^{39}Ar-^{40}Ar 'AGE' OF BASALTIC SHERGOTTITE NWA-3171.
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North-West-Africa 3171 is a 506 g, relatively fresh appearing, basaltic shergottite with similarities to Zagami and Shergotty, but not obviously paired with any of the other known African basaltic shergottites [1,2]. Its exposure age has the range of 2.5-3.1 Myr [3], similar to those of Zagami and Shergotty [4]. We made ^{39}Ar-^{40}Ar analyses of a "plagioclase" (now shock-converted to maskelynite) separate and of a glass hand-picked from a vein connected to shock melt pockets.. Plagioclase was separated using its low magnetic susceptibility and then heavy liquid with density of <2.85 g/cm^3.

The ^{39}Ar-^{40}Ar age spectrum of NWA-3171 plag displays a rise in age over 20-100% of the ^{39}Ar release, from 0.24 Gyr to 0.27 Gyr. The first 20% of the ^{39}Ar release involves terrestrial weathering products characterized by adsorbed terrestrial Ar and likely terrestrial K contamination. Over the last 80% of the ^{39}Ar release, constant values of the ^{36}Ar/^{37}Ar ratio indicate that essentially all ^{36}Ar released is cosmogenic. An isochron plot (^{40}Ar/^{36}Ar vs. ^{39}Ar/^{36}Ar) of these data (R^2=0.996) has a slope corresponding to an age of 225 ±4 Myr. Essentially the same age is obtained whether we use total ^{36}Ar or correct for trapped ^{36}Ar. A radiometric formation age for NWA-3171 has not yet been reported. However, the Ar-Ar age spectrum of NWA-3171 closely resembles that of Zagami, and the Arrhenius diffusion plots of ^{39}Ar for the two shergottites also are similar. Thus, the "true" age of NWA-3171 may be similar to the Zagami age (177 ±3 Myr; [5]). This implies NWA contains an extra component of ^{40}Ar, not accompanied by significant trapped ^{36}Ar, an inference that we have made for Zagami as well (Bogard & Park, this volume). We suggest this excess ^{40}Ar was inherited from the basaltic melt.

The ^{39}Ar-^{40}Ar age spectrum for the glass inclusion is very different and shows apparent Ar-Ar ages ranging between 0.3 and 1.9 Gyr. Variations in the ^{36}Ar/^{37}Ar ratios indicate release of trapped ^{36}Ar throughout most of the extraction. An isochron plot of ^{36}Ar/^{40}Ar vs ^{39}Ar/^{40}Ar suggests the release of terrestrial Ar in the first ~30% of the ^{39}Ar release, and high K/Ca ratios in these extractions also suggest terrestrial weathering. We used trapped ^{36}Ar in the isochron by subtracting a cosmogenic $^{36}Ar_{cos}$ component obtained from average data reported for Zagami and Shergotty whole rock [4, 6-8]. Measured ^{36}Ar/^{37}Ar ratios were used to apportion this $^{36}Ar_{cos}$ over individual releases. The temperature extraction data of 780-1160 ºC (corresponding to ~37%-93% of the ^{39}Ar release) define a mixing line between a radiogenic component and Martian atmospheric Ar with ^{40}Ar/^{36}Ar ≅1800, consistent with previously reported values for Mars atmospheric Ar [9].. Like other impact glasses in shergottites, NWA-3171 glass contains martian atmosphere incorporated at the time of impact formation, and does not directly yield a formation age.

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