

3.073 Leaf uptake of atmospheric monocyclic aromatic hydrocarbons by plants.

Early Career Scientist

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Abstract:

Plants are reported to remove several species of volatile organic compounds (VOCs) from the atmosphere. The uptake of VOCs by plants contributes directly to the purification of the atmosphere and indirectly to suppression of the generation of photochemical oxidants such as ozone. Aromatic hydrocarbons including phenol and benzyl alcohol are ubiquitous VOCs in the atmosphere. We determined leaf uptake rate of these compounds by *Spathiphyllum clevelandii*, *Osmanthus fragrans*, *Quercus acutissima* and *Quercus myrsinifolia* at several part per billion by volume using a measurement system consisting of a proton transfer reaction mass spectrometer (PTR-MS), infrared gas analyzer, diffusion device and two leaf enclosure bags. One bag contained the plant leaf (sample bag) and the other bag was empty (blank bag). We calculated the VOC uptake rate, net photosynthetic rate and transpiration rate from the concentration differences of VOC, CO₂ and water vapor, respectively, between sample and blank bags. These uptake rates varied with VOC species and plant species. *S. clevelandii* absorbs phenol and benzyl alcohol more rapidly than low molecular weight ketones and aldehydes. We also found that the *S. clevelandii* leaves exposed to phenol emitted anisole. It might be produced by methylation of phenol inside the leaf.