Argon and Tritium Radioactivities in Lunar Rocks and in the Sample Return Container

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Ar^{37} and Ar^{39} radioactivities were measured in lunar rocks nos. 12063 and 12065. The magnitude of the observed activities will be compared to the production of these isotopes in a thick target of lunar-like material by 600 MeV protons. Higher levels of Ar^{37} were observed in Apollo 12 rocks than were observed in Apollo 11 rocks. The higher Ar^{37} observed is attributed to the solar flare of Nov. 2, 1969. Tritium analyses of these rocks revealed the presence of tritons adsorbed on the surface of the samples studied. The origin of the adsorbed tritium is not clearly understood, though it is conceivably a residue from the Nov. 2d flare.

Ar^{37} was observed in the Apollo Lunar Sample Return Container (ALSRC) containing the selected rock samples. The gas contained 0.046 ± 0.002 dpm Ar^{37} and -0.0016 ± 0.0018 dpm Ar^{39}. The Ar^{37}/Ar^{39} ratio of over 25 is much higher than was observed in the rock samples, indicating the Ar^{37} observed was present in the lunar atmosphere. These observations will be compared to a 600 MeV proton irradiation of simulated lunar fines. Based on these measurements an estimate is made of the amount of Ar^{37} released to the lunar atmosphere by recoil and diffusion processes.

A search was made for Pb^{210} activity on the Mylar foil covering of the command module. An upper limit of 2×10^{-6} dis/cm^2 sec^{-1} of Pb^{210} was set, corresponding to a flux of less than 0.05 Rn^{222} atoms/cm^2 sec from the lunar atmosphere.