RECOVER OF HIGH PURITY CALCIUM SULFATE FROM PHOSPHOGYPSUM I:
THERMODYNAMIC STUDY OF SO₄²⁻ PURIFICATION

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Chemical agents SO₄²⁻ and Ca²⁺ 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 Na₂SO₄ solution and Ca(OH)₂ residue. In this decomposition process, thermodynamic analysis indicates that the majority of impurities reports to the residue phase Ca(OH)₂, with minor amounts of Si and Al impurities end up in Na₂SO₄ solution in forms of Na₂SiO₃ and KAlO₂. Based on phase diagram at 25°C for the Na₂SO₄-SiO₃²⁻-AlO₂⁻ system, Si and Al impurities may be removed via precipitation by adjusting pH value of the Na₂SO₄ 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%.