
Noble gases in refractory inclusions from the North West Africa 10235 CV3 chondrite: Searching for presolar signatures

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Résumé

Refractory calcium-aluminum rich inclusions (CAIs) are essential records of the distribution of solids in the early protoplanetary disk and their isotopic analysis allows to shed light on the distribution of nucleosynthetic anomalies in the early solar system (*e.g.*, 1). However, it remains unclear if CAIs contain well-preserved presolar grains or if they simply directly condense from gas carrying nucleosynthetic anomalies (2). A recent study reports the detection of presolar grains in by measuring noble gases in one fine-grained inclusion, Curious Marie, contained in the CV3 Allende meteorite (3). A more recent study by another group analyzed noble gases in five CAIs originally contained in the Allende and Axtell CV3 chondrites (4). Results did not allow to identify the presence of presolar grains. In this study, we isolated CAIs from the North West Africa 10235 CV3 chondrite (5). We measured the elemental and isotopic composition of neon, argon, krypton and xenon in an attempt to further search for the presence of presolar grains in refractory inclusions hosted by carbonaceous chondrites.

CAIs analysed in this study contain significant amounts of cosmogenic and fissiogenic gases, making the detection of primordial trapped gases extremely challenging. For neon, most data cluster close to the average cosmogenic end-member for chondrites and only few extraction steps reveal the presence of a ²²Ne-rich component, which could correspond to presolar Ne-G or, more likely, from ²²Ne-rich cosmogenic neon produced in Na-rich phases. The isotopic ratios of argon reveal the presence of both cosmogenic and radiogenic argon. Krypton shows elevated ^{78,80}Kr/⁸⁴Kr ratios, signing the presence of cosmogenic krypton. The isotopic composition of xenon corresponds to a mixture of trapped xenon, cosmogenic xenon, fissiogenic xenon and radiogenic. During the presentation, attempts at correcting xenon isotope ratios for cosmogenic and fissiogenic contributions in order to identify the

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nature of the trapped primordial component will be discussed. **References:** (1) Trinquier A. et al. 2007. *ApJ* 655:1179–1185. (2) Burkhardt C. et al. 2019. *GCA* 261:145–170. (3) Pravdivtseva O. et al. 2020. *Nature Astronomy* 4:617624. (4) Nakashima D. et al. 2021. LPSC LII, Abstract #1944. (5) Bouvier A. et al. 2017. *MAPS* 52:2284.