Water Online

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Thinking About NDMA (N-Nitrosodimethylamine) In Drinking Water

By the Water Research Foundation (WRF)

Project 4457 from WRF provides the water community with tools for understanding and communicating the risks associated with contaminants of emerging concern (CECs). As part of the initiative, WRF has created question-and-answer articles for each of four substances: VOCs, chromium, medicines and personal care products, and NDMA. The core message sheets were developed following best practices for risk communication as employed by the Centers for Disease Control and Prevention (CDC). What follows is WRF's core message sheet covering NDMA (N-Nitrosodimethylamine).

The United States has some of the safest public water supplies in the world. Our drinking water is treated and monitored to assure that the water being delivered is safe for consumption. While our water is safe, drinking water quality and management is understandably complicated. Small traces of naturally occurring or human-made substances can sometimes find their way into the tap water. One such substance is N-nitrosodimethylamine or NDMA.

What is NDMA?
NDMA is an organic chemical that can mix with water and is defined as both toxic and carcinogenic. NDMA is sometimes formed when water is disinfected with chloramines.

Where does NDMA come from?
NDMA can occur in water, air, and soil as a result of chemical reactions with naturally occurring substances. NDMA also is produced when chloramines (a disinfectant) react with compounds in water and thus it is an unintended disinfection byproduct at some water treatment plants that ends up in the drinking water. It is also found in foods such as beer, smoked and cured meats, cheese, and in cosmetics, rocket fuel, solvents and lubricants.

What are the concerns about NDMA in drinking water?
According to the World Health Organization, NDMA has been occasionally measured in drinking water, but typically at low concentrations that are unlikely to affect our health.[i] The amount of NDMA in some food such as beer, cheese, and hotdogs is found in far greater concentrations than in drinking water.

The primary health concern related to NDMA exposure is its potential to cause cancer. NDMA is also considered to have moderate to high toxicity, especially to the liver. People with liver or renal disease and alcoholics have been identified as potentially more sensitive populations.[ii]

There are no established federal standards for acceptable levels of NDMA in drinking water.

What solutions exist for removing or reducing NDMA from water?
NDMA can be detected in water using a variety of methods. The most common method for removing NDMA is ultraviolet (UV) light and biological degradation. In addition, water is sometimes treated to remove the chemicals that may form NDMA (called NDMA precursors).[iii]

Source of information
This information is based on detailed technical information prepared by Dr. Shane Snyder. Dr. Snyder is a Professor of Chemical & Environmental Engineering, and holds joint appointments in the College of Agriculture and School of Public Health, at the University of Arizona. He also co-directs the Arizona Laboratory for Emerging Contaminants (ALEC) and the Water & Energy Sustainable Technology (WEST) Center. For nearly 20 years, Dr. Snyder's research has focused on the identification, fate, and health relevance of emerging water pollutants. Dr. Snyder has been invited to brief the Congress of the United States on

three occasions on emerging issues in water quality. He has served on several US EPA expert panels and is currently a member of the EPA's Science Advisory Board drinking water committee. He was recently appointed to the World Health Organization's Drinking Water Advisory Panel.

[i] WHO. (2014). Chemical hazards in drinking water – N-nitrosodimethylamine (NDMA). (Website). Geneva, Switzerland. World Health Organization (WHO). Accessed 2/16/2014. http://www.who.int/water_sanitation_health/dwq/chemicals/ndma/en/

[ii] HSDB. (2014). Hazardous Substances Data Bank (HSDB). Accessed via the National Library of Medicine's Toxicology Data Nework (TOXNET®). Bethesda, Maryland: National Institutes of Health, Health & Human Medicine. Accessed Feb 2014. http://toxnet.nlm.nih.gov/cgibin/sis/htmlgen?HSDB

[iii] US EPA. (2012a). Technical Fact Sheet – N-Nitroso-dimethylamine (NDMA). (Website). May 2012. Washington, DC: United States Environmental Protection Agency (US EPA). Accessed 2/16/2014. http://www2.epa.gov/fedfac/technical-fact-sheet-n-nitroso-dimethylaminendma

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