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Oxygen isotope fractionation originated from the atmospheric escape in the course of the accretion process. Implications in the formation of the Solar System

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By virtue of the data gathered by the Genesis mission, as well as of the magnificent work done by scientists such as Robert Clayton, Mark Thiemens or Hisayoshi Yurimoto, among many others, it has been possible to obtain a wide collection of the isotopes of oxygen from different meteorites and planetary bodies in the Solar System, which have been classified according to their isotope fractionation. Despite this, the source of the diversity of this data collection is still uncertain. One of the foremost inquiries that commonly arise refers to the mechanism by which some planetary bodies such as the Earth, Mars or Vesta, acquired a mass-dependent fractionation (MDF) of three oxygen isotopes, whereas the most primitive Solar System material analysed so far, the CAIs, registers a mass-independent performance (MIF). This study is designed to suggest that, in the course of the accretion process, the vaporization of oxygen owing to high temperatures resulting from different impacts, alongside gravity on proto-planets, are the responsible for the atmospheric escape of the fraction of oxygen which formed the planetesimals. This resulted in the transformation of the MIF fractionation, inherited from the protoplanetary disk, into MDF in the rocky planetary bodies.