

Colloid and Surface Chemistry

The Interaction of Gases with Lunar Materials

E. L. Fuller, Jr.	Oak Ridge National Laboratory P. O. Box X Oak Ridge, Tennessee 37830	Yes	Yes	Ph.D. Chemist
H. F. Holmes		Yes	Yes	Ph.D. Chemist
R. B. Gammage, Co-Investigator		Yes	Yes	Ph.D. Chemist
Klaus Becker, Principal Investigator		No	No	Ph.D. Chemist

Oak Ridge National Laboratory, P. O. Box X, Oak Ridge, Tennessee 37830

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R. B. Gammage, and Klaus Becker,** Oak Ridge National Laboratory,
P. O. Box X, Oak Ridge, Tennessee 37830.

Adsorption studies have been conducted on two different lunar surface fines. Microgravimetric analysis of an Apollo 12 sample (12033,46), crystal-vitric ash, showed the powder to have a specific surface area of less than $0.05 \text{ m}^2 \text{ gm}^{-1}$. In contrast, an Apollo 11 sample (10087,5) had an apparent specific surface area of ca one $\text{m}^2 \text{ gm}^{-1}$. Nitrogen, argon, oxygen, and carbon monoxide isotherms at -196°C show this material to be unique by terrestrial standards. Water and carbon dioxide isotherms at 22°C aided in elucidating the complex nature of the surface and its inherent porosity. The water isotherms show a "conditioning" effect which stabilizes to a state where the uptake is reversible below $P/P_0 = 0.9$. Above this pressure there is a slow irreversible hydration process. The pore size analyses show a predominant aperture, coexisting with a wide range of other apertures. The ramifications of these analyses will be discussed in light of the interaction of life-supporting atmospheres with lunar soil.

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**Principal Investigator