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# Aquatic organic matter descriptors correlated with formation of chlorination disinfection byproducts: what works better and which factors are important?

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Common disinfection practices involving chlorination of source water lead to the formation of toxic disinfection byproducts (DBPs) due to the presence of aquatic organic matter (OM). Organic matter exhibits distinct light absorbance (Abs) and fluorescence properties, and hence the concentrations of DBPs formed in water are often correlated with OM descriptors such as UV absorbance, fluorescence - an ability to emit light in UV and visible ranges and organic C (OC) concentrations, all serving as DBP predictors. Those correlations are of significant concern due to the interest in preliminary estimating the potential for toxic DBP formation and also in general understanding of OM reactivity. This study was aimed to examine how different prediction approaches, type of water source, disinfection agents and DBP classes affect the strength of correlations between concentration of DBPs and OM descriptors in waters undergoing chlorination. Totally, 59 literature studies covering the 1997-2018 period and reporting the correlations between DBP concentrations and their predictors in chlorinated water were examined, and a set of 491 correlation coefficients describing various associations between OC concentration, OM absorbance and fluorescence properties, and DBP concentrations were collected. The correlation coefficients converted to Z scores using variance-stabilizing Fisher transformation were analyzed by main effects ANOVA, both weighed and non-weighed. Main effect ANOVA showed that the type of source water, disinfection agent and a kind of DBP predictor were the significant factors in correlations with the formation of DBPs, whereas the type of the DBPs formed was hardly significant, if at all. Use of different weighing procedures did not effectively alter the results obtained from non-weighted ANOVA. Increased strength of correlations between DBP concentrations and its predictors is expected in wastewater, probably due to relatively high OM contents in this type of water. Among the DBP predictors, absorbance- and OC-based methods predominated over specific UV absorbance and fluorescence-based predictors associated with different techniques (i.e. peak picking, regional integration and parallel factor analysis) and different nature of a signal (humic-like and proteinaceous OM). Based on broad literature analysis, these findings highlight that non-fluorescent organic matter present in source water should not be overlooked in evaluating toxic DBP formation potential during chlorination.