High precision noble gas isotope measurement by NGX multi-collector noble gas mass spectrometer

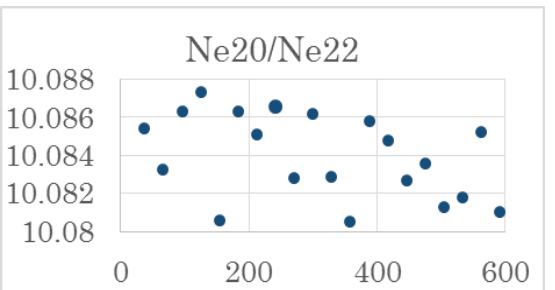
HAJIMU TAMURA[1*], YOKO SAITO-KOKUBU[1], KOJI UMEDA[1]

[1]Tono Geoscience Center, JAEA, Toki 509-5102, Japan, tamura.hajimu@jaea.go.jp

JAEA installed an IsotopX NGX noble gas mass spectrometer with a water sample oriented preparation system in Tono Geoscience Center, JAEA to measure helium accumulation age and neon isotope ratio of ground water.

High precision isotope analysis by multi-collector mass spectrometer is neccessary tool for neon isotope analysis of young ground water due to small isotopic variation of neon for nucleogenic reaction or mixing of volcanic fluids in ground water. Less than 0.5 % change of $^{21}Ne/^{22}Ne$ by nucleogenic ^{21}Ne was estimated by Morikawa (2004) [1] for ground water sampled from boreholes penetrating uranium rich Tertiary sedimentary rocks of Mizunami Group and Seto Group, and Toki Granite in Tokai region, Japan, depending their helium content and $^{21}Ne/^{4}He$ production ratio reported by Craig and Lupton (1976) [2].

NGX-004 was configured for simultanous measurement of neon isotopes with 2 Faradays for ^{20}Ne and ^{22}Ne, and 1 SEM for ^{21}Ne spaced out 1 m/z each other. The Faraday for ^{22}Ne is equipped with a 10^{12} ohm gain register amplifier. Atmospheric neon measurements gave 0.15 % precision isotope ratios which were able to resolve the small isotopic difference.



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[1] Morikawa (2004), *Limnology* 5, 61-69. [2] Craig and Lupton (1976), Earth Planet. Sci. Lett. 31, 369-385.