

Removal of hexavalent chromium from your drinking water

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The only way to learn if your water source has hexavalent chromium is to check with your public water supplier and request a water quality report, said NJIT Professor Taha Marhaba, a civil/environmental engineer. Most municipal or city engineers should be able to provide such a report upon request. Additional information specifically about hexavalent chromium levels may also be available.

"In general, hexavalent [chromium](#) can be found in either surface or groundwater sources and its source can be either natural or man-made industrial operations that have used chromium," Marhaba said. "The best way to remove this and other known and un-known contaminants from the [water](#) supply to a residence is to install a five-stage reverse osmosis home unit. They cost about \$300. If you have your own well, I would advise testing for hexavalent chromium."

Marhaba is a professor and chair of the department of civil and environmental engineering and director of the New Jersey Applied Water Research Center at NJIT. His expertise in water quality most notably has developed what is known as the spectral fluorescent signatures (SFS) technique, which is used to rapidly identify organics in water—organics that could be problematic. The SFS acts like a fingerprint of water, characterizing its organic content and allowing researchers to see if the water contains natural or unnatural sources. Most importantly, the SFS allows researchers to determine the organic character of watersheds and to check the water quality.

Chromium is an inorganic metallic element that is odorless and tasteless. It is found naturally in rocks, plants, soil and volcanic dust, humans and animals. The most common forms of chromium in the environment are trivalent (chromium +3), which has relative low toxicity and occurs naturally in many vegetables, fruits, meats, grains and yeast, and hexavalent (chromium +6). Trivalent chromium can be oxidized and dissolved through natural processes, leading to hazardous levels of aqueous hexavalent chromium in surface and groundwater.

The latter, which is more toxic and poses potential health risks to people, has been shown to cause allergic dermatitis in people who over many years use water containing water with a total chromium level in excess of the recommended maximum contaminant level (MCL). It can be found in the compounds salt sodium dichromate, chromium trioxide and various salts of chromate and dichromate. Hexavalent chromium is used for the production of stainless steel, wood preservation, textile dyes, leather tanning, and as anti-corrosion coatings.

Marhaba noted that the Environmental Protection Agency (EPA) set a Maximum Contaminant Level Goal (MCLG) for total chromium at 0.1 mg/L or 100 parts per billion (ppb). This level was set at a level below which there were no adverse health effects on humans. The EPA has set an enforceable regulation for chromium (total), called a maximum contaminant level (MCL), at 0.1 mg/L or 100 ppb. MCLs are set as close to the health goals as possible, considering cost, benefits and the ability of public water systems to detect and remove [contaminants](#) using suitable treatment technologies. In the case of chromium (total), the MCL equals the MCLG, because analytical methods or treatment technology do not pose any limitation. It should be noted that EPA still does not have an enforceable MCL for the more toxic form of chromium (i.e. hexavalent).

The EPA has set the following "best available technologies" for the

removal of chromium (total) to below 0.1 mg/L or 100 ppb: a) coagulation/filtration, (b) ion exchange, (c) lime softening, and (d) reverse osmosis membrane processes. All these technologies are generally applied in large scale or at "point of treatment". However, there are "point of use" home units that have ion exchange and reverse osmosis processes that can remove chromium below the MCL.

Provided by New Jersey Institute of Technology

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