

Minimizing Nitrosamines in Drinking Water

Principal Investigators:

Dr. Susan Andrews, University of Toronto

Collaborators:

Region of Waterloo (ON)

City of Ottawa (ON)

National University of Singapore

Funding Sources:

Canadian Water Network

Ontario Research Fund

Natural Sciences and Engineering Research

Council of Canada

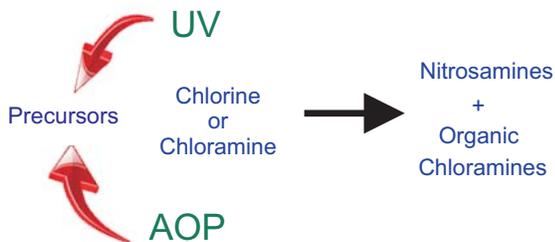


Nitrosamines, such as N-nitrosodimethylamine (NDMA), are a class of emerging contaminants and disinfection by-products (DBPs) that have been found in drinking waters throughout North America. Several nitrosamine species are human carcinogens at parts per trillion (ppt) levels. Concentrations of NDMA 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/H₂O₂ 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.



University of Toronto

Department of Civil Engineering, 35 St. George Street, Toronto, ON, Canada M5S 1A4

For more information on the Drinking Water Research Group contact:

Dr. Robert Andrews
andrews@civ.utoronto.ca
416-978-5399

Dr. Susan Andrews
sandrews@civ.utoronto.ca
416-946-0908

Dr. Ron Hofmann
ron.hofmann@utoronto.ca
416-946-7508

Jennifer Lee
jenwy.lee@utoronto.ca
416-946-0302