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Optimizing electrocoagulation-filtration for nitrate removal from drinking water – tracer and other studies

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Electrocoagulation (EC) is a well-known technique for the treatment of water as well as wastewater. The principle of EC involves a sacrificial anode which dissolves in an electrolytic cell containing the feed water to release ions of the coagulant material which form polymeric hydroxide complexes. These complexes can then remove dissolved and suspended pollutants by flocculation thereby removing them. The objective of this study was to optimize operating conditions for nitrate removal using electrocoagulation and filtration. Continuous-flow experiments for nitrate removal were conducted with tap water or ground water obtained from within IIT Kharagpur campus. Mild steel electrodes were used for anode and cathode. Tracer studies were performed with different baffle configurations to evaluate the flow regime in the EC reactor and to compare analytical results obtained using an ISE probe versus ion chromatography. The differences in the results are discussed in detail. The reactor proved to be close to a CSTR even at a very low flow-rate of 1 L/h. Nitrate removal efficiency was inversely proportionate to the initial nitrate concentration. Removal efficiencies ranged from 87% in tap water to 99% in groundwater. Similar removal efficiencies were obtained with distilled water and ground water in this study and addition of kaolinite as a coagulant aid did not result in any significant difference in nitrate removal. While the final, treated water met nitrate standards for drinking water, turbidity standards were not met. Longer settling time, longer filtration time along with finer filtration media will be required to meet turbidity standards.

Biography

Kruttika R Apshankar (MTech) is currently doing her PhD in IIT Kharagpur. She has published two conference papers and presented one poster in international conferences.

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