AN INNOVATIVE ODORANT GENERATOR FOR BENCH SCALE PHOTODEGRADATION STUDIES ON MULTICOMPONENT GAS ODOR

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Abstract- Destructive treatment of gas-phase odor by heterogenous photocatalysis is one among the actively studied topics within the air quality and pollution abatement research areas. Most studies investigate the catalytic efficiency of a given photocatalyst relative to photoreaction system features and conditions (e.g. photoreactor design, source and wavelength composition of incident photons, irradiation level, odorant concentration, etc.) while limited to treating a single to very few model odorants at a time. Malodorous gas emissions such as those from wastewater treatment plants, industrial activities, or livestock production, however, contain complex mixtures of individual odorants of varied odor thresholds and concentrations. An innovative odor generation system was hence developed to produce multicomponent gas-phase odor for photodegradation studies. A mixture of fifteen model odorants including volatile acids, phenolics, sulfides and an indolic was spiked into the liquid-phase based system; the generated gas odor is subjected to photodegradation treatment using titania based photocatalyst and light emitting diodes as irradiation source. The relative photodestruction of each odorant was determined by gas chromatography-mass spectrometry. Results trends across odorant groups are discussed on the basis of odorant preparation technique, employed photocatalyst, and photoreaction conditions. The potential for use of this low-cost odor generator in routine photocatalysis and relevant applications is also discussed in relation to commercially available counterparts.