THE MORRO DE LA MINA H-CHONDRITE: A NOBLE GAS STUDY AND MÖSSBAUER SPECTROSCOPY EVIDENCES FOR TERRESTRIAL ALTERATION.

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The Morro de la Mina meteorite was found in the Atacama desert (Chile) in November 1986 and classified by L. Graham as an H-group chondrite. We report here on its cosmogenic rare gases and 57Fe Mössbauer spectroscopy characterization.

The sample we analyzed is significantly oxidized, as shown from hand-specimen examination. Accordingly, its Mössbauer spectra exhibit components similar to that generally observed in unweathered chondrites (Fe-Ni alloys, troilite, olivine and pyroxene) but in different proportions [1], with evidences of Fe3+-containing species. Usually, Fe3+ is absent in unweathered chondrites and we attribute its presence in Morro de la Mina to the weathering processes acting in the warm Atacama desert. The identification of the suite of oxidation products, in progress, is expected to give some clues about the nature of the weathering processes which acted during the terrestrial residence time of the meteorite.

We also report the concentrations and isotopic ratios of He, Ne, and Ar measured in a 88.5 mg sample of Morro de la Mina. From these data and using standard assumptions made for the isotopic ratios [2], the cosmogenic and radiogenic components are determined. The inferred gas-retention ages are (3253±56) Ma and (3672±155) Ma for 4He and 40Ar respectively.

Cosmic-ray exposure ages based on cosmogenic 83Kr concentrations and on cosmogenic ratio 81Kr/83Kr using production rate calibrations as given in refs. [3, 5] are consistent with determination based on light noble gases but with much larger uncertainties. Kr and Xe abundances being largely dominated in Morro de la Mina by the trapped component.

References: