The importance of metal complexes in pegmatitic fluids.
An example: the formation of scandium minerals

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The species where scandium is an essential component are quite rare in nature; however, in the last years a number of new minerals and occurrences have been found, a variety of them appearing especially in some pegmatitic miaroles present in localities such as Baveno in Italy and Tørdal in Norway.

The composition of such minerals from the miaroles is interesting, since Sc is relatively pure and there is little contamination with the rare earths, differently from thortveitite from the "classic" Iveland region in Norway which appears instead to be strongly contaminated. A peculiar mechanism for a strong enrichment in scandium leading to "true" Sc minerals should therefore exist.

On considering the composition of the REE mixture, as well as the deviation of the known stability constants of the REE and Sc complexes with respect to a simple dependence on the ionic radii, there is evidence for such a process not to depend on the ionic radii only, but on the formation of particular complexes in the depositing solutions: such complexes are very likely to be those with fluorides and phosphates.

A simple inspection of the paragenesis of such minerals in the miaroles confirms such a supposition: for instances, fluorite or fluoride-rich micas are very common in the proximity of these rare species.

REFERENCES:

For an adequate list of references see in particular: C.M.Gramaccioli, I. Campostrini and P.Orlandi: Scandium minerals in the miaroles of granite at Baveno, Italy: Eur.J.Mineral. (2004) **16**, 951-956