

FROM FIRE ASSAY NICKEL SULPHIDE COLLECTION WASTE TO NICKEL HYDROXIDE

By

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ABSTRACT

The present research describes a novel methodology for converting refuse materials generated during a novel fire assay procedure, particularly those originating from nickel sulphide (NiS) collections that contain nickel (Ni), into nickel hydroxide (Ni(OH)₂), which is considered to be highly valuable.

The procedure begins by gathering waste materials that contain Ni, and is subsequently subjected to rigorous separation and sorting methods to extract the specific Ni compounds of interest. Solvent extraction is utilised in conjunction with 5,8-diethyl-7-hydroxydodecan-6-oxime (LIX 63-70) procedures to extract copper (Cu) selectively. A controlled pH adjustment is performed on the purified Ni solution using lime. Iron (Fe) impurities are eliminated at pH 2.5-3, and Ni(OH)₂ precipitates at pH 6. The solid product obtained through filtration and dehydration is subjected to stringent quality control analyses, which validate the crystalline β -Ni(OH)₂ structure via X-ray diffraction (XRD) and Fourier transform infrared (FTIR) characterizations, as well as chemical analysis via inductively coupled plasma-optical emission spectroscopy (ICP-OES).

The process of converting waste materials into crystalline β -Ni(OH)₂ not only recovers valuable resources but also efficiently eliminates Fe impurities, thus adhering to sustainable practices and environmental concerns.

Keywords: Fire Assay, Nickel Sulphide, Nickel Hydroxide