# MOSSBAUER SPECTROSCOPY OF AMPHIBOLES FROM ANDESITES OF THE BEZYMYANNY VOLCANO (EASTERN KAMCHATKA)

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Amphibole fractionation and high $\boldsymbol{D}^{\text{Amph-Liq}}$ for REE and HFSE are the important factors of evolution of island arc magmas at intermediate and late stages of crystallization. It is evidenced by geochemical trends of major and trace elements in many calc-alkaline series [1-4]. In particular, our investigations of mutual mineral inclusions in lavas of the Bezymyanny volcano show, that hornblende and magnetite are in cotectic relations with plagioclase and pyroxenes. It means amphibole fractionation should be taken into account during development of realistic computer models simulating crystallization of hydrous basalt melts.

Before develop a quantitative hornblende-melt phase equilibria model the amounts of FeO, $Fe_2O_3$, and $H_2O$ must be measured or estimated in order to characterize a hornblende solid solution [5]. Definition of the ferric-ferrous ratio and $H_2O$ content in amphiboles is a problem because 1) such information is commonly absent among experimental data on phase equilibria; 2) no normalization scheme based on chemical and stechiometric limits of the given microprobe data alone consistently replicates the measured FeO, $Fe_2O_3$, and $H_2O$. To estimate the $Fe^{3+}/Fe^{total}$ ratio with reference to the amphiboles of a Bezymyanny volcano, Mossbauer spectroscopy of hornblende was caried out. We used hornblende crystals from andesites of directed blust eruption of 1956 as a starting material. These crystals were obtained as a result of magnetic separation, excretion in a bromoform and subsequent selection under binocular microscope of minerals from fractions of andesites of 2-1 mm and 1-0.5 mm.

The Mossbauer absorption measurements were performed on a MS1101E spectrometer (the MOSTEK Company, RUSSIA) in a constant-acceleration mode at room temperature. The source of γ-quanta was the $^{57}$Co isotope in the Rh matrix.

As a result we observed, that about 14 % of total Fe is presented in the form of magnetite. This is despite of the use of a magnetic separator which reduces to a minimum possible hit of crystalline joint of hornblende with magnetite. The presence of fine-dyspersated (cotectic) magnetite in the amphibole is consistent with presence of magnetite inclusions investigated earlier on a microprobe. This fact should be taken into account at interpretings total chemical analysis of hornblende, obtained by "wet" chemistry.

The proportions of $Fe^{3+}$ in hornblende is to about 39 %, that allows us to assume oxidizing conditions during crystallization of the mineral. Values of isomeric shifts for $Fe^{2+}$, and $Fe^{3+}$ uniquel specify an octahedral environment for both cations.

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