

RECOVER OF HIGH PURITY CALCIUM SULFATE FROM PHOSPHOGYPSUM I: THERMODYNAMIC STUDY OF SO_4^{2-} PURIFICATION

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Chemical agents SO_4^{2-} and Ca^{2+} in phosphogypsum could be recycled to make high-purity calcium sulfate whisker. A key step in this process is to decompose phosphogypsum using NaOH solution to obtain Na_2SO_4 solution and $\text{Ca}(\text{OH})_2$ residue. In this decomposition process, thermodynamic analysis indicates that the majority of impurities reports to the residue phase $\text{Ca}(\text{OH})_2$, with minor amounts of Si and Al impurities end up in Na_2SO_4 solution in forms of Na_2SiO_3 and KAlO_2 . Based on phase diagram at 25°C for the Na_2SO_4 - SiO_3^{2-} - AlO_2^- system, Si and Al impurities may be removed via precipitation by adjusting pH value of the Na_2SO_4 solution. In verification tests on a sodium phosphate solution of pH 13.2 with 17.7mg/L of Al and 3.41mg/L of Si, when pH was adjusted to 12 no Al was detected in the solution with 8.48% Si removal. After solution pH was further lowered to 7, Al was still negligible in the liquid phase, but Si removal was increased to 75.89%..