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INDOOR AND OUTDOOR VOLATILE ORGANIC COMPOUNDS MONITORING IN A MULTI-STOREY CAR PARK

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Abstract

A VOC monitoring was carried out inside and outside a multi-storey car park in order to characterize the emission profile of vehicular traffic source in an indoor environment. BTEX, and in particular toluene, were the most abundant compounds in all monitored sites, with different compositions between indoor parking areas and outdoor sites. The motor vehicle exhaust and gasoline vapor emission in these enclosed parking garages were characterized by diffusion or degradation phenomena different from those that occur in urban areas as the BTEX compositions, their ratios and their reactivity with OH and with NO₃ radicals demonstrate. In detail, xylenes/BTEX and ethylbenzene/BTEX ratios in indoor environments were twice than those in outdoor ones, while toluene/BTEX ratio resulted half than that obtained in outdoor sites. In this work, BTEX concentrations depend both on number of vehicles, on vehicular characteristics (age, emission control technology, fuel quality etc.) and on factors related to the characteristics of parking facilities (volume of the monitored areas, indoor or open facilities, ventilation systems, size and maintenance). However, it was found that the external contribution (intrusion of pollutants from outdoor and from the other floors) and the influence of mixing air (removal of pollutants by ventilation and air exchange) on BTEX concentrations were not significant if inside the multi-storey car park there was a strong source (due to the number of vehicles) such happened in the first and second floors and along the ramp that connected them.

Key words: BTEX ratios, garage, indoor environment, number of vehicles, VOC

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