عنوان مقاله:

Preparing an intermediate nickel product from spent reformer catalysts of sponge iron reduction

محل انتشار:

نهمین کنفرانس و نمایشگاه بین المللی مهندسی مواد و متالورژی ایران و چهاردهمین همایش ملی مشترک انجمن مهندسی متالورژی و مواد ایران و انجمن ریخته گری ایران (سال: 1399)

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خلاصه مقاله:

In this study, preparing an intermediate nickel product from scrap catalysts of the direct reductionprocess of the MIDREXTM reformers was investigated. The recovery procedure consists of leaching indilute sulfuric acid solution, following by direct electrowinning process. The process was initiated byroasting the scrap catalysts at 700oC for 4 hours to burn off any organic matter, carbon, and sulfurcontent. The roasted catalyst was then leached in an optimum condition of T = 85oC, solid to liquidratio of 1:5 g/ml, [H2SO4] = 1M, and t = 5 hours. Over 91% of nickel was dissolved from the catalystusing the optimum conditions. After the leaching process, the pH of the leach solution was increased to4 by the addition of sodium hydroxide. Nickel oxide was recovered from the solution using theelectrowinning process. The optimum electrowinning temperature was T = 70oC. In this manner, thecurrent efficiency was calculated at around 96%. The spent catalysts contained around 10 wt.% nickeland 85 wt.% aluminum oxide. Nickel oxide, as an intermediate product of the process, was found to be53% pure with the aluminum as the main impurity (≈ 7 wt.%) of the process. This concentratedintermediate product can be used for further metallic nickel purification processes.

کلمات کلیدی:

nickel, spent reformer catalyst, leaching, electrowinning