Noble gases in two hot desert eucrites, DHO007 and DHO275

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In recent years, a large number of meteorites have been collected from hot deserts (*c.f.*, The Meteoritical Bulletin). Noble gas data are helpful to understand terrestrial resident time and paring of specimens as well as thermal and ejection histories of meteorites. We report here noble gas results (only cosmogenic component in the abstract) on two eucrites from Oman desert, DHO007 and DHO275.

Cosmogenic noble gases including ^{81}Kr ($T_{1/2}$ = 0.21 m.y.) are summarized in the table below. One achondrite we have measured before is also given for comparison. The ages have been calculated with the manner similar to Miura *et al*. (1998). We found moderate discrepancy between the cosmic-ray exposure ages obtained from ^{21}Ne and ^{38}Ar (T_{21} and T_{38}). Although T_{38} is close to T_3, cosmogenic ^{3}He and ^{38}Ar seems to be sensitive against weathering compared with ^{21}Ne. Therefore, as more reliable cosmic-ray exposures we suggest 13 Ma (DHO007) and 12 Ma (DHO275), respectively. On the basis of these exposure ages and ^{81}Kr-Kr ages, we obtain upper limits of the terrestrial ages of 0.02 Ma for DHO007 and 0.07 Ma for DHO275, respectively. The absolute concentrations of ^{81}Kr are in the range reported for recently fallen eucrites (Miura *et al*., 1998), suggesting that they do not have long terrestrial ages comparable to the ^{81}Kr half life. For the terrestrial ages of meteorites from Oman desert, it has been reported that two achondrites (Martian and lunar meteorites) have long terrestrial ages of 0.34 Ma and 0.5-0.6 Ma (Nishiizumi *et al*., 2002 and reference therein), whereas others present a terrestrial age peak around 0.015-0.020 Ma (Jull *et al*., 2002).

	T_3*	T_{21}*	T_{38}*	^{81}Kr-Kr*	^{81}Kr$^{\&}$
DHO007 #1$^+$	10.9	13.6	10.2	13±2	0.087
DHO007 #2$^+$	9.2	13.1	9.5	11±2	0.11
DHO275	7.2	11.7	8.5	11±3	0.096
NWA011$^\$$	11	30	23	39±5	0.15

* in Ma. $^\&$ in 10^{-12}cm^{3}STP/g. $^+$bulk chemical compositinon of the meteorite (Setoyanagi, Ebihara and Yamaguchi, personal com.) is used. $^\$$ Yamaguchi *et al*. (2002).

References

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Cross-check of radiocarbon dating between the beta ray counting method and the AMS method

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A widespread tephra sedimentary layer is often used as a "key bed" in geology and geography. It means that the age of a tephra layer is used as a criterion to estimate the other layer's age. In Japan, we have a lot of tephra layers of probably less than 50,000 years, and radiocarbon dating is most suitable to date them. Therefore, it is important to establish radiocarbon dating method of tephra layer with high levels of reliability. Although many ^{14}C ages have been reported for the tephra layer in Japan, they vary widely even for the same tephra in many cases. Hence, it is important to clarify the reasons for such scattering among the obtained ages.

Aira-Tn(AT) ash layer is one of the major widespread tephra distributed in Japan, covering almost the whole area of the Japanese Islands. Many ^{14}C ages have been reported for the AT ash. However, ^{14}C ages of AT ash vary widely. To obtain those ages, two types to measure ^{14}C have been used. One of them is the use of a counter to measure the beta ray which is emitted when ^{14}C decays. Another one is the Accelerator Mass Spectrometry (AMS) method.

In the reported values, the median value of AT ash, using the beta ray counting method is 21,500yr BP and that using the AMS method is 24,500yr BP. The difference between these two values is about 3,000 years.

Several possibilities are raised to explain the difference in the obtained ages between the two methods; (1) Some systematic bias in the laboratory, since only one laboratory measured ^{14}C so far by the AMS method. (2) Sample heterogeneity, since the amounts of required carbons for the AMS method is one thousands of those by the beta ray counting method. (3) Difference in the chemical treatment of samples.

By using the AMS method, we determined the age of charcoals from the AT ash. Our results show similar ^{14}C ages to those measured with the AMS method by the other laboratory. Further, multiple measurements from different portions of the same sample have shown similar ^{14}C ages. Hence (1) and (2) are not likely to explain the difference and (3) remains as a possibility. To check this, we have been doing cross-checks on ^{14}C ages of charcoal samples that were taken from the same AT ash layer, but measured with different methods. Through such experiments, we hope to reveal that the difference of chemical pretreatments might cause systematic differences of those ^{14}C ages.