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Indoor air quality impacted by ozone-induced reactions

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The purpose of this paper is to discuss the impact of outdoor-produced ozone on indoor air quality (IAQ) as documented by two field campaigns conducted during the 2003 and 2004 summer seasons in the CSTB experimental house (MARIA). For those field experiments, new building products were installed in a test room of MARIA. The selected building products were a carpet, pinewood boards and polystyrene acoustic tiles. Ventilation conditions were precisely controlled by mechanical extraction during all experiments.

Ozone was continuously monitored outdoors and indoors in the test room. During photochemical pollution episodes selected on the basis of pollution forecast, VOC and aldehyde were also measured outdoors and indoors, on a daily basis.

During those experiments, the mean indoor to outdoor ratio for ozone was 0.1, for an air exchange rate of 1 h^{-1}. The sharp depletion of this ratio is an evidence of ozone-induced reactions occurring in the test room both on indoor surfaces and in the gas phase with specific VOC emitted by the installed products.

The impact of outdoor ozone on indoor air quality will be described through the daily experiments where VOC and aldehyde were also measured. In particular, the discussion will focus on the daily evolution of potential precursors (e.g. terpenes and styrene) and reactions products (formaldehyde, hexaldehyde) of indoor ozone-induced reactions.

The relative contribution of heterogeneous reactions occurring on indoor surfaces and homogeneous reactions in the gas phase will be tentatively documented through laboratory experiments conducted in an experimental set-up developed for the characterization of reactions between ozone and building products. Results of the experiments conducted on the products installed in MARIA and which have been tested individually will be presented.