Abstract

SEARCH FOR LUNAR MANIFESTATIONS OF EXTINCT NATURAL RADIOACTIVITY

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Lead isotope studies have shown that at least one major chemical fractionation occurred very early in the history of the moon at a time comparable to that of the last cooling of meteoritic matter. On the other hand, all lunar matter has evidently been heated at substantially later times, so that no effects of extinct radioactivity of I^{129} or Pu^{244} are preserved in accessible lunar matter. Extinct nuclides with nonvolatile decay products might, however, produce isotope variations dating from very early chemical fractionations in spite of later heating.

Cases of possible interest are Sm^{146} (half-life 80 My) $\rightarrow Nd^{142}$, Pb^{205} (~24 My) $\rightarrow Tl^{205}$, Cm^{247} (16 My) $\rightarrow U^{235}$, Hf^{182} (9 My) $\rightarrow W^{182}$, Pd^{107} (~ 7 My) $\rightarrow Ag^{107}$, and, remotely, Al^{26} (.74 My) $\rightarrow Mg^{26}$.

Work on the first three systems in Apollo 11 and 12 materials is in progress using isotope dilution analysis and precision mass spectrometry. As previously reported, it was not possible to detect Tl in 4-g samples of fines, and larger samples have been requested for this purpose. Results of measurements on the Sm^{146}-Nd^{142} and Cm^{247}-U^{235} systems will be reported.