Photocatalytic degradation of safranin O by ZnO-Ag loaded on cotton fabric

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Abstract:

ZnO-Ag photocatalyst was prepared by phtoreduction of Ag^{+} on ZnO to improve its activity towards photodegradation of safranin O. The photocatalyst tested by XRD and FTIR analysis. The prepared catalyst was loaded and stabilized on cellulosic fabric and tested for safranin O dye solution photodegradation. The fabric was efficient for decolorization of safranin O dye and full time to vanish from solution was 225 min. Concentration, initial pH value and light intensity were studied as affecting factors of photodegradation. At low concentration the degradation is high according to high light flux can penetrate in to solution, so active site can generate high active species, while high concentration fill all active sites and prevents generation of active species and makes a filter of light to reach photocatalyst. At high pH value photodegradation is high as well as at pH= 7, 10 and 12, so it is decreasing when pH value is in acidic media. Point of zero charge (pzc) is the main factor that no charge on photocatalyst surface, where no repulsion and high adsorption of dye molecule on surface and in pH= 3 or 5 a positive charge carried on ZnO-Ag or safranin O dye; therefore, high repulsion and less interaction and low photodegradation. Photodegradation reactions are dependent on light intensity and high degradation of safranin O dye when light intensity is increasing.

Keywords: photocatalytic degradation, photodeposition, safranin O dye.

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