

## 1.197 Detecting Human Emissions of Volatile Chemical Products in Urban Atmospheres.

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Abstract:

Recently it has been identified that everyday use of volatile chemical products (VCPs), including personal care products, cleaning agents, inks, coatings, adhesives, and pesticides account for around half of the petrochemical volatile organic compounds (VOCs) emitted in the Los Angeles basin. In addition to VOC measurements of Los Angeles in 2010, we show measurements made in 2015 and 2018 detecting VCP emissions in Boulder, Colorado and New York City. In the latter two cities, atmospheric measurements were made during wintertime when biogenic activity is low, and anthropogenic sources are expected to dominate urban VOC emissions. To detect VOCs in ambient air, we utilized a proton transfer reaction-time of flight-mass spectrometer (PTR-ToF-MS), and canister samples analyzed by gas chromatography-mass spectrometry (GC-MS). We demonstrate the utility of decamethylcyclopentasiloxane (D5-siloxane) as a chemical tracer of personal care product emissions, which is mainly found in antiperspirants and hair care products. In Boulder, ambient measurements suggest that the mass concentration of D5-siloxane is similar to benzene (primarily emitted from mobile sources). The emissions of D5-siloxane peak in the morning when most personal care products are likely applied. In New York City, using a mobile laboratory instrumented with the PTR-ToF-MS, we find that atmospheric concentrations of D5-siloxane correlate

strongly with population density ( $R^2 \sim 0.70$ ). This suggests a population-dependence of D5-siloxane emissions, consistent with prior indoor air quality studies showing that D5-siloxane off-gasses from people. Lastly, we explore the presence of other highly reactive VOCs found in chemical products, such as terpenes, which can efficiently produce ozone and secondary organic aerosol. Terpenes are common fragrances, and found in cleaning agents and other consumer products. A challenge is distinguishing human terpenes from natural sources in the urban environment. However, the speciation of human terpenes will differ from natural sources, and be elevated in limonene.