

HEXAVLENT CHROMIUM



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HEXAVALENT CHROMIUM

Also referred to as:

Chromium Six, Chromium VI, Cr - VI, Cr – 6

USES	ACTION
Pigments for paints, inks, plastics	Type of Cr-6 Chemicals lead chromate (yellow, chrome green, molybdenum orange), zinc chromate, barium chromate, calcium chromate, potassium dichromate, sodium chromate
Anti-corrosion coatings	chromic trioxide (chromic acid), zinc chromate, barium chromate, calcium chromate, sodium chromate, strontium chromate
Stainless steel	Cr-6 is given off when stainless steel is cast, welded or plasma torch cut
Textile dyes	ammonium dichromate, potassium chromate, sodium chromate
Wood preservative	chromium trioxide
Leather tanning	ammonium dichromate

OCCUPATIONAL EXPOSURES:

- chrome plater
- paint mixer/maker
- leather tanner
- welder
- metal sprayer
- printer
- spray painter
- plastics formulator
- pigment and dye maker
- ship/boat builder or repairer
- paint scraper
- (ferrochrome) metal caster
- abrasive blaster
- boiler maker
- ceramics & crafts

HOW CHROMIUM ENTERS THE BODY:

Hexavalent chromium can enter the body by breathing air containing the contaminant or by being swallowed.

MIST: Droplets of liquid containing hexavalent chromium get into the air if a liquid containing Cr-6 is vigorously mixed or sprayed.

DUST: Solid particles containing Cr-6 get into the air if powdered Cr-6 material is dumped, scooped or by grinding a material containing Cr-6.

FUME: Very fine particles containing Cr-6 get into the air by melting or welding a metal containing chromium.

Hexavalent chromium can get on cigarettes. If contaminated cigarettes are smoked, the smoker inhales additional chromium along with the tobacco smoke.

Particles of chromium can be swallowed if the dust gets on hands, clothing or beard or in food or beverages.

POTENTIAL HEALTH EFFECTS OF HEXAVALENT CHROMIUM EXPOSURE:

CANCER

The U.S. Environmental Protection Agency (EPA) and the International Agency for Research on Cancer (IARC) have classified Cr-6 as a known human carcinogen. Exposure to Cr-6 can cause lung cancer in humans. Workers exposed to hexavalent chromium in workplace air had much higher rates of lung cancer than workers who were not exposed. Studies of workers in the chromium pigment, chrome-plating and ferrochromium industries also suggest a statistically significant association between worker exposure to Cr-6 and lung cancer. An increase in lung cancer deaths has been associated with occupational exposures as short as two or three years. That is why it is important to take steps to reduce worker exposure immediately. In sensitized workers, contact with even very tiny amounts can cause a serious skin rash.

BREATHING SYSTEM EFFECTS

Cr-6 is a respiratory tract irritant. It can irritate the nose, throat and lungs. Sensitization resulting in an asthmatic response can result from Cr-6 exposure. Repeated or prolonged exposure can damage the mucous membranes of the nasal passages and cause ulcers to form. In some cases, the damage is so severe that a hole develops in the septum (*the wall separating the nasal passages*).

SKIN EFFECTS

Cr-6 compounds are not only powerful skin irritants but can also be corrosive. On broken skin, a penetrating round ulcer may develop. Common sites for these ulcers ("*chrome holes*") include the nail root, knuckles and finger webs, back of the hands, and forearms. The chrome sore begins as a pimple, forming an ulcer with raised hard edges. Ulcers may penetrate deep into soft tissue or become the site of secondary infection, but are not known to lead to cancer. The lesions heal slowly and may persist for months. Some workers develop an allergic reaction to chromium.

EYES

Hexavalent chromium is an eye irritant. Direct eye contact with chromic acid or chromate dusts can cause permanent eye damage.

MEDICAL TESTS FOR HEXAVALENT CHROMIUM EXPOSURE:

There are no routine medical tests to measure the amount of Cr-6 that has been absorbed into the body. Excreted chromium can be measured in the urine. However, this test is only useful when measuring recent exposure to Cr-6. In most cases, air monitoring gives the best indication of worker exposure. So, measuring Cr-6 in the blood or urine is not recommended or legally required.

CONTROL OF HEXAVALENT CHROMIUM EXPOSURE

The two best ways of dealing with Cr-6 exposure are:

- substitution
- engineering controls (local exhaust ventilation)

If chromium-free substitutes are not a possibility then local exhaust ventilation (LEV) should be installed. A mechanically powered local exhaust hood should be placed at the point where chromium is released into the air, or the entire process should be contained within the hood. Properly designed and maintained local exhaust ventilation draws off most of the chromium before it can be inhaled.

Using local exhaust is much better than leaving doors and windows open, or bringing in fresh air through a fan or duct. With dilution or general ventilation, overexposure can still occur at the point of chromium release into the air, or if the dilution air does not mix well with the room air.

Continuous upper back and neck muscle work is often required to hold the head in position, especially if vibration is present. Continuous muscle activity can lead to muscle strain.

Holding a foot pedal down over a long period of time may cause stiffness and spasm in the legs and low back.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Wearing a respirator is the least effective way to control exposure. A respirator should only be used to prevent overexposure as a last resort. The reason for this is that the use of respirators is complex and prone to error, often resulting in inadequate protection. Sometimes, even with good local exhaust ventilation, a respirator may still be required.

The respirator must be approved for the type of particles in the air. A paper dust mask designed for removing powder particles will not remove the mist particles created during

chrome plating. Also, the respirator must be fit-tested to ensure that it fits the worker's face. The worker should also be trained on how to use and maintain the respirator. Workers should be medically examined for their ability to wear a respirator (especially important for workers with asthma or heart conditions).

In plating operations, additional ppe is required due to the corrosive nature of the chromic acid.

PPE includes:

- splash-proof goggles
- face shield
- chemical resistant gloves
- apron
- boots

Emergency eyewash and showers should also be available in the immediate vicinity of the chromic acid tanks (*refer to OHCOW Information Bulletin, Electroplating – A Focus on Chrome Plating*).

SAFE WORK PRACTICES

- Don't clean up by dry sweeping
- Always use wet clean-up methods
(*hose then use squeegee or mop*)
- Don't eat, drink or smoke in the workplace
- Wash up before eating, drinking or smoking

If workers feel they are experiencing health effects from hexavalent chromium exposure they should see a doctor and inform the Joint Health & Safety Committee.

The Occupational Health Clinics for Ontario Workers Inc. can assist in the medical and occupational hygiene evaluations for hexavalent chromium.

OHCOW OFFICES

If you need further assistance, call the Occupational Health Clinic for Ontario Workers Inc. Closest to you.

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