



Effect of different coagulants on the ultraviolet light intensity attenuation

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ABSTRACT

The effect of different coagulants added to deionized water on ultraviolet (UV) light intensity at the wavelength of 253.7 nm was investigated in this study. It was demonstrated that iron salts had a greater negative effect on the UV transmittance (UVT) of the solution, but aluminum salts had little effect on the UVT of the solution except polyaluminium chloride (PAC). Polyferric sulfate (PFS) and PAC, as highly effective inorganic-polymer coagulants, had a greater negative effect on the UVT of the solution than the related metal salts. UV light attenuation of iron salts and aluminum salts existing in the solution were in good agreement with the Lambert-Beer law, except PAC and PFS. The UV absorption coefficients of different coagulants were obtained and compared below: $\text{PFS} > \text{FeCl}_3 > \text{Fe}_2(\text{SO}_4)_3 > \text{FeSO}_4 > \text{PAC} > \text{AlCl}_3 > \text{Al}_2(\text{SO}_4)_3$. If the coagulation pretreatment with PFS was added before UV disinfection of water, it would lead to stronger UV light attenuation than that with PAC. It means that more UV light can reach and inactivate bacteria in water to accomplish a better water disinfection after coagulation with PAC, compared with PFS. Therefore, these results can give guidance on the coagulants used in the pretreatment before UV disinfection process.

Keywords: Ultraviolet transmittance; Coagulant; UV absorption coefficient; Polyaluminium chloride; Polyferric sulfate; UV disinfection

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