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A Review: Research on Innocuous Depose Treatment of Waste Slag with Various Harmful Elements for Environment from Copper-Zinc Mine

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Abstract

As the application of slag from copper-zinc mine with decreased contents of toxic and harmful inorganic elements could protect the environment and increase the addition value of ore as well. This review will demonstrate some characterization methods and orthogonal experimental techniques, for obtaining the major factors which could change the elements contents in slag, exploring the physical-chemical methods and techniques. The recovery of slag for harmless treatment and comprehensive utilization was built on this research foundation.

Introduction

Large amounts of amorphous slag were produced in the process of mining and smelting for copper-zinc ore. The slag, which enriched with a variety of toxic and harmful inorganic elements, was piled up in the open air. Its production and stock were increasing [1-3]. Element contained in slag could migrate to the surrounding in connection procedure with soil and water environment, this could result of land resources waste and water pollution. Slag that reached the national environmental safety standards could be used as the building materials, the coproduct which accumulated inorganic elements in post-processing procedure of waste slag could be used in various chemical industrial engineering projects, and got some economic effectiveness.

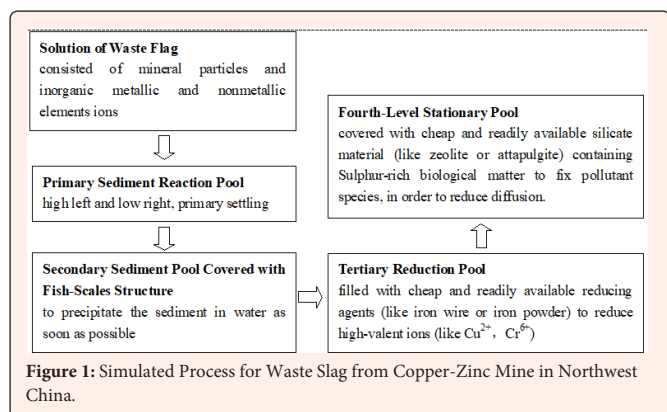
Summary of Methods and Materials

The elemental analysis results of slag from mining and smelting procedures in copper and zinc deposit of Northwest China were complex, the contents of three kinds of heavy metallic (copper, zinc and cadmium), and one kind of non-metallic, poisonous and harmful elements, arsenic, were beyond the range of environmental protection standard values. Meanwhile, the content of toxic and harmful heavy metallic element, lead, was not too genetically distant from the environmental protection standard value [4].

Table 1: Classification of Inorganic Elements in Periodic.

Atomic Number	Symbol of Elements	Element Name	Position in Periodic Table		Element Classification
			Period	Group	
24	Cr	Chromium	4th	VIB	Transition Metal
28	Ni	Nickel		VIIIB	
29	Cu	Copper		IB	
30	Zn	Zinc		IIB	
33	As	Arsenic	5th	VA	Metalloid
48	Cd	Cadmium		IIB	Transition Metal
80	Hg	Mercury			
82	Pb	Lead	6th	IVA	Main Group Metal

So we must take some appropriate approaches and methods for innocent after treatment of slag from mining and smelting procedures before the slag was discharged into the environment for environmental protection. The main research object of this review was the slag from mining and smelting procedures in copper-zinc deposit of Northwest China Table 1. We use the procedures from wet chemistry according to the differ of elements in chemical and reaction properties. We divided the five elements into three groups, copper, zinc and cadmium, arsenic and lead. We adopted the step precipitation method by establishing the multi-stage pools for slag power leachate with many kinds of elements [5]. Each Settlement stage in complex reaction of leachate corresponding to the pools made up of different installation for the sake of elements content reducing in copper, zinc, and cadmium, arsenic and lead [2] Figure 1.



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