

## **The Search for Surviving Direct Samples of Early Solar System Water**

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We have become increasingly aware of the fundamental importance of water, and aqueous alteration, on primitive solar-system bodies. All classes of astromaterials studied show some degree of interaction with aqueous fluids. Nevertheless, we are still lacking fundamental information such as the location and timing of the aqueous alteration and the detailed nature of the aqueous fluids. Halite crystals in two meteorite regolith breccias were found to contain aqueous fluid inclusions (brines) trapped ~4.5 BYBP. Heating/freezing studies of the aqueous fluid inclusions in these halites demonstrated that they were trapped near 25°C. The initial results of our O and H isotopic measurements on these brine inclusions can be explained by a simple model mixing asteroidal and cometary water. We have been analyzing solids and organics trapped alongside the brines in the halites by FTIR, C-XANES, SXRD and Raman, as clues to the origin of the water. The organics show thermal effects that span the entire range witnessed by organics in all chondrite types. Since we identified water-soluble aromatics, including partially halogenated methanol, in some of the halite, we suspected amino acids were also present, but have thus far found that levels of amino acids were undetectable (which is very interesting). We have also been locating aqueous fluid inclusions in other astromaterials, principally carbonates in CI and CM chondrites. Although we have advanced slowly towards detailed analysis of these ancient brines, since they require techniques right at or just beyond current analytical capabilities, their eventual full characterization will completely open the window onto the origin and activity of early solar system water.