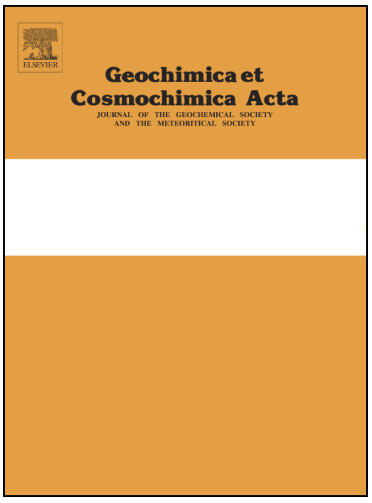
Accepted Manuscript



A history of violence: insights into post-accretionary heating in carbonaceous chondrites from volatile element abundances, Zn isotopes, and water contents

Brandon Mahan, Frédéric Moynier, Pierre Beck, Emily A. Pringle, Julien Siebert

PII: S0016-7037(17)30583-5
DOI: http://dx.doi.org/10.1016/j.gca.2017.09.027
Reference: GCA 10475

To appear in: *Geochimica et Cosmochimica Acta*

Received Date: 20 January 2017
Accepted Date: 13 September 2017

Please cite this article as: Mahan, B., Moynier, F., Beck, P., Pringle, E.A., Siebert, J., A history of violence: insights into post-accretionary heating in carbonaceous chondrites from volatile element abundances, Zn isotopes, and water contents, *Geochimica et Cosmochimica Acta* (2017), doi: http://dx.doi.org/10.1016/j.gca.2017.09.027

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

ACCEPTED MANUSCRIPT

A history of violence: insights into post-accretionary heating in carbonaceous chondrites from volatile element abundances, Zn isotopes, and water contents

Brandon Mahan [a,*], Frédéric Moynier [a,b], Pierre Beck [b,c], Emily A. Pringle [a], Julien Siebert [a,b]

[a] *Institut de Physique du Globe de Paris, Université Paris Diderot, Université Sorbonne Paris Cité,*

CNRS UMR 7154, 1 rue Jussieu, 75238 Paris Cedex 05

[b] *Institut Universitaire de France, Paris, France*

[c] *UJF-Grenoble 1, CNRS-INSU, Institut de Planétologie et d'Astrophysique de Grenoble (IPAG), UMR 5274, Grenoble F-38041, France*

**corresponding author, email: mahan@ipgp.fr, phone: +33 (07) 62 93 56 12*

Abstract

Carbonaceous chondrites (CCs) may have been the carriers of water, volatile and moderately volatile elements to Earth. Investigating the abundances of these elements, their relative volatility, and isotopes of state-change tracer elements such as Zn, and linking these observations to water contents, provides vital information on the processes that govern the abundances and isotopic signatures of these species in CCs and other planetary bodies. Here we report Zn isotopic data for 28 CCs (20 CM, 6 CR, 1 C2-ung, and 1 CV3), as well as trace element data for Zn, In, Sn, Tl, Pb, and Bi in 16 samples (8 CM, 6 CR, 1 C2-ung, and 1 CV3), that display a range of elemental abundances from case-normative to intensely depleted. We use these data, water content data from literature and Zn isotopes to investigate volatile depletions and to discern between closed and open system heating. Trace element data have been used to construct relative volatility scales among the elements for the CM and CR chondrites. From least volatile to most, the scale in CM chondrites is Pb-Sn-Bi-In-Zn-Tl, and for CR chondrites it is Tl-Zn-Sn-Pb-Bi-In. These observations suggest that heated CM and CR chondrites underwent volatile loss under different conditions to one another and to that of the solar nebula, e.g. differing oxygen fugacities. Furthermore, the most water and volatile depleted samples are highly enriched in the heavy isotopes of Zn. Taken together, these lines of evidence strongly

Download English Version:

https://daneshyari.com/en/article/5783152

Download Persian Version:

https://daneshyari.com/article/5783152

Daneshyari.com