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Photocatalysed decolourization of two textile dye derivatives, Martius Yellow and Acid Blue 129, in UV-irradiated aqueous suspensions of Titania

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ABSTRACT

Photocatalysed decolourization of two textile dye derivatives, Martius Yellow and Acid Blue 129, has been investigated in aqueous suspensions of titanium dioxide under a variety of conditions. The decolourization was studied by monitoring the decrease in dye concentration as a function of irradiation time employing the UV spectroscopic analysis technique. The decolourization kinetics was investigated under different conditions such as types of TiO_2 (Anatase [Hombikat UV-100 and PC500]/Anatase–Rutile mixture [Degussa P25]), initial reaction pH, catalyst dosage, dye concentration and in the presence of electron acceptors such as potassium bromate, hydrogen peroxide and ammonium persulphate. The decolourization of both dyes was also investigated under sunlight. The decolourization rates were found to be strongly influenced by all the above parameters. The photocatalyst Degussa P25 was found to be more efficient for the decolourization of dye derivative Martius Yellow, while UV100 was better for the decolourization of Acid Blue 129. All the electron acceptors markedly enhanced the decolourization rate of Martius Yellow, while only $KBrO_3$ as an electron acceptor shows pronounced effect for the decolourization of Acid Blue 129 in the presence of TiO_2 and air.

Keywords: Photocatalysis; Martius Yellow; Acid Blue 129; Titanium dioxide; Decolourization of dyes

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