HYDROGEN, CHLORINE AND OXYGEN ISOTOPE ANALYSES OF THE ANGSA DRIVETUBE SAMPLES. Z.D. Sharp[1], E. J. Cano[1], M. Cato, A. M. Gargano[1], C. K. Shearer[2], K. G. Ziegler[2] [1]Dept. of Earth & Planetary Sciences, University of New Mexico, Albuquerque, NM, 87131, [2]Institute of Meteoritics, University of New Mexico, Albuquerque, NM, 87131. Email: zsharp@unm.edu

Introduction: The δD values of H_2 from Apollo return samples were extremely light and thought to represent implanted solar wind [1]. 'Water' was heavier, with δD values up to -580‰ [2]. Terrestrial contamination and/or spallation reactions were postulated as the source of deuterium. Later ion microprobe measurements of apatite show extremely elevated δD values approaching 1000‰, suggesting either cometary input [3] or extensive hydrodynamic escape of protium during an early episode of volatile loss [4]. Ion microprobe analyses of agglutinates are generally similarly light with several samples having extremely high D/H ratios [5]. In order to eliminate terrestrial contamination concerns, we plan to analyze the D/H ratio and water content of the Apollo 73002 drive tube sample as part of the ANGSA project. We will also measure the Cl isotope composition and halogen (F, Cl, Br, I) concentrations and high precision triple oxygen isotope ratios.

Methods: A 1.0 g sample was taken from the 'derind' of the upper section of the 73002.5 drive tube between 8.5 and 18.5 cm. The sample was sealed in a cleaned stainless steel container in a N_2 glove box with <10 ppm H_2O. The sealed sample was brought to the Center for Stable Isotopes (CSI) at the University of Mexico and transferred to a similarly dry nitrogen glovebox (<10 ppm water). Part of the sample will be transferred to silica glass tubes sealed at each end with Swagelok bellows valves (each one previously dried on a hot plate in the glove box to remove adsorbed water). The sealed sample will then be transferred to the micro-extraction line where evolved hydrogen (as H_2 and H_2O) will be carried in a stream of He over hot copper oxide to oxidize H_2, cryofocused using a liquid nitrogen trap and then quantitatively reduced to H_2 by carbon reduction at 1350°C [6]. The hydrogen isotope ratio is measured in continuous flow mode. Hydrogen isotope values and water contents will be calculated at ~100°C steps to assess whether H_2 and H_2O reservoirs release at different temperatures.

We will also measure the $\delta^{37}Cl$ values of water soluble and 'structurally bound' chloride using gas source mass spectrometry [7]. The $\delta^{37}Cl$ values of lunar samples are almost always enriched in ^{37}Cl compared to terrestrial samples. It is generally assumed that preferential volatilization of the light isotope explains the heavy $\delta^{37}Cl$ values. The high level position of this core sample may reflect the 'depository' of the light vaporized Cl.

Finally, we will measure the $\delta^{17}O$ and $\delta^{18}O$ values of this and future samples. For oxygen isotopes, we are especially interested in measuring samples that represent potential new lithologies. For all samples, a 10 mg split will be taken for careful SEM analysis.

References:

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