Visvesvaraya Technological University, Belgaum

A Project Report On

"SYNTHESIS AND UV-LIGHT PHOTOCATALYTIC ACTIVITY OF NOVEL FERRIC OXIDE NANO PARTICLES"

Submitted in partial fulfillment for the award of

Bachelor of Engineering
In
Chemical Engineering

Submitted By

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Synopsis

Project title:

Synthesis and UV-light Photocatalytic Activity of Novel Ferric Oxide Nano particles

Objectives of the project are listed below.

1. Synthesis of Nano ferric oxide by gel combustion method using novel oxidants such as glycine and dextrose.
2. Characterization of synthesized ferric oxide for using X Ray diffraction method (XRD).
3. Degradation studies of various azo dyes using synthesized iron oxide in UV light.

In recent years, semiconductor-assisted photocatalysis has attracted extensive attention since it has a great potential to contribute to degrade a great number of organic materials in aqueous media. Much semiconductor material has been explored for photocatalytic activity. The present work is mainly aimed a. exploring the photocatalytic activity of nano iron oxide. We are also planning to explore the possibility of using it as adsorbent for the adsorption of the heavy metals.

Synthesis and characterization of Nano Iron Oxide Powders

From the different physicochemical methods available for the production of Nano particles includes spray pyrolysis, sol gel process, CVD, micro emulsion and so on. In the present work we are planned to synthesize nano Iron Oxide powder using self propagated gel combustion technique. We planned to synthesize iron oxide using its nitrate solution in presence of various oxidants such as sugar & dextrose etc. It is necessary to optimize feed to fuel ratio to get desired particle size using. It will be characterized using Scanning Electron Microscope and X ray Diffraction methods.

Degradation studies of azo dyes

The removal of dyes and other complex organics from industrial effluents is a major engineering challenge today. It is estimated that in the textile industry, 10-15% of the dye used is lost during the dyeing process and is released in the effluent stream. Dye wastes cause eutrophication and lead to the production of dangerous by-products through oxidation, hydrolysis and other chemical reaction taking place in the wastewater. Decolourization of dye effluents has therefore received increasing attention. Traditional techniques such as adsorption, flocculation, ultra filtration, reverse osmosis etc., can generally be used efficiently for decolourization. However, these techniques are non destructive since they simply

transfer organic compounds from water to another phase, causing secondary pollution. Furthermore, due to the presence of stable aromatics in dye molecules, biological treatments effective for degradation. However, the presently available chemical disinfection techniques suffer from disadvantages like formation of possibly carcinogenic products. Therefore there is a need for developing additional disinfection processes, which could eliminate or reduce the use of these disinfecting chemicals. One of the most promising technologies proposed for waste water treatment is advanced oxidation process (AOP). This method is based on the generation of very reactive species such as hydroxyl radicals that can oxidise a broad range of pollutants effectively.

It is one of the better alternatives owing to its cost effectiveness in treating high concentration of hazardous pollutants. The great significance of this technique is that it can degrade various complex organic chemicals, which has not been addressed by several other methods of purification. In the present work we are planned to carryout the photocatalytic degradation of azo dyes using iron oxide which was not explored as photo catalyst. Degradation studies in azo dyes will be carried out by varying various parameters such as weight of catalyst, concentration of dyes &temperature.