Trace Elements in the Rumuruti Chondrites

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The Rumuruti chondrites are a group of highly oxidized [1, 2], highly sulfidized [3, 4] meteorites with enhanced $\Delta^{17}O$ values [5]. These meteorites provide a record of a region rich in volatiles. Determining the conditions for formation of these meteorites will therefore lead to greater understanding of the distribution of volatiles in the early Solar System.

Previous measurements of the bulk composition of the R chondrites indicate that they are chemically similar to the ordinary chondrites [5, 6], with some key differences. Refractory lithophile elements Al, Ca, Sc, and V are intermediate between the carbonaceous and ordinary chondrites in the R chondrites. Moderately volatile elements Mn, Na, Se, and Zn are enriched relative to the carbonaceous chondrites; for Mn and Na this enhancement is mirrored in the ordinary chondrites (~1.2-1.4 x CI for R chondrites and ordinary chondrites).

We report trace elements in six R chondrites: LAP 031135, LAP 031156, LAP 04840, NWA 7514, PCA 91002, and PRE 95411. Meteorites were chosen for their unweathered character (LAP 031135, LAP 031156) [6, 7], or unique characteristics, including amphibole and biotite (LAP 04840) [3], and chalcopyrite (NWA 7514, PCA 91002, and PRE 95411) [8]. Measurements include 23 elements for which no data have yet been reported (Li, Be, Cu, Ge, Sr, Y, Zr, Nb, Mo, Sn, Ba, Ce, Pr, Nd, Gd, Tb, Dy, Er, Tm, Ta, Pb, Th, and U). Data were collected with an Element 2 ICP-MS on solutions of 50 mg samples of bulk meteorites.

Our measurements expand on previous research [5, 6], and provide new insight into the chemistry of these unique meteorites. This research will help to elucidate the diversity of environments present in the early Solar System.

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