

Elastic and Thermal Properties of Apollo 12 and Apollo 11 Rocks

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Abstract

Low temperature (2° to 5°K) specific heat and thermal conductivity measurements were made on igneous rock sample 10017 and microbreccia sample 10046. Measurement of $1/Q$ from resonance methods were made as a function of pressure and temperature on rocks 12063 and 12038. Velocities V_p and V_s were measured on 12063 at room pressure and temperature. The main findings to date are that density and average elastic properties of 12063 are similar to those of the Apollo 11 rocks, but that the actual room P, T velocities are higher. Sample 12063 has a bulk density of 3.1 gm/cm³, and an average V_p of about 2.6 km/sec., and average V_s of 1.4 km/sec.

Q was found to be on the order of 100, with a weak temperature dependence and a strong dependence on total pressure from 25° to 125°C (and partial pressure of water vapor).

Low temperature heat capacity measurements for both 10017 and 10046 are anomalous. The values of C_v are over 100 times greater than predicted from the acoustic wave data on these rocks.