

Rare earth metal mineralization in South Nam Xe carbonatites, Northwest Vietnam

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Investigations of rare earth and trace element variation were conducted for constituent minerals and bulk-rock from South Nam Xe carbonatites (Northwest Vietnam). The data show that the changes in rare earth element (REE) concentrations of the two carbonatites (calciocarbonatites and ferrocarnatites) are strictly along with the changes in mineral compositions. Excepting (Ba-Sr) sulfates, all minerals display parallel to subparallel REE distribution patterns at different enrichment levels relative to the host rocks. Calcite (in calciocarbonatites) and REE fluorocarbonates (in ferrocarnatites) hold the highest REE concentrations suggesting their crucial roles in the REE variation of the rocks. Mineral association, textural feature and chemical data of the South Nam Xe carbonatites have shown that the ligand components (including F^- , CO_3^{2-} , SO_4^{2-} and PO_4^{3-}) are significantly responsible for the REE mobility and distribution. The crystallization system is probably acidic (low pH) and low temperature-pressure. Effects of magmatic differentiation on the REE distribution are minor and restrictively observed in parisite and monazite.

The South Nam Xe carbonatites are characterized by a depletion in high-field-strength elements (Zr-Hf-Ti-Ta-Nb). This is attributed to less abundance of high-field-strength element host-minerals in the rock such as zircon, ilmenite and pyrochlore.