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Treatment of tannery effluent by electrocoagulation

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Electrocoagulation (EC) has been studied extensively throughout the world during the last decade for the treatment of various types of water and wastewater. The optimum treatment times, current densities and initial pH have been reported in the literature in the range of 5-60 minutes, 10-150 A/m² and near neutral pH respectively for mostly high removal efficiencies. Both operating cost and electricity consumption costs have been indicated to vary between 0.0047-6.74 €/m³ and 0.002-58.0 kWh/m³. As EC has great potential in the field of water and wastewater purification, a study was carried out to determine the efficiency of EC to treat tannery effluent of Hazaribag, Dhaka, Bangladesh. A total of three raw effluent samples were collected from Hazaribag area and were treated in the Environmental Engineering Laboratory of BUET. The samples were tested for color, turbidity, BOD and COD. Stainless steel electrodes were used and batch experiments were conducted with 1.5L capacity of the reactor at three different current densities (70, 140 and 210 A/m²). For each experimental run, samples were taken out from the reactor after 20, 40, 80 and 160 minutes flow of current.

All these samples were then filtered and analyzed for color, turbidity, BOD and COD. Analysis of the results showed that the color removal efficiency varied from 48.3% to 98.7% having the best performance (86.4-98.7% removal efficiency) at the current density of 140 A/m². The turbidity removal efficiency was found to be in the range of 82.4-99.6% with the best performance (98.9-99.6% removal efficiency) for the current density of 140 A/m². The BOD₅ removal efficiency varied from 49.6 to 93.3% and the best performance (80.9-93.3% removal efficiency) was at the current density of 140 A/m². At the same current density, the COD removal efficiency varied within a very narrow range (76.3-78%) whereas it varied greatly (35-78%) when all the data were considered. The experimental results revealed that the optimum time and current density were 40 minutes and 140 A/m² respectively for removal of color, turbidity, BOD and COD from the tannery effluent, and EC is an efficient process for treating tannery effluent especially for color and turbidity. The treated effluent can be recycled for various purposes.

Biography

Md Abdul Jalil is a Professor of Civil Engineering Department at Bangladesh University of Engineering & Technology (BUET), Dhaka, Bangladesh. He received his BSc in Civil Engineering in 1986 from BUET. He obtained his MSc in Civil Engineering in 1988 from the same university. He received his PhD in Civil Engineering in 1993 from Tokyo University, Japan under ADB Scholarship. He conducted Post-doctoral research on Water Management in Loughborough University, UK under Commonwealth Fellowship. He was appointed as a Lecturer in the Department of Civil Engineering of BUET in 1986. He was promoted to the post of Assistant Professor in 1989. He became Associate Professor in 1996 and Professor in 2001. He has published over 36 papers upto now. His current research areas are biogas generation from solid wastes, water and wastewater treatment technologies, and rain water harvesting. He also works as a Consultant and completed over 45 important national development projects.

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