Removal of lead from aqueous solutions by precipitation: statistical analysis and modeling

Duygu Kavak

Faculty of Engineering and Architecture, Department of Chemical Engineering, Eskişehir Osmangazi University, Meselik, Eskişehir 26480, Turkey
Tel. +90 222 2393750/3645; Fax: +90 222 2393613; email: dbayar@ogu.edu.tr

ABSTRACT

Chemical precipitation is the most common technology for the removal of dissolved metals from industrial wastewater. In this study, the removal of Pb(II) from aqueous solutions by precipitation was investigated and factorial design was applied. The effects of three variables i.e. pH, mass of precipitating agent, and precipitation time on the removal of lead were evaluated. The significance of the effects was checked by analysis of variance within a 95% confidence level. The model function equation for lead removal was obtained. Analysis of variance, t-test, and F-test showed that the precipitation time (C) had the greatest effect on Pb(II) removal, followed by mass of precipitating agent (B), pH (A), mass of precipitating agent–precipitation time (BC), and pH–precipitation time (AC). The maximum Pb(II) removal efficiency obtained at the optimum conditions was 99.42%. The removal of Pb(II) from industrial effluent was also studied.

Keywords: Lead; Heavy metal removal; Chemical precipitation; Factorial design