

Decolourisation of wastewaters using composite coagulant: A novel solution to the textile industries

A. K. Verma, P. Bhunia and R. R. Dash

School of Infrastructure, Indian Institute of Technology, India

The textile industries are one of the most chemically intensive industries on the earth and the major polluter of potable water. As environmental protection becomes a global concern, industries are constantly in search for a novel solution that can diminish the environmental damage. In this manuscript, the effectiveness of a composite coagulant {magnesium chloride (MC) added with aluminum chlorohydrate (ACH)} was explored for the treatment of simulated as well as real textile wastewater. The pre-established studies revealed that the significantly higher dosage of MC is required to achieve the desired degree of colour removal, which ultimately increases the treatment cost. Keeping this in mind, the effectiveness of a novel and least explored ACH was investigated for the treatment of textile wastewater using coagulation/flocculation technology. Based on its characteristics, a composite coagulant was prepared by blending both the chemicals at different ratio.

The present study was aimed to investigate the effectiveness of a composite coagulant (MCACH) for treatment of the textile wastewater containing different classes of dyes (Reactive Black 5, Disperse Blue 3 and Congo Red) along with other chemical additives.

The optimum pH for the composite coagulant was 12 at which 90.35% decolourisation efficiency was obtained when both the coagulants were used in equal ratio with a combined dosage of 800 mg/L. Out of the three different coagulant dosing methods, namely, MC+ACH, ACH+MC and MC-ACH, MC+ACH at the ratio of 1.5:1 with a combined dosage of 800 mg/L was found to be the best combination, at which almost complete colour removal was achieved. The effectiveness of the composite coagulant was also verified with real textile wastewater. For real textile wastewater, 95% decolourisation efficiency was obtained at just 1000 mg/L of combined MC+ACH (1.5:1) dosage. Adsorption and charge-neutralisation along with sweep-flocculation were proposed as the predominant colour removal mechanisms of MC+ACH.

Biography

A. K. Verma is a Ph.D. student working in the area of water and wastewater treatment under the joint guidance of Dr. P. Bhunia and Dr. R. R. Dash Assistant Professor at School of Infrastructure, Indian Institute of Technology Bhubaneswar, India. As a student, he contributed significantly in the area of textile wastewater treatment and published numerous papers in reputed journals.

akshaya@iitbbs.ac.in