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Isotope fractionation of moderately volatile elements in variably shocked ordinary chondrites

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Ordinary chondrites (OC) represent the most abundant type of meteorites, representing more than 85% of the total world collection. Yet they remain poorly studied for their stable isotope compositions. Results have been published for a range of elements but generally as part of broader studies (e.g. [1], [2]). Stable isotope variations of moderately volatile elements (MVE) such as Cu and Zn are useful tools to investigate fractionation effects induced by condensation and evaporation. OC may have also experienced shock events on their parent bodies as they exhibit different shock features, resulting in the loss of volatile elements and subsequently leading to possible isotope fractionation of MVE. Therefore, new stable isotope data are required to reconcile literature data with the shock degree of OC and behavior of MVE. In recent years, high precision isotope measurements of MVE gallium have shown promising results regarding isotopic fractionation in volatility-controlled processes such as condensation and evaporation [3]. Here, Ga will thoroughly be investigated together with Cu and Zn and compared to previous studies in order to evaluate the possible shock effects on MVE isotopes in ordinary chondrites.

In this study, we have determined the shock stage as well as the degree of weathering of a series of H6 ordinary chondrites according to the classification established by [4] and [5], respectively. Elemental data were collected using two different ICP-MS instruments at ULB and VUB whereas isotope ratios were measured using the Nu II HR-MC-ICP-MS in combination with an Aridus 2 desolvating nebulizer at ULB. We report new data on the MVE isotopes Cu, Zn, and the recently developed Ga as well as more refractory Fe in bulk H6 chondrites and aim to link isotopic variations to the shock degrees recorded in ordinary chondrites.

[1] Luck et al. (2005), *Geochim. Cosmochim. Acta* 69, 5351–5363. [2] Moynier et al. (2007), *Geochim. Cosmochim. Acta* 71, 4365–4379. [3] Kato & Moynier (2017), *Earth Planet. Sci. Lett.* 479, 330-39. [4] Stöffler et al. (1991), *Geochim. Cosmochim. Acta* 55, 3845–3867. [5] Wlotzka (1993), *Meteoritics* 28, 460-460.