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Optimization of Operational Parameters and Design of an Electrochlorination System to Produce Naclo

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Abstract : Chlorine, as Sodium Hypochlorite (NaClO) solution in water, is an effective, worldwide spread, and economical substance to eliminate germs in the water. The disinfection potential of chlorine lies in its ability to degrade the outer surfaces of bacterial cells and viruses. This contribution reports the main parameters of the brine electrolysis for the production of NaClO, which is afterward used for the disinfection of water either for drinking or recreative uses. Herein, the system design was simulated, optimized, build, and tested based on titanium electrodes. The process optimization considers the whole process, from the salt (NaCl) dilution tank in order to maximize its operation time util the electrolysis itself in order to maximize the chlorine production reducing the energy and raw material (salt and water) consumption. One novel idea behind this optimization process is the modification of the flow pattern inside the electrochemical reactors. The increasing turbulence and residence time impact positively the operations figures. The operational parameters, which are defined in this study were compared and benchmarked with the parameters of actual commercial systems in order to validate the pertinency of those results.

Keywords : electrolysis, water disinfection, sodium hypochlorite, process optimization
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