ENSTATITE METEORITES – SAMPLES OF THE INNER PROTOPLANETARY DISK?

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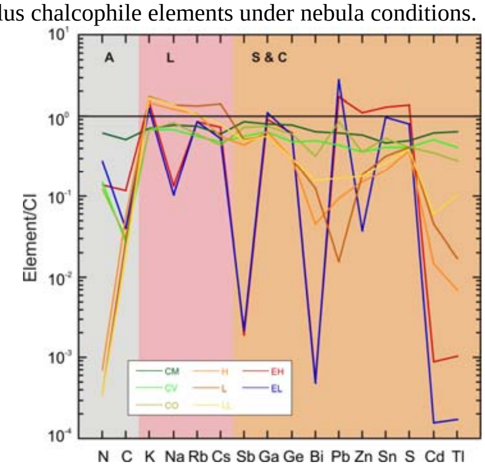
Introduction: The two groups of enstatite chondrites (EH and EL) and aubrites, their differentiated counterparts, are a unique suite of specimens that formed under highly reducing conditions within the solar nebula, possibly on three separate parent bodies [1]. The reduced nature of the meteorites is shown by their unusual mineralogy, characterised by the presence of abundant sulphides. They also have the same oxygen isotopic signature as the Earth-Moon system [2]. This does not mean that Earth and enstatite meteorites formed from the same reservoir, but it suggests that they formed in a similar locality, i.e. the innermost part of the protoplanetary disk. If we wish to understand the formation and evolutionary history of the Solar System, then we must explain how the characteristics of the parental sources of enstatite meteorites fit in with other, more oxidized parents. To this end, we have been investigating the mineralogy of silicate and opaque (oxidised *vs.* reduced) phases within a suite of enstatite meteorites, including unequilibrated enstatite chondrites (UEC), as well as aubrites. We will match mineralogy with volatile content (as determined by a combination of ICP-MS and combustion MS techniques). UEC are little affected by thermal processes, and should preserve a record of volatile condensation under reducing conditions, although very little is known about the distribution and location of volatiles in UEC, as most of the compositional data available are for equilibrated enstatite chondrites [3].

Results: Preliminary whole rock data for equilibrated E chondrites are shown below, compared with C and O chondrites. Data for C and O chondrites are taken from the compilation of [4]. Data for E chondrites are the mean of 3 EH and 3 EL samples; C and N data by combustion, other elements by ICP-MS. Elements are arranged in order of increasing volatility within affinity, where A – atmophile; L- lithophile; S & C – siderophile plus chalcophile elements under nebula conditions.



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