Rare Earth Elements in CO and CV Chondrite Components

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We have analyzed the REE compositions of matrix, chondrule minerals and mesostasis, CAIs and AOAs of CV and CO carbonaceous chondrites to assess whether complementarity [1] might hold for the REE, as it does for the major non-volatile elements [2], trace elements [3], and also for certain isotopes of siderophile elements [4,5]. Complementarity refers to the combination of varying modal amounts of chondrules and matrix, and perhaps refractory inclusions (CAIs), to produce bulk rocks with solar system elemental and isotopic ratios. With other lines of evidence [6], complementarity strongly suggests accretion of each chondrite type from a single reservoir with solar ratios of non-volatile elements. Single reservoirs for formation of all components in chondrites would place strong constraints on chondrule formation and on accretionary processes [7].

Polished thick sections of CV3 (Allende, Axtell, Vigarano, and Leoville) and CO3 (Colony, Moss, DaG 023, DaG 078 and Lancé) chondrites were mapped in X-ray element intensity to locate clasts. High count rate maps of spot targets, obtained prior to LA-ICPMS analyses of minerals and mesostasis in chondrules, and other components, were compared to maps of standard minerals to provide analytical calibration, a new method [8].

Our results are consistent with [9], but with more statistical power. The distributions of REE are very consistent among chondrite components in the CO and CV chondrites. We will speculate on their meaning.

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