

## Partitioning behavior at pressure in the Fe-S System

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Sulfur-bearing metallic liquids played a role in the differentiation and evolution of bodies throughout the solar system, and considerable work has focussed on determining solid metal-liquid metal partitioning behavior at 0.1 MPa in the Fe-S system [1]. These data have been used to interpret the history of iron meteorites as well as other meteorite types. However, these 0.1 MPa Fe-S data have also been applied to understanding planetary core formation and Earth's core crystallization, processes that occurred at pressures much greater than 0.1 MPa. There are limited partitioning studies in the Fe-S system at elevated pressures [2-7], the results of which are intriguing but somewhat contradictory and consequently difficult to interpret fully.

To address the influence of pressure on partitioning, we have performed systematic experiments at 9 GPa over a range of 5-22 wt% S and determined solid metal-liquid metal partition coefficients for 21 trace elements. Our results show noticeable pressure effects for most of the elements examined, and the effect of pressure is different for different elements. Some elements have higher partitioning values at 9 GPa than at 0.1 MPa while other elements have lower partitioning values. Some elements exhibit partitioning behavior that is insensitive to S-content at 9 GPa, while at 0.1 MPa these same elements are clearly influenced by the S-content of the liquid. These changes in partitioning are not random, but have periodicity. A noteworthy pressure effect is observed for D (Mo), whose behavior is classic siderophile at 0.1 MPa but appears largely insensitive to S-content at 9 GPa. Here we present our new 9 GPa results, compare them to previous studies, and discuss our understanding of partitioning in the Fe-S system at pressure.

[1] Chabot *et al.* (2003) *MAPS* **38**, 181–196. [2] Jones & Walker (1991) *EPSL* **105**, 127–133. [3] Walker (2000) *GCA* **64**, 2897–2911. [4] Lazar *et al.* (2004) *GCA* **68**, 643–651. [5] Van Orman *et al.* (2008) *EPSL* **274**, 250–257. [6] Stewart *et al.* (2009) *EPSL* **284**, 302–309. [7] Hayashi *et al.* (2009) *GCA* **73**, 4836–4842.

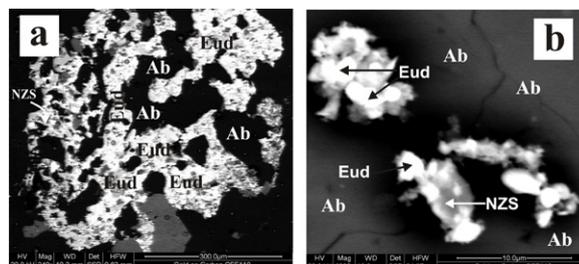
## First report of Oneillite from the Singhbhum Region, Purulia, West Bengal, India

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The Chandil Formation (Sushina Hill Region) of North Singhbhum Mobile Belt is well known for hosting varieties of alkali syenite gneisses. Among the different varieties, the strongly banded ones are characterized by the presence of albite and nepheline and thus can be best termed as *mariupolite*. They are also characterized by the formation of hydrothermal eudialytes replacing the early formed albites (Fig. 1). Compositionally the eudialyte grains are enriched in ZrO<sub>2</sub> (11.94-9.53 wt.%), Nb<sub>2</sub>O<sub>5</sub> (4.95-3.98 wt.%), MnO (7.48-5.47 wt.%), FeO (0.35-5.38 wt.%), Ce<sub>2</sub>O<sub>3</sub> (2.81-1.86 wt.%) and CaO (13.48-10.16 wt.%). They are highly manganous eudialyte and the more Fe-Mn rich variety compositionally approaches towards *oneillite* with Mn <2.5 afu. in M (1) site. Along with the eudialytes the mariupolites are also containing unknown sodium-zirconium silicates (NZS), which are essentially enriched in ZrO<sub>2</sub> (~35 wt.%). The ZrO<sub>2</sub> content is almost 3-4 times higher in these NZS. This is the first ever report of *oneillite* from the Indian sub-continent. Such sodic mineralogical assemblage indicates 'agpaitic-to-hyperagpaitic' assemblage, which is formed by the autometasomatic process. Both the eudialytes and NZS can be considered as a prolific zirconium resources of economic importance and the same may be extracted by conventional heap-leach method.



**Figure 1:** (a) Eudialyte replacing albite and (b) NZS replacing early formed eudialyte