



Perspective

About the diffusion process of light earths in apatite

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The paper by Iqdari et al. [3] is an experimental study of diffusion at relatively high temperatures of light REE into apatite by electron microprobe analysis. The experimental diffusion profiles obtained in the study show that the diffusion process is complex. An important new and somewhat surprising result is that “the diffusion is greater for larger ions than for smaller ones”. This is in contrast to Cherniak’s results [1] “suggesting little difference in diffusion rates in apatite with increasing ionic radii of the REEs”. Other new results are that the “anisotropy diffusion is observed between a and c crystallographic directions”, and that there is an indication that the maximum amount of substitution of light REEs for Ca in the apatite structure is 20%. The study confirms previous work by Fleet and Pan [2] about the site preference of rare-earth elements in apatite. It is possible that

the results of this study might be extrapolated to low-temperature sedimentary apatites, as has been done by Reynard et al. [4] for mineral/melt partition.

References

- [1] D.J. Cherniak, Rare-earth element diffusion in apatite, *Geochim. Cosmochim. Acta* 64 (2000) 3871–3885.
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- [3] A. Iqdari, B. Velde, N. Benalioulhaj, S.-C. Dujon, N. El Yamine, Exchange of light earths for Ca in apatite, *C. R. Geoscience* 335 (2003) 381–390.
- [4] B. Reynard, C. Lécuyer, P. Grandjean, Crystal-chemical controls on rare-earth element concentrations in fossil biogenic apatites and implications for paleoenvironmental reconstructions, *Chem. Geol.* 155 (1999) 233–244.

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