

# Investigating Impact of Halide Concentration on Cs Partitioning Between Fluids and Melts

MS. KATHARINE GRACE ROSE, MSC.<sup>1</sup>, HAKIM BOUKHALFA<sup>1</sup>, THOM RAHN<sup>1</sup>, CHRISTOPHER CAMPE<sup>2</sup>, DANIEL ELDRIDGE<sup>1</sup>, HAYDEN MILLER<sup>1</sup> AND MARLENA J ROCK<sup>1</sup>

<sup>1</sup>Los Alamos National Laboratory

<sup>2</sup>New Mexico Environment Department

Presenting Author: katharine.g.rose@wmich.edu

The partitioning of metals in igneous melts is linked to the relative abundance of SiO<sub>2</sub>-non-bridging oxygens (NBOs) between tetrahedra, and ions introduced by the aqueous phase may play an important role. Cl has been shown to impact NBOs by bonding with silica, and Cl solubility in the melt is greater with greater alkali/alkali earth metal concentrations [e.g. 1, 2]. This trend of increased Cl solubility was recently linked to ionic bonding in the melt between alkali/alkali earth metals and Cl, such as K-Cl and Ca-Cl<sub>2</sub> [2].

The large radius of the Cs<sup>+</sup> makes it unique among the alkali metals.  $D(\text{Cs})^{\text{Fluid/Melt}}$  were observed to be lower when Cl<sup>-</sup> fluid concentrations increased, but only above 60 wt.% [3]. To determine if these observations are unique to Cs and Cl, we evaluate  $D(\text{Cs})^{\text{Fluid/Melt}}$  while varying halide concentrations of Cl and F. Here we present initial results from high-temperature, cold-seal experiments conducted with synthetic haplogranite glasses at 14.5 Kbar, 800 °C, and with solutions containing either CsCl or CsF. Cl<sup>-</sup> and F<sup>-</sup> concentrations were adjusted with HCl and HF to avoid altering the peralkalinity and silica concentration. Elemental analysis of the fluids and glasses are conducted with LA-ICP-MS. Glasses are additionally analyzed with XRD and optical microscopy to ensure their amorphous nature.

[1] Webster and de Vivo (2002) *American Mineralogist* 87, no. 8-9, 1046–1061.

[2] Thomas, Wade, and Wood (2023) *Chemical Geology* 617, 121269.

[3] Kravchuk, Kotelnikov, & Senin (2004) *Geochemistry International* 42, no. 11, 1071–1077.