

Accepted Manuscript

Title: Removal of heavy metal ions from zinc hydrometallurgical wastewater using CaS-containing alkaline slag

Authors: Huifen Yang, Yatian Xu, Kang Shen, Yehong Qiu, Ge Zhang



PII: S2213-3437(18)30572-4
DOI: <https://doi.org/10.1016/j.jece.2018.09.040>
Reference: JECE 2661

To appear in:

Received date: 1-7-2018
Revised date: 1-9-2018
Accepted date: 20-9-2018

Please cite this article as: Yang H, Xu Y, Shen K, Qiu Y, Zhang G, Removal of heavy metal ions from zinc hydrometallurgical wastewater using CaS-containing alkaline slag, *Journal of Environmental Chemical Engineering* (2018), <https://doi.org/10.1016/j.jece.2018.09.040>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Removal of heavy metal ions from zinc hydrometallurgical wastewater using CaS-containing alkaline slag

Huifen Yang¹, Yatian Xu², Kang Shen², Yehong Qiu¹, Ge Zhang¹

1. University of Science and Technology Beijing, School of Civil and Resource Engineering, Beijing 100083, China

2. University of Science and Technology Beijing, School of energy and environmental Engineering, Beijing 100083, China

E-mail address of corresponding author: yanghf@ustb.edu.cn

Abstract: The CaS-containing alkaline slag (CCAS), discharged after recovering valuable metals from high-sulfur residues in zinc hydrometallurgical plants, was used to remove heavy metal ions from acid wastewater produced in zinc hydrometallurgical process. The CCAS was capable of effectively removing aqueous Pb^{2+} and Cd^{2+} ions with the neutralization of acid wastewaters. As the CCAS usage was 30 g/L for Pb^{2+} and 45 g/L for Cd^{2+} containing synthetic solutions, the removal rate of Pb^{2+} and Cd^{2+} reached 99.13% and 99.87% with the equilibrium pH of 10.81 and 10.85, respectively. The Pb^{2+} and Cd^{2+} ions were removed with the CCAS by generating metal sulfides, hydroxides and aluminosilicate. The treatment of real acid wastewater from zinc hydrometallurgical process was also investigated with the CCAS. As the CCAS usage was 160 g/L, the concentrations of Cd^{2+} , Pb^{2+} , As^{3+} and Zn^{2+} ions were reduced to 0.102 mg/L, 0.09 mg/L, 0.003 mg/L and 0.0193 mg/L respectively, and the equilibrium pH of treated wastewater was increased from around 2.0 to 11.30. For the treatment of real wastewater, heavy metals were proved to be removed by forming $Cd_2SO_4(OH)_2$, $Cd_3Al_2Si_3O_{12}$, $PbSO_4$ and CuS on CCAS surface. The results revealed that it was feasible for the CCAS to treat real acid wastewater discharged from zinc hydrometallurgical process. However, the used CCAS must be stored in specialized landfill because the leaching concentration of Cd^{2+} reached 0.107 mg/L, which was higher than the Cd^{2+} emission standard of 0.05 mg/L.

Keywords: CaS-containing alkaline slag, heavy metal ion, removal, zinc hydrometallurgical process, acid wastewater, neutralization

1. Introduction

Download English Version:

<https://daneshyari.com/en/article/11263713>

Download Persian Version:

<https://daneshyari.com/article/11263713>

[Daneshyari.com](https://daneshyari.com)