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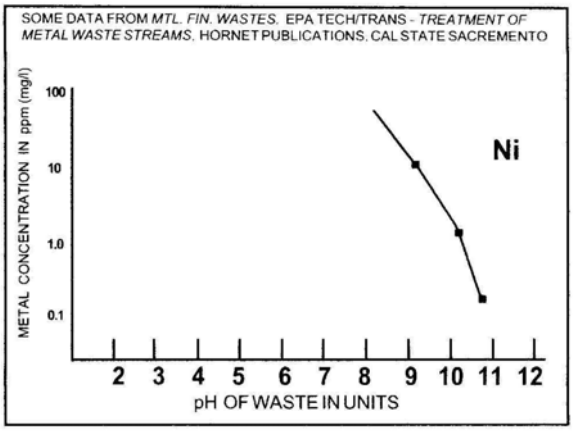
METHODS OF BATCH TREATMENT
ELECTROLESS NICKEL

TYPICAL SOURCES:

Electroless Nickel plating is used extensively in the aerospace and electronics industries. Applications include magnetic disks, connectors, ceramics and integrated circuit fabrication. Electroless nickel is unlike typical electrolytic plating baths in that it has a definite pot life and must be replaced frequently. Chelating chemicals are added to the bath to hold dissolved nickel in solution, making it difficult to batch treat unless done properly.

ASSUMPTIONS & NOTES:

We will assume that the electroless nickel solution is a raw bath from a spent plating tank. The solution should be free from oils and grease and should not be blended with other wastes. The normal plating bath contains high levels of nickel and where other metals are present, secondary treatment may be required. BE SURE PROPER SAFETY GEAR IS USED!



METHODS & PROCEDURES

JAR TESTING FOR ALL TREATMENT IS A MUST! This is especially true with electroless nickel. A successful process must be determined and the operator must know ahead of time how the waste stream will react in a large batch.

As electroless nickel solutions are sensitive baths, it is difficult to keep them from "plating out" on various surfaces. Periodically the plater must strip his tank system because the nickel can deposit on everything it touches. This phenomenon can be used to the operator's advantage. When the plater determines the bath requires dumping, the operator should experiment with "dummy plating". This is a process where the spent bath is allowed to plate out on a metal surface such as aluminum or stainless wool. The more metal that is plated, the less sludge that will have to be shipped as a hazardous waste. Metal plated out on a dummy, can be disposed of as a metal.

After dummy plating, large amounts of nickel ions are still in the bath. For this reason dilution of the waste may help the treatment process. In dealing with concentrated wastes, solids levels may be so high that the batch may not allow a precipitant to form. This can cause problems in filter pressing and disposal.

Electroless baths are usually acidic. Raising the pH of the bath to obtain the optimum solubility level of 10 to 11 can be done using caustic, but with some disadvantages. Sludge volume is much greater and the filter cake can be wet. Also because of chelation, the possibility of not removing all of the nickel is increased. This author has found the use of magnesium hydroxide, a metal precipitant such as DTC, & polymer, produces better results.

STEP 1.
Fill the treatment tank with the proper amount of Electroless solution. Begin dilution as needed. Make sure that enough room is left at the top of the tank to add the reagent chemicals. (The jar testing will aid in this). Begin agitation using a mechanical mixer. Air agitation is not recommended.

STEP 2.
Slowly add Mag Hydroxide to elevate the bath to pH 6.5 to 7.5. Mag hydroxide may take longer to raise the pH value, allow at least 5 to 20 minutes for each point rise in pH. Less mag hydroxide is needed than caustic if done properly. If you are using caustic, consider reducing it to 25%. This will help prevent over dosing. Also if you use caustic be careful not to add it too quickly or the bath will generate heat. After the pH has been raised, let it stand for 10 minutes. The color of the bath should go from clear green to milky green.

STEP 3.
Add the proper amount of DTC or other precipitant. The amount should be determined by jar testing. Take care not to overdose or the filter cake can become like gelatin. The milky green color will change to a dark green and the particulates will be very visible. Let the DTC mix for at least 30 minutes. Prepare polymer and add to the batch. If you are using a high speed mixer, take care not to over mix and break the floc. Shut off mixer and begin filter pressing. Return the filtered water back to the batch tank until clear with no color. Send the clear water to a clean tank for final test and discharge.