



Area: ANA ou AMB

ANALYSIS OF THE PRESENCE AND QUANTIFICATION OF SULFATE IN SAMPLES OF POLYALUMINUM CHLORIDE USED FOR DRINKING WATER TREATMENT.

ALINE B. NUNES (TM)¹, JIMI A. STROBELT (TM)¹, GUSTAVO DAFFERNER (TM)¹, JOSÉ A. KIELLING (PG)¹.

aline.nunes@semasaitajai.com.br; adriano.kielling@semasaitajai.com.br

¹ SEMASA – Serviço Municipal de Água, Saneamento Básico e infraestrutura

Keywords: water, sulfate, Polyaluminum chloride, treatment.

Highlights

ANALYSIS OF THE PRESENCE AND QUANTIFICATION OF SULFATE IN SAMPLES OF POLYALUMINUM CHLORIDE USED FOR DRINKING WATER TREATMENT

"Poly-aluminum chloride should not contain sulfate." "The presence and quantification of aluminum sulfate in poly-aluminum chloride samples indicates possible adulteration." "The use of poly-aluminum chloride is indicated for water with high turbidity and/or alkalinity characteristics that require it." "Aluminum sulfate is a cheaper coagulation agent than poly-aluminum chloride." "Chemical quantification of aluminum sulfate in poly-aluminum chloride samples."

Resumo/Abstract

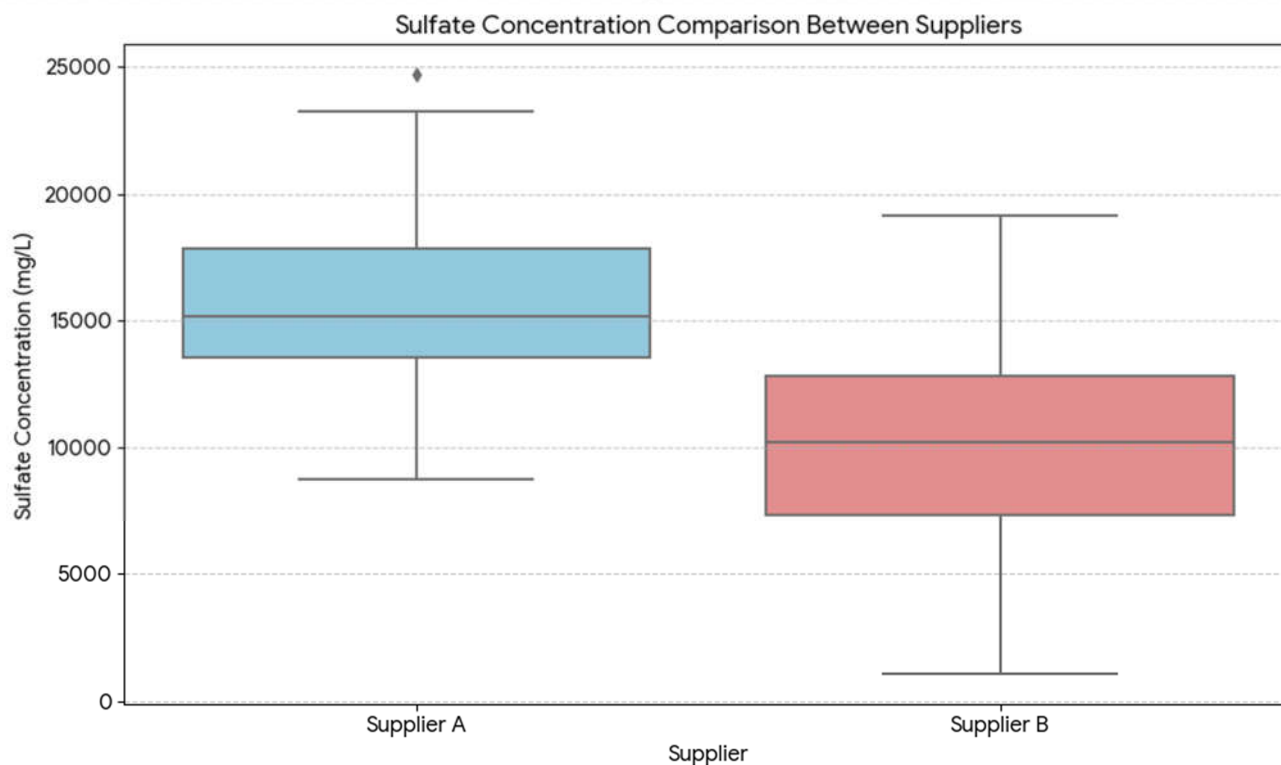
Water is one of the most important elements for the maintenance of human life. In addition to being part of the body's composition, it is responsible for all organic functions. The global economy also depends on water for industries, agriculture, energy generation, transport, and domestic use. For this reason, water is an indispensable asset for the entire population. However, many regions in Brazil and worldwide still do not have access to potable water and basic sanitation. Consequently, the lack of water and inadequate treatment affect the health of the global population and the economy alike.

Raw water needs to go through physical and chemical treatment stages in Water Treatment Plants (WTPs) to become suitable for public consumption. The main stage of water treatment consists of the coagulation-flocculation process, which removes impurities suspended in the water, mainly colloidal ones. In this process, the dosage of a coagulant agent is necessary. There are several coagulants available on the market for use in water treatment. Therefore, to define the choice of coagulant, it is important to perform tests on the raw water captured by the WTP. In the specific case of the SEMASA WTPs, Polyaluminum Chloride (PAC) with a concentration of 9% to 11% and a medium basicity of 65% is used, as this was the coagulant that best adapted to the raw water captured from the rectified Itajaí-Mirim River. The standard that controls the quality of this coagulant is ABNT NBR 16.488/2016. In this context, the present

study aimed to determine and quantify the sulfate content in Polyaluminum Chloride (PAC) to evaluate commercial samples.

A total of 87 (eighty-seven) PAC samples obtained from batches supplied by two distinct vendors were analyzed. The quantitative analysis results revealed the presence of sulfate, an undesirable component, in all evaluated PAC samples, with concentrations reaching a maximum of 1.98% w/w (weight/weight) of the commercial product. As illustrated in Figure 1, the dispersion is highly heterogeneous, with the mean concentration from Vendor A (1.26% w/w) being statistically higher than that of Vendor B (0.83% w/w) ($P < 0.001$).

Figure 1. Comparison of sulfate concentration between suppliers



This critical disparity demonstrates that manufacturers lack uniform control over the sulfate content, directly impacting the quality and consistency of the coagulant. Given that PAC has a higher financial value, in the evaluated situation, than commercial iron and aluminum sulfate coagulants, the results justify the urgency in including a maximum limit for sulfate content in the ABNT NBR 16.488/2016 standard, aiming to guarantee the quality and operational stability of the PACs used for drinking water treatment.

Referencias

LEMOS, K.S., AGUIR FILHO, S. Q., CAVALLINI, G. S. AVALIAÇÃO COMPARATIVA ENTRE OS COAGULANTES SULFATO DE ALUMÍNIO FERROSO E POLICLORETO DE ALUMÍNIO PARA TRATAMENTO DE ÁGUA: ESTUDO DE VIABILIDADE ECONÔMICA, Periódicos UFT, 2019.



CONSTANTINO, V,R.L., ARAKI, K, SILVA, D.O., OLIVEIRA W., PREPARAÇÃO DE COMPOSTOS DE ALUMÍNIO A PARTIR DA BAUXITA: CONSIDERAÇÕES SOBRE ALGUNS ASPECTOS ENVOLVIDOS EM UM EXPERIMENTO DIDÁTICO. Química Nova, vol. 25, n. 3 490-498, 2002.

RODRIGUES, P. H., COMPARAÇÃO DO PROCESSO DE COAGULAÇÃO/FLOCULAÇÃO UTILIZANDO OS COAGULANTES POLICLORETO DE ALUMÍNIO E SULFATO DE ALUMINIO NO TRATAMENTO DE UM EFLUENTE TEXTIL, TCC, Departamento Acadêmico de Construção Civil – da Universidade Tecnológica Federal do Paraná – UTFPR. 2014.

Agradecimentos/Acknowledgments

Central Laboratory of Analytical Tests

CLEAN University of the Itajaí Valley - Univali