Brominated THMs: Bromide Source Identification, Characterization and Geochemical Fingerprinting

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Abstract. In drinking water source waters, due to elevated bromide concentrations, water treatment facilities are facing increasing difficulty in meeting drinking water disinfection byproduct (DBP) regulation requirements. The risk from bromide comes not from its concentration in surface water itself; at the concentrations found in surface water, it does not adversely affect human health or the environment. The associated problem from bromide comes from its alteration of the chemistry in drinking water produced from source water with elevated bromide concentrations that can result in DBPs such as trihalomethanes (THMs). In both the Allegheny and Monongahela rivers, there has been an observed increase in the total THM concentrations coupled with elevated bromide concentrations in the source water. The increased bromide loads in the water systems can stem from various sources. By identifying and characterizing the bromide source to these water systems, steps can be taken to reduce the bromide loading and subsequently mitigate the effects of increased bromide loads to drinking water treatment plants. The two stable and dominant isotopes of bromine are ^{79}Br and ^{81}Br with relative abundance of 50.69% and 49.31% respectively. Through the utilization of bromide isotope analysis, source identification can be achieved. In particular, distinction can be made between the manufacturer bromide sources applied in different avenues (e.g. coal fired power plants, industrial applications, oil and gas operations, etc.). This approach, coupled with the determination of background bromide levels, will enable the identification and quantification of bromide sources. This talk will focus on an exploration of the bromide loading problem, and the relevance and applicability of bromide isotope application for source identification and characterization.