Overview

The hazards of hexavalent chromium compounds are significantly different from those of non-hexavalent chromium compounds. Hexavalent chromium compounds are confirmed human carcinogens, mutagens and developmental toxicants and have high acute toxicity. Non-hexavalent chromium compounds do not pose the same level of concern with regard to either chronic or acute toxicity.

Until 2011, all chromium compounds were treated as a single category under TURA. Starting in reporting year 2012, hexavalent chromium compounds are reportable as a separate category under TURA. The hexavalent chromium compounds category has been designated as a Higher Hazard Substance under TURA, so the reporting threshold is 1,000 lb/year.

Terminology

Chromium exhibits a wide range of possible oxidation states (or "valence states"), ranging from chromium(-II) to chromium(VI).

Chromium compounds are stable in the trivalent state (III or +3) and occur in nature in ores, such as ferrochromite.

The hexavalent (VI or +6) form is the second most stable state. Hexavalent chromium rarely occurs naturally; it is usually produced from industrial activity.

Acute (Short-Term) Health Effects

Hexavalent chromium exposure has been documented to cause several short-term and intermediate effects including, but not limited to, respiratory irritation, nosebleeds, asthma, sensitization, skin burns and dermatitis.¹

Chronic (Long-Term) Health Effects

The International Agency for Research on Cancer (IARC) classifies hexavalent chromium compounds in Group 1 (carcinogenic to humans). In contrast, trivalent chromium compounds are Group 3 (not classifiable with regard to carcinogenicity to humans).

Exposure to hexavalent chromium is associated with lung cancer and nasal and sinus cancer.² Exposure can also cause damage to the nasal mucous membrane, perforation of the nasal septum, and asthma. If inhaled through the mouth, it can cause periodontitis and gingivitis.

Impacts of chronic hexavalent chromium skin exposure include dermatitis, hypersensitivity reactions, eczema, and kidney or liver damage. The characteristic lesions resulting from hexavalent chromium exposure are referred to as "chrome holes" or "chrome ulcers." Chronic eye exposure can result in conjunctivitis.³

Hexavalent chromium is a mutagen, a developmental toxicant, and a renal toxicant.⁴ ⁵ ⁶

Both hexavalent chromium compounds and non-hexavalent chromium compounds are recognized by the Association of Occupational and Environmental Clinics (AOEC) as asthmagens.⁷

³ATSDR 2012.
⁴www.expub.com; 6 RTECS citations found under ‘Mutation Data.’