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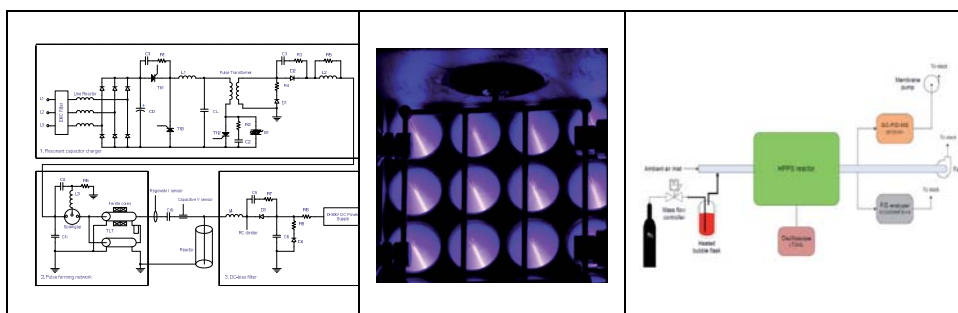
Oxidative degradation of toluene and limonene in air by pulsed corona technology

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The oxidative degradation of two volatile organic compounds i.e. toluene and limonene, by pulsed electrical discharges, has been studied. The TU/e-EES 10 kW hybrid pulsed power corona reactor with adjustable energy density has been utilized for degradation of ppm-level target compounds in 150 m³/h air flows. Degradation of the VOCs proceeds via reactive oxygen species like e.g. OH(X²□), O(³P, ¹D, ¹S), O₂(a¹□_g), O₃(X¹A) and excited, metastable and/or ionized bulk gas species produced in the atmospheric plasma.



The oxidation product range, observed with gas chromatography-mass spectrometry, features a complex energy density-dependent spectrum of oxygen-functional hydrocarbons, which has been extensively discussed on the basis of literature studies. Typically observed stable oxidation products for both target compounds are the biocompatible carboxylic acids acetic and formic acid. Measured degradation efficiency G-values are 23 nmol/J at 74% conversion of 70 ppm toluene and 181 nmol/J at 81% conversion of 10 ppm limonene.