

# What controls the partitioning of base metals between hydrothermal fluids and melts? An experimental approach

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Metal degassing during magmatic and volcanic activity is a major driving force for the formation of ore deposits and can have severe environmental implications [1]. The degassing efficiency of metals has been proven to depend on the tectonic setting (e.g., intraplate vs. subduction), the composition of the magma from which the metals derive, the fluid composition and the availability of ligands, as well as the oxygen fugacity of the system [e.g., 2]. To better understand metal fluxes within different tectonic settings it is extremely important to understand the partitioning behavior of metals between a magma and its exsolved magmatic volatile phase. Different experimental strategies have been previously employed to analyze experimental fluids which have equilibrated with a silicate melt, and include techniques such as fluid-trapping [3] and direct analyses of the separated fluid [4, 5]. However, most studies have focused on the conditions of ore-forming systems, such as Cu-porphyrines [3, 4, 6]. In order to better understand the effect of melt composition on the partitioning behaviour of base metals (Cu, Zn, Pb), we have further developed these methods [4, 5] to directly analyze the quenched experimental fluids of IHPV experiments. By using this method, we not only explore the effect of composition, but also the effects of  $fO_2$ , fluid salinity, and pressure on metal partition coefficients. The compiled experimental data will allow for a more complete picture on metal cycling in different tectonic settings and the prediction of volatile metal discharge during volcanic degassing beyond porphyry copper deposits [e.g., 7].

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[3] Tattitch et al. 2015 *GCA* 148.81-99

[4] Iveson et al. 2019 *Chem Geol* 516. 18-41

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[6] Zajacz et al. 2012 *GCA* 91 140-159Z.,

[7] Chelle-Michou et al. 2017 *Sci Rep* 7. 40566