TRAPPED NOBLE GAS COMPONENT AND THERMAL HISTORIES OF UNEQUILIBRATED ORDINARY CHONDRITES. Y. N. Miura[1], N. Sugiura[2], K. Kiyota[1] and K. Nagao[3], [1]Earthquake Research Inst., University of Tokyo, Yayoi, Bunkyo-ku, Tokyo 113-0032, Japan, [2]Dept. of Earth and Planetary Sci., University of Tokyo, Hongo, Bunkyo-ku, Tokyo 113-0033, Japan, [3]Lab. Earthquake Chemistry, University of Tokyo, Hongo, Bunkyo-ku, Tokyo 113-0033, Japan, yayoi@eri.u-tokyo.ac.jp.

Introduction: Some UOCs and carbonaceous chondrites contain a trapped component with Ar/Xe ratio (□several hundreds) higher than "Q" [e.g., 1,2]. Our previous studies found some remarkable features of the component, (i) elemental composition is different from that of "Q", but isotopic compositions are similar to "Q" within analytical errors, (ii) released temperature is around 1100 °C under stepwise heating in vacuum, (iii) it seems to be related to isotopically light nitrogen, and (iv) it is mostly removed by etching with HCl [2,3]. In order to examine if the component has been distributed widely into UOCs as well as to clarify its feature, origin and evolution in further detail, we attempted additional analyses of noble gases with stepwise heating extraction.

Samples and Experiments: The samples measured in the present work are: Yamato (Y) -74024 (L3.7) whole rock (hereafter WR) and HCl (etched with 1M HCl for 3hours), Allan Hills (ALH) 83010 (LL3.3) WR and HCl (1M for 3h), ALH 77299 (H3.7) WR, and ALH 77167 (L3.4) HCl-(C) (0.5M for 1h) and HCl-(d) (0.2M for 5min). ALH 77167 contains a large amount of the trapped noble gas component. We have reported noble gas data for WR and HCl-etched samples with different condition (1M for 3h and 3M for 3 h) of the meteorite [3]. Noble gases were extracted from 8 temperature steps, 700, 900, 1000, 1100, 1200, 1300, 1500 and 1700 °C.

Results and Discussion: The two whole rock samples, ALH 83010 and ALH 77299, show large release of trapped Ar and higher Ar/Xe ratios at temperatures between 1000 and 1200 °C. Y-74024 shows the high Ar/Xe ratios below 1000°C. The absolute concentrations of ^{36}Ar are similar among the three meteorites (1.9 – 2.3 x 10^{-7} cm^3STP/g), which are about one third of that in ALH 77167 WR. Although trapped noble gas contents are expected to correlate with petrologic types, ALH 83010 (LL 3.3) shows the ^{36}Ar concentration lower than those in some UOCs with higher petrologic types. K-Ar age of ALH 83010 is obtained to be 1.1 b.y. assuming the average K content of 793 ppm for LL chondrites [4], indicating a large impact event took place about 1 b.y. ago at which a part of trapped noble gases might have been released. As suggested by [5], complex histories, like thermal metamorphism, aqueous alteration and shock events, must have changed all or any of petrology, TL sensitivities and/or volatile contents.

Combined with the results of HCl-etched samples, majority of trapped noble gases, particularly Ar, seems to be in a phase other than Q. The concentrations of Ar in the 1M HCl-etched samples are 20 - 30 % of the WR, which and mass yields of the residues suggest that noble gases in phase Q are minor component in these meteorites.

HCl-etching of four different conditions has been applied to ALH 77167. Etching with 1 M and 3 M HCl efficiently removed the trapped noble gases (only 3% and 6% of trapped ^{36}Ar is in residues, respectively), however, 0.5 M HCl removed slightly and 0.2 M for 5 minuets HCl did not removed noble gases significantly.

References: [1] Schelhaas N., et al. (1990) *GCA, 54,* 2869-2882. [2] Miura Y. N. et al. (2001) *Meteorit. Planet. Sci.*, *36,* A137. [3] Miura Y. N. et al. (2002) *Meteorit. Planet. Sci.*, *37,* A102. [4] Kerridge J. F. and Matthews M. S. (1988) in *Meteorites and the Early Solar System,* Appendix 3, The University of Arizona Press. [5] Sears et al. (1991) *Proc. LPS, 21,* 493-512.