Nibedita Pani et al., J Geol Geophys 2018, Volume 7
DOI: 10.4172/2381-8719-C2-020



# Divalent iron oxidative process for degradation of carbon and nitrogen based pollutants from dye intermediate industrial wastewater

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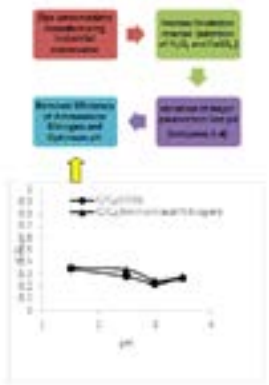
**Statement of the Problem:** Water pollution resulting from discharge of partial/not treated textile wastewater containing high carbon and nitrogen pollutants pose a huge threat to environment, ecosystem and human health. It is essential to remove carbon and nitrogen based organic pollutants more effectively from industrial wastewater before discharging. In recent years the removal of nitrogen in particular ammoniacal-nitrogen, nitrate-nitrogen from wastewater is a topic of concern. Wastewater arising from textile operations is characterized to have intense color, high suspended solids, very high concentration of ammoniacal nitrogen and chemical oxygen demand. Ammoniacal nitrogen has adverse effect on aquatic life as well as human being. It acts as one of the main contributor of eutrophication, causes depletion in DO level. The task of treating high to very high concentration of ammoniacal nitrogen is difficult.

**Purpose:** The purpose of this study is to treat high strength ammoniacal nitrogen and COD (chemical oxygen demand) by Fenton Oxidation process with less detention time from dye intermediate manufacturing industrial wastewater.

**Methodology & Theoretical Orientation:** Present study focuses on removal of Carbon based pollutant in particular COD and nitrogen based pollutants in particular ammoniacal nitrogen by Fenton Oxidation process using $Fe_{2+}$ and $H_2O_2$ as reagents. The study was carried out with high strength wastewater containing initial COD above 5000 mg/L and NH4+-N above 1000 mg/L. The major operating condition like pH was varied and the effective operating condition was derived.

**Findings:** The maximum degradation was obtained at pH - 3.0. At this pH the removal efficiencies of COD and ammoniacal nitrogen were found to be 77.27% and 74.9% respectively.

**Conclusions & Significance:** The Fenton process can be the best alternative for the simultaneous removal of COD and $NH^{4+}$-N from industrial wastewater.



Concentration-pH profile on degradation of COD & Ammoniacal nitrogen by Fenton process using molar ratio of $Fe^{2+}/H_2O_2$ as 1:1

**Fig 1:** Removal process of Ammoniacal Nitrogen and COD by Fenton Process

## Recent Publications

1. Carolina Gonzalez Merchan et al. (2016) Influence of contaminant to hydrogen peroxide to catalyzer molar ratio in the advanced oxidation of thiocyanates and ammonia nitrogen using Fenton-based processes. Journal of Environmental Chemical Engineering. 4(4):4129-4136. Doi:10.1016/j.jece.2016.09.001.

2. A D Bokare and W Choi (2014) Review of iron-free Fenton-like systems for activating $H_2O_2$ in advanced oxidation processes. Journal of Hazardous Materials. 275:121-135. Doi:10.1016/j.jhazmat.2014.04.054

3. Puthiya Veetil (2013) Degradation of dyes from aqueous solution by Fenton processes: a review. 20(4):2099-2132. Doi:10.1007/s11356-012-1385-z.

4. Libing Chu et al. (2012) Treatment of coking wastewater by an advanced Fenton oxidation process using iron powder and hydrogen peroxide. Chemosphere. 86:409-414. Doi:10.1016/j.chemosphere.2011.09.007

5. Neyens E and Baeyens J (2003) A review of classic Fenton's peroxidation as an advanced oxidation technique. J. Hazard Mater. 98:33-50. Doi:10.1016/S0304-3894(02)00282-0.

**Biography**

Nibedita Pani is a full time PhD scholar at the Pandit Deendayal Petroleum University, Gandhinagar, Gujarat, India. She is working on industrial wastewater treatment processes in particular Ammoniacal Nitrogen removal processes .

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