I-Xe ages and trapped Xe compositions

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I-Xe isochrons are mixing lines between a single trapped and a single iodine derived component. The slope of this line establishes initial iodine and hence the I-Xe age. One end of the isochron is fixed by the composition of the trapped Xe component, which should be representative of the Xe extant in the early solar system (Q-Xe or OC-Xe). Because the I/Xe ratio in the solar nebular was ~1, and the $^{129}I/^{127}I$ was about 10^{-4}, the ^{129}Xe in trapped Xe cannot evolve in an open system. While it may be possible for Xe in a closed system with elevated I/Xe ratios to evolve producing trapped components with higher $^{129}Xe/^{130}Xe$ ratios (Kennedy et al., 1988), trapped Xe compositions with *lower* (sub-planetary) $^{129}Xe/^{132}Xe$ ratios seem unlikely. In general, isochron slopes (I-Xe ages) are much better constrained than end member (trapped Xe) compositions. High precision isochrons are required to convincingly constrain trapped compositions. Here we present new data and alternative explanations for sub-planetary trapped Xe.

I-Xe isochrons from 4 Allende CAIs and 6 Allende dark inclusions show two clustered groups of alteration ages, ~ 4 Ma apart, and a range of trapped Xe compositions, each determined with more precision than in previous studies (Swindle, 1998). By comparing irradiated and unirradiated samples, we confirm that the $^{128}Xe/^{132}Xe$ ratios in the trapped components are identical to OC-Xe, but the isochrons often pass below OC-Xe, suggesting that the $^{129}Xe/^{132}Xe$ ratios are lower than OC-Xe. We propose here, however, that it may not be the ^{129}Xe that is anomalously low but the ^{128}Xe (in irradiated samples) that is anomalously high, an alternative to the nebular chemical evolution model (Ozima et al., 2002). If ^{127}I is intimately mixed with trapped xenon, it can result in a trapped Xe pseudo-component with an elevated ^{128}Xe (after neutron irradiation). If this is true, it has important implications: a) Similarly trapped, iodine can act much like an isotope of Xe, and b) trapping of iodine and Xe must have occurred late, after decay of most of the ^{129}I, placing new constraints on the duration of aqueous alteration processes.

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References

Kennedy B. M., Hudson B., Hohenberg C. M., and Podosek F. A. (1988) *Geochim. Cosmochim. Acta* **52,** 101-111.

Swindle T. D. (1998) *Meteorit. Planet. Sci.* **33,** 1147-1155.

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