THE DATING OF PRE-EXPOSURE TIMES OF LUNAR ROCKS AND SOILS.

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Xenon produced by fission of uranium, thorium and plutonium has repeatedly been observed in lunar rocks and soils. In two basaltic rocks, 12053 and 14310, and in two soils, 74001 and 74261, we also found Xe WAS FOUND originating from fission of ^{235}U induced by neutrons which are due to the interactions of cosmic-ray particles with lunar matter. Two facts lead to this conclusion: (i) fission Xe is present in excess of that expected for the U, Th and Pu concentrations and for the gas retention age of the samples, and (ii) the $^{134}Xe/^{136}Xe$ ratio of excess fission Xe is close to 1.25 as expected for neutron induced fission of ^{235}U. Information on the duration of the exposure to cosmic rays was obtained from the ^{81}Kr-Kr systematics whereas the effective shielding conditions were derived from the depth sensitive cosmogenic ratio $^{131}Xe/^{126}Xe$. For the four samples the exposure to cosmic rays in the lunar regolith is described by a two-stage exposure model. The history of the four samples was derived in terms of duration and shielding depth of the two stages.

In the two rocks 12053 and 14310 a large proportion of ^{136}Xe and ^{134}Xe is fission produced and more than half of the fission Xe is neutron induced. For the two rocks we calculated pre-exposure times of 3.1 AE and 2.5 AE ago, respectively. This method for dating the time of a pre-exposure in the lunar regolith is of particular interest for soils which might have acquired trapped gases from the solar wind or the lunar atmosphere during the pre-exposure period. The two soils 74001 and 74261 which show an excess of neutron fission yield pre-exposure times of 3.6 AE and 2.5 AE, respectively, the latter value being preliminary.

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