Development of a Portable Instrument for the Continuous Analysis of Volatile Organic Compounds (VOCs) and Its Application to Environmental Monitoring

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A small, time efficient and sensitive instrument for the continuous analysis of very volatile organic compounds (VOCs) with a boiling point lower than 100°C in addition to the analysis of VOCs with a boiling point in the range of 100–150°C was developed and applied to the measurement of VOCs in the course of university research and environmental monitoring. VOCs, such as n-hexane, acetone, ethyl acetate, alcohols, benzene, toluene and xylene, were continuously measured once every 30 min. The detection limits of hexane, ethyl acetate, benzene and toluene at a preconcentration time of 10 min were 0.41 µg/m³ (0.12 ppb), 0.67 µg/m³ (0.19 ppb), 0.22 µg/m³ (0.07 ppb) and 0.22 µg/m³ (0.06 ppb), respectively. The relative standard deviations of VOCs were less than 5%. The sensitivities of the present method VOCs were higher than those of the conventional method. The temporal changes in VOC concentrations in several laboratories and at a plant for the disposal of organic liquid wastes were measured, and the behavior of VOCs was analyzed. All the VOC concentrations, except that of ethyl acetate, determined using the portable instrument were slightly lower than those determined using a passive sampler. The portable instrument developed in the course of this study can be used for the risk assessment and management of chemicals.

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