Chamberod, A., J. Laugier and J.M. Penisson, to be published.
Danon, J., R. Scorzelli, I. Souza Azevdeo, W. Curvello, J.F. Albertsen and J.M. Knudsen, to be published.
Gooley, R., R.B. Merrill and J.R. Smyth, 1975. *Meteoritics* **10**, 410.
Gros, Y. and J. Paulevé, 1970. *Journal de Physique* **31**, 459.
Gros, Y. and J.C. Pebay-Peyroula, 1964. *Physics Letters* **13**, 5.
Kimball, M., 1973. *Meteoritics* **8**, 397-399.
Lin, L.S., J.I. Goldstein and D.B. Williams, 1977. *Geoch. et Cosmoch Acta* **41**, 1861-1874.
Marchand, A., 1966. PhD thesis, April, Grenoble.
Paulevé, J., D. Dautreppe, J. Laugier and L. Néel, 1962. *Phys. Rad.* **23**, 841.
Petersen, J.F., M. Aydin and J.M. Knudsen, 1977. *Physics Letters* **62A**, 192-194.
Scott, E.R.D., 1973. *Geoch. et Cosmoch. Acta* **37**, 2283-2294.
Taylor, G.J. and D. Heymann, 1971. *Geoch. et Cosmoch. Acta* **35**, 175-188.
Wood, J.A., 1967. *Icarus* **6**, 1-49.
Yoshitaka, Minai, Hiroshi Wakita and Takeshi Tominaga, to be published. *Radiochem. Radioanal. Lett.*

SOLAR NEBULA CONDENSATION: IMPLICATIONS FROM ALLENDE INCLUSION MINERALOGY

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Mineralogical study of a coarse-grained, hibonite-rich Type A inclusion from the Allende meteorite provides information on its mode of formation and, by inference, conditions in the solar nebula (Allen *et al.*, 1978). Primary phases are melilite, hibonite, Ti-Al-pyroxene, perovskite, spinel and rhönite. Although some evidence exists that Type B inclusions were once molten, the possibility that this was the case for Type A inclusions has never been specifically addressed. Because the inclusion studied here is composed almost entirely of CaO, Al_2O_3 and SiO_2, the melting relations in this system can be used as a tool for determining whether the primary phases crystallized from a liquid. For this bulk chemical composition, the phase diagram predicts the presence of melilite enclosed by hibonite, the phase $CaAl_4O_7$ and an interstitial assemblage of gehlenite, hibonite and anorthite if the inclusion crystallized from a melt. None of these features are found in the inclusion, indicating that the primary phases could be direct solid condensates from the solar nebular gas. These were intensely altered during a later condensation event which deposited grossular, anorthite, nepheline and wollastonite in veins and cavities. Five condensate rims were then deposited as layers on the outside of the inclusion, from inside to outside consisting of perovskite + spinel, nepheline + anorthite, Ti-Al-pyroxene + diopside, hedenbergite ± andradite ± wollastonite, and Mg-Fe clinopyroxene + wollastonite + andradite.

Primary melilite grains are reversely zoned from cores of Ak_{20} to rims of Ak_0 and spinel inclusions have halos of Ak-poor melilite, both features indicative of increase in T, decrease in P or change in composition of the gas. At fixed temperature and gas composition, the observed zoning could be produced by condensation of melilite from a gas whose total pressure dropped by 40 percent during crystallization. Spinel and perovskite show irregular, grain-to-grain variations in minor element contents. Spinels vary in Cr, V, Fe and Ti, with interior ones richer in Cr and V and poorer in Fe than those in the rim. Differences in composition between different interior spinels are often greater than differences between interiors and rim spinels. Perovskites vary in Sc, Y, Zr and Fe, with interior one poorer in Fe than those in the rim. These minor element differences and the mineralogical composition differences between primary, alteration and rim assemblages are evidence that different phases in the inclusion condensed from gases under different physico-chemical conditions.

Allen, J.M., L. Grossman, A.M. Davis and I.D. Hutcheon, 1978. *Proc. Ninth Lunar Planet. Sci. Conf.*, in press.

"PLANETARY" NOBLE GASES IN CHONDRITES: A REVIEW

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A variety of ancient noble-gas components are hidden in chondrites. They can be disentangled by unconventional mineral separation techniques (peptization, selective etching), combined with stepwise heating.

The following topics will be reviewed, in the light of recent work by B. Srinivasan, R.S. Lewis, and L. Alaerts.

1. The "normal" planetary component; its host mineral Q, and its variation in chondrites of different petrologic types.

2. The "fission" Xe component, its possible origin from a volatile superheavy element, and its albatross: the "light" Xe component.

3. A new, apparently presolar component, showing the signature of nuclear reactions in red giants: enhancement of Xe^{128}, Xe^{130}, Xe^{132}, Kr^{82}, Ne^{22}, and He^3.