RAMAN STUDY OF CARBON IN ALLENDE, D. Heymann and NW Read, Dept. of Geology and Geophysics, Rice University, Houston, Texas, USA.

Michel-Levy and Lautie (1) have studied carbons in chondrites with Raman spectroscopic techniques. Monocrystalline graphite exhibits a single first-order band at 1580 cm^{-1} shift, also called G-band. Polycrystalline and disordered carbons show a disorder, or D-band at 1355 cm^{-1} and the G-band is blue-shifted. The widths at half-maximum of both bands are increased. However, the most useful quantitative measure of "order" and "disorder" in carbons is the intensity ratio D/G. This ratio is close to zero for monocrystalline graphite and HOPG, is about 0.3 for natural graphites from Sri Lanka (our own measurements), and is close to 1.0 in carbons from Tieschitz and carbonaceous chondrites (1).

Michel-Levy and Lautie have reported that the D/G ratio decreases by up to 30% in Tieschitz samples heated in the range 400-600 ^{o}C for 1 hr. We therefore set out to study both inert gas release and Raman spectra of carbons in heat treated samples of the Allende meteorite. It was our hypothesis that the gas release should be associated with ordering of the carbon. However, prior to this work, we measured D/G in eleven spots of the matrix of three Allende thin sections. We find an average value D/G = 1.13, but a large range of 0.8 to 1.3; much larger than the range reported for unheated Tieschitz (1). We think that the carbon in Allende comes from "different sources" with a wider initial D/G range than the carbon in Tieschitz.

We then heated nine ½ gram samples of Allende <u>in vacuo</u> to temperatures of 100, 200....1000 deg. C for ½ hour; then for ½ hour to 300, 400....1100 deg. C. The released inert gases were measured mass-spectrometrically. The results for the second heating step are shown in Figure 1.

Raman spectra in the shift range 1200-1700 cm^{-1} were taken on thin sections prepared from the heated samples. Figure 2 shows the measured D/G ratios. All values are in the range of the unheated thin section mentioned above. We conclude, however, that the correlation of gas release and decreasing D/G ratio in the range 900-1100 deg. C is real and signifies that the gas release is associated with ordering of carbon of Allende. We cannot, of course, conclude that the correlation is causal, because one expects the carbon to order upon heating, whether or not any gas is released from these multicomponent systems.

(1) M Christophe Michel-Levy & A Lautie, Nature 292(1981)321 and Journee d' Etude de l' INAG, Paris, 23-35, fevrier 1982.

We used the Dilor Microdil 28 laser microprobe at the Instituut voor Aardwetenschappen of the Vrije Universiteit, Amsterdam, Netherlands. We thank Prof. J. Touret and Mr. R. Burke for their guidance.

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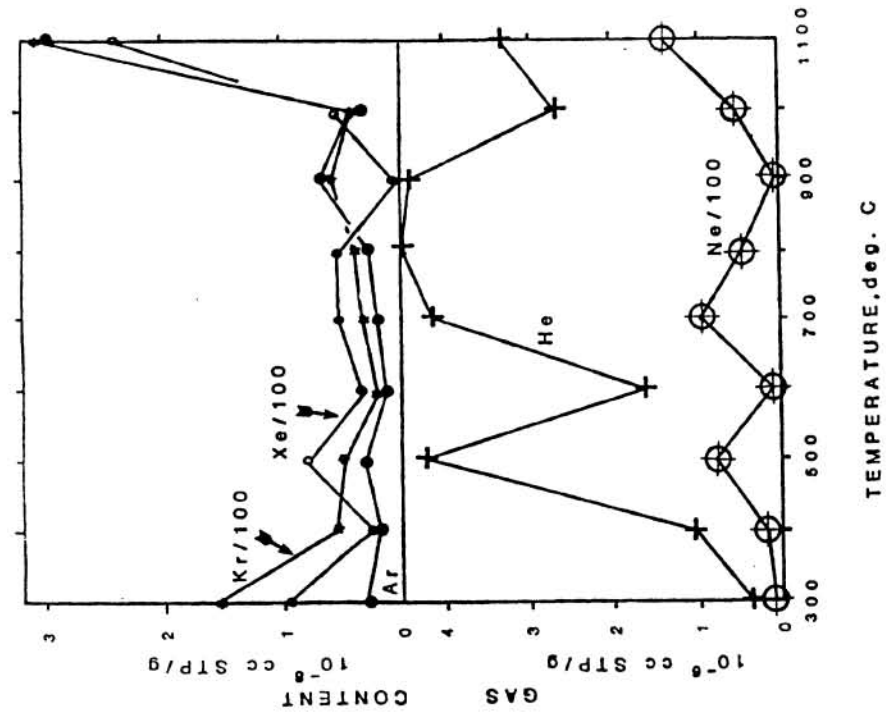

FIGURE 1

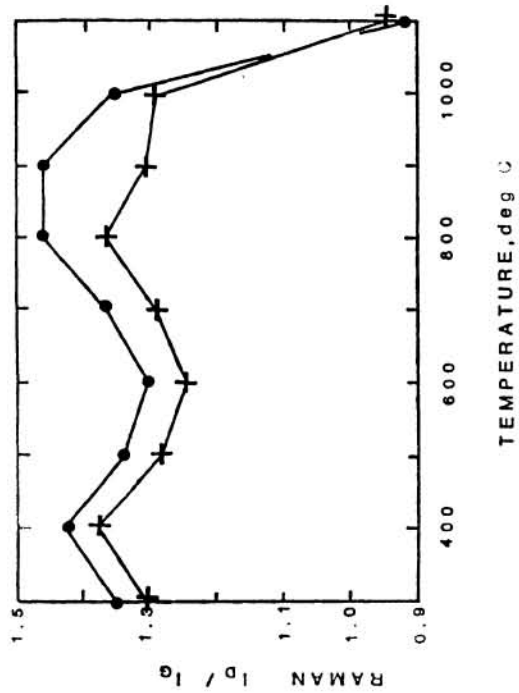

FIGURE 2