

Effect of thermal alteration on noble gases in type-3 ordinary chondrites

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The isotopic dichotomy between non-carbonaceous (NC) and carbonaceous (CC) Solar System reservoirs is well established for refractory elements [1], but whether it extends to volatile noble gases remains uncertain. Noble gases in CCs are well studied. We analyse NC ordinary chondrites (OCs) to test this dichotomy by comparison with CCs. So far, 28 unequilibrated OCs (H, L, and LL; types 3.0–3.9) have been analysed for their noble-gas inventories. A key result is the observed decrease of $^{20}\text{Ne}_{\text{tr}}/^{132}\text{Xe}$ ratios with petrologic type: the most primitive samples show higher ratios, while more metamorphosed ones show lower ratios. Elevated $^{20}\text{Ne}_{\text{tr}}/^{132}\text{Xe}$ values also support reclassifying GRO 06054, previously type 3.6, to ~ 3.05 as also shown by [2]. This trend indicates alteration of Ne-rich components during parent-body metamorphism and resembles those observed in primitive CO chondrites [3], suggesting similar initial noble-gas components and similar alteration effects across NC and CC reservoirs.

[1] Kruijer T.S. et al. (2019) *Nat. Astron.* 4, 32–40. [2]
Righter K. et al. (2021) *Meteorit. Planet. Sci.* 56, 1556–
1573 [3] Eckart L.M. et al. (2025) *GCA* 402, 104–133.