IPEC *GLOBAL INC*

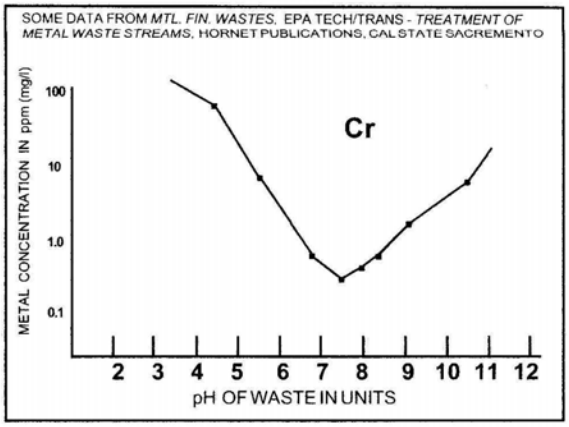
1285 N. Fitzgerald Ave. Suite J, Rialto, CA. 92376
Tele: (909) 421-9960 Fax: (909) 421-8095

METHODS OF BATCH TREATMENT

CHROME METAL IN SOLUTION

TYPICAL SOURCES:

Chromium metal in a dissolved state can be found in many industries. Chromium is normally used for three purposes; Corrosion resistance, bearing surface and decorative finishes. Electro-plating, chromate conversion coatings, chromate sealers, anodizing, etching or finishing of stainless steel, chromated paints and dyes, deoxidizers, Alodine, Iridite, passivation, chem-film, pcb etching, and brite dipping are just a few.



ASSUMPTIONS & NOTES:

We will assume that the chromium is in a dissolved state and that it is Cr+6 or hexavalent. This is the most common form delt with. Where tri-valent (Cr+3) is present, the second stage of treatment will apply. The same basic method of treatment should apply if solution is concentrated or dilute. Oils and grease are assumed to be removed or minimal. Where other metals are present, treatment for these will be secondary after the chrome.

METHODS & PROCEDURES

Where the presence of chromium is known or suspected, the first step is to determine the concentration of the chromium in parts per million (ppm). An empirical check is to note the color of the solution. Chromium +6 has a distinctive yellow color, while trivalent (Cr+3) is a green to a blue color. Concentration and other factors can affect color, so lab and jar testing have no substitutes.

Chromium in the hexavalent state (+6) does not precipitate well as a conventional hydroxide. Therefore it is necessary to convert or reduce the hexavalent to a trivalent chromium ion. This is done using a reducing agent such as sodium bisulfite, or meta-bisulfite. Other reducers such as sulfur dioxide gas and hydro-sulfite are used. It is important to note that with most of the above reducers a certain amount or sulfides or sulfates will be emitted into the air. Approved safety gear is a must. Especially those who are sensitive to sulfide bearing compounds. (asthmatics).

Reduction & precipitation of chrome is a function of pH and ORP (oxidation reduction potential). It involves three distinct steps.

STEP 1. requires the pH of the solution to be low, (about pH 2 to 3). This allows for a faster and more efficient reduction. If pH is to high, the reduction will be slowed or stopped. Sulfuric acid is a normal reagent for this. Many of the chromium bearing wastes are already acidic. If waste is already at pH of 2 to 3, no additonal acid need be added. If pH is to low, gas liberation may occur and the ORP meter will be interfered with. So bring up the pH with magnesium hydroxide to 2 to 3. If you use caustic soda, you may experiance heat generation or large jumps in pH so use more dilute concentrations to control the reactions.

STEP 2. Begin adding reducer to the batch. You will immediately notice a distinct change from a yellow color to blue or dark green. This testifies to the change of the hexavalent to trivalent . You may also notice a distinct odor of sulfide. Rapid addition of the reducer may cause gasing. As you raise pH in the final stage, the smell should decrease. Make certain to wear your protective gear! Begin checking the ORP level as you add the reducer and you will see a drop in the milivolt levels. The value you want to acheive is 250 mv to 300 mv. It is not uncommon to see the ORP meter stall at about 350 mv. This is especially common with concentrated solutions and those on the low pH side. There is a tendency at this point to try and drive the ORP level down by overdosing the reducer. Remember, ORP is affected by pH. At the point of stalling, discontinue adding reducer.

STEP 3. Begin to add magnesium, or sodium hydroxide. As the pH climbs the ORP value may drop, this is normal. Raise pH to an optimum level of 7.5 to 8.0. If you are using lime or caustic you may see heat developing in the solution, proceed slowly. When the pH reaches the optimum point, you will see a milky color and a metal precipitant form. The resulting water should separate and start to settle. Begin filter pressing. If filtrate water is yellow or discolored, test, and treat again if necessary.

It is important to note that if the pH is allowed to rise above the optimum level, the chrome may re-dissolve back into the solution. This is where proper jar testing will help the operator anticipate and prevent problems.