# The origin of the elevated Hg concentrations in meteorites

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Mercury is a highly volatile element with a condensation temperature that falls between ices/gases and elements that condense into troilite (e.g., Cd, Tl) [1]. Compared to Cd and Tl, the Hg abundances in stony meteorites are elevated and scatter significantly. Meteorites, depleted to various degree in volatiles, such as the CV3 or ordinary chondrites show puzzling variations from ~$10^1$–$10^4$ ppb Hg that do not follow the general volatile depletion trend in these meteorites. Most strikingly concentration data from the CI chondrite Orgueil vary from 480–213000 ppb [2]. This abundance is key to determine the average solar system abundance, which is a crucial baseline in cosmochemistry. The Hg variations were proposed to be contamination, while others argued that this is unlikely [3]. Key to resolve this conundrum is the form, in which Hg occurs in these meteorites. Therefore, we performed thermo-desorption experiments on chondrites for which we previously determined Hg concentrations and isotope compositions [4]. Mercury species were determined by pyrolitic-thermo-desorption-AAS [5], continuously recording Hg release up to 700°C under $N_2$ gas flow.

Orgueil shows two distinct release peaks at ~200 °C (40% of total Hg) and ~300 °C (60%). The latter peak is identical to our cinnabar standard and indicates that 60% of the total Hg ($10^5$ ppb in our sample) is HgS. Intrinsic contamination with HgS in a terrestrial environment is highly unlikely and thus we conclude that the concentration variations in Orgueil are a true feature of the rock and most likely stem from the heterogeneous distribution of HgS. Allende (CV3) and Vigarano (CV3) show release peaks at ~200 °C with a hint of a later release. This may indicate HgS breakdown to metallic Hg, which is then incorporated into minerals during parent body heating. This idea is also supported by data for ordinary chondrites (Estacado H6, Richardton H5, Allegan H5, Sharps H3.6), which have experienced parent body metamorphism and show a well-resolved single release peak around 200°C.

[1] Lodders (2003) *ApJ* **591** 1220-1247. [2] Lauretta *et al.* (1999) *EPSL* **171**, 35- 47 [3] Lauretta *et al.* (2001) *GCA* **65**, 2807-2818. [4] Wiederhold & Schönbächler (2015) *LPSC* **46**, 1841. [5] Biester & Scholz (1996) *ES&T* **31**, 233-239.