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Recovery of valuable elements from spent hydrotreating catalyst using a carbothermic reduction method

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Recovery of spent hydrotreating catalyst is imperative considering their hazardous nature to the environment and high recovery value as an important secondary resource. As valuable metals contained in spent catalyst are in different chemical status and are highly mixed, the difficulty for their recovery lies in how to enhance leaching efficiency and separate different elements from each other efficiently. Till now, the leaching process has been studied fully while the separation of elements is complicated and reagent consumed. Herein, a novel promising method for separation valuable elements was introduced by using a carbothermic reduction process. In the new method, thermodynamic calculation method was used to predict the reaction mechanism and optimum conditions for carbothermic reduction. After carbothermimc reduction, metal oxides were transformed to compounds with obvious property differences using a carbothermic reduction method. Subsequently, the generated compounds were separated from each other through simple operations. This new route for recovery of valuable elements from spent hydrotreating catalyst not only dramatically reduce the handling cost and simplify handling procedure, but also make the recycling process much more environmentally friendly.

Biography

Wang Wenqiang received his master's degree in Metallurgical Engineering from Central South University (Changsha, China) in 2016. His research directions included extraction metallurgy of rare metals (W, Mo and V), separation and purification technology (separation of similar elements like Mo from W, Li from Mg). Currently, he is pursuing his Ph.D. in Chemical Engineering and Technology under direction of Prof. Xu Shengming in Tsinghua University. His researches mainly focus on the recycling of secondary resources, including spent lithium ion batteries (LIBs), spent hydrotreating catalysts and metallurgical slags.

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