COSMOGENIC RADIONUCLIDES AND LIGHT NOBLE GASES IN EET 96026. P. Ma[1], G.F. Herzog[1], L. Schultz[2], H.W. Weber[2], K. Knie[3], T. Faestermann[3] and G. Korschinek[3], [1]Dept. Chem. & Chem. Bio., Rutgers Univ., Piscataway, NJ 08854-8087, [2]Max-Planck-Institut für Chemie, Postfach 3060, D-55020 Mainz, Germany, [3]Fakultät für Physik, Technische Universität München, 85748 Garching, Germany.

Introduction: EET 96026 was first classified as an R3 chondrite but recent work indicates affinities to CO, CV or CK chondrites [1]. Noble gas contents suggest a short cosmic ray exposure [2]. We discuss the cosmic-ray exposure (CRE) history of this meteorite.

Experimental methods and results: A sample of 60 mg was dissolved with Be, Al, and Mn carriers in concentrated HF-HNO_3-$HClO_4$. We separated Cl from another aliquot of 23 mg. ^{10}Be, ^{26}Al and ^{36}Cl were measured at PRIME Lab, Purdue University; ^{53}Mn was measured as discussed previously [3,4]. The activities of ^{10}Be, ^{26}Al, ^{36}Cl and ^{53}Mn are 1.8±0.2, 8.9±0.5, 2.0±0.1 (dpm/kg) and dpm/[kg Fe], respectively. Two samples with masses of 147 and 103 mg were analyzed for noble gases [5]. The contents of ^{3}He, ^{4}He and ^{21}Ne were reported in [2]. Additional results for those samples are as follows: ^{20}Ne (0.23/0.24), ^{22}Ne(0.09/0.09), ^{36}Ar (1.56/1.67), ^{38}Ar (0.31/0.33) and ^{40}Ar (249/226) in $10^{-8}cm^3$ STP/g.

Discussion: The high ratios of $^{3}He/^{21}Ne$ (7.4) and $^{22}Ne/^{21}Ne$ (1.21) indicate light shielding for EET 96026. CRE ages based on 1) the noble gas contents, 2) the elemental composition of CO chondrites [6], and 3) the method of [7] are T_3=0.28, T_{21}=0.28 and T_{38}=0.52 Ma. Assuming that EET 96026 was not huge in space, we expect the production rate of ^{10}Be, P_{10} (atom/kg-min) to be bounded on the low side by 14 (for a radius, R<10 cm), and on the high side by 25 (for 40<R<50 and a depth, d>25). Accordingly, we find for a one-stage CRE age (Ma) $0.16<T_{10}<0.30$, and choose as our best estimate 0.23±0.07 Ma. Internal consistency then requires that P_{26}/P_{10}=2.45±0.05. From the galactic cosmic ray (GCR) production rate profiles of [8] and assuming CO composition, we would infer that our sample came from near the surface of a body with a radius of 15-40 cm. The ^{53}Mn activity gives a CRE age of 0.25-0.29 Ma for such a shielding condition. The activity of ^{36}Cl is lower than the expected value of 3.3 dpm/kg for a CRE age of 0.23 Ma, implying a terrestrial age of 0.21±0.03 Ma.

If we assume that T_{21}=0.28 Ma is a more precise estimate of the CRE age, then the production rate of ^{10}Be was 15 atom/kg-min. According to [8], P_{10}=15 would be expected at the surface of a body with R<10 cm. The values of P_{26} and P_{53} calculated from the measured activities are about 30% larger than the modeled (GCR) production rates. This difference could reflect SCR production. Barring a very long terrestrial age, however, the low activity of ^{36}Cl and the $^{22}Ne/^{21}Ne$ ratio do not seem to support this interpretation.

In sum, EET 96026's transit time was similar to that of Isna (CO) and those of numerous CM chondrites [9], but atypically short for a CO, CV, or CK chondrite. Nominally larger CRE ages from noble gases than from ^{26}Al and ^{10}Be may reflect uncertainties or, less likely, some pre-exposure.

References: [1] Tonui, E.K. (2002) Pers. Comm. [2] Patzer A. et al. (1999) *LPC XXX*, 1145. [3] Knie K. et al. (2000) *Nucl. Instrum. Meth. Phys. Res B 172*, 717-720. [4] Schnabel C. et al. (2001) *LPS XXXII 1353*. [5] Schultz L. et al. (1991) *GCA 55*, 59-66. [6] Wasson J. and Kallemeyn G. (1988) *Phil. Trans. R. Soc. Lond. A* 325, 535-544. [7] Eugster O. (1988) *GCA 52*, 1649-1662. [8] Leya I. et al. (2000) *MPS 35*, 259-286. [9] Caffee M. and Nishiizumi K. (1997) *MPS **32**, Suppl*, A26.