ALUMINUM-26 ACTIVITIES IN METEORITES; J.F. Wacker, Battelle, Pacific Northwest Laboratories, P.O. Box 999, Richland, WA 99352

We report ^{26}Al activities for 686 Antarctic meteorites and 46 non-Antarctic meteorites. The data set includes new results for 253 Antarctic and 5 non-Antarctic meteorites. Most of the Antarctic specimens were collected from the Allan Hills region, but specimens from other regions have been measured as well. The non-Antarctic specimens include freshly fallen meteorites, in which short-lived radionuclides (*e.g.*, ^{22}Na, ^{54}Mn, ^{57}Co, etc.) were also measured. The data have been analyzed for terrestrial age distributions, identification of samples with unusual activities, pairing of specimens, and comparison of Antarctic and non-Antarctic activity distributions.

Terrestrial ages Terrestrial ages for individual specimens are generally determined using ^{36}Cl or ^{14}C. Ages of individual specimens based on ^{26}Al are generally unreliable due to variations in the ^{26}Al production rate caused by shielding effects, unusual exposures or undersaturation. Nevertheless, ^{26}Al can provide information on terrestrial ages of meteorite populations and provide useful guidance in identifying and selecting samples with long terrestrial ages. Comparisons of ^{26}Al activities and ^{36}Cl terrestrial ages [1] for Antarctic Ls and Hs show that older specimens, especially with ages >100 kyr (for Hs) or >250 kyr (Ls), have lower than normal ^{26}Al activities. Almost one half of the low activity samples have long terrestrial ages, indicating that ^{26}Al is useful in identifying old samples with about 50% success. Samples with low ^{26}Al but young ages are still of interest since they often have experienced unusual irradiation histories.

Unusual samples Several of the specimens show higher than saturation activities (59±9 for L and 55±8 for H chondrites [2]). Although many of these samples have recovered masses less than 100 g (*e.g.*, META 78008 [2] and Salem [3,4]), some high activity samples have large recovered masses. A notable example of the latter is ALHA 83101 (639.2 recovered mass). Two samples were measured, ALHA 83101.1 (515.1 g) and ALHA 83101.2 (23.1 g), with ^{26}Al activities of 90 and 113 dpm/kg, respectively. The high ^{26}Al activity in ALHA 83101 may indicate exposure to solar cosmic rays (SCRs), but atmospheric ablation should have removed most of the SCR-implanted material of the sample, given a typical range ~1 cm for SCRs [5]. Nevertheless, ALHA 83101 is a good candidate for either SCR exposure or an unusual irradiation history and it should be analyzed for noble gases and other radionuclides, such as ^{10}Be, ^{53}Mn.

One specimen had an unusually low ^{26}Al activity. EETA 83274 (L3) had an ^{26}Al activity of 18.9±0.9 dpm/kg. This activity is well below the L-chondrite saturation value of 59±9 dpm/kg and corresponds to a terrestrial age of 1.2±.2 Myr. The weathering and fracturing classes are B and A, suggesting a short terrestrial residence time and possibly a short cosmic ray exposure.

Pairings Aluminum-26 provides a useful means of identifying and confirming the existence of paired specimens. Recently analyzed meteorites include over 40 specimens from the Elephant Moraine region. Twelve L6s (EETA 83206, 83238, 83239, 83241, 83243, 83252, 83271, 83312, 83335, 83348, 83363, and 84304) have ^{26}Al activities from 70 to 84 dpm/kg, strongly suggesting that these samples belong to a single shower. The terrestrial age of EETA 83206, based on ^{36}Cl, is 45±45 kyr [1]. The high activity in the 12 samples also implies that they may have experienced an unusual cosmic ray exposure history, as may also be the case for a group of ALHA L6s. Two LL6 chondrites were analyzed (EETA 82608 and 83204, with ^{26}Al activities of 40±4 and 52±4, respectively), however, their ^{26}Al activities suggest independent falls. Other potential pairings were revealed by comparing the non-ALHA H and ALHA H distributions. The ALHA H distribution may have two components, one that has a broad ^{26}Al distribution and contains specimens with longer terrestrial ages, while the other is strongly peaked at 55 dpm/kg and represents younger specimens. The 55 dpm/kg peak in the ALHA H distribution has specimens from all compositional groups, suggesting that it was unlikely due to a shower. A group of ALHA

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H6s form a peak at 35 dpm/kg, suggesting a shower. The ALHA L distribution also appears to have several peaks, suggesting shower components.

<u>Antarctic/non-Antarctic comparisons</u> We have continued to examine and compare the distribution of ^{26}Al in Antarctic and non-Antarctic chondrites, in light of suggestions that these two groups of meteorites may be compositionally different [6,7]. A working hypothesis is that Antarctic/non-Antarctic differences ought to show up in the terrestrial age distributions of the Antarctic meteorites. If the compositional flux of meteorites is variable, then older meteorites should show greater differences. Previous reports have shown that Antarctic chondrites have average terrestrial ages of ~200 kyr , with ages up to ~1 Myr [1]. An average age of 200 kyr should shift the distribution of ^{26}Al activities for Antarctic chondrites to values that are typically ~20% lower than those of non-Antarctic ones. Average activities for ALHA L and H chondrites are 51 and 53 dpm/kg, by comparison, average (saturation) ^{26}Al activities for non-Antarctic L and H chondrites are 55 and 59 dpm/kg [2]. The ALHA Ls (111 specimens, corrected for known pairs) show the expected distribution, with an average ^{26}Al activity corresponding to a terrestrial age of 140 kyr. In contrast, the ALHA Hs (254 specimens, corrected for known pairings) show an unexpected behavior as their ^{26}Al distribution is similar to that of the non-Antarctic Hs. Thus, ALHA Hs are indistinguishable from modern specimens on the basis of ^{26}Al activities. This similarity suggests that the majority of ALHA Hs may be recent falls — within the last ~50,000 years. If Antarctic and non-Antarctic H chondrites sample different compositional groups, then a gradual shift in the composition of the incoming flux appears to be ruled-out by the ^{26}Al data [8,9]. This observation agrees with results obtained from cosmic ray exposure ages of Antarctic and non-Antarctic meteorites [10]. These results, however, may be consistent with suggestions of meteoroid streams [6,7,11,12] or may imply that Hs are more rapidly destroyed than Ls by terrestrial weathering.

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