OXYGEN ISOTOPIC ANALYSES OF WATER IN BJURBÖLE AND MURCHISON METEORITES. M. H. Nunn[1] and M. H. Thiemens[1], [1]Department of Chemistry and Biochemistry, University of California, San Diego, 9500 Gilman Drive, La Jolla, California, 92093-0356. E-mail: mnunn@ucsd.edu.

**Introduction:** Past oxygen isotopic analyses of the Bjurböle meteorite have been limited to whole rock and chondrule studies. We present here the first oxygen isotopic measurements of water contained in the matrix and chondrules of the L4 equilibrated ordinary chondrite Bjurböle.

**Methods:** Water was extracted by vacuum pyrolysis from samples of separated matrix and chondrules from Bjurböle. A new, low volume, ultra low blank system was built specifically for these measurements. Each sample of matrix or chondrules was pumped overnight on a vacuum line to remove as much adsorbed terrestrial water as possible before heating stepwise to 150, 350, 600 and 1000°C. While heating, evaporated volatiles were collected in a liquid nitrogen cold trap. Water was quantitatively converted to molecular oxygen with bromine pentafluoride. Isotopic abundances were measured on a double-collecting isotope ratio mass spectrometer.

**Results and Discussion:** The $\Delta^{17}O$ values of extraterrestrial water extracted at high temperatures from Bjurböle matrix and chondrules are up to 0.8 and 0.7, respectively (Figures 1 and 2). Previous studies performed using direct fluorination of Bjurböle chondrules and whole rock and UV laser probe analyses of individual Bjurböle chondrules indicate the bulk oxygen is isotopically heavy compared to oxygen in water contained in these fractions [1, 2]. This presumably reflects different equilibration histories of water and oxygen-bearing minerals in each component. Additionally, the proximity of $\Delta^{17}O$ values of water extracted at lower temperatures to zero indicates low-temperature heating is necessary to remove all adsorbed terrestrial water and obtain the true isotopic signature of extraterrestrial water.

More terrestrial controls are being developed and studied to elucidate the true isotopic signature of extraterrestrial water in meteorite samples.

The step-wise pyrolysis method employed for these measurements is currently being applied to study the water contained in Murchison, a CM2 carbonaceous chondrite. Results of this study will be presented and discussed.

**References:** [1] Clayton *et al.* (1991) *GCA* **55**, 2317. [2] Ash *et al.* (1997) *60th Annual Meteoritical Society Meeting*, 5282.

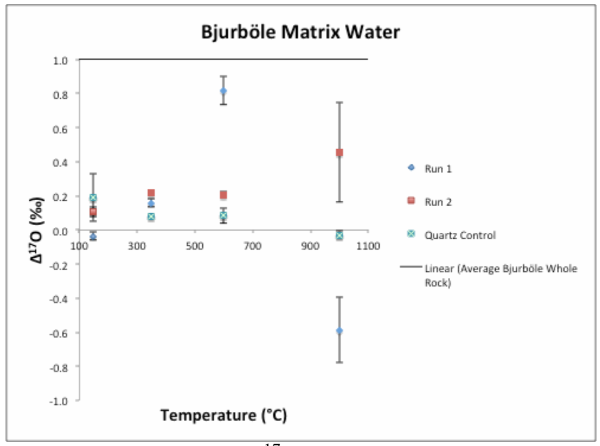


Figure 1. Variation of $\Delta^{17}O$ of oxygen in water extracted from Bjurböle matrix with temperature. Water evolved at lower temperatures (150 and 350°C) is terrestrial in origin while higher temperatures (600 and 1000°C) reflect extraterrestrial water. The $\Delta^{17}O = 1$ line obtained from analysis of Bjurböle whole rock by direct fluorination is shown for reference [1].

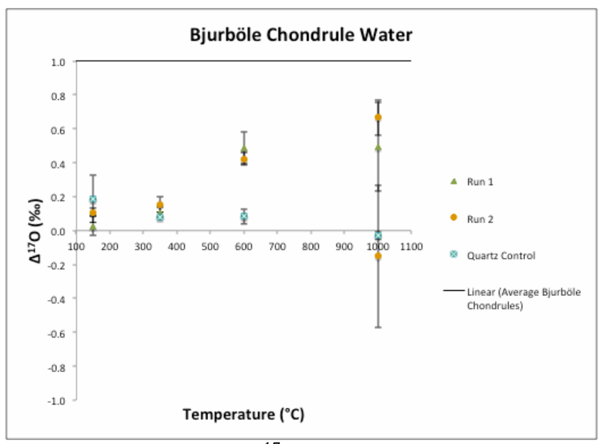


Figure 2. Variation of $\Delta^{17}O$ of oxygen in water extracted from Bjurböle chondrules with temperature. Water evolved at lower temperatures (150 and 350°C) is terrestrial in origin while higher temperatures (600 and 1000°C) reflect extraterrestrial water. The $\Delta^{17}O = 1$ line obtained from analysis of Bjurböle chondrules by direct fluorination and UV laser probe is shown for reference [1, 2].