



Substitutes for Chromic Acid-Based Cleaners

For many years, laboratories on the OSU campus have used chromic acid-based cleaners to remove stubborn deposits from laboratory glassware. There are many safety and environmental concerns that make the use of chromic acid substitutes desirable.

Safety Concerns

Handling any concentrated acid is a dangerous task requiring caution and appropriate personal protective equipment. Acids can burn or severely irritate the skin. Eye contact with them can lead to a loss of vision. Exposure to chromic acid, in particular, can cause several adverse health effects. Inhalation of chromic acid mists can lead to irritation of the nose, throat, and lungs, causing coughing, labored breathing, and swelling of the larynx. Chronic exposure can result in perforation of the nasal septum. The chromium VI in these cleaning solutions is also a carcinogen and regulated by the state of Ohio. One brand of chromic acid-based cleaner, Chromerge®, requires the user to mix the chromic acid with sulfuric acid, introducing another strong acid with its accompanying potential for injury. Mixing the two creates heat that can cause splattering and increase the danger of skin or eye contact.

Environmental Concerns

The heavy metal in chromic acid solutions is harmful to the microorganisms used to treat local wastewater. It is also difficult to treat and may end up in local water supply. Therefore, campus policy prohibit drain disposal of solutions containing chromic acid. Drain disposal also corrodes plumbing and may expose plumbers to the hazards of chromic acid.

Disposal Costs

Chromic acid solutions have a low pH and high heavy metal content that require special hazardous waste handling and disposal, leading to higher costs. Presently, disposal of chromic acid solutions cost almost twice as much as that of most other solutions. Although the costs of waste disposal can vary, disposal of chromium-based cleaning solution waste will probably continue to cost more than other cleaners.

Alternatives

For the above reasons, it is recommended to use of non-chromium-based substitutes. While many of the available alternatives (see next section) contain an acidic or alkaline component and pose some health hazard, they do not contain the highly toxic chromic acid. The use of alternatives also removes the risk of chromium contamination in glassware cleaned with chromium-based cleaners. Fisher Scientific, VWR Scientific, and other laboratory suppliers sell alternatives to chromic acid-based cleaning solutions. Some of these are listed below. Remember, while these cleaners have the benefit of being free of chromium, you should still obtain and read their material safety data sheets (MSDSs) before using them. Both Fisher and VWR will provide free samples and consult with individual campus laboratories regarding their specific cleaning needs. (Keep in mind that the pH and the presence of certain organic compounds or heavy metals in the end solution determine the cost of disposal. Some of the listed alternatives would be no cheaper to dispose of than chromium-containing waste.)

Fisher Scientific

Contrad 70®: Soak and rinse in hot or cold conditions. Can be used in a static solution or in an Ultrasonic tank. Works on glass, plastics, ceramics and metals. Hazardous ingredient(s): potassium hydroxide

VWR Scientific

Chem-Solv®: Simple two-step cleaning: soak and rinse. Heating is usually not required. Works well on glass, plastics and electron-capture gas chromatograph detectors. Hazardous ingredient(s): sodium hydroxide, propylene glycol, methyl alcohol, and Triton X-100®.

RBS-35®: Soak and rinse in hot or cold conditions. Good for glass, plastics, porcelain, ferrous metals, optics, and radiochemical decontamination. Available in a phosphate-free formula as well. Hazardous ingredient(s): sodium hydroxide.

PCC-54®: A clean-and-rinse all-purpose laboratory cleaner. Available in a phosphate-free formula as well. Hazardous ingredient(s): none.

Fisher Scientific and VWR Scientific

Nochromix®: All-purpose heavy-duty laboratory cleaner. Hazardous ingredients: none when diluted according to directions. At higher concentrations, it may require disposal as hazardous waste. For more information on these or other alternatives, call your vendor representative. For information on health, safety, or disposal issues for chromic acid-based cleaners or alternative products, call EHS at 292-1284.