MOBILE ODOR TESTERS FOR SOILS OR GRANULAR MATERIALS

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1. Introduction

Localization and characterization of volatile organic pollutants in soils is the aim of a rapid on-site analysis. In order to evaluate the potential of an electronic nose for direct online detection of volatile soil pollutants. Model gas exposures and practical tests were performed using KAMINA, the Karlsruhe MicroNose with two different sampling assemblies in direct sniffing mode. Odor testing with an electronic nose is nothing else than gas analysis of usually complex gas ensembles in an integral manner. Contrary to the classical description of a gas mixture as a sum of components with individual concentrations the electronic nose detects the gas ensemble as an entity with an integral concentration. However, similar to human odor perception the integral can be quantitatively divided into components which themselves may be complex mixtures. Owing to the measuring principle all pollutants are detectable as long as their volatility makes them appear in the gas phase. Therefore the term 'odor' should be understood as a pollutant signature in the gas phase no matter whether the human nose can smell it or not.

The KAMINA is an electronic nose system originally developed for gas analytical applications in consumer products such as ventilation flap control in automobiles or automated cooking processes and private medical diagnostics. The concept and technical outfit of the KAMINA do not only take analytical demands into account but also aim at low costs, minimum spatial requirements, low power consumption, and low weight, which are all mandatory for the equipment of mass products. This also makes the KAMINA an attractive tool for on-site soil screening. One application of this kind could be the screening of soil for localizing soil patches contaminated with volatile organic pollutants. Screening can be carried out either above the soil surface or an in-depth analysis is possible. Even a depth profile analysis, presently under development, can be performed.

2. Measuring Principles And Technical Equipment

The sensory heart of the KAMINA is a gradient microarray of conductivity gas sensors [1] (see Fig. 1). Owing to the high sensitivity of the measuring principle nearly to all types of gases (except rare gases and nitrogen) metal oxide gas sensing is the most universal gas detection principle for volatile pollutants. It is based on a

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