, carried out using Tedlar bags, to capture VOCs from human exhaled breath before transfer to thermal desorption tubes. As proper elucidation of complex exhaled human breath VOC mixture containing several thousands of analytes is challenging, TD tubes were desorbed into a GC×GC-HRTOFMS system to characterize as much as possible of the patient VOC profile.

Because these sampling bags are known to possibly be the source of issues in terms of cross contamination, leaching (Phenol and acetamide N,N dimethyl [3]), and leaking, we specifically went through an exhaustive search of these peaks and other possible contamination analytes to control and decrease the impact of the use of Tedlar bags on our air sample integrity. We produced preliminary data that demonstrated some background noise emitted by Tedlar bag. We also investigated kinetic study of the permeability of these bags from a saturated environment in VOCs, to determine how long a samples can stay in bag without being contaminated by VOCs from the environment. With these results, we show that it is possible to pursue the goal of early stage non-invasive diagnostic of certain diseases by trapping exhaled breath in dedicated bags.