Synthesis and Photocatalytic Performance of TiO_2- Pr Photocatalysis for Degradation of BB41

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Praseodymium ion-doped TiO_2 (Pr^{+3}-TiO_2) photocatalysis were synthesized by acid sol-gel method. The catalysts were characterized structurally by X-ray diffraction (XRD), transmission electron microscopy (TEM), Brunauer, Emmet and Teller (BET) and Fourier Transform Infrared (FT-IR) techniques. Pr-doping concentration was selected 1 wt% and calcination temperature employed was 400 °C. The absorption properties and photocatalytic activity of the catalysis were studied in a batch reactor. The photocatalytic activities of samples were tested for degradation of Basic Blue 41 (BB 41) mono azo dye solutions. Azo dye removal efficiencies were examined with total organic carbon and UV-vis measurements.

The Pr^{+3}-TiO_2 photocatalysis were found to exhibit a much higher photocatalytic activity under UV-A light irradiation for 30 minute achieved 89.38% for 15 mg·L^{-1} as compared to a TiO_2 photocatalyst. Moreover, according to Water Pollution Control Regulations, COD (Chemical Oxygen Demand) limitations for textile industry are between 200-400 mg·L^{-1}. To evaluate the degradation characteristics of Pr^{+3}-TiO_2 photocatalysis, the change of COD values with time for 15 mg·L^{-1} BB41 were investigated. The COD values obtained were 1.7 mg O_2/L after 30 minute of oxidation processes for BB41. As it can be seen from the results COD values decreased under the limitations in a very short time.

Key Words: Sol-gel, TiO_2, Pr, Potocatalytic Batch Oxidation, TOC.

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