



“Gheorghe Asachi” Technical University of Iasi, Romania



COMPARATIVE STUDIES ON THE EFFICIENCY OF ALUMINIUM COAGULANTS

Adina Păcală^{1*}, Ilie Vlaicu¹, Ciprian Radovan²

¹Water Treatment Company - AQUATIM, 11A Gh. Lazar Street, 300081 Timisoara, Romania

²West University of Timisoara, Faculty of Chemistry, Biology and Geography, Department of Chemistry, 16A Pestalozzi Street, 300115 Timisoara, Romania

Abstract

An alternative preparation method for PAC (pre-hydrolyzed aluminium chloride with general formula $Al_m(OH)_nCl_{3n-m}$) by electrochemical synthesis is presented in this paper. The electrochemically obtained PAC (E-PAC), in which the most effective species of the polymeric Al component were estimated by ^{27}Al RMN method, with properties similar to the properties of a commercially available PAC solution, was successfully generated in a electrochemical reactor. For obtaining as much as Al_{13} polymer by electrolysis process, optimum preparation conditions was selected and process was carried out in galvanostatic conditions at high electric current densities ($i = 1.15 A dm^{-2}$). Furthermore, the coagulation properties of E-PAC was evaluated in laboratory scale for the treatment of Bega River as raw water source for potable utility of Timisoara town (Romania) and it was compared with the performance of a commercially available PAC solution and classical aluminium sulphate (alum), using the so-called “Jar test” procedure, in accordance with water treatments standards. Various chemical and instrumental methods were evaluated in order to assess the efficiency of the coagulation process in all situations (PAC, E-PAC and aluminium sulphate as coagulants). Also, after settling of samples, the scanning electron microscopy (SEM) coupled with a X-ray energy-dispersion detector (EDAX) was used for imaging and characterization of the $Al(OH)_3$ -rich and Al_{13} -aggregate flocs. The relevant advantage in the use of E-PAC coagulant obtained in our laboratory, produced by an easily controlled electroysis process, can be concluded from the efficiency of the water treatment by coagulation and lower residual aluminium concentration.

Key words: Al hydrolyzed speciation, coagulation, EDAX, Electrochemical Polyaluminiumchloride (E-PAC), SEM

Received: September, 2011; Revised final: January, 2012; Accepted: February, 2012

* Author to whom all correspondence should be addressed: e-mail: apacala@yahoo.com; Phone/Fax: +40 256294753