

Potassium Dichromate

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POTASSIUM DICHROMATE is an orange-red chromium salt made by the reaction of potassium hydroxide and chromium trioxide. It has the ability to oxidize primary and secondary alcohols into aldehydes and ketones, respectively. These aldehydes can then be further oxidized to the corresponding carboxylic acids, changing color from orange to green.

As a main ingredient in cement, chromium has been a major cause of occupational allergic contact dermatitis (ACD). Trivalent chromium (Cr_3), present in the raw material from which cement is produced, forms hexavalent chromium (Cr_6), which is better able to penetrate and accumulate in the skin and is thus more sensitizing. The addition of ferrous sulfate to cement (which reduces the chromium from hexavalent to trivalent) in some European countries (such as Denmark) has effectively decreased the sensitization potential of cement.¹

Exposure in the leather tanning process and exposure to chromium-tanned leather products constitute other important occupational and environmental exposures to chromium. The industrial uses for potassium dichromate are broad and range from the determination of ethanol content in solutions to the making of automobile finishes. It is also used in the manufacturing of ceramics, pyrotechnics, explosives, matches, some bleaches and detergents, wood preservatives, and pigments used in paints, dyes, and varnishes.² In dentistry, it is used for implants and as an external astringent or antiseptic. It is also used for cleaning laboratory glassware and as an oxidizing agent in photographic printing.

Additional sources of chromium include vitamin supplements, acupuncture needles (chromium content, 18.12%),³ suture materials (such as chromated catgut), some cosmetics, green tattoos, medical prostheses (artificial knees and hips may contain up to 20% chromium),⁴ and metal wire in orthodontic materials.⁵ Of interest,

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exposure to the chromium salts used for dyeing the green felt that covers gambling tables has been associated with so-called blackjack dermatitis.⁶

Potassium dichromate is one of the most common culprits in causing chromium-related dermatitis. ACD reactions to chromates tend to be persistent, insidious, and relapsing. Patients present with a greater susceptibility to dryness, fissuring, and lichenification.⁷ The North American Contact Dermatitis Group patch-test results for the 2001–2002 study period showed a prevalence rate of 4.3% for positive patch-test reactions to potassium dichromate.

References

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Potassium Dichromate

What is it?

Potassium dichromate is a metal salt derived from chromium. Chromium itself is one of the most abundant metals on the earth’s surface.

Synonyms of potassium dichromate include chromium, chrome, chromate, dichromic acid, potassium bichromate, and dipotassium dichromate.

Where is it found?

In the household setting, the most common source of exposure to chromates is tanned leather. Shoes, boots, belts, gloves, briefcases, and handbags may be made of leather tanned with chromates.

Chromium is also a major ingredient in wet cement although dried cement (and dried cement dust) is not allergenic.

Potassium dichromate can be found in numerous industrial products, including dyes and pigments (such as those used for coloring the green felt that covers gambling and pool tables), paints and varnishes, anticorrosives, automobile chromate finishes, ceramics, pyrotechnics, explosives, matches, some bleaches or detergents, and wood preservatives.

In dentistry, chromium can be used as an external astringent or antiseptic, in implants (such as chrome-nickel alloy dental crowns), and in the metal wire used in orthodontic materials. Chromium also has important uses in photographic processes. Other sources of chromium include orthopedic prostheses (hip and knee), suture materials (such as chromated catgut), vitamin supplements, green tattoos, acupuncture needles, and some cosmetics. The most common cosmetic sources are probably greenish eye shadows and eyeliners and anti-redness makeup with green tints (including some mineral makeup).

How can it be avoided?

Persons allergic to chromates need to avoid the use of chromium-tanned leather products and direct skin contact with such products. Instead, they should switch to vegetable-tanned leather products or athletic shoes with synthetic uppers. Plastic, canvas, or wooden clogs are also safe.

White leather is often tanned with formaldehyde; these shoes can be further dyed to produce colored shoes with no chromates. Some Hush Puppies (Rockford, MI) shoes (customer service number: 1-800-545-2425), Birkenstock (St Katharinen, Germany) shoes (<www.birkenstockusa.com>), and Ecco (Londonderry, NH) shoes (customer service number: 1-877-240-2365) in several styles are specifically chromate free.

Do not use any product that lists potassium dichromate or a related compound as an ingredient on its label. For example, refrain from using products such as the topical headache-relief product HeadOn (Miralus Healthcare, Chicago, IL) or ingesting vitamin supplements that contain chromium.

Exposure to industrial potassium dichromate can be prevented by not touching chromate-containing products or inhaling chrome fumes. It is also important to use rubber gloves when working with wet cement.

Your dermatologist may have given you a list of products that are safe for you to use. This list contains only products that do not contain anything you are allergic to. Be careful to avoid products that have names that are similar to those that are listed or that are made by the same company as products that are on the list.