

I-XE AGES OF THE DARK INCLUSIONS FROM THE REDUCED CV3 CHONDRITES LEOVILLE, EFREMOVKA AND VIGARANO. O. V. Pravdivtseva¹, C. M. Hohenberg¹, A. P. Meshik¹, A. N. Krot² and A. J. Brearley³, ¹Physics Department, Washington University, St. Louis, MO 63130, ²University of Hawaii at Manoa, Honolulu, HI 96822, ³Earth and Planetary Sciences, University of New Mexico, Albuquerque, NM 87131, USA.

Dark inclusions (DIs) are lithic clasts commonly observed in the oxidized (CV_{ox}) and reduced (CV_{red}) subgroups of the CV chondrites [1]. The mineralogy and petrology of the CV DIs indicate that they experienced different types (Fe-alkali metasomatic, aqueous) and degrees of alteration in an asteroidal setting before subsequent excavation and incorporation into their host meteorites [2-4].

To estimate the duration of this alteration, we studied I-Xe systems of DIs from the CV_{red} and CV_{ox}. I-Xe ages of the 17 Allende (CV_{ox}) DIs have been previously reported [5, 6]. These DIs yielded well defined isochrons with ages ranging from 2.77 to 0.46 Ma older than the Shallowater standard (4566 ± 0.2 Ma). Here we present new I-Xe data for DIs from the CV_{red} Vigarano (2226), Efremovka (E80), and Leoville (LV, LV2), whose mineralogy and petrology have been previously described [1, 7-10].

Previously reported I-Xe ages of Efremovka DIs E53 and E39 [9, Table 1] correlate with their degree of alteration and O-isotopic compositions, with least altered E53 being the oldest. DI E80 studied in this work shows highest degree of replacement of primary minerals by secondary fayalitic olivine, andradite and phyllosilicates among Efremovka DIs. The I-Xe age of E80 is concordant with the age of E39 [9] and indicates that this sample was altered either later, or underwent longer alteration than E53. DIs LV1 and E80 are mineralogically similar [8,9]. LV-1 yields a well-defined isochron with a single release peak. In contrast with other CV3 DIs, LV2 shows little evidence of aqueous alteration. Although its I-Xe system is somewhat disturbed, it has an apparent isochron age younger than LV1 [Table 1] and abundant trapped Xe. DI 2226 is composed of high- and low-Ca pyroxene and olivine fragments set in a fine-grained matrix with bands of densely packed, fine-grained matrix-like material, interpreted to be products of sedimentary processes [10]. The I-Xe age of DI 2226 is 8.8 ± 0.6 Ma younger than Shallowater.

The I-Xe ages of 23 DIs from the CV_{ox} and CV_{red} span ~ 14 Ma, suggesting a long period of low temperature alteration.

Table 1. The I-Xe ages of DIs from CV3 meteorites relative to the age of Shallowater, 4566 ± 0.2 Ma (negative means older).

chondrite	sample	I-Xe age, Ma	references
Allende	17 DIs	from -2.77 to -0.46	[5,6]
Efremovka	E53	-4.9 ± 1.8	[9]
	E39	0.8 ± 2.0	
	E80	-1.0 ± 0.5	
Leoville	LV1	3.0 ± 0.1	present work
	LV2	9.5 ± 2.3	
Vigarano	2226	8.8 ± 0.6	

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