Humic acid removal by deep-bed filtration and by UF membranes

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ABSTRACT

Currently, rational choice of either the conventional filtration method or of the more expensive membrane pretreatment technique is hampered by the lack of sufficient experience and the paucity of design data. The main objective of the present study was to compare water qualities achieved by filtration of humic acid feed solutions by the two alternate pretreatment techniques under well controlled conditions. Deep-bed filtration of humic acid in the presence of the coagulant ferric chloride was performed in a continuous flow column (98 mm diameter, 750 mm long) filled with silica sand grains of 0.65 mm. Two PVDF tubular UF membranes were tested — a large pore size membrane of 100 kDa and a small pore size membrane of 20 kDa. In both systems, commercial humic acid solutions were tested at feed concentrations covering the range of 5–50 ppm. Water quality was monitored by TOC and turbidity measurements. Meaningful interpretation of conflicting water quality data was obtained by interlinking TOC and turbidity removal measurements with the particle size distribution of the feed solution. One of the main results of this study is that in the case of humic acid removal, both pretreatment techniques appear to be capable of providing substantially identical product qualities.

Keywords: Pretreatment; Deep-bed filtration; Granular medium; Ultrafiltration; Humic acid

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