

crystalline matrix. Electronprobe analyses show that olivine ( $Fa = 24.8 \pm 1.0$ ;  $n = 131$ ) followed by plagioclase ( $An_{11}Ab_{83}Or_6$ ;  $n = 60$ ) and pyroxene ( $Fe/Fe+Mg : HY (Wo \sim 2) = 0.21$ ,  $PG (Wo \sim 7) = 0.19$ ;  $n = 91$ ) are severely restricted in composition. Interestingly, one small grain of augite ( $Wo_{44}En_{46}Fs_{10}$ ) was also found. Matrix and chondrule minerals are similar in composition indicating that the meteorite is well equilibrated. Apatite occurs in the vugs of the matrix. Irregular patches of Fe-Ni metal, troilite, and chromite are common.

Extreme fracturing, granulation, and undulose extinction of olivine and pyroxene, maskelynitization of plagioclase (at places even as veins in olivine), and the apparent free flowing forms of troilite attest to a moderately heavy shock event ( $\sim$  "e" of Dodd and Jarosewich). However, maskelynite is almost totally recrystallized with no change in the major element composition into large nearly poikilitic grains of plagioclase. Tabular and rounded olivine is wrapped by a feathery intergrowth of acicular plagioclase and sheaf-like olivine/pyroxene in certain areas of the matrix. If this indicates a rapid cooling from a clast-laden melt, such melting even probably took place prior to the later shock event resulting in the dark bands, etc. In this regard the Louisville meteorite may represent a transition between usual L6 chondrites (Van Schmus and Wood, 1967) and Shaw (Dodd *et al.*, 1975; Taylor *et al.*, 1979).

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## MAJOR ELEMENT COMPOSITIONS OF COARSE-GRAINED ALLENDE INCLUSIONS

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An accurate knowledge of the pre-alteration major element compositions of coarse-grained inclusions is necessary to answer the following questions: a) Do Type A and Type B inclusions (Grossman, 1975) differ in major element composition? b) Do the major element compositions of coarse-grained inclusions plot along or near predicted vapor-solid condensate trajectories? c) In those inclusions interpreted to have been molten, can textural differences be explained by phase relationships on appropriate phase equilibrium diagrams?

Previously published data do not suffice, either because the analysed aliquots are non-representative of inhomogeneous objects, because the compositions include alteration components such as FeO or Na<sub>2</sub>O or because modes were visually estimated rather than calculated from point counts. We have calculated the major element compositions of the primary phase assemblages in five fluffy Type A (MacPherson and Grossman, 1979), four compact Type A (MacPherson and Grossman, 1979), two Type B1 and five Type B2 inclusions by combining detailed point count modes of thin sections of them with electron microprobe analyses of their constituent phases.

Our results from this limited data base suggest that CaO is higher in Type A's than Type B's (33-37% vs 18-30%) and MgO and SiO<sub>2</sub> are lower in Type A's than Type B's (2-10% and 18-25% vs 8-14% and 23-35%, respectively). Type A and Type B inclusions have completely overlapping Al<sub>2</sub>O<sub>3</sub> contents. Fluffy Type A's appear to be slightly richer in SiO<sub>2</sub> and poorer in MgO than compact Type A's. Type B1 inclusions are richer in CaO and poorer in MgO than B2's. Bulk compositions of most coarse-grained inclusions differ significantly from those of condensates predicted by equilibrium calculations to form from a cooling nebular gas. These discrepancies may be caused by omission of hibonite and fassaite from condensation calculations, due to lack of thermodynamic data. Because the average Ca/Al ratio of Type B's is lower than that of Type A's, B's are not simply related to A's by addition of MgO and SiO<sub>2</sub>. On one atmosphere liquidus diagrams for the system CaO-MgO-Al<sub>2</sub>O<sub>3</sub>-SiO<sub>2</sub>, most compact A inclusions plot in the primary phase field for melilite, B2's plot in the primary phase field for spinel, and B1's plot near the melilite-spinel boundary curve. These results are in accord with textural evidence that melilite was the first-crystallizing phase in compact A's, spinel the first in B2's, and spinel and melilite nearly simultaneously in B1's.

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