Northwest Africa 4734

Unbrecciated basalt

1372 g

Figure 1: Surface of NWA 4734 and 1 cm cube for scale.

Introduction

NWA 4734 was found in several pieces (two pieces with a total mass of 477, and other paired stones weighing 895 for a total of 1372 g) in northwest Africa in 2006, and purchased from nomads in Erfoud, Morocco in October 2006 and February 2007. The fusion crust is dull black/brown, and nearly complete. The interior is gray and coarse grained, and has the appearance of a magmatic rock consisting of millimeter-sized phenocrysts, mainly of pyroxene and plagioclase (Connolly et al., 2008).

Petrography and Mineralogy

The texture of NWA 4898 is sub-ophitic with pyroxene (50%) grains highly fractured, and plagioclase (32%) laths partly transformed to maskelynite. Pyroxene grains are complexly zoned ($En_{65}Fs_{21}Wo_{13}$ to $En_2Fs_{83}Wo_{15}$; average FeO/MnO = 78). Plagioclase is normally zoned from An_{75} to An_{91} (average An_{89}). Silica, silica-feldspar glass intergrowths (7.5%), and patches of impact melt are relatively minor components. Smaller amounts of fayalite (Fa_{80-95}), ilmenite, baddeleyite, zirconolite, tranquilityite, pyrrhotite and metal, collectively totaling 7%, are also present. Fayalite associated with silica likely results from the dissociation of iron rich pyroxene. Voids and fractures comprise approximately 3% of the sample (Connolly et al., 2008).

Chemistry

Rare earth element analyses reveal enrichments of 53 (La) to 40 (Yb) relative to chondrites, with negative Sr and Eu anomalies (Connolly et al., 2008). Interstitial glass is high in silica (75 wt%) and contains micro-crysts of K-feldspar with a significant celsian component. The very low abundance of olivine and the relative abundance of silica in NWA 4734 are the main differences beside the grain size and the slightly different composition of the major phases. The chemistry, major and trace elements, overlap with those of NWA 032-479-773 and the LAP 02205-02224-02226-02234-02436-03632 lunar basaltic meteorites (e.g., Sm and Sc; Fig. 2). The texture of NWA 4734 is nearly identical to that of the LAP specimens, suggesting that these are source crater paired (suggested by R. Korotev; **http://meteorites.wustl.edu/lunar/stones/nwa4734.htm**).

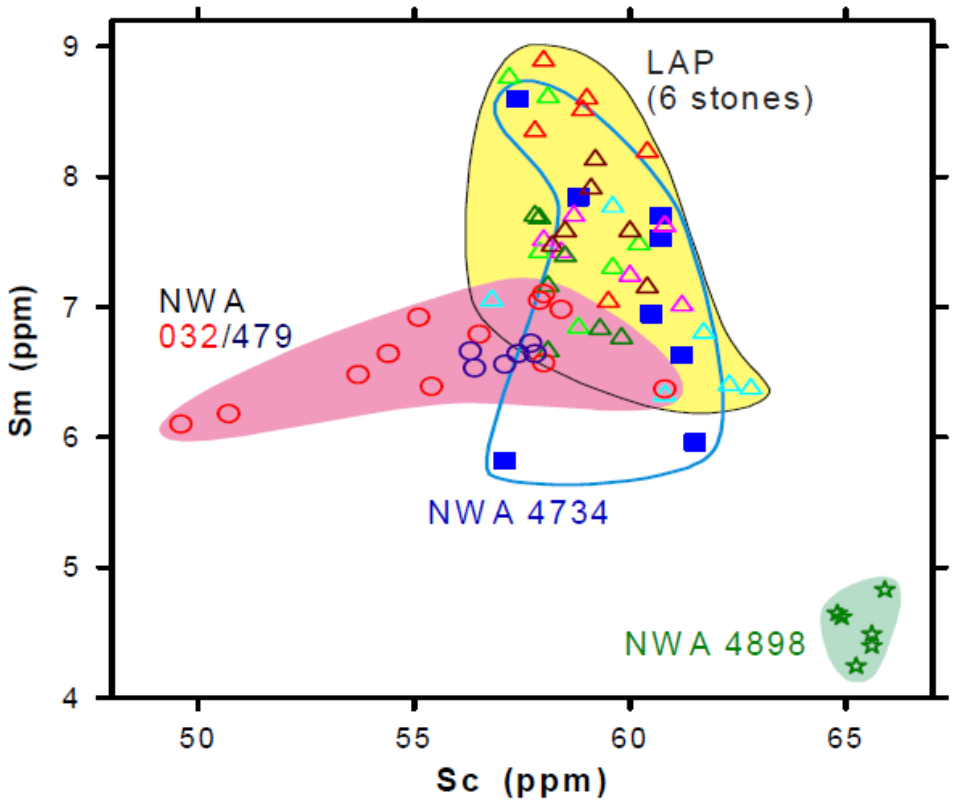

Figure 2: Subsamples of NWA 4734 overlap in composition with those of the LAP and NWA 032/479 stones for all elements measured (from Fernandes et al., 2009c).

Radiogenic ages

Bulk rock Ar-Ar dates carried out by Fernandes et al. (2009c) illustrate that this sample has a plateau age at 2.743 Ga (Fig. 3). These ages are in contrast totthe older Pb-Th ages measured in monazites by Jambon and Devidal (2009). Perhaps the younger Ar-Ar ages represent a resetting from an impact event.

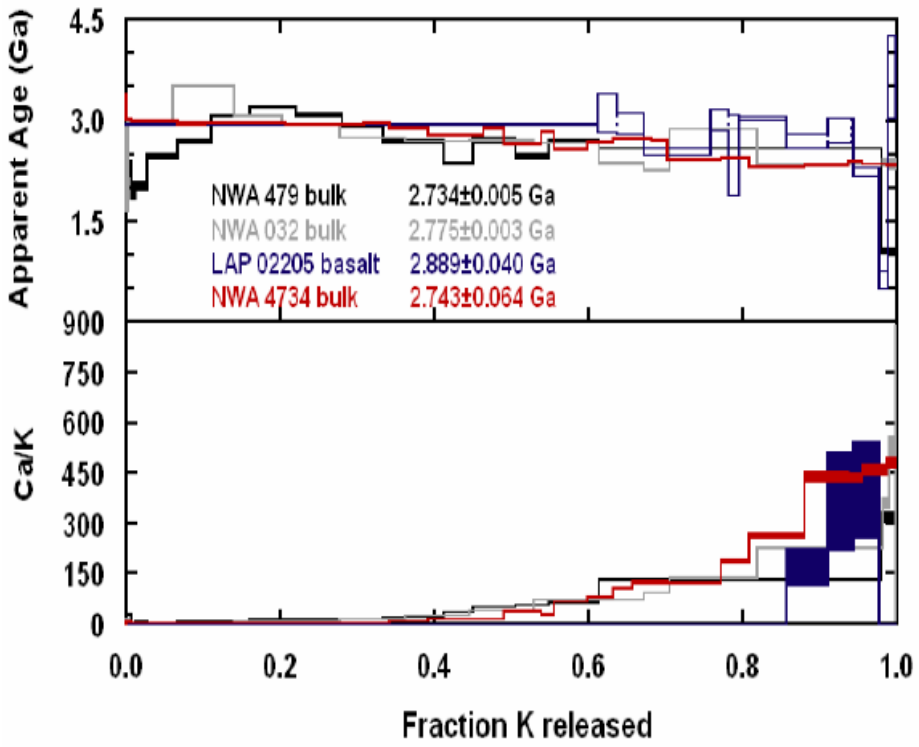

Figure 3: Apparent age vs. % 39Ar-release for two aliquots from lunar basalt NWA 4734 (from Fernandes et al. 2009c).

Cosmogenic isotopes and exposure ages

None yet reported.

K. Righter, Lunar Meteorite Compendium, 2010