N-C-Ar-He systematics of basalt glasses from Bouvet Triple Junction: stepwise crushing approach

BUIKIN A.I.[1], VERCHOVSKY A.B.[2], MIGDISOVA N.A.[1]

[1] Vernadsky Institute of Russian Academy of Sciences, Moscow, Russia (bouikine@mail.ru)

[2] School of Physical Sciences, The Open University, Milton Keynes, MK7 6AA, UK (sasha.verchovsky@open.ac.uk)

Here we present the first stepwise crushing results for N_2, Ar, He and C (CO_2) in basalt glasses from several dredging stations located at different segments of Bouvet Triple Junction (BTJ): Spiess Ridge, Mid Atlantic Ridge (MAR) and in a valley of the Southwest Indian Ridge (SWIR). The concentrations of C (CO_2), N and Ar vary in the ranges 3500-50500, 5-81 ng/g and 6-86×10^{-8} cm^3/g STP, respectively, independantly on the sampling region. The He concentrations vary in much wider range: from 4 to 893×10^{-8} cm^3/g STP, being commonly high in MAR and both very low and high in SWIR samples (what is in accordance with data by Kurz et al., 1998 and Buikin et al., 2017). The C/N_2 and C/Ar ratios in crushing steps vary within 5 orders of magnitude and form a linea trend reflecting similar behavior of Ar and N_2 during basaltic melt degassing. The total $\delta^{15}N$ values vary from -1.4 to 3.3 ‰ (Atm) which could point to a significant contribution of organogenic/sedimentary component. Variations of the $\delta^{13}C$ values (from -3.6 to -10.6 ‰ VPDB) also support this conclusion for most of the samples. Argon isotopic composition indicates a significant atmospheric contamination that corresponds to the data obtained for Ne and Ar (Buikin et al., 2017). The highest $^{40}Ar/^{36}Ar$ ratios (up to 6232±330 in one of the crushing steps) observed in MAR samples. Interestingly, this crushing step (with a significant mantle argon contribution) is also characterized by the $\delta^{15}N$ value of -7.8 ± 2.7 ‰, that falls within the range previously defined for mantle nitrogen (Marty and Zimmermann, 1999; Buikin et al., 2013). The Ar and N concentrations in the crushing steps are correlated, forming a well defined trend from atmospheric (pure air for MAR and air saturated water for the other samples) to the mantle values on the $^{40}Ar/^{36}Ar$ - $N/^{36}Ar$ diagram. The largest contribution of the mantle component is observed in the MAR samples, while the Spiess and SWIR samples are characterized by increased contribution of the atmospheric component.

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References: Kurz et al. (1998) // *GCA* **62**, 841-852; Buikin et al. (2017) // *Geochem. Int.* **55**(11), 977-987; Marty and Zimmermann (1999) // *GCA* **63**, 3619-3633; Buikin et al. (2013) // *Geochem. Int.* **51**(4), 338-343.