Calcium Polysulfide Solution

CHEMICAL REACTIONS

HEAVY METALS

Calcium Polysulfide Solution (CPS) decomposes in water when air (or CO^2) are introduced, generating aqueous hydrogen sulfide, thiosulfate and colloidal sulfur. Heavy metal ions (M^{2+}) are precipitated as metal sulfides by thiosulfate breakdown products and H_2S. If excess H_2S is produced it is recycled into the system for efficient precipitation.

Hexavalent chromium (Cr^{6+}) is reduced to trivalent chromium Cr^{3+}) which is then precipitated as chromium hydroxide, $Cr(OH)_3$.

CYANIDE

CPS reacts with cyanide (CN) in wastewater treatment, a moderately exothermal reaction, to produce thiocyanate (SCN), which can then be disposed to a municipal wastewater system. As thiocyanate is corrosive in higher concentrations, especially when hot, it may be necessary to decompose it by adding lime. The reaction produces calcium carbonate, gypsum and ammonia, which present no disposal problems.

The successful use of CPS depends on a few points which must be observed. Be sure each item is observed when bench testing for treatment:

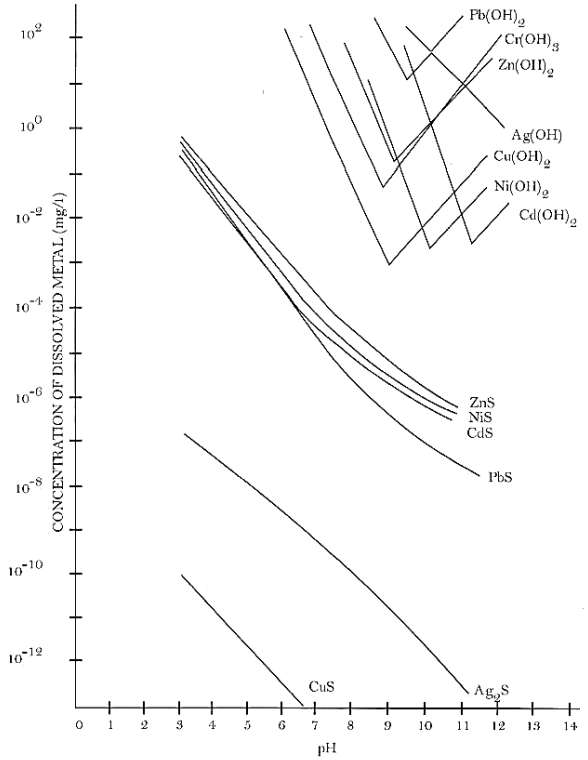
(1) CPS must be decomposed into its reactive products by aeration or carbon dioxide.

(2) Allow sufficient time for completion of sulfide formation through flow rate and/or tank size.

(3) While chromium treatment does not require decomposition, aeration speeds the reaction.

CPS precipitates heavy metals as insoluble metal sulfides* which are far less soluble than the metal hydroxides.

US EPA CHART COMPARING SULFIDE AND HYDROXIDE SOLUBILITIES



*Chromium is precipitated as chromium hydroxide by CPS' strong base. CPS converts cyanide to thiocyanate, a non-hazardous substance.