NOBLE GAS ANALYSIS OF Q-RICH FRACTIONS FROM SARATOV (L4). Sachiko Amari[1] and Jun-ichi Matsuda[2], [1]Laboratory for Space Sciences and the Physics Department, Washington University, One Brookings Drive, St. Louis, MO 63130-4899, USA. E-mail: sa@wuphys.wustl.edu. [2]Department of Earth and Space Science, Graduate School of Science, Osaka University, 1-1, Machikaneyama-cho, Toyonaka-shi, Osaka 560-0043, Japan.

Introduction: It has been known that a small portion of primitive meteorites carries most of Ar, Kr and Xe in meteorites [1]. The carrier, most likely carbonaceous matter [2], was dubbed Q for quintessence [1]. It is present in meteorites in a variety of compositional types, indicating that it must have commonly existed in the early solar system [3, 4]. Elemental and isotopic abundances of Q-gases have been extensively studied [3-5]. The Q-gases show an elemental abundance pattern that is heavily enriched in the heavy noble gases and close-to-solar isotopic compositions. Isotopic compositions of the Q-gases are fairly uniform except Ne. ^{20}Ne/^{22}Ne ratios of Ne-Q in various meteorites range from 9.8 ± 0.6 [Ornans (CO3.4)] to 10.70 ± 0.20 [Murchison (CM2)] [4].

We chose Saratov to study Q and the Q-gases because meteorites with higher petrologic types (≥ 3.7) contain Q but not diamond [3], which are always found in the same fractions during separation. Part of the noble gas data are already reported [6].

Experimental: Approximately 7g of Saratov (L4) were treated with HF-HCl to dissolve silicates and with CS_2 to remove elemental sulfur. Colloidal separation was performed on the HF-HCl residue AC. The colloidal fraction AE was black, while the non-colloidal fraction AF was dark brown, suggesting that AF consists of predominantly non-carbonaceous matter. Two successive colloidal separations were performed for AE, yielding the colloidal fractions AG and AI, and the non-colloidal fraction AJ. Noble gas analysis of AG, AI and AJ was carried out using the VG5400 at Osaka University, Japan.

Results and Discussion: The ^{132}Xe concentrations of AG, AI and AJ are 1.3, 0.41 and 2.1 × 10^{-6} cm^3STP/g, respectively. The concentration of AJ is the highest among extra-terrestrial material that has ever measured. The elemental abundance patterns of these fractions, normalized by ^{36}Ar and the average Q-gas abundance, indicate that AJ is more enriched in Xe and depleted in He compared with the average (Fig. 1).

The cosmogenic Ne, which was a dominant component in AC (^{20}Ne/^{22}Ne = 2.739 ± 0.034, ^{21}Ne/^{22}Ne = 0.678 ± 0.004) [6], was significantly reduced in AJ. However, the Ne data from AJ, even the Ne in the 1600°C fraction, plot on the right side of Murchison Ne-Q, indicating there is still a little amount of cosmogenic Ne in AJ (Fig. 2). Assuming that Saratov Ne-Q lies on the line connecting Ne-A2 and Murchison Ne-Q, the ^{20}Ne/^{22}Ne of Saratov Ne-Q is calculated to be 10.38 ± 0.45.

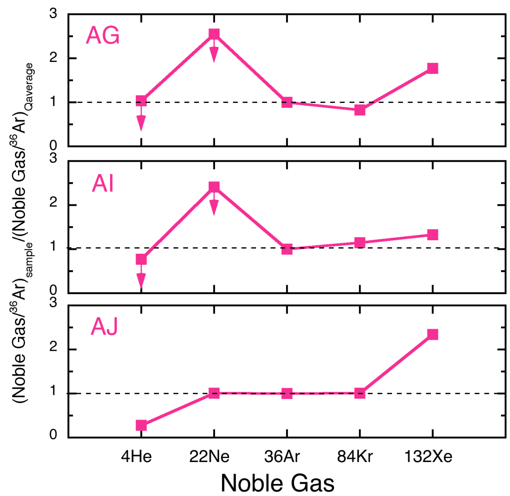

Fig. 1. Elemental abundance patterns of the Saratov fractions, first normalized by ^{36}Ar and the average Q-gas abundance. The arrows indicate upper limits.

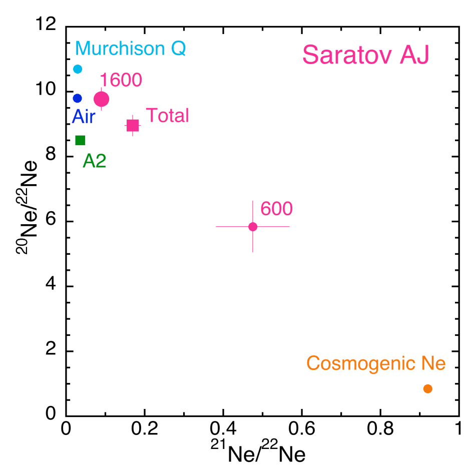

Fig. 2. Neon isotopic ratios of Saratov AJ.

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