



FACT SHEET

CHROMIUM

(All Compounds Except Hexavalent Chromium)

CAS Registry Numbers:

Trivalent Chromium (16065-83-1)

Elemental Chromium (7440-47-3)

This fact sheet provides a summary of the Development Support Document (DSD) created by the Toxicology Division (TD) of the Texas Commission on Environmental Quality (TCEQ) for the development of Regulatory Guidelines (ESL and ReVs) for ambient exposure to this chemical. For more detailed information, please see the DSD or contact the TD by phone (1-877-992-8370) or e-mail (tox@tceq.texas.gov).

What is chromium?

Chromium (Cr) is a metal that occurs in oxidation states from -2 to +6; however, only the +2 (divalent), +3 (trivalent) and +6 (hexavalent) states occur naturally. Elemental chromium (Cr⁰) does not occur naturally, but is commonly produced for things like manufacturing stainless steel and for chrome-plating. Although some chromium compounds are soluble in water, others are slightly soluble, and still others are insoluble, all chromium compounds are treated as particulates when evaluating inhalation exposure. Hexavalent chromium compounds have very different properties and effects on living organisms than other forms of chromium and are evaluated separately. Chromium occurs primarily in the trivalent state in animals, plants, rocks, soil and in volcanic dust and gases. It is also an essential nutrient required in small amounts to promote the action of insulin, allowing the human body to use sugar, protein, and fat. Chromium is used in the metallurgical industry, refractory industry and chemical industry, with lesser amounts used in other industrial and commercial applications. Specific occupations where one may be exposed to divalent, trivalent, or elemental chromium include painters, candle makers, dye makers, printers, rubber makers, and cement workers.

How is chromium released into ambient air?

Although ingestion is the most common route of exposure to chromium compounds other than hexavalent, chromium is released into ambient air from a variety of sources. Major sources include the various industries mentioned above, as well as on-road and non-road mobile sources. Background levels of chromium exist in ambient air measurements taken from across Texas with levels up to about 10 ng/m³ measured recently in respirable particulate matter (PM₁₀). Overall, hexavalent chromium appears to make up less than 10% of total chromium measured in ambient air, so well over 90% of ambient chromium is made up of chromium compounds other than hexavalent.

How can chromium affect my health?

Permitted levels of chromium compounds should not cause adverse health and welfare effects. Both human and laboratory animal studies indicate that the respiratory tract is the primary target



FACT SHEET

Chromium

All Compounds Except Hexavalent Chromium

CAS Registry Numbers:

Trivalent Chromium (16065-83-1)

Elemental Chromium (7440-47-3)

of toxicity for chromium compounds. The most sensitive effects in animal testing for short-term exposure to high levels are enzyme changes in lung tissue that are early indicators of lung damage. Breathing chromium compounds other than hexavalent for longer periods of time in animals has specifically been shown to cause increased lung and trachea weights, in addition to causing widespread inflammatory effects throughout the respiratory tract. Although the critical effects from exposure to chromium compounds other than hexavalent compounds are consistent across compounds, each compound does not behave exactly the same way or have identical toxic effects. The water solubility of the particular chromium compound influences its effects on animals and humans. However, using the available data, the most conservative critical effect for the most toxic trivalent chromium compound was used to derive the regulatory guidelines.

The consensus from various reviews and agencies is that evidence of carcinogenicity of elemental, divalent, or trivalent chromium compounds is lacking. This is in stark contrast to hexavalent chromium compounds which have been identified as known human carcinogens via the inhalation route of exposure. Therefore, chromium compounds other than hexavalent are not considered to be human carcinogens by the TCEQ, the United States Environmental Protection Agency, the Agency for Toxic Substances and Disease Registry, or the International Agency for Research on Cancer.

Is chromium odorous or harmful to plants?

Chromium compounds are odorless and adverse effects to plants from airborne chromium have not been documented.

Why does the TCEQ set Regulatory Guidelines for chromium?

The TCEQ has set various air quality guideline levels (ESLs and ReVs) to protect human health and welfare. Please see Definitions of ESLs, ReVs, and AMCVs located on the TCEQ DSD webpage for more information. The ESLs and ReVs for chromium compounds other than hexavalent have been designed to protect the general public from short-term and long-term adverse health and welfare effects. The general public includes children, the elderly, pregnant women, and people with pre-existing health conditions. If you would like to know more about the specific ESLs and ReVs developed, what the values are and what they are used for, please see the DSD.