

Magmatic process of Cretaceous plutonic complex in Ikoma mountains, SW Japan

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The Ikoma gabbroic complex is one of the largest Cretaceous mafic pluton in SW Japan are exposed at Ikoma mountains, consisting of mafic rocks (the Ikoma gabbroic rocks) and intermediate to felsic rocks, the Fukihata tonalites and the Kyuanji quartz diorites. These rocks show three modes in whole-rock compositional relation, 1) as Plagioclase (Pl) cumulate, 2) as Hornblende-plagioclase (Hbl-Pl) cumulate and 3) as Hornblende (Hbl) gabbronorite.

The SiO₂ contents of the Ikoma gabbroic complex show 44 to 63 wt.%. Plagioclase cumulate and Hbl-Pl cumulate with SiO₂<50wt.%, their major oxide contents change widely for SiO₂ contents. Hbl gabbronorite are mafic to intermediate with SiO₂>50wt.%, major oxide contents show linear trends with respect to SiO₂ contents on compositional variation diagrams.

Plagioclase cumulate shows cumulus structure and consists of mainly Ca-rich plagioclase (An₈₅₋₉₀). On the compositional variation diagrams, plagioclase compositions included in Plagioclase cumulate is located to the end-member on the trend of Plagioclase cumulate. Moreover, their plagioclase mode are shown by a positive trend with respect to the variation of CaO contents. It suggests that Plagioclase cumulates were associated with the accumulation of plagioclase. On the other hand, plagioclase compositions in Hbl-Pl cumulate and Hbl gabbronorite are Ca-poor (An₇₀₋₇₅). It suggests Hbl-Pl cumulate and Hbl gabbronorite occur after forming Plagioclase cumulate. Whole-rock compositions of the Ikoma gabbroic complex vary linearly with increasing SiO₂ contents, and their ⁸⁷Sr/⁸⁶Sr initial ratios at 82 Ma show a positive trend with variation of SiO₂ contents. These characteristics suggest a mixing of mafic magma and felsic materials. The mafic end-member is mafic magma of Ikoma gabbroic complex. Granitoids occurred at the same time of the activity of the Ikoma gabbroic complex are plotted on the extrapolation of the compositional trend of Hbl gabbronorite, but their ⁸⁷Sr/⁸⁶Sr initial ratios at 82 Ma is too low as the felsic end-member in a mixing. It is suggesting that the felsic end-member may not be the granitoids, but other crustal materials.

Keywords: Ryoke belt, Magmatic process, cumulate, accumulation