Removal of Residual Aluminium in Electrochemically Treated Water

A. B. T. M. Tharindu Bandaranayake[1] and Ajith .C Herath[1(*)]

06 Nov.
NSM52

[1]*Department of Physical Sciences, Rajarata University of Sri lanka, Mihinthale, Sri Lanka*

[(*)]Email: ajithch037@gmail.com

Electrocoagulation (EC) is a proven green technology for the removal of fluoride, hardness and hazardous heavy metals from water. However, residual aluminium in treated water is a major issue in EC. Electrocoagulation process was carried out in batch mode at different pH values with aluminium electrodes. A constant DC current of 1.0A was applied and the resulted precipitate of aluminium hydroxide and aqueous solution were analyzed for Al by Inductively Coupled Plasma Optical Emission Spectrometry as a function of electrolysis time. The removal of residual Al in aqueous phase was accomplished by two different methods. In method one, activated carbon was subjected to 24h $Ca(OH)_2$ treatment followed by CH_3COOH treatment and finally oven dried. In method two, aniline was chemically polymerized by ammonium persulfate on the surface of purified graphite powder dispersed in 0.1 mol dm^{-3}HCl. Green colored polyaniline embedded graphite powder was separated, washed with distilled water and oven dried at 60°C for 6 hours. Both base treated activated charcoal and polyaniline embedded graphite were characterized by UV-visible and Fourier Transform Infrared spectroscopic techniques and used for subsequent experiments. Aqueous phase of electrocoagulated system at different pH was passed through a column prepared by two adsorbents. It was found that highest removal percentage of 80% showed by polyaniline embedded graphite at pH 10 compared to that of 60% removal efficiency by base treated activated carbon at the same pH. Therefore, polyaniline embedded graphite system could be a promising material for the removal of excess Al in treated water by EC.

Keywords: Electro Coagulation, aluminium, activated carbon, polyaniline embedded graphite removal efficiency