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Mg isotope homogeneity in planetary materials

J., Sikdar[1,2*] and V.K., Rai[1,3]

[1]Physical Research Laboratory, India-380009; [2]Freie University, Berlin, D-12249; [3]Center for Meteorite Studies, School of Earth and Space Exploration, Arizona State University, Tempe, USA.

*Email: jinia@zedat.fu-berlin.de

The correlated variation of $\delta^{30}Si$ and Mg/Si among chondrites and BSE has been debated between i) equilibrium Si isotope fraction between metal and silicate during core formation, ii) nebular/disc processes involving removal of forsterite from nebular gas, and iii) preferential loss of Si relative to Mg during impact erosion. Distribution of Mg isotopes place important constraints in identifying the process responsible for this variation. Although Mg isotopes remain unaffected by core-mantle segregation due to its strict lithophilic nature under reduced conditions but forsterite (Mg_2SiO_4) condensation and impact erosion should cause a shift in $\delta^{26}Mg$. Despite the light $\delta^{30}Si$ of enstatite chondrite, our high precision Mg isotope analyses carried out in silicate and matrices of EH3 meteorites indicate its homogeneous $\delta^{26}Mg$ composition similar to chondrites and BSE. This suggests a lead role played by the formation of iron silicide alloy under reduced conditions to fractionate Si isotopes and Mg/Si ratio across solar system.

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