

How Trivalent Chrome Compares to Hexavalent

Q. I'm getting pressure to eliminate my decorative hexavalent chromium plating process primarily due to the high cost of waste treatment and regulatory changes. To add to it, we have troubles with HCD burning and whitewash, which increases our scrap rate. Can you tell me how the performance of trivalent chromium will compare to hexavalent chromium and what is needed to make the change?

A. Recent regulations and performance requirements are making the switch from decorative hexavalent chromium plating to trivalent chromium plating a necessity. With hexavalent chromium plating set to be eliminated in the European Union by 2021, many manufacturers; especially global manufacturers, have already specified or are in the process of specifying trivalent chromium on their plans to meet the new regulations. OSHA and the EPA continue to adopt legislation that further justifies switching from hexavalent to trivalent chromium plating. However, much hesitation still exists regarding the switchover to trivalent chromium due to concerns about performance, cost and the overall logistics of the conversion.

The benefits quickly and increasingly overcome the drawbacks.

From a testing performance standpoint, trivalent chromium has already been used in exterior applications in the trucking industry for the past 30 years. The sulfate/chloride process has shown indefinite electrolyte life, process stability,

ease of use, and excellent exterior corrosion performance. The field performances of trivalent chromium confirm test results performed by ASTM. The recent testing by USCAR has also confirmed these results. From an operational performance standpoint, throwing power is much better with trivalent chromium. Trivalent chromium is also extremely forgiving with respect to current interruption (this feature eliminates the occurrence of white wash commonly experienced with hexavalent chromium). The advantages of improved covering power and uniform thickness have eliminated the need for use of auxiliary anodes for plating difficult geometries.

When looking to make the transition from hexavalent to trivalent chromium plating, the best place to start is to recognize that not all trivalent chromium plating systems are equal. It is best to research the variety of trivalent chromium plating processes available to match the one that will best meet your needs and that of your customers. You will want to evaluate finish color, speed, control, needed equipment and, perhaps most important, is the level service and support you will receive in advance of and during the conversion itself as well as after as you continue to work with the process.

The first portion of the actual conversion process involves pumping out the hexavalent chromium solution, removing the anodes, taking apart the bussing and removing the tank liner. Following that, you cut off the exhaust hood and rinse the remaining ductwork. The tank will need leached to remove all traces of hexavalent chromium (this is a critical step). Next, rinse the tank and all associated equipment in the area to complete the removal phase of the hexavalent chromium. Now you will install the new liner and then install the graphite anodes and copper bussing. Complete the installation process by installing the air agitation, cooling and heating, and new ductwork. At this point you can fill the tank with water then acidify to operating pH and use the applicable wetting agent to be used for the process to leach all new equipment. Make up a new plating bath as directed by the manufacturer and turn on the properly prepared ion exchange. Run your initial lab tests, begin plating and scale up accordingly.

Although there is an initial time and cost investment involved in the conversion from hexavalent chromium to trivalent chromium, the benefits quickly and increasingly overcome the drawbacks. Improved production efficiency, decrease in rejects, substantial savings in wastewater treatment and improvements in employee safety are among the key advantages. Once the transition has been made, many shops quickly realize the positive impact to their operations. ■■



MARK SCHARIO
Columbia Chemical

Mark is executive vice president at Columbia Chemical. Visit columbiachemical.com.

LEARN MORE

Research and White Papers

Searching for in-depth analysis of a plating process or technology? Look no further than *Product Finishing's* Research and White Paper Zone, an entire section of our site dedicated to free papers and presentations from leading researchers in the finishing industry. pfonline.com/zones/research