Laboratory and pilot plant studies on electrochemical pretreatment of drinking water

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ABSTRACT

Human health risks associated with drinking water chlorination disinfection have been identified, and the development of new disinfecting methods to minimize the risks with less energy and chemicals is the direction of water treatment industry. In this study, an electrochemical system was investigated for drinking water treatment in an undivided electrochemical reactor using Ti/RuO\textsubscript{2}–IrO\textsubscript{2} anode and graphite felt cathode. The reactor configuration was designed in such a way that the angle of the electrodes was adjustable between 0° and 90°. It was found that the laboratory reactor (660 × 620 mm size) with electrodes positioned between 30° and 65° provided satisfactory results at a treatment capacity of 250 L/h water. A pilot plant test was conducted for treatment of Yellow River water using four laboratory-scale reactors in parallel, and the electrochemical treatment was compared with chemical disinfection using sodium hypochlorite, ozone, and potassium permanganate in the pilot plant facility. The results demonstrate that the electrochemical treatment is superior to chemical disinfection using sodium hypochlorite, ozone, and potassium permanganate in terms of removal of taste and odor and formation of disinfection byproducts.

Keywords: Drinking water treatment; Electrochemical disinfection; Chemical disinfection; Hydrogen peroxide

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