



Illinois Wesleyan University Digital Commons @ IWU

John Wesley Powell Student Research
Conference

1990, 1st Annual JWP Conference

Apr 6th, 6:30 PM - 8:00 PM

Photochemistry of Nitrous Acid and Nitrite Ion

Christopher L. Exstrom
Illinois Wesleyan University

Tim Rettich, Faculty Advisor
Illinois Wesleyan University

Follow this and additional works at: <http://digitalcommons.iwu.edu/jwprc>

Christopher L. Exstrom and Tim Rettich, Faculty Advisor, "Photochemistry of Nitrous Acid and Nitrite Ion" (April 6, 1990).
John Wesley Powell Student Research Conference. Paper 5.
<http://digitalcommons.iwu.edu/jwprc/1990/posters/5>

This Event is brought to you for free and open access by The Ames Library, the Andrew W. Mellon Center for Curricular and Faculty Development, the Office of the Provost and the Office of the President. It has been accepted for inclusion in Digital Commons @ IWU by the faculty at Illinois Wesleyan University. For more information, please contact digitalcommons@iwu.edu.

©Copyright is owned by the author of this document.

PHOTOCHEMISTRY OF NITROUS ACID AND NITRITE ION

Christopher L. Exstrom, Dept. of Chemistry, IWU, Tim Rettich*

In a study of aquatic nitrogen chemistry, Zafiriou and True reported decomposition of and hydroxyl radical (OH) formation from nitrite ion (NO_2^-) in seawater upon absorption of solar radiation. NO_2^- exists in an acid-base equilibrium with nitrous acid (HONO) [$\text{NO}_2^- + \text{H}_2\text{O} \rightleftharpoons \text{HONO} + \text{OH}^-$]. A comparison study of HONO and NO_2^- photochemistry was undertaken to evaluate the importance of the preceding equilibrium.

Aqueous HONO and aqueous NO_2^- were each photolyzed with 365 nm radiation. Benzene, toluene, benzoic acid, and terephthalic acid were each used as OH-scavengers (there have been no previous reports of using the latter two compounds as OH-scavengers). In the case of HONO, it was determined by ultraviolet/visible (UV/vis.) light spectroscopy that the scavenger compound was hydroxylated by OH resulting from HONO photochemical decomposition and subsequently nitrosated by HONO. In the case of NO_2^- , no hydroxylated aromatic compound was detected, and no decrease in NO_2^- concentration was observed. It was concluded that, at 365 nm, HONO yields OH upon photolytic decomposition and NO_2^- does not photolytically decompose to yield OH. Kinetic information for both thermal and photochemical decomposition of HONO was obtained.

The proposed mechanism for OH-scavenging by benzene was examined under varying pH conditions. H_2O_2 , a known OH producer, was photolyzed in the presence of benzene. UV/vis. spectroscopy indicated that one or more hydroxylated aromatic products formed, supporting the proposed OH-scavenging mechanism.