

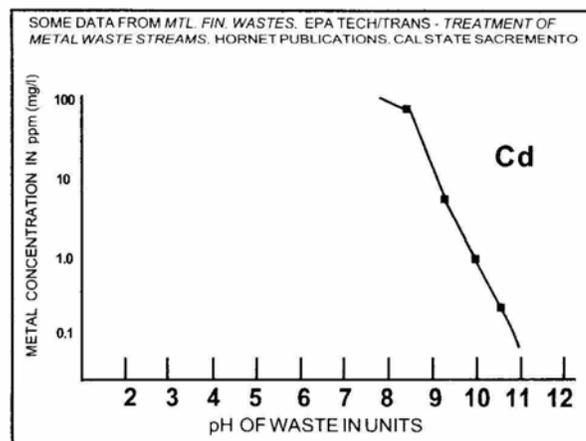
METHODS OF BATCH TREATMENT CADMIUM METAL IN SOLUTION

TYPICAL SOURCES:

Cadmium metal is primarily used and found in surface finishing processes that require a sacrificial deposit and thus a high degree of corrosion resistance. Cadmium is also used for lubricity in die and wire feeding operations. Electro-plating, mechanical finishing, and some paints are good examples. Cadmium is most often found in aerospace fasteners, air frame, hardware, and machine and tooling industries.

ASSUMPTIONS & NOTES:

We will assume that the cadmium is from an electro-plating bath or a cyanide based striping solution. In dealing with this type of solution, typical concentrations of sodium cyanide can reach as high as 10 ounces per gallon. Caution must be taken to destruct the cyanide first, before any attempt is made to alter pH. Another method is to dilute the solution to where high concentrations of metals and cyanides are reduced to more managable levels.



METHODS & PROCEDURES

Cadmium as a dissolved metal can be precipitated into a metal hydroxide by using sodium or magnesium hydroxide. When treating cadmium the first thing to accomplish is a complete jar test for the treatability method that works best. This is because many other pollutants are usually found with cadmium in waste streams. Cyanide both free and complex is a typical constituent along with chrome and nickel, and can be present in significant amounts. When treating for cadmium these pollutants can interfere with the process or compete with the cadmium metal precipitant, giving poor results.

Using the jar testing method, treat all cyanides first with a prescribed and safe method. This is usually done by a two step process of elevating the pH to 10.5 and then chlorinating to a prescribed millivolt level. The second step is to lower the pH to 8 or 8.5 and dose more chlorine. This process takes about 90 minutes. During the process of raising and lowering pH, you may experience cadmium falling out as a precipitant. After the cyanide is treated, filter to remove suspended solids. Test the decanted water to check the amount of cadmium metal remaining.

Since cadmium precipitates out at higher levels than some other metals, you may wish to use a coagulant or a metal precipitant such as DTC. This is done, because metals such as chromium and nickel have different ideal pH levels, (or solubility curves). One method of treatment is to pick a pH value which averages out the best pH values for all. This method is not preferred, and can be improved upon. This is where DTC or a sulfide precipitant can help, as they will precipitate out many metals at one pH value.

A point to remember is that some of these precipitants can be oxidized by too much chlorine left over from the cyanide process. Also if there are significant amounts of other metals present, they will compete with cadmium and use up the DTC. This is why jar testing is important. It can tell you how much of a chemical to add and at what time. Also it is important to purchase treatment chemicals from a vendor who will work with you and has a lab and the experience in treating cadmium. Paying a few cents more for quality and knowledge, will pay off big down the road!

As the cadmium is brought from a dissolved to a suspended state, you may notice that the floc is very light and easily disturbed and may be broken. Cadmium flocs are very fragile, and the use of a good polymer is likely to be called for. This helps give mass to the floc and aids in the filter pressing process. When jar testing, enlist the services of a qualified polymer vendor. Repeated jar tests will help determine the right polymer for you.

Many cadmium wastes can contain large amounts of oils and grease. It is necessary to remove these before final treatment can commence. Oils tend to prevent the metals from falling out. Also blinding of filter presses and the fouling of pH and ORP probes can occur. Some oil and grease treatment methods require adding acids or acidified emulsion breakers. Check with your vendor first before jar testing to see if this can react with the cyanides. When batch treating cyanide bearing wastes, it is usually advised to destroy the cyanides first. Always wear your protective gear!

IMPORTANT; The above information is supplied as a general information guide only. In developing the Methods of Treatment Series, IPEC has obtained the above data from various sources. Industrial standards, vendors, government publications and experience in the field. No guarantee of effectiveness is implied or accepted by IPEC. Each user has a unique waste stream and is totally responsible for the outcome. Prudent methods of batch treatment requires proper safety measures & training are in force and the user has performed jar testing for effectiveness and safety..