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## Extraction of Nanosized Cobalt Sulfide from Spent Hydrocracking Catalyst

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### Abstract

The processes used for the extraction of metals (Co, Mo, and Al) from spent hydrotreating catalysts were investigated in this study. A detailed mechanism of the metal extraction process is described. Additionally, a simulation study was performed to understand the sulfidizing mechanism. The suggested separation procedure was effective and achieved an extraction of approximately 80-90%. In addition, the sulfidization mechanism was identified. This sulfidizing process for Co was found to involve an intermediate, the structure of which was proposed. This proposed intermediate was confirmed through simulations. Moreover, the activities of the spent and the regenerated catalyst were examined in the cracking of toluene. The modification of the spent catalyst through the use of different iron oxide loadings improved the catalytic activity.

### Keywords

**KeyWords Plus:** THIOGLYCOLIC ACID; CONTROLLABLE SYNTHESIS; HYDROTHERMAL PROCESS; SOLVENT-EXTRACTION; RECOVERY; HYDRODESULFURIZATION; NANOCRYSTALS; MOLYBDENUM; PRECURSOR; NANORODS

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