A CLOSER LOOK AT THE SIGNIFICANCE OF CHEMICAL VARIATIONS IN ENSTATITE CHONDRITES. M. L. Hutson, Lunar and Planetary Laboratory, University of Arizona, Tucson, AZ, 85721.

Recent study of major element variations has led to the belief that the enstatite chondrites comprise two chemical groups, EH (high-iron) and EL (low-iron), analagous to H- and L- ordinary chondrites (1,2). The two enstatite groups are distinguished primarily on the basis of nonrefractory siderophile elements, particularly Fe, Ni, Co and Ga. Plots of these four elements have shown two distinct groups separated by a large hiatus (1,2,3). One study also suggested that the two groups have different, non-overlapping values of Mg/Si (3). However, neither the siderophile element content nor the Mg/Si ratio is entirely diagnostic, as shown in figure 1. The crosses in figure 1 are not error bars, but represent the minimum and maximum values reported in the literature. In many cases, the range of Fe/Si for a particular meteorite is as great as the entire range of Fe/Si for the H-group ordinary chondrites. The large variation in Fe/Si may be a result of brecciation in some cases. However, not all of these meteorites appear to be breccias, suggesting there may be a problem with Fe determination in the enstatite chondrites.

No discernable gap can be seen between the EH and EL chondrites in figure 1, unlike for H- and L-group ordinary chondrites. In addition, a least squares line through the entire data set has a greater correlation coefficient ($r=0.7$) than those for the EH and EL data individually. Thus, the major element data is equally consistent with one continuous or two overlapping enstatite chondrite groups.

Larimer and Anders (4) showed that the enstatite chondrites spread over a much greater range of Fe/Mg and Ni/Mg than ordinary or carbonaceous chondrites and suggested that two separate trends of metal-silicate fractionation could explain this data. But when these authors "reconstituted" the data to the CI Mg/Si ratio to take into account lithophile element fractionation, they found that (a) the CI chondrites had the highest Fe/Mg value, implying unidirectional metal-silicate fractionation, and that (b) the enstatite chondrites clustered into two groups with Fe/Mg and Ni/Mg values similar to those of the H- and L-group ordinary chondrites.

The presence of two discrete clusters in Larimer and Anders normalized plot was based on a fairly small data set. There were three meteorites in the low-iron cluster (Fe/Mg approx. = .4) and five in the high-iron cluster (Fe/Mg approx. = .7). As shown in figure 2, additional data tends to fill in the gap between the two clusters. Also, the clusters do not correspond to the EH and EL groups. As with figure 1, figure 2 shows that the data do not distinguish between one continuous or two overlapping enstatite chondrite groups.

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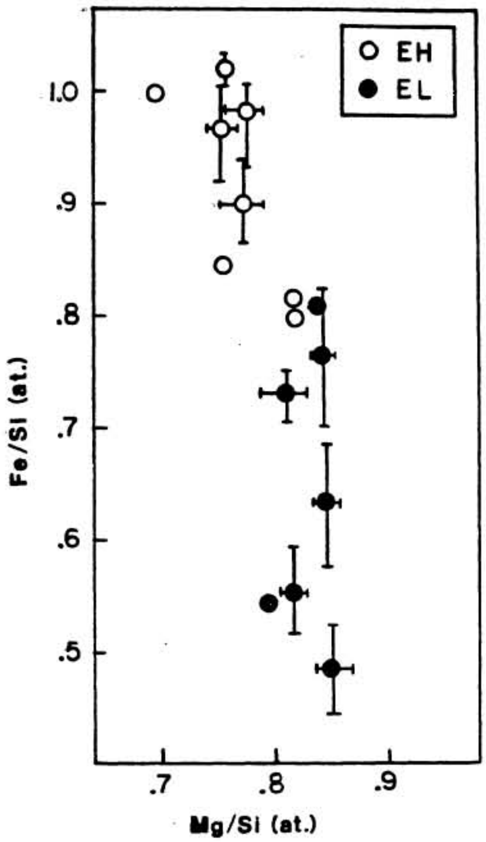

Figure 1. Iron and magnesium variations in enstatite chondrites. Data points represent means taken from the literature. The crosses show the full range of values reported for each meteorite.

Figure 2. Variation of iron and nickel in enstatite chondrites. Data are "reconstituted" to cosmic Mg/Si ratio, after Larimer and Anders (4).