A PRELIMINARY LIGHT NOBLE GAS INVESTIGATION OF STARDUST SAMPLES. R. L. Palma[1,2], R. O. Pepin[2] and D. Schlutter[2]. [1]Minnesota State University, Mankato, USA. [2]University of Minnesota, Minneapolis, USA.

We have measured the concentrations and isotopic compositions of helium and neon by stepwise pyrolysis in four different Stardust sample types: (a) melted aerogel with embedded particle fragments from the track 41 wall; (b) aerogel adjacent to track 41 without visible particle fragments; (c) individual terminal particles extracted from track 108; (d) "blank" surface aerogel from cell 41. All samples were loaded in platinum foil and analyzed by procedures similar to those described in [1].

(a) Three track 41 samples (C2044,17,41,0,0; C2044,17-18,41,0,0; C2044,18,41,0,0) were from cross sectional slices of melted track wall previously analyzed lengthwise [1]. Comparisons with results from these previous samples indicate that noble gases are distributed highly heterogeneously, with ^{4}He and ^{20}Ne concentrations significantly less than earlier measurements. Also, unlike previous pyrolyses where gas release did not occur until T > 1250 °C, in these analyses gas release peaked at ~1000 °C. The Ne-Q composition reported earlier [1] was not observed.

(b) Three samples of aerogel without visible tracks or particle fragments were excavated from cell 2044 adjacent to track 41. One of these samples (#1) released sufficient helium and neon at T < 900 °C for multiple stepwise heating analyses, yielding an integrated isotopic composition of ^{3}He/^{4}He = (3.56 ± 0.23) x 10^{-4}, ^{20}Ne/^{22}Ne = 11.67 ± 0.62 and ^{21}Ne/^{22}Ne = 0.0261 ± 0.0050 that is intermediate between the Q-like composition observed previously [1] and solar wind. Another sample (#2) released extraordinarily high abundances of helium and neon between 800 and 900 °C, accompanied by very large amounts of water and hydrocarbons. High pressure induced gas release in the mass spectrometer produced a memory effect that only allows limits to be placed on the helium and neon isotopic compositions observed; nonetheless, these limits, ^{3}He/^{4}He < 2.2 x 10^{-4} and ^{20}Ne/^{22}Ne > 18, are intriguing in light of elevated ^{20}Ne/^{22}Ne ratios also seen in IDPs that may have originated in comet Grigg-Skjellerup [2].

(c) We analyzed three ~10-15 µm diameter terminal particles from track 108, C2081. Helium and neon concentrations released by stepped heating were below those seen in track 41 wall samples [1] by factors of 10^{3}-10^{4}. Detection of ^{20}Ne but no ^{22}Ne above background in one particle suggests a high ^{20}Ne/^{22}Ne ratio. The other two particles had no detectable neon at all. Gas release from all particles occurred at T < 1000 °C, so if these are the refractory cores of larger incident particles, any high temperature gas component is either lost or nonexistent.

(d) During interstellar particle collection, Stardust aerogel cell surfaces may have been obliquely exposed to the solar wind. Three fragments of "blank" aerogel from the surface of cell 41 were individually analyzed to explore this possibility. These samples had a combined ^{3}He/^{4}He signature consistent with solar wind, but gas amounts were only approximately twice blank values, precluding a precise isotopic determination.

Helium and neon data reported in [1] and for sample #2 in (b) above are compositionally distinct. They are evidence for the presence of at least two isotopically independent light noble gas components in Stardust materials. Solar wind may constitute a third, but that is not yet established.

References: [1] Marty B. et al. 2008. *Science* 319:75-78. [2] Palma R. et al. 2005. *Meteoritics & Planetary Science* 40:A120.