

^{26}Al - ^{26}Mg INTERNAL ISOCHRONS FOR TWO CAIs FROM LEOVILLE CV3 CHONDRITE. A. Bouvier¹ and M. Wadhwa¹. ¹School of Earth and Space Exploration, Arizona State University, Tempe, AZ, 85287-1404, USA. E-mail: audrey.bouvier@asu.edu.

Introduction: Constraints on the condensation history and time scales of formation of the calcium aluminum-rich inclusions (CAIs) are important towards understanding the evolution of the solar nebula preceding planetary accretion. The ^{26}Al - ^{26}Mg radiochronometer ($T_{1/2} \sim 0.73$ Ma) provides a means of obtaining high resolution chronology of these events. Recently, however, there has been some debate regarding the initial Solar System $^{26}\text{Al}/^{27}\text{Al}$ ratio, with several studies reporting supracanonical values ($6-7 \times 10^{-5}$) [1-3], and others supporting the canonical value [4] based on CAIs from CV3 chondrites. To address the questions of formation timescales of CAIs and the initial Solar System $^{26}\text{Al}/^{27}\text{Al}$ ratio, we present here high precision ^{26}Al - ^{26}Mg internal isochrons for two separate inclusions from the reduced CV3 chondrite Leoville.

Analytical Methods: A 2.2 g slice of Leoville was obtained from the meteorite collection in the Center for Meteorite Studies. Two mm-sized fine-grained Type-A CAIs (CAI-1 and CAI-2) in this slice were selected for sampling for the Al-Mg isotope analyses. Each of these inclusions was microdrilled at several spots (6 spots for CAI-1 and 4 for CAI-2), using a New Wave Research MicroMill using a 50 μm tungsten-carbide drill bit. The drill holes had diameters of 150 to 450 μm , and a typical depth of ~ 100 μm . Samples equivalent to 0.8 to 10 μg of Mg were recovered in Milli-Q water, dissolved in concentrated HF-HNO₃, and chemically processed for Al-Mg isotope analyses using techniques similar to [5]. Mg isotope ratios and Al/Mg ratios were then measured with the Neptune MC-ICPMS at ASU. Subsequent to sampling, the Leoville slice was carbon-coated and examined using the JEOL JSM 845 scanning electron microscope (SEM) at ASU to determine the mineralogy of the two CAIs.

Results and Discussion: The 6 samples from CAI-1 have $^{27}\text{Al}/^{24}\text{Mg}$ ratios ranging from 3.07 to 5.33 ($\pm 2\%$) and have $^{26}\text{Mg}^*$ excesses of 0.81 to 1.57‰ (typical 2SE, $\pm 0.04\%$), corresponding to an initial $^{26}\text{Al}/^{27}\text{Al} = 4.49 (\pm 0.93) \times 10^{-5}$ (MSWD = 2.2). The 4 samples from CAI-2 have lower $^{27}\text{Al}/^{24}\text{Mg}$ ratios, ranging from 0.35 to 1.39, and $^{26}\text{Mg}^*$ excesses of 0.12 to 0.44‰; these data correspond to an initial $^{26}\text{Al}/^{27}\text{Al}$ ratio of $4.44 (\pm 0.39) \times 10^{-5}$ (MSWD = 1.7). Therefore, the initial $^{26}\text{Al}/^{27}\text{Al}$ ratios from internal isochrons from each of the two Leoville CAIs analyzed here are consistent, within errors, with the typical canonical value of $\sim 5 \times 10^{-5}$ found in normal CV3 CAIs [4, 6]. As such, our data do not show any evidence of a supracanonical $^{26}\text{Al}/^{27}\text{Al}$ ratio in CAIs.

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