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Photochemical Reactions of Molecular Nitrous Acid in Benzen

Ovette Villavicencio
Illinois Wesleyan University

Tim Rettich, Faculty Advisor
Illinois Wesleyan University

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PHOTOCHEMICAL REACTIONS OF MOLECULAR NITROUS ACID IN BENZEN

Ovette Villavicencio and Tim Rettich*
Department of Chemistry, Illinois Wesleyan University

At the Earth's surface, radiation of wavelengths 290 nm and greater (actinic region) is available for inducing photochemical reactions. The term "photochemical" air pollution reflects the essential role of solar radiation in driving the chemistry. These photochemical reactions involve volatile organic compounds (VOCs) and nitrogen oxides (NO_x). The complex chemistry of VOCs and oxides of nitrogen lead to the formation of various oxidizing species such as ozone, O_3, and the highly reactive hydroxyl radical. In this research, the photochemistry of molecular nitrous acid in the presence of benzene scavenger was studied. Nitrous acid is of special interest because it leads to the production of O_3 and hydroxyl radical. Cox and Atkins[1] first studied the photochemical reactions of nitrous acid in 1973 using 330 nm to 380 nm light. However, in our research, by studying the photochemistry of nitrous acid in a matrix composed of 100% benzene scavenger, many side-reactions of nitrous acid such as equilibrium reactions with NO_2^- and N_2O_3 that exist in aqueous solutions become inconsequential. This allows for a detailed study of the reactions between benzene, a VOC, and the photochemical products of nitrous acid. The results and data are reported here.

[1]Cox, R.A. and Atkins, D.H. *U.K. At. Energy Tes. Establ. Rep.*, 1973, AERE-R7615 as cited by Rettich, T.R in Ph.D. Thesis at Case Western Reserve University, Cleveland, OH, 1978.