



Heavy metal removal from wastewater by chemical precipitation

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This research was to study the suitable conditions for the precipitation of heavy metals in COD wastewater consisting of chromium, iron and silver. To determine conditions for reducing chromium and precipitation of heavy metals, the pH values and precipitation times were studied. Chemicals used in the precipitation were sodium hydroxide (NaOH) and calcium oxide (CaO) which were investigated using Jar Test. The amounts of remaining heavy metals were measured by Atomic Absorption Spectroscopy (AAS) and Inductively Coupled Plasma Spectroscopy (ICP). It was found that the pH of the wastewater was in a very high acidic condition, with a pH value of 0.20. The experimental conditions were studied in 3 modes of operation consisting of (1) 10 times dilution followed by pH adjustment to 2.5 (2) pH adjustment to 2.5 followed by 10 times dilution (3) pH adjustment to 2.5 without dilution. The suitable condition was the 10 times dilution followed by pH adjustment to 2.5 before treatment. Ferrous sulfate with an amount of 2 times its theoretical values was used for chromium (VI) reduction and chromium (III) was precipitated by using sodium hydroxide solution at pH of 7.0-8.5. The precipitation time of 60 minutes and the chromium, iron and silver removal efficiencies of 99.98%, 99.99% and 99.99%, respectively, were found. When using the same condition with calcium oxide instead of sodium hydroxide, removal efficiencies of all heavy metals were more than 99%. The operation costs of the treatment were 319 and 229 bath per 1 cubic meter of wastewater for using sodium hydroxide and calcium oxide, respectively.

Keywords: Chemical Precipitation; Heavy Metals; Jar Test