Influence of dissolved organic matter properties on Fe(II) oxidation in natural and engineered waters

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Fe(II) oxidation rates in effluents and natural waters

Dissolved organic matter (DOM) properties and its effect on Fe(II) oxidation were investigated in Sagami River basin (Japan). Fe(II) oxidation rate constant were measured in filtered waters and treated effluents from municipal wastewater treatment plants (MWWTPs) showed Fe(II) oxidation rate constant linearly increased with increasing pH within the observed range of pH. However, the degree of rate constant increase per unit of pH for effluents was smaller than that for organic free seawater, resulting in comparable oxidation rates between effluents and seawater at pH ~8.0. One of the plausible reasons for different response of effluent and seawater is probably due to the different degree of Fe(II) complexation by organic ligands.

Effect of DOM characteristics on Fe(II) oxidation

The addition of humic-type DOM isolates derived from MWWTPs into tributary waters, which are less influenced by human activities, resulted in an increase of Fe(II) oxidation rates at pH 8.0. The DOM isolates from natural waters had higher specific UV absorbance ($SUVA_{254}$), whereas MWWTPs effluent and MWWTP-derived DOM isolate had low $SUVA_{254}$. DOM with high $SUVA_{254}$ consists of organic compounds with a high aromatic content[1,2]. The results suggest that dissolved humic compounds with lower $SUVA_{254}$ are likely associated with the increase in Fe(II) oxidation in MWWTP effluent (**Fig. 1**).

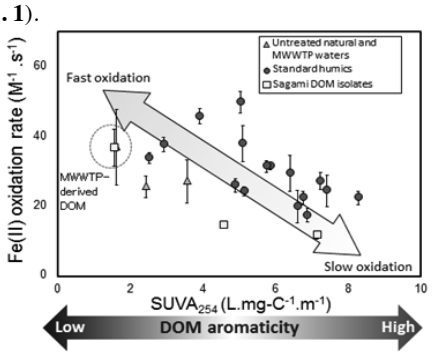

Fig. 1: Relationship between Fe(II) oxidation and $SUVA_{254}$.

[1] Rosario-Ortiz, et al. *WaterRes.*2007,*41*,4115-4128.

[2] Weishaar, et al. Environ.Sci.Technol.2003,*37*,4702-4708.