



Atmospheric chemistry of phenoxy-type radicals formed in the oxidation of phenolic-type compounds

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Aromatic hydrocarbons are known abundant constituents of the urban atmosphere. They are mainly emitted to the atmosphere by anthropogenic activities and make a sizable contribution to photooxidant formation. Oxidation of emitted aromatic hydrocarbons leads to the formation of ring-retaining aromatic products, such as phenols, nitrophenols etc., and a key role of these compounds in the formation of secondary organic aerosol (SOA) has been suggested. Recent studies in our laboratories have shown that the photolysis of ortho-nitrophenols may contribute quite considerably to HONO formation in the troposphere. Mechanistic studies, which are focused on the H-atom abstraction channel from the OH group in the photooxidation of phenol-type compounds will be presented. These experiments were carried out in a 1080 l quartz glass photoreactor using FT-IR spectroscopy for both reactant and product monitoring. The IR spectra of products formed in the OH-radical initiated photooxidation of catechols, nitrophenols and other related compounds investigated in this laboratory show many similarities with the spectra of products observed in the Cl-atom initiated oxidation which proceeds entirely by H-atom abstraction from the phenolic OH group. Since this would appear to indicate that the primary reaction pathway in the OH-radical photooxidation of catechols and nitrophenols is driven to a large extent by phenoxy radical formation it was decided to investigate the chemistry of several phenoxy-type radicals formation. The products derived from the phenoxy radicals generated in the reaction of atomic chlorine with phenol, catechol, and nitrophenol have been investigated. In all of the compounds investigated, formation of a thermally unstable ketene-type compound ($R_1-C(R_2)=C=O$) has been observed. In the Cl + phenol reaction, IR spectra features have been observed which are indicative of the for-

mation of dihydroxybiphenyls and phenoxyphenols stemming from the self reaction of the phenoxy radical. The present status of the IR product studies will be presented together with first efforts to identify the products in the various reaction systems using cryogenic trapping or cartridge sampling techniques in combination with GC-MS.