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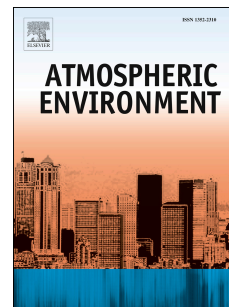
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Effect of Fiber Material on Ozone Removal and Carbonyl Production from Carpets

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ABSTRACT:

Indoor air quality is affected by indoor materials such as carpets that may act as sources and/or sinks of gas-phase air pollutants. Heterogeneous reactions of ozone with carpets may result in potentially harmful products. In this study, indoor residential carpets of varying fiber types were tested to evaluate their ability to remove ozone, and to assess their role in the production of carbonyls when exposed to elevated levels of ozone. Tests were conducted with six types of new unused carpets. Two sets of experiments were conducted, the first measured ozone removal and ozone deposition velocities, and the second measured primary carbonyl production and secondary production as a result of exposure to ozone. The tests were conducted using glass chambers with volume of 52 L each. Air exchange rates for all tests were 3 h^{-1} . The ozone removal tests show that, for the conditions tested, the polyester carpet sample had the lowest ozone removal (40%), while wool carpet had the greatest ozone removal (65%). Most carpet samples showed higher secondary than primary carbonyl emissions, with carpets containing polypropylene fibers being a notable exception. Carpets with polyester fibers had both the highest primary and secondary emissions of formaldehyde among all samples tested. While it is difficult to make blanket conclusions about the relative air quality merits of various carpet fiber options, it is clear that ozone removal percentages and emissions of volatile organic compounds can vary drastically as a function of fiber type.

Keywords: Indoor air quality, ozone deposition velocity, formaldehyde, aldehydes, measurements

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