

## **A rapid sample digestion and U-Th separation method for gypsum in $^{230}\text{Th}$ dating**

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Gypsum is widely used for  $^{230}\text{Th}$  dating in salt lake and cave evolution, but there are still some problems in sample pretreatment. Digesting gypsum samples is difficult and time consuming. In addition, the recrystallization of gypsum crystal will cause difficulties in U-Th separation and purification.

In this study, a rapid and simple method has been developed for the gypsum digestion and U-Th separation. Gypsum samples were digested using  $\text{K}_2\text{CO}_3$  solution, in which the insoluble calcium sulfate was converted into the digestible calcium carbonate and soluble sulfate only in 2 hours. After that, we separated the calcium carbonate and soluble sulfate to avoid the recrystallization of gypsum crystal. The U-Th separation was performed using TRU-resin, and the  $\text{Fe}(\text{OH})_3$  coprecipitation step was omitted. U-Th isotopic ratios were measured by multi-collector inductively coupled plasma mass spectrometry (MC-ICP-MS).

Based on repeated measurements of Laboratory internal standard sample (PX1704), the preliminary results show that the gypsums were almost fully converted into calcium carbonate deposit in the  $\text{K}_2\text{CO}_3$  solution. The  $^{230}\text{Th}$  ages of the gypsum samples digested in  $\text{K}_2\text{CO}_3$  solution are in agreement with our previous experiments, in which the gypsum samples were digested using mixed acids. Therefore, the proposed method can be used for rapid sample digestion and U-Th separation in gypsum  $^{230}\text{Th}$  dating.