BULK COMPOSITIONAL CONFIRMATION OF THE FIRST EL3 CHONDRITE AND SOME IMPLICATIONS Chang Yanhong, Paul H. Benoit and Derek W.G. Sears, Cosmochemistry Group, Dept. of Chemistry and Biochemistry, Univ. of Arkansas, Fayetteville, AR 72701.

The enstatite chondrites are unusual in that they formed under much lower f(O) and higher f(S) conditions than the other chondrites (1), and for many years it seemed that they showed a correlation between metamorphism and bulk composition, the EL chondrites being type 6, while EH chondrites were type 3-5 (2-4). The latter observation suggests a very unusual parent body structure and history. However, the discovery of RKPA80259, an EL5 chondrite, suggested that the "correlation" might also represent a sampling artifact and that there were two isochemical enstatite chondrite groups (EH and EL) analogous to the three essentially isochemical ordinary chondrite groups (H, L, LL) (5). However, the classification of the highly weathered RKPA80259 has been questioned (6). Recently, petrographic and mineral-chemical data suggested to Lin et al. that the newly discovered MAC88136 is an EL3 chondrite (7,8). Alabandite, schreibersite and kamacite compositions are typical of EL chondrites, while sphalerite and perryite compositions are outside the EH range. Daubreelite is present with EL6 contents of MnS, but higher Zn contents. MAC88136 is also the first enstatite chondrite to contain pentlandite. However such data are difficult to apply to classification because they are often metamorphism-sensitive. Here we report bulk compositional data for MAC88184, which is paired with MAC88136 (and also MAC88180)(7), and several EH chondrites of low petrologic type. We confirm the EL classification of MAC88184.

In addition to MAC88184, we analyzed two new samples of Qingzheng (EH3), and EET87746, which was classified as E4 by Brian Mason (7). Splits weighing about 150-200mg were prepared and analyzed by our previously described INAA method (9). Subject to the reservations below, our data for Qingzheng are in excellent agreement with our earlier analyses (9). We also analyzed two splits Allende standard material and found excellent agreement with literature values. The data for the E chondrites are shown in Fig. 1.

Our bulk compositional data confirm Lin et al.'s suggestion that MAC88136 pairing group is the first known type 3 member of the EL class. Lithophile elements are systematically high by about 30% (expressed CI-normalized abundance ratios) in MAC88184 compared to the other three chondrites and siderophiles are about 20% lower, and their detailed abundance patterns are consistent with EL for MAC88184 and EH for the others. Our Al, La and Sm data sometimes seem a little high, but our data reduction procedures for these elements are incomplete. The three EH chondrites in the present study have compositions very similar to each other. We also observe that Cr, Mn, Na and Se in these low petrologic type enstatite chondrites are on the low end of the observed range for equilibrated enstatite chondrites. This observation was first made by Weeks and Sears and only partially confirmed by Kallemeyn and Wasson (9,6). The former authors suggested that it reflected volatile element mobilization and loss, perhaps during shock; El Goresy et al. have observed chalcophile-rich veins in these chondrites (10). Lin et al. observed that MAC88136 is brecciated. The Zn abundance in these samples is higher than group means, presumably because of their low petrologic type.

For two reasons, the existence of an EL3 chondrite is important in our efforts to understand the history and origin of the enstatite chondrite classes. (1) It is further and highly significant evidence that the enstatite chondrites form two reasonably isochemical series analogous to the three classes of ordinary chondrites. (2) We now have relatively unmetamorphosed equivalents of both classes of enstatite chondrite.

1. Sears (1980) *Icarus* **43**, 184. 2. Keil (1968) *JGR* **73**, 6945. 3. Sears et al. (1982) *GCA* **46**, 597. 4. Keil (1990) *Meteoritics* **24**, 195. 5. Sears et al. (1984) *Nature* **308**, 257. 6. Kallemeyn and Wasson (1986) *GCA* **50**, 2153. 7. Mason (1989, 1990) in *Antarctic Meteorite Newsletter*, **12 (3)** and **13 (2)**. 8. Lin et al. (1991) *LPSC XX* 811. 9. Weeks and Sears (1985) *GCA* **49**, 1525. 10. El Goresy et al. (1983) *Meteoritics* **18**, 293. (NASA grant NAG 9-81).

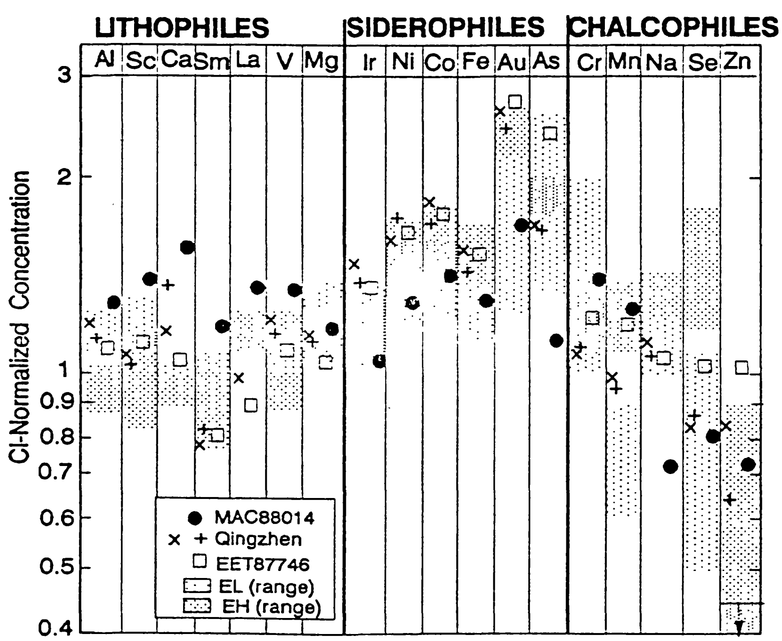

Fig. 1. CI-normalized element abundance ratios in MAC88184, EET87746 and two samples of the Qingzheng enstatite chondrites.