E2 234

Photosensitized oxidation of Triaminophenylmethane pigments

Triaminophenylmethame pigments, Magenta and Crystal violet are used in textile and printing ink industry. In view of the toxicity, detoxification appears to be of great interest. Photosensitized oxidative degradation processes have been show to play an important role in destroying organic pollutants when compared to traditional methods such as adsorption, coagulation, ect.

In our recent work, visible light excited hematoporphyrin 1Xdihydrochloride in oxygenated solutions has been found to be promising material for photobleaching of Magenta and Crystal violet.

During a 24 h period of photoirradiation using a 20 W fluorescence lamp, complete decolouration of both dyes was achieved. Visual colour change of both dyes and loss of optical absorbance at 545 nm for magenta and at 580 nm for crystal violet at pH 3, 6 and

8 were observed upon continuous irradiation. No photobleaching was observed for controlled experiments performed exactly as above but in the absence of one of the components, oxygen, photosensitizer and light. The use of singlet oxygen scavenger (sodium azide) and superoxide anion scavenger (benzoquinone) n the above experiments, revealed that at high pH the photobleaching is due to singlet oxygen produced by the photosensitizer while at low pH both singlet oxygen and superoxide anion are involved in photoassisted decomposition of the dye species. The estimated redox potential of the excited photosensitizer is -1.8 V in comparison to -0.35 V for one electron redox potential of dioxygen vs Ag/AgCl, confirms the feasibility of an electron transfer from the excited sensitizer molecule to ground state oxygen to yield a superoxide anion.