EVALUATION OF OPERATIONAL PARAMETERS INVOLVED IN ELECTROLYTIC DEFLUORIDATION PROCESS

[1]NEHA MUMTAZ, [2]GOVIND PANDEY, [3]PAWAN KUMAR LABHSETWAR & [4]SUBHASH P. ANDEY

[1]Student of M.Tech (Civil) Environmental Engineering, M. M. M. Engineering College, Gorakhpur, U. P., India

[2]Associate Professor, Department of Civil Engineering, M. M. M. Engineering College, Gorakhpur, U. P., India

[3]Principal Scientist and Head, Water Technology and Management Division, National Environmental Engineering Research Institute (NEERI), Nagpur, India

[4]Principal Scientist, Water Technology and Management Division, National Environmental Engineering Research Institute (NEERI), Nagpur, India

ABSTRACT

In the present work, the performance of electrolytic defluoridation by continuous process with aluminium electrodes has been investigated to look into the effects of operation parameters on the performance of electrolytic defluoridation process. The process utilizes "sacrificed" anodes to form active coagulant, which is used to remove the pollutant by precipitation and flotation in situ. It involves the anodic dissolution of aluminium by passing direct current (DC) in fluoride bearing water. The aluminium hydroxide is formed and binds the fluoride. The electrolytic dissolution of aluminium anodes in water produces aqueous Al3+ species and hydrogen bubbles at the aluminium cathodes.

The pH value was found to be an important variable that affected fluoride removal significantly. The optimal influent pH range is 6.0–7.0 at which effective defluoridation can be achieved and optimum value is adopted as 6.5. Different operational conditions such as composition of sodium fluoride (NaF) based stock solutions (5, 6, 8, 10 mg/L), flow rates and current intensity were varied and performance of the process has been examined. Their influence on the defluoridation efficiency, the effect of initial pH of raw water and the amount of aluminium released (coagulant) have being investigated. It is revealed that current intensity has little effect on fluoride removal and the residence time requirement increases with the rise in initial fluoride concentration.

KEYWORDS: Aluminium Electrodes, Coagulant, Continuous Process, Electrolytic Defluoridation, Operational Parameters, Water Treatment