

## 1.123 Quantifying occupants' role influencing the organic composition of indoor air in two northern California homes.

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Abstract:

Elevated concentrations of volatile organic compounds (VOCs) constitute a major concern for indoor air quality. Emissions from occupants and their activities have long been recognized as important sources of indoor VOCs. However, detailed source characterization studies generally have been restricted to controlled facilities investigating scripted processes and activities. The quantitative contribution of occupant-related emissions to human indoor VOC exposure under ordinary living conditions has been minimally explored, in particular in residential environments where people spend most of their time. We are quantifying temporally resolved occupant-related VOC emissions in two normally occupied residences by combining continuous monitoring tools with original experimental design and analysis. Time- and space-resolved measurements of VOC composition were carried out in each house using a proton-transfer-reaction time-of-flight mass spectrometer, during both normal occupancy (weeks to months) and vacancy (days). Over 200 VOC species were measured throughout the experiments. The time series of most VOCs exhibited clear episodic short-term enhancements above a building-associated baseline; these enhancements are attributable to specific occupant activities. Combined with simultaneous measurements of air change rates (achieved by steady release of inert tracers), time-varying indoor emission rates were determined with 2-h resolution. Comparing emissions rates in vacant vs. occupied periods demonstrates a consistent temperature-dependent baseline of emissions from the building envelope and its static contents. Dynamic occupant-related emissions are observed as additions to the baseline emissions. On average, baseline and occupant-related emissions, respectively, contributed 70% and 30% (60% and 40%) to total indoor emissions of acetic acid (acetaldehyde) for one of the studied houses. Further analysis is under the way for a broader range of compounds and for the second house. The importance of different activities and mechanisms through which human occupants contribute to indoor emissions of specific chemicals and summed VOCs will be discussed.