

Chromium-6 in the Workplace

Chromium-6 is a very toxic form of the element chromium (Cr). Chromium is a shiny metal, but materials containing chromium-6 may take on a variety of colors and forms, such as liquids, dusts, mists, or fumes.



Do you work with chromium-6?

- ▶ Do you produce, weld, or torch-cut stainless steel?
- ▶ Do you apply or remove coatings containing chromates such as zinc chromate or lead chromate?
- ▶ Do you work near chrome plating tanks?

Many other jobs involve handling chromium-6. Concrete and other cement products nearly always contain some chromium-6. Some pigments and dyes contain chromium-6. Stainless steel usually contains more chromium than mild steel.

Other names and abbreviations for chromium-6:

- Hexavalent chromium
- Cr-VI
- Cr+6
- Hex chrome
- Chromic acid (chromic trioxide)
- Chromates (such as zinc chromate)
- Dichromates (such as ammonium dichromate)

FACT SHEET



HESIS

HAZARD EVALUATION SYSTEM & INFORMATION SERVICE
California Department of Public Health
Occupational Health Branch
850 Marina Bay Parkway, Building P, 3rd Floor, Richmond, CA 94804
510-620-5757 • www.cdph.ca.gov/programs/ohb

How can chromium-6 affect your health?

- ▶ Chromium-6 can cause lung cancer—even at low exposure levels.
- ▶ Chromium-6 is very irritating to your eyes, nose, throat, and skin. It may cause a rash, runny nose, nosebleeds, sneezing, coughing, itching, or a burning sensation. If you are exposed for a long period of time, you may get open sores, or ulcers on your skin or in your nose. If you get it in your eye, it can cause permanent damage.
- ▶ Some people develop an allergy to chromium-6, affecting the skin and lungs. In these “sensitized” workers, contact with even tiny amounts can cause a skin rash or asthma. Asthma attacks, which may occur hours after work, usually include wheezing and shortness of breath.
- ▶ At relatively high levels of exposure, chromium-6 can have reproductive health effects in both men and women. Workplace studies show that exposure to chromium-6 has caused decreased sperm count and quality in some male stainless steel welders. Animal studies have shown that exposure during pregnancy can affect the development of the fetus and the offspring. Since the level of exposure that could cause these effects is not known, you should minimize your chromium-6 exposure if you are planning to have children.

How does chromium-6 enter your body?

Chromium-6 enters the nose, throat, and lungs when you breathe dust, mist, or fumes containing chromium-6 in the air. Entry through the skin is minimal. However, chromium-6 can contaminate food or drink if they are consumed without adequate hand-washing.

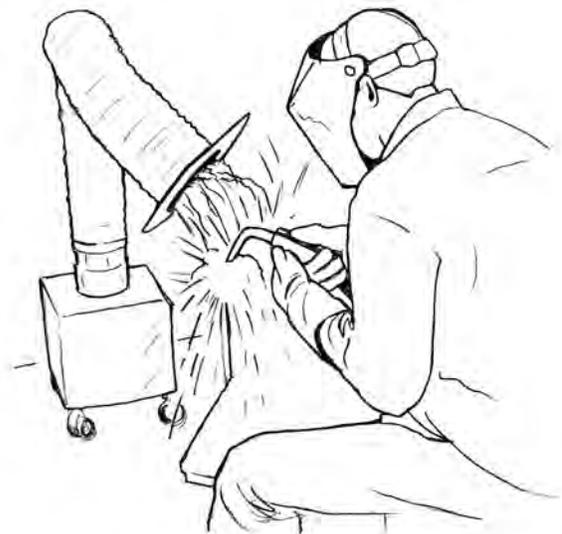
- ▶ **Solid particles** (dust) containing chromium-6 get into the air if you dump or scoop powders containing chromium-6, or grind metal containing chromium-6.
- ▶ **Droplets of liquid** (mist) containing chromium-6 get into the air when you mix or spray a liquid containing chromium-6.
- ▶ **Very small particles** (fume or smoke) get into the air if you melt or weld a metal containing chromium-6. You will also breathe in chromium-6 fumes if you smoke a cigarette contaminated with chromium-6.

Reducing your exposure to chromium-6

▶ Use products with little or no chromium-6

The best way to protect workers from chromium-6 is to switch to products that do not contain it. This may not be possible, but here are some ideas for replacing chromium-6 in some industries:

- ▶ **Welding:** You may not have a choice about what type of metals you are welding, but when you do, choose mild steel over stainless steel—it has less chromium.



Welding with local exhaust ventilation

- ▶ **Spray Coating/Painting:** There are many alternatives to chromium-6 in coatings, depending on the substrate material, the desired appearance, and the anti-corrosion properties required. Ask your supplier for alternative coating formulations to try out.

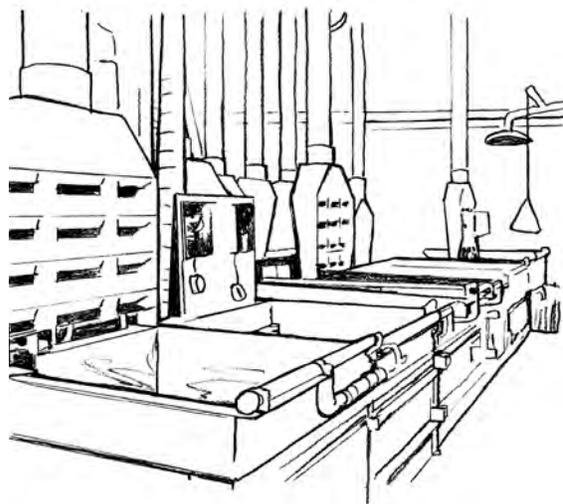


Spray painting in a booth

- ▶ **Chrome Plating and Metal Finishing:** Commercially available alternatives to chromium-6 in metal finishing exist for: Decorative Chromium Electroplating, Hard/Functional Chromium Electroplating, and Passivation of Zinc (anti-corrosion treatment of zinc using chromium-6). See the TURI (Toxics Use Reduction Institute) “Five Chemicals Study” for more information. www.turi.org/library/turi_publications/five_chemicals_study/final_report/chapter_6_hexavalent_chromium

- ▶ **Masonry Work and Chromium-6:** Portland cement and its products (concrete, mortar, and grout) contain chromium-6. Cement made with fly ash, or with other non-slag fillers, usually contain somewhat less chromium-6 than traditional products. Adding ferrous sulfate can reduce some of the chromium-6 in cement.

- ▶ **Use ventilation to reduce chromium-6 in the air**



Ventilated electroplating tanks

A fan-powered local exhaust hood (such as an “elephant trunk” used in welding) should be used to capture chromium-6 at the place where it is generated, before workers can breathe it. If possible, the entire work process should be inside the hood, such as a spray booth. You can also use local ventilation at the surface of plating tanks.

▶ **Modify work practices**

It is often possible to use techniques that generate less dust, mist, or fume that can be inhaled.

- Use wet clean-up methods for dust. Use water or water-based cleaners, then squeegee or mop.
- Don't clean up with dry sweeping or compressed air. If a vacuum cleaner is used, it must have HEPA filters.
- Wash with soap and water before eating, drinking, or smoking.
- When leaving work, wash or shower, and put on clean clothes to avoid bringing chromium-6 contamination home to your family.

For free training materials on chromium-6 exposure control and best practices, including videos, manual, and assessment tool, see <http://depts.washington.edu/frcg/HexChec.htm>

► Wear personal protective equipment

- **Gloves:** Always wear fully coated, chemical-resistant gloves to protect your skin from chromium-6, especially when handling cement products.
- **Protective Clothing:** Wear protective clothing such as coveralls and use change rooms provided by your employer to leave protective clothing at work, so you don't bring chromium-6 home with you.
- **Eye Protection:** Prevent contact with your eyes by wearing a face shield, safety glasses, or goggles when working with chromium-6.

► Wear a respirator

Wearing personal protective equipment such as a respirator is the least reliable way to control exposure, and Cal/OSHA allows it only as the last resort when exposure cannot be avoided or reduced below acceptable levels.

- **Respirators:** Your employer must provide you with a respirator with a particulate filter or supplied air if you are exposed to chromium-6 at a level above the legally allowed limit. Selection of the right type of respirator must be based on the amount of chromium-6 in the air. If you must wear a respirator, you must first be medically evaluated to make sure you can wear it safely. You must also be fit tested to make sure the respirator seals to your face properly. You must also be trained on how to use and maintain the respirator.



Welder with powered air purifying respirator

The amount of chromium-6 in the air at your workplace is regulated by law. However, even if the amount is below the allowable limit, chromium-6 may still cause lung cancer. Lung cancer caused by chromium-6 may take many years to show up— just as with smoking. The best way to prevent lung cancer is to lower your exposure to chromium-6.

What your employer must do if you work with chromium-6

Employers must make sure that workers are not exposed to chromium at a level higher than the permissible exposure limit (PEL) of 5 µg/m³ by doing the following things.

► **Measure your exposure:**

If there may be chromium-6 exposure at your workplace, your employer must evaluate the exposure level of all employees. Air monitoring must be done to measure exposures for each job on each shift. If exposures are higher than the PEL, air monitoring must be repeated every three months. If exposure is higher than one half of the PEL, air monitoring must be repeated every six months. Air monitoring must also be repeated if work processes or conditions change. You have the right to watch any air monitoring that your employer does. You must be notified of the results of any exposure measurements and if the levels are above the PEL, you must be told what is being done to lower the exposure below the PEL.

► **Provide medical services to employees who may be exposed to chromium-6:**

Your employer must allow you to see a doctor if: 1) you are exposed to the Action Level of 2.5 µg/m³ for more than 30 days per year; 2) you have symptoms of chromium-6 exposure; or 3) you are exposed in an emergency. These medical services must be provided to you free of charge.

► **Control exposures:**

- Use ventilation and other methods such as those discussed on page 3.
- Provide protective clothing and equipment, including respirators.
- Provide local exhaust ventilation when welding in a confined space, and supplied air respirator if adequate ventilation is not possible.
- Provide change rooms, washing facilities, and separate eating and drinking areas.
- Use safe cleaning methods in areas where there is chromium contamination.

► **Establish regulated areas:**

Your employer must mark any areas where exposures are expected to be above the PEL and limit access to these areas.

Recommended Standards:

Because the current PEL does not protect against lung cancer, HESIS and the National Institute for Occupational Safety and Health NIOSH both recommend an exposure limit of 1 µg/m³ for all chromium-6 compounds.

RESOURCES

REGULATIONS THAT HELP TO PROTECT WORKERS

- ▶ **Hexavalent Chromium Standard.** This standard, California Code of Regulations (Title 8, Sections 5206, 1532.2, and 8359), requires employers to take specific actions to protect workers from hexavalent chromium, or chromium-6. See www.dir.ca.gov/title8/5206.html or www.dir.ca.gov/title8/1532_2/htm.
- ▶ **Hazard Communication Standard.** Under this standard (Title 8, Section 5194), your employer must tell you if you are working with any hazardous substances, must train you to use them safely, and must make Material Safety Data Sheets available. See www.dir.ca.gov/title8/5194.html.
- ▶ **Injury and Illness Prevention Program.** Every employer must have an effective, written Injury and Illness Prevention Program (IIPP) that identifies a person with the authority and responsibility to run the program (Title 8, Section 3203). The IIPP must include methods for identifying workplace hazards, methods for correcting hazards quickly, health and safety training at specified times, a system for communicating clearly with all employees about health and safety matters (including safe ways for employees to tell the employer about hazards), and recordkeeping to document the steps taken to comply with the IIPP. See www.dir.ca.gov/title8/3203.html.
- ▶ **Access to Medical and Exposure Records.** You have the right to see and copy your own medical records, and any records of toxic substance exposure monitoring (Title 8, Section 3204). These records are important in determining whether your health has been affected by your work. Employers who have such records must keep them and make them available to you for at least 30 years after the end of your employment. See www.dir.ca.gov/title8/3204.html.

WHERE TO GET HELP

- ▶ **HESIS.** Answers questions about workplace hazards for California workers, employers, and health care professionals. Call **(510) 620-5817** or **toll free (866) 282-5516**. HESIS also has many free publications available. To request publications, leave a message at **(510) 620-5717** or **toll free (866) 627-1586**, visit our website at www.cdph.ca.gov/programs/ohb, or write to HESIS at 850 Marina Bay Pkwy, Building P, 3rd Floor, Richmond, CA 94804.
- ▶ **California Division of Occupational Safety and Health (Cal/OSHA).** Investigates workers' complaints and answers questions about workplace health and safety regulations. Complainants' identities are kept confidential. Contact the nearest Cal/OSHA Enforcement District Office. They are listed in the blue government section near the front of the phone book, under "State Government / Industrial Relations / Occupational Safety and Health / Enforcement" or visit their website at www.dir.ca.gov/asp/DOSHZIPSEARCH.html.
- ▶ **Other resources for employees** may include your supervisor, your union, your company health and safety officer, your doctor, or your company doctor.
- ▶ **Cal/OSHA Consultation Service.** Helps employers who want free non-enforcement assistance to improve health and safety conditions. Employers can call **1-800-963-9424**.

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