CARBON AND SULFUR CONCENTRATION AND

ISOTOPIC COMPOSITION IN APOLLO 12 LUNAR SAMPLES

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The concentration and isotopic content of carbon and sulfur in three lunar fines ranged from 37 to 116 ppm (δC^{13}_{PDB} = -1.6 to + 14 0/00) and 509 to 714 ppm (δS^{34} = +8.8 to +4.9 0/00) respectively. An inside and outside fragment of a basalt (No. 12022) were also analyzed, yielding a carbon and sulfur content of 16 ppm (δC^{13} = -25.4 0/00) and 754 ppm (δS^{34} = -0.16 0/00) respectively for the former and 21 ppm (δC^{13} = 24.9 0/00) and 704 ppm (δS^{34} = -0.18 0/00) for the latter. The two fines containing the highest carbon content were most enriched in C^{13}; the basalt samples showed values for carbon content and isotopic abundance similar to a Hawaiian basalt freshly collected from a recent flow. Analysis of carbon-containing gases released by acid hydrolysis of lunar material, generally reflected the isotopic content of the intact sample. Stepwise pyrolysis of samples over a temperature range of 150°-1100° C yielded a gas mixture with a spread in isotopic values.

The fines are less fractionated in these samples than in samples from Apollo 11 mission. The isotopic content (for both C and S) in the basalt is typical of terrestrial basalts and no significant difference could be detected between an inside, and outside fragment of the same rock exposed to solar radiation. The data argues against a simple origin of the fines from the basalt and also suggest that the regolith may have a more heterogeneous composition than suspected.