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TECHNICAL BULLETIN

HEALTH EFFECTS INFORMATION

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Office of Environmental Public Health

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HALOACETIC ACIDS

For More Information Contact:

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SYNONYMS

Haloacetic acids include monochloracetic acid (MCAA), dichloroacetic acid (DCAA), trichloroacetic acid (TCAA), monobromoacetic acid (MBAA), dibromoacetic acid (DBAA), tribromoacetic acid (TBAA), bromochloroacetic acid (BCAA), bromodichloroacetic acid (BDCAA), and dibromochloroacetic acid (DBCAA).Of this chemical family only MCAA, DCAA, TCAA, MBAA and DBAA are currently regulated as drinking water contaminants. These five regulated HAAs are often referred to as HAA5.

USES

Most haloacetic acids in the environment are created as byproducts of chemical reactions or deliberately synthesized for industrial uses.They are used in fruit harvesting, as pesticides, as bacterial control agents, and in production of chemicals, pharmaceuticals and medicationsThey are also inadvertently formed during chlorination of water, in wood and paper bleaching industries, during sewage treatment processes. They are so widely produced, used and released that they can be found in most surface water and even in rainwater.

The most significant source of haloacetic acids in drinking water is their production during disinfection with chlorine disinfectants.

WHAT HAPPENS TO HALOACETIC ACIDS IN THE ENVIRONMENT

Haloacetic acids are very soluble in water, and are quite stable chemically.They are difficult to destroy or remove from water. It is much more feasible to prevent their formation than to remove them after they are formed. By removing organic contaminants from drinking water before chlorine disinfectant is applied, one can minimize the formation of HAAs.

HOW CAN HALOACETIC ACIDS ENTER AND LEAVE MY BODY

The principal route of exposure to HAAs is through drinking water except for persons who work in industries where HAAs are used.When consumed in drinking water, HAAs are rapidly absorbed into the bloodstream and are carried throughout the body.HAAs in water are not significantly absorbed through the skin.

HOW ARE HAAs HARMFUL TO HEALTH

HAA's have low human and animal toxicity.At levels encountered in drinking water they are not expected to produce any acute health effects.However over long periods of time, exposure to levels of HAAs at or above the maximum contaminant level can cause injury to the brain, nerves, liver, kidneys, eyes and reproductive systems.Animal studies suggest that HAAs increase the risk of cancer, and they are currently classed as possible human carcinogens.Decreased fertility and spontaneous abortion have been linked to HAA exposure in animals.

DRINKING WATER STANDARDS

The US Environmental Protection Agency (USEPA) has established some drinking water limits for HAAs.The mandatory limit or maximum contaminant level (MCL) for regulated HAAs in drinking water is 0.06 miligram per liter of water.The sum of the concentrations of the five regulated HAAs (MCAA, DCAA, TCAA, MBAA, DBAA) may not exceed the MCL of 0.06 mg/l (ppm) or 60 ug/l (ppb).Individual MCL goals have also been established by USEPA for dichloroacetic acid (0.0 mg/l) and for trichloroacetic acid (0.30 mg/l).MCL goals are not mandatory or enforceable standards.

CAN HALOACETIC ACIDS BE REMOVED FROM WATER

It is possible to remove HAAs from water by reverse osmosis and by activated charcoal filtration, but it is expensive and labor intensive to do so.It is more feasible in most cases to reduce the quatities of HAAs that are formed during disinfection.This can be accomplished by:

1. Selecting source waters having the highest quality and having the least hemical and organic contamination,
2. Carefully controlling the amount of chlorine needed to accomplish adequate disinfection,
3. Using a disinfectant other than chlorine (most disinfectants produce their own kinds of disinfection byproducts, however), and
4. Using effective filtration and pretreatment processes to remove organic contaminants from the water prior to addition of chlorine.

For additional advice and information about drinking water treatment methods call the Drinking Water Section of the Department of Human Services, Public Health Systems. (See cover sheet for telephone numbers.)