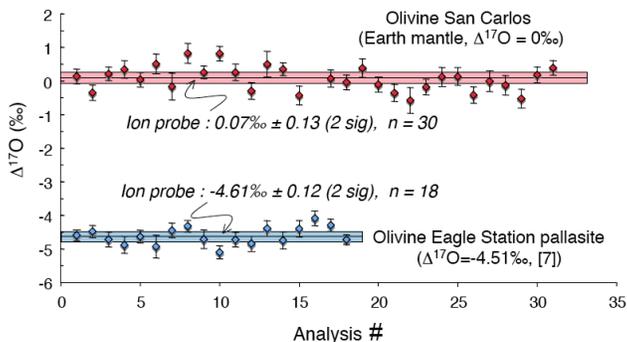


HIGH PRECISION O ISOTOPIC MEASUREMENTS OF Mg-RICH OLIVINES FROM THE ALLENDE METEORITE: CONSTRAINTS ON THEIR ORIGIN

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Introduction: Most type I chondrules from primitive chondrites are characterized by ¹⁶O enrichments which are intermediate between bulk chondrites and the extreme values ($\Delta^{17}\text{O} < -25\%$) observed in Ca-Al-rich refractory inclusions [1]. Libourel & Krot [2] have proposed, on the basis of petrographical observations in CV chondrites, that the Mg-rich olivines in type I chondrules were relict (this is in agreement with the fact that olivines have generally the lowest $\Delta^{17}\text{O}$ value within a given chondrule [3]) and could be fragments of pre-existing planetesimals that underwent global melting and differentiation. One way to test this hypothesis is to look for discrete $\Delta^{17}\text{O}$ values among relict olivines: all olivines originating from a single planetesimal should share the same $\Delta^{17}\text{O}$ value as it is the case for fragments of planetary bodies (Earth, Moon, Mars as sampled by SNCs, Vesta as sampled by HEDs) that underwent an episode of magma ocean ($\Delta^{17}\text{O}$ values homogenized to $\pm 0.015\%$, i. e. the precision reached by the best analytical techniques [4, 5]).

Analytical procedure: The oxygen isotopic compositions were measured in multi-collection mode with 3 FCs at M/AM ≈ 5000 for ¹⁷O with the CRPG-CNRS ims 1270 and ims 1280 HR2 ion probes. The data on San Carlos and Eagle Station olivines (see Figure) show that the $\Delta^{17}\text{O}$ can be determined at $\approx \pm 0.1\%$ (2 sigma) if enough measurements are made on a homogeneous sample. The ultimate goal is to reach a 2 sigma error of $\pm 0.03 - 0.05\%$ as for the measurement of the excess of ²⁶Mg [6].



Results:

Nine Mg-rich olivines from Allende, either isolated olivines or olivines in type I chondrules, were analysed so far with this high precision technique (more than 10 spots per olivine). The $\Delta^{17}\text{O}$ values of these 9 olivines correspond to only three values which are defined, each, within $\pm 0.15\%$ (2 sigmas), as it would be if these olivines originated from 3 different planetesimals. Work is in progress to improve the precision and to increase the data set.

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