

# Chromium

## Getting the Facts Straight



Chromium is most toxic in the man-made form produced in the manufacturing of paint pigments, metal coatings, cement, rubber, glass and other materials.

In recent years, chromium became a more talked about contaminant among consumers. It helped that not only was it being covered in news reports, but even Hollywood took a chance at bringing it to the forefront of concerns among consumers with its movie, "Erin Brockovich."

Chromium fell second to arsenic as the top contaminant concerns in the U.S. Western Region in a recent WQP survey. Dealers expressed that many of their calls are in dealing with chromium and finding treatment methods to best eliminate the problem for customers.<sup>1</sup>

### Chromium Forms

**Metallic (Cr<sup>0</sup>)**  
Used to make steel and other metal alloys and does not occur naturally.

**Trivalent (Cr<sup>+3</sup>)**  
Occurs naturally in rocks and soil and sometimes produce and meat.

**Hexavalent (Cr<sup>+6</sup>)**  
chromate and dichromate— Produced by particular chemical processes and does not occur naturally.

"Natural levels of chromium in the United States are perhaps more prevalent in the Western region, but these usually are well below 100 milligrams per liter (mg/L)," says Joe Harrison, technical director of the Water Quality Association. However, he adds, that the occurrence of high levels of chromium from industrial discharges could be anywhere industry uses it or has used it in the past. The contaminant also is more likely to be found in untreated well water.

Chromium in drinking water, particularly long-term exposure, can have serious health effects. There are ways for dealers to eliminate this contaminant for its customers.

### What Is Chromium?

Chromium can exist in the environment as +2 or +6, Harrison explains. But most of the time when it exists naturally in soils and rocks, it is in the form of +3. The two main types of chromium that we are discussing here are: Hexavalent or chromium 6 and Trivalent or chromium 3. The current maximum contaminant level (MCL), which is based on the total concentration of chromium, is 0.1 mg/L. Each

### Industry Technical Briefs

The WQA currently is updating its technical brief for chromium. The newly completed bulletin will be available in Fall 2004. Other new and updated bulletins will include cadmium, fluoride, radon, copper, lead, arsenic, mercury, chloramine, ammonia, aluminum, nitrate, silver, uranium, selenium, perchlorate, radium and barium.

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## Useful Chromium Websites

Additional information can be found at the following websites.

- **Water Quality Association**, [www.wqa.org](http://www.wqa.org)
- **EPA**, [www.epa.gov/safewater/dwh/t-ioc/chromium.html](http://www.epa.gov/safewater/dwh/t-ioc/chromium.html)
- **NSF International**, [www.nsf.org/certified/dwtu](http://www.nsf.org/certified/dwtu) and [www.nsfconsumer.org/water/contaminant\\_chromium.asp](http://www.nsfconsumer.org/water/contaminant_chromium.asp)
- **California Department of Health Services**, [www.dhs.cahwnet.gov/ps/ddwem/chemicals/Chromium6/Cr+6index.htm](http://www.dhs.cahwnet.gov/ps/ddwem/chemicals/Chromium6/Cr+6index.htm)

has its own health effects and treatment methods, which will be discussed later in the article.

Chromium is a metal found in natural deposits and is used in metal alloys. The contaminant can be found in protective metal coatings, pigments for paints, cement, paper, glass and rubber among other materials, reports NSF International. The industries with the highest amount of chromium deposits into water are the pulp mills and steel-works. In 1992, an estimated 200 million pounds of the most water-soluble forms of chromium was produced.<sup>2</sup>

“Chromium 6 usually is the result of human activities,” Harrison states. “It also happens to be the more toxic and health-significant form.”

### Health Effects

There are various short- and long-term health effects related to chromium exposure in drinking water. Being exposed to chromium for a short amount of time can create skin irritation or ulceration. The effects long-term exposure are far more severe, ranging from liver to kidney to nerve tissue damage. However, there remains to be no evidence, according to the EPA, “that chromium in drinking water has the potential to cause cancer from lifetime exposure.”

### How Do I Remove It?

There are point-of-use and point-of-entry (POU/POE) treatment methods for the individual forms. However, distillation and reverse osmosis are the only treatments that can eliminate both chromium 6 and 3 simultaneously, and they are the only ones NSF-certified (Standard 53, 58 and 62) for the reduction of the contaminant, according to NSF.

“For whole house water treatment, ion exchange usually is considered more practical,” Harrison says. “Chromium 3 must be removed with cation exchange and +6 is readily removed with anion exchange.” For the best results, the WQA also recommends proper pretreatment for such things as iron and hardness. Other methods of removal include strong acid cation exchange for +3 and strong base anion exchange and weak

base anion exchange with a pretreatment can be used for +6. **WQP**

### References

- 1 *Water Quality Products*. “U.S. Western Dealers Survey,” 2003.
- 2 U.S. Environmental Protection Agency. [www.epa.gov](http://www.epa.gov).
- 3 NSF International. [www.nsf.org](http://www.nsf.org).
- 4 Water Quality Association. “Technical Application Bulletin: Chromium (Cr),” 2004.



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