DECOMPOSITION OF CHLOROBENZENE BY THERMAL PLASMA PROCESSING

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Abstract

Decomposition of chlorobenzene as a model molecule of aromatic chlorinated compounds was studied in radiofrequency thermal plasma both in neutral and oxidative conditions. Optical emission spectroscopy was applied for the evaluation of the plasma excitation and molecular rotational-vibrational temperature. Atomic (C, H, O) and molecular (CH, OH, C2) radicals were identified, while the morphology of the formed soot was characterized by electron microscopy. Organic compounds adsorbed on the surface of the soot after plasma processing comprised of various polycyclic aromatic hydrocarbons (PAH) and chlorinated PAH molecules. Their amount was greatly affected by experimental conditions, especially the oxygen content and plate power. The higher input power reduced the ring number of the PAH molecules. Addition of oxygen significantly reduced the amount of both PAHs chlorinated PAH molecules but enhanced the formation of polychlorinated benzene compounds.

Keywords

Chlorobenzene, Decomposition, RF thermal plasma, Optical emission spectroscopy, Gas chromatography mass spectrometry

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