

## Minimizing Nitrosamines in Drinking Water

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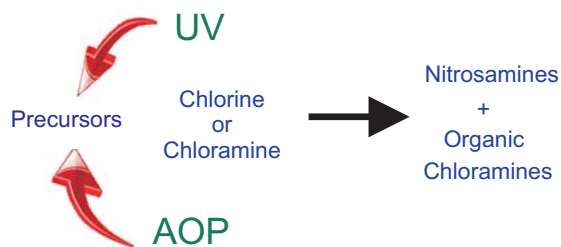


Nitrosamines, such as N-nitrosodimethylamine (NDMA), are a class of emerging contaminants and disinfection by-products (DBPs) that have been found in drinking waters throughout North America. Several nitrosamine species are human carcinogens at parts per trillion (ppt) levels. Concentrations of NDMA that are 10 to 20 times Ontario's regulated level of 9 ppt have been measured.

Disinfection with chloramines may pose a greater risk for producing nitrosamines compared to free-chlorine. As drinking water utilities consider switching from free chlorine to chloramines to comply with regulations for chlorine-related DBPs such as trihalomethanes, they may see an increase in nitrosamine formation. In addition, adoption of new technologies such as UV disinfection or UV/H<sub>2</sub>O<sub>2</sub> advanced oxidation into drinking water treatment trains will modify nitrosamine precursor materials to either decrease or increase the final nitrosamine concentrations in treated water.

Numerous factors governing the formation of nitrosamines including their relationship with organic chloramine intermediates must still be more fully understood to develop effective minimization and/or removal strategies. Being studied is the formation of 8 nitrosamine species from sequential treatment processes in both natural water and in water that has been augmented with known nitrosamine precursors such as ranitidine, a common pharmaceutical, and the fungicide thiram. The research expands upon previous and concurrent studies by including a larger suite of nitrosamine compounds (most studies focus on NDMA alone) and augments limited surveys of nitrosamine occurrence in North America.

This work will yield a clearer picture of how nitrosamines are formed and therefore, how they may be controlled through improved operation of treatment facilities.



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