

Formation and Occurrence of Disinfection By-Products

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Disinfection by-products (DBPs) are formed when disinfectants such as chlorine, ozone, chlorine dioxide, or chloramines react with naturally occurring organic matter, anthropogenic contaminants, bromide, and iodide during the production of drinking water. There is concern about DBPs due to bladder cancer and reproductive/developmental effects that have been associated with them in human epidemiologic studies. A recent review published in 2007 (Richardson et al., *Mutation Research* 2007, 636, 178-242) provided an analysis of 30 years of published research on the occurrence, genotoxicity, and carcinogenicity of regulated and emerging DBPs, as well as a roadmap for future research. This presentation will focus on the formation and occurrence of these DBPs from different disinfectants. Emerging, unregulated DBPs discussed include halonitromethanes, iodo-acids and other unregulated halo-acids, iodo-trihalomethanes, halofuranones, haloamides, haloacetonitriles, and nitrosamines. Many of these have been shown to be carcinogenic or mutagenic and many are increased in formation through the use of alternative disinfectants (e.g., chloramines, ozone) that are gaining in popularity. The emerging DBPs occur at concentrations ranging from low ng/L (e.g., nitrosamines) to low µg/L levels (e.g., halonitromethanes, iodo-trihalomethanes). Strategies for minimizing DBP formation will also be discussed.