

The research of the possibility of using industrial effluents for the regeneration of Na-cation exchanger in the water treatment process

© Svetlana E. Pratskova,⁺ Aleksandr V. Kolesnikov,*

Alena O. Kuvaeva, and Oksana U. Kuznetsova

Department of Analytical and Physical Chemistry. Chelyabinsk State University.

Br. Kashirinykh St., 129. Chelyabinsk, 454136. Russia.

Phone: +7 (351) 799-70-69. E-mail: se_pratskova@mail.ru.

*Supervising author; ⁺Corresponding author

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Abstract

One of the main tasks of environmental protection enterprises is to reduce industrial effluents. Industrial effluents with a content of sodium chloride 24-25% and sodium sulfate 1.5-3.0% are formed at one of the plants. The high content of sodium chloride in the effluent allowed us to make an assumption about the possibility of their use in the regeneration of Na-cation exchanger in the process of water treatment for vapor-vapor cooling of operating metallurgical units.

The aim of the work was to determine the feasibility of using industrial salt effluents in the water treatment process while ensuring optimal conditions for the operation of Na-cation exchanger.

In the process of water treatment used the method of removing impurities from water - cationization. This method is applied to soften water and is of independent importance in the preparation of additional water for low pressure boilers and make-up water for heating networks, if the source water has low alkalinity.

The object of the study is a strongly acidic cation exchanger in the Na-form (*Purolite PPC-100Na*) designed to soften process water. In the course of the regeneration of cation exchange resin with a sodium sulfate-containing salt solution, the concentration of the latter should be controlled – this is due to the high exchange capacity and the real danger of the formation of the gypsum layer. The volume of spent regeneration solution (OPP) will contain sparingly soluble calcium sulfate and soluble magnesium sulfate. Under certain conditions, most of the calcium sulfate can be separated from the ORP in the form of a suspension of a two-water compound and detached from the solution. Laboratory studies were conducted on the effect of a solution of NaCl salt (24-25%) with an admixture of sodium sulfate (1.5-3.0%) on the total and working exchange capacity of cation exchange resin. In order to reduce the salt background of the regenerated solution, studies were carried out on the use of a 10% NaCl salt solution with an admixture of sodium sulfate (1.5-3.0%) on the static, dynamic and full dynamic working exchange capacity of cation exchange resin (SOE, DOE and PDOE). We used the methods of alkalimetric and complexometric titration to control the capacity value of the cation. It was determined that the numerical values of the DOE and PDOE of the studied cation exchanger during its regeneration with a saline solution of sodium chloride with a content of 1.5-3.0% sodium sulfate vary in the range of 1.96-1.22 and 2.58-1.89 mEq/g dry resin, respectively.

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