

Isotope Fractionation by Mass Transport in Silicate Melts and Minerals.

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Abstract

Evaporation as a mechanism for isotopic fractionation of silicate liquids has been demonstrated and quantified by vacuum evaporation experiments and the results are used to constrain the thermal evolution of calcium- aluminum- rich inclusions (CAIs) in primitive meteorites. Laboratory experiments have also documented large isotopic fractionations by diffusion in both silicate melts and in minerals such as pyroxenes and olivines. Diffusive isotope fractionations have been used to determine the cooling history of a variety of natural settings ranging from lava lakes, arc volcanics, minerals in mantle nodules, basalt- granite contacts in coastal Maine, and pyroxene cumulates from Mars.