

Evaluation of the performance of the Nasal Ranger and Scentroid field olfactometers using selected ion flow tube mass spectrometry (SIFT-MS)

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ABSTRACT

Odour quantification is generally performed by olfactometry, a technique which determines to what extent an odorous air sample should be diluted with odour-free air to be just distinguishable from odour-free air. In this study, the performance of two field olfactometers (Nasal Ranger and Scentroid 110c) was evaluated with respect to their ability to generate accurate dilutions. Therefore, an air stream with known concentrations (500 ppb_v to 5 ppm_v) of odorous compounds (acetic acid, propanoic acid, n-butanol, dimethyl sulphide, dimethyl disulphide) was diluted by the olfactometers at their different set points after which the concentrations of the target compounds in the diluted air stream were measured by selected ion flow tube mass spectrometry (SIFT-MS). This enabled to determine the observed dilution ratios (DR_{obs}) and relate them to the set point values (DR_{set}). The Nasal Ranger showed good performance in the interval between DR_{set} 3 and 31. Only at the highest set dilution ratio ($DR_{set}=61$) breakthrough of the compounds through the activated carbon filter was observed. This breakthrough resulted in lower observed dilution ratios (up to a factor of 2 for dimethyl sulphide) when compared to the DR_{set} . For the Scentroid a good linearity between DR_{set} and DR_{obs} was observed but dilution ratios were much higher (up to a factor of 2) than what could be theoretically expected on the basis of air flows. This behaviour could be explained by sorption effects of the target compounds onto the metal parts and into the rubber seal of the Scentroid.

Keywords: Olfactometry; Nasal Ranger, Scentroid, SIFT-MS