

ILMENITE MEDIATED PHOTODEGRADATION OF REMAZOL BLUE IN AQUEOUS MEDIUM

L.A.W.D. ARIYADASA¹, H.M.A.M.C. HERATH² AND C.P. UDAWATTHE *²

¹*Posgraduate Institute of Science, Peradeniya, Sri Lanka*

²*Department of Chemistry, Faculty of Science, University of Peradeniya*

A naturally occurring substance, ilmenite was investigated for its ability to degrade dye prior to adsorption in aqueous solution under sunlight. For the experiment a reactive azo dye, Remazol blue was used. Since ilmenite is essentially composed of oxide of titanium and iron, the photocatalytic ability of ilmenite was studied.

Aqueous dye solution of known concentration was treated with ilmenite while oxygen was bubbled through the solution. Photobleaching studies carried out with 30 ppm Remazol blue dye at pH 3.0 in the presence of 100 mg of ilmenite showed that a visual discharge of blue color and the gradual loss of optical density of the dye at 601 nm upon irradiation for 7 hours. No significant discolouration of the dye was observed in the absence of catalyst or sunlight, which suggests that photobleaching was purely photocatalytic. It was found that a remarkable decrease in absorbance in first two hours of irradiation could be attributed to the adsorption of the dye on ilmenite surface. Thereafter, a slow change in absorbance with time was observed.

The analysis of degradation products for nitrate, sulfate and ammonia were carried out by Cd-reduction method, turbidimetric and the indophenols blue method respectively. A considerable yield of nitrate (0.06 ppm) and sulfate (0.70 ppm) ions in comparison to controls revealed that sulfur and nitrogen moieties of the dye were converted to such simple inorganic ions. However, no detectable amount of ammonia was observed during the irradiation period.

In order to check the degree to which the degradation or mineralization of the dye had occurred upon irradiation, chemical oxygen demand (COD) was determined at different time intervals in the irradiation processes. The percentage reduction of COD assays is high up to 83.67%. The COD values decreased from 740.9 ppm to 121.0 ppm confirming the effective photocatalytic ability of ilmenite that converted the original dye into simpler inorganic compounds.