Solar Ne in the Brenham Pallasite. K.J. Mathew and F. Begemann, Max-Planck-Institut für Chemie (Otto-Hahn-Institut), Postfach 3060, 55020 Mainz, Germany.

Noble gases conjectured to be isotopically similar to solar ones have been measured in Pesyanoe [1, 2] and other gas rich meteorites in addition to lunar samples. These gases presumably provide a snapshot of the solar wind composition at various times in the past when the mineral grains were loaded before their compaction into larger aggregates. The time at which this loading took place is quite uncertain, though.

There have been indications for the presence in the Brenham pallasite of Xe of an isotopic composition similar to solar/U-Xe [3]. We investigated into the isotopic composition of the noble gases in silicate separates from this meteorite and the Ne results are discussed here. The preparation of the samples consisted of crushing, but without any grinding, of olivine grains in a stainless steel mortar followed by size separation by sieving in ethanol into fractions \( \leq 10 \, \mu m \), 10-20 \( \mu m \), 20-54 \( \mu m \), 54-75 \( \mu m \), 75-120 \( \mu m \) and \( \geq 200 \, \mu m \). One bulk sample which is the starting material for the various size fractions was also analysed. A 66% (by weight) residue was prepared by treating part of the \( \leq 20 \, \mu m \) fraction with 4M HCl under ultrasonication for 20 minutes. All samples were analysed by standard procedures involving extraction of the gases in 2 to 6 steps.

**Results and Discussion** Fig. 1 shows the Ne data in a conventional three-isotope plot. The Ne concentrations measured are large so that blank corrections and corrections due to interferences from \( H_2O^+ \), \( ^{40}Ar^+ \) and \( ^{44}CO_2^+ \) are negligible and change the ratios only within the experimental uncertainties that are typically less than 1%. The data for all temperature steps plot on a tie-line which, when projected, yields a \( \frac{^{20}Ne}{^{22}Ne} \) ratio of 12.6 on the line joining the SW and Planetary compositions. The obtained \( \frac{^{20}Ne}{^{22}Ne} \) ratio is similar to that of Ne-B determined from gas rich meteorites [4] which is now believed to result from a mixing of SW-Ne and SEP-Ne [5,6]. It may also be noted that the spallation Ne has \( \frac{^{20}Ne}{^{22}Ne} \approx \frac{^{21}Ne}{^{22}Ne} = 1 \) indicating spallation by GCR particles.

A most puzzling aspect of the present results is that the concentration of solar-type neon increases as the grain size decreases (Fig. 2). The only suggestion we have is that the carrier of the solar gases is fine-grained and has preferentially gone with the smaller-sized grains. The solar-type Ne release is peaked at a temperature of about 600 °C (Fig. 3). The acid-treated sample shows less solar Ne as becomes obvious from the position of the data points in the \( \frac{^{20}Ne}{^{22}Ne} \) vs. \( \frac{^{21}Ne}{^{22}Ne} \) diagram. A significant difference between the present results and those on gas-rich meteorites and lunar brecciae is the way the neon isotopic ratios change with release temperature. While for gas-rich meteorites and lunar fines the isotopic composition changes from SW-Ne to SEP-Ne and only then moves over towards spallogenic Ne [7] here all data points fall on the same regression line: There is no evidence for the presence in the Brenham olivine of more than two isotopically distinct Ne components. If this Ne is also a mixture of SW-Ne and SEP-Ne the mixing must have taken place before incorporation of the Ne into its present carrier(s).

The present findings imply that the gases would have been incorporated into the meteorite before the formation of the meteorite as a whole and further that the evolution of the meteorite took place as a closed system so that the isotopic composition of the starting material is retained by, at least, some mineral phases of the meteorite. In all probability, we are dealing with the solar isotopic composition
of Ne as it was 4.55 Ga before the present when the meteorite parent bodies acquired their noble gases from the solar nebula.

References