Iron Catalysis in Oxidations by Ozone

APPLICATION AREAS
Oxidation of Aqueous Waste Streams, Water Treatment, Food Treatment and Processing

ABSTRACT
Ozone is recognized as potent and effective oxidizing agent, and has a number of commercial uses, including use as an industrial oxidant and water treatment. Ozone is attractive as an oxidant or a disinfectant because it is one of the most active and readily available oxidants, and because the formation of molecular oxygen as a by-product makes it environmentally friendly. However, ozone is not always as fast or efficient as chemical oxidants, since ozone can degrade during the reaction and cause incomplete oxidation. To overcome these limitations, ISU researchers have developed a method for using iron as an effective catalyst in oxidations mediated by ozone. By reacting iron(II) with ozone, nearly instantaneous and complete oxidation of substrates such as alcohols, ethers, aldehydes, nitriles, sulfides and sulfoxides occurs, making this a particularly useful process for waste water treatment, water purification, and other similar applications.

BENEFITS
- Rapid rate of catalysis (oxidation occurs nearly instantaneously)
- Environmentally friendly (ozone naturally decomposes to oxygen, and no toxic halogenated compounds are produced)
- Simple (catalyst is formed in situ using commercially available materials at the point of ozone generation)
- Versatile (may be used for any application and/or substrates for which ozone is used as an oxidant)

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INTELLECTUAL PROPERTY STATUS

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