

IMPACTS OF MIEX PROCESS INTERRELATIONSHIPS WITH COAGULATION

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Many water treatment utilities have found it necessary to assess alternatives for meeting regulations pertaining to enhanced coagulation, disinfection byproducts and filtered water turbidity. These goals are interrelated in that a sound approach involves the application of basic coagulation concepts. Most conventional water treatment plants utilize coagulants and coagulant aids as the primary means of removing total organic carbon (TOC) to achieve disinfection byproduct goals and to ensure low filtered water turbidity. The MIEX (Magnetic Ion Exchange) process is a new technology targeted towards helping utilities reduce dissolved organic carbon and disinfection byproduct formation; however, MIEX can also be integrated with coagulation processes as an additional component of an overall treatment strategy. As part of an AwwaRF tailored collaboration project, a 10 gpm MIEX pilot plant was operated for five weeks at two conventional water treatment plants that employ coagulation-based treatment processes.

Tests were conducted at the Hanahan Water Treatment Plant that is operated by the Commissioners of Public Works of Charleston, South Carolina, and the Ft. Thomas Water Treatment Plant that is operated by the Northern Kentucky Water District. The first step in this testing focused on the MIEX process to identify the optimum conditions for operating MIEX and coagulation in sequence. Profiles were then developed to compare the basic coagulation attributes in MIEX treated raw water with those in untreated raw water. A systematic multiple goal/ multidimensional approach was used to develop the coagulation profiles that made it possible to examine each treatment scenario in detail. Multidimensional statistical and graphical methods were applied to characterize a broad range of water quality and coagulation conditions. Results of the coagulant dose/pH profiles of the testing sequences were compiled to characterize the coagulation condition for each treatment scenario. This information helps explain how the MIEX process alters the coagulation condition to produce dose and pH optima different from those of the control condition. Water treated by the MIEX process was also used for simulated distribution system THM/HAA formation testing. The results of the testing showed that the MIEX pretreatment did substantially improve DOC removal and DBP reduction in comparison with the raw water control sample. A significant reduction in coagulant demand, while producing similar or reduced settled water turbidity, was observed at both utilities.