

## Cyanide compounds removal efficiency in a reverse osmosis system using a water supply from a co-precipitation chemical process

Edgar E. Vásquez Salazar\*, Flavia P. Hurtado Bolaños

*Chemical Engineering Department (FIQ), Universidad Nacional de Trujillo (UNT), Trujillo, Perú, emails: edgarenrique231275@gmail.com (E.E. Vásquez Salazar), paolacha4@hotmail.com (F.P. Hurtado Bolaños)*

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### ABSTRACT

This article sets forth the removal efficiency for cyanide compounds in a full-scale reverse osmosis system supplied with water coming from a co-precipitation chemical process. This test was carried out for a month and a half, with a 72% recovery rate using Dow Filmtec thin-film composite membranes, the MDS-41 8040 model in the first and second stages, and the MDS-42 8040 model in the third stage. The results showed removal efficiencies for ammonia at 92.71%, and thiocyanates at 91.76%. For WAD cyanide, the system did not achieve good removal efficiency (47.93%), probably due to its low molecular weight and low inlet concentration level (0.054 ppm); however, this value is lower than the Peruvian Environmental Quality Standard (<0.10 ppm). According to the results, the highest removal efficiency has been determined for cyanate compounds at an average value of 95.33%. The results have shown the best average removal efficiency for monovalent cyanide compounds of higher molecular weight (cyanates and thiocyanates) and by-products of the oxidation and hydrolysis process of cyanide compounds (ammonium ion), representing an overall average efficiency of 93.26%. This finally confirms that the rejection of components in reverse osmosis is related to molecular weight and ionic charge.

*Keywords:* Cyanates; Thiocyanates; Chemical co-precipitation; Monovalent cyanide compounds; WAD cyanide

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\* Corresponding author.