**CORRELATED NUCLEOSYNTHETIC ISOTOPE VARIABILITY IN Cr, Sr, Ba, Sm, Nd AND Hf IN MURCHISON AND QUE 97008.**

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**Introduction:** Step-wise acid digestion is a very useful means of increasing the magnitude of nucleosynthetic isotope anomalies and probing the nature of the carriers of isotope anomalies in chondrites. We performed step-wise dissolution of two primitive meteorites, the CM2 chondrite Murchison and the L3.05 chondrite QUE 97008. The isotopic compositions of Cr, Sr, Ba, Nd, Sm and Hf were characterized. We also examined the consequences of nucleosynthetically-induced isotope variations for the interpretation of the variations of radiogenic isotope abundances.

**Methods:** ~ 5g of each meteorite was crushed to <60 μm, and sequentially leached with (i) 8.5 N acetic acid (at room temperature for 24h), (ii) 6 N $HNO_3$ (at room temperature for 5d), (ii) 6 N HCl (at 75 °C for 24h), and the residue was dissolved with an HF-$HNO_3$ mixture using a Parr Bomb (at 170 °C for 1w). From each leach and residue, Cr, Sr, Ba, Nd, Sm and Hf were extracted and purified using conventional ion-exchange techniques. The isotopic compositions for all elements except Hf were measured on a Triton thermal ionization mass spectrometer. Hf isotopic compositions were determined on a Nu-plasma multicollector ICP-MS.

**Results:** Isotopic anomalies of nucleosynthetic origin are observed in all elements in all leaches and the residue of Murchison. In general, where resolved, the nucleosynthetic isotopic anomalies are 2-5 fold smaller in QUE 97008 than in Murchison. The difference in the magnitude of anomalies is similar to the difference in their matrix abundances consistent with the suggestion that matrix is the main carrier of anomalous material. The anomalies in all but Cr are best explained by variable additions of pure *s*-process nuclides to a background nebular composition slightly enriched in *r*-process isotopes compared to average Solar System material. Leaching leaves a residue in Murchison that is strongly enriched in *s*-process nuclides with depletions of over 1 % in $^{135}$Ba and 7 ε in $^{84}$Sr. Combined with concentration data, this indicates that the isotopic compositions of Ba and Sr in the Murchison residue are strongly influenced by *s*-process-rich presolar SiC. Neodymium, Sm and Hf display variable *s*-,*r*-process nuclide abundances as do Ba and Sr, but the anomalies are much smaller. Samarium shows variable relative abundances of the *p*-process isotope $^{144}$Sm that do not correlate with $^{142}$Nd, suggesting that the direct *p*-process contribution to $^{142}$Nd is small. Correcting for nucleosynthetic variability in Nd explains the range in $^{142}$Nd/$^{144}$Nd seen between C-, and O-, E-chondrites, but not the difference between chondrites and all modern Earth rocks, leaving decay of $^{146}$Sm and a superchondritic Sm/Nd ratio as the likely explanation for Earth's high $^{142}$Nd/$^{144}$Nd. The *s*-,*r*-variations observed in Hf caution relying on isotopically anomalous refractory inclusions for the initial abundance of the short-lived $^{182}$Hf, a *r*-process nuclide, in the Solar System.