Reduction of extraneous 40Ar contamination for accurate K-Ar age determinations: an experimental study in various sample

Seiko Yamasaki\(^1\)*, Shotaro Isobe\(^2\), Hiroki Sato\(^2\), Takahiro Tagami\(^2\)

\(^1\)Geological Survey of Japan, AIST, \(^2\)Kyoto University

A fundamental assumption of K-Ar dating is that the samples initially contained no radiogenic \(^{40}\)Ar, but sometimes rocks contain radiogenic \(^{40}\)Ar called extraneous \(^{40}\)Ar. Some previous study reported argon isotopes of historical lavas had anomalously high \(^{40}\)Ar/\(^{36}\)Ar ratios, and show old apparent ages. Since extraneous \(^{40}\)Ar is likely contained in the phenocrysts and xenoliths, groundmass samples are generally prepared for analysis. Besides, Ozawa et al. (2005) showed fine-grained grandmas samples had less extraneous \(^{40}\)Ar contamination, and suggested that extraneous \(^{40}\)Ar is contained in fluid inclusions or vesicles and released during crushing. We measure argon isotopic ratios in various sizes of young lava samples, and investigated the reduction of extraneous \(^{40}\)Ar contamination. The finer samples roughly showed lower \(^{40}\)Ar/\(^{36}\)Ar ratios but more difficult to handling of the preparation such as mineral separation and wrapping in foils for isotopic measurements.

Keywords: K-Ar dating, extraneous 40Ar, sample size