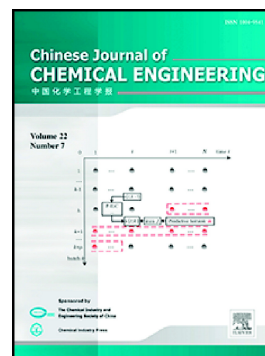


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*Separation science and engineering*

## **Separation of chalcopyrite and pyrite from a copper tailing by ammonium humate<sup>#</sup>**

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**Abstract:** Copper tailings constitute a large proportion of mine wastes. Some of the copper tailings can be recycled to recover valuable minerals. In this paper, a copper tailing was studied through the chemical analysis method, X-ray diffraction and scanning electron microscope-energy dispersive spectrum. It turned out that chalcopyrite (Cu) and pyrite (S) was the main recoverable minerals in the tailing. In order to separate chalcopyrite from pyrite in low pulp pH, ammonium humate (AH) was singled out as the effective regulator. The depression mechanism of AH on the flotation of pyrite was proved by FTIR spectrum and XPS spectrum, demonstrating that there was a chemical adsorption between AH and pyrite. By response surface methodology (RSM), the interaction between AH, pulp pH and iso-butyl ethionine (Z200) were discussed. It was illustrated that the optimal dosage of AH was 1678g/t involving both the recovery of Cu and S. The point prediction by RSM and the closed-circuit flotation displayed that the qualified Cu concentrate and S concentrate could be obtained from the copper tailing. The study indicated that AH was a promising pyrite depressor in the low pulp pH from copper tailings.

**Keywords:** Copper tailings; Ammonium humate; Depression; Response surface methodology

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