

## Public Abstract

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Title: Formation studies on N-nitrosodimethylamine (NDMA) in natural waters

N-nitrosodimethylamine is carcinogenic to humans and a disinfection by-product of monochloramine in water treatment. As chloramines become used as a primary and post disinfectant instead of chlorine by more and more water utilities to reduce the formation of halogenerated disinfection by-products regulated by US Environmental Protection Agency (USEPA), the public may be increasingly exposed to NDMA. The state of California established action level, a health-based advisory level of 10 ng/L for NDMA in drinking water.

A reliable and accurate analytical method for the measurement of NDMA in waters at the trace level was developed. The analysis of NDMA in ten drinking water utilities in Missouri which uses monochloramine as a primary disinfectant showed that four utilities were found to have NDMA higher than 10 ng/L.

The experimental results showed that natural organic matter (NOM) played an important role in NDMA formation in natural waters. More precisely, the hydrophilic fraction of the NOM has more ability to produce NDMA in water. It is difficult to remove NDMA precursors from water. Basic conditions and bromide ions increase the production of NDMA.

The findings reported in this dissertation provide data on NDMA occurrences in drinking water and natural waters in Missouri. The results provide valuable information about NDMA precursors in natural waters and this information could be used in the further study of mitigating NDMA formation or removing NDMA precursors in drinking water utilities. The results on factors affecting on NDMA formation provide more information for water utilities to determine operation conditions to reduce and control NDMA formation.