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Photochemisty of the Nitrite Ion

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PHOTOCHEMISTRY OF THE NITRITE ION

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Nitrogen compounds contribute to many environmental problems such as acid rain, air pollution, groundwater contamination, and smog formation. When the atmosphere is heavily polluted with nitrites and aromatic hydrocarbons, these compounds can undergo some type of photochemical reaction. By attempting to understand how this reaction occurs, society comes closer to repairing the damage it has done and prevents further problems. This project studied the photochemistry of the nitrite ion in aqueous basic solution which served as a concentrated reaction model of smog formation. Both OH and NO radicals are produced during photolysis, but the two radicals recombine in the presence of pure water causing no net reaction. However, aromatic compounds present in the solution being photolyzed can act as scavengers reacting with either one or both radicals to produce different compounds. At present, two scavengers have been studied in the basic nitrite solution: benzene and phenol. Upon 24 hour photolysis, both solutions have darkened considerably with the benzene solution changing from clear to brown/orange and the phenol solution changing from yellow to dark brown. Thermal reactions for the same amount of time have yielded no such results. Methylene chloride preceeded by acidification has been used to extract the photolysate. UV-vis spectroscopy, FTIR, TLC, HPLC, and column chromatography have been used in the attempt to separate and characterize the products of both the benzene and the phenol photolysates. Products that are most likely to be present include p-nitrosophenol and phenol (from the benzene photolysate).