

and dolomite, followed by dry quartzite, marble, and wet quartzite. Equivalent viscosities (η) range from 10^{18} to 10^{22} Pa·s (10^{19} to 10^{23} P). At intermediate depths (at $T = 300$ - 500°C), σ in dolomite is slightly greater than dry quartzite; both are much stronger than marble. In the shallow crust, secondary creep is expected only in marble ($T > 250^\circ\text{C}$) and in halite ($T > 25^\circ\text{C}$). The η of halite at 25 to 250°C , range from 10^{21} to 10^{17} Pa·s. At the surface and at $\dot{\epsilon}$ of 10^{-7} to 10^{-10} s $^{-1}$ (glacier flow), η of ice would be 10^{15} to 10^{12} Pa·s between -30 and 0°C . Values of η for all rocks examined appear insensitive to T , except wet quartzite and all dunite.

HEARD, H. C., Duba, A., Piwinski, A. J., and Schock, R. N., Electrical conductivity studies: refinement of the selenotherm, Sixth Lunar Sci. Conf., Houston, March 17-21, 1975. [UCRL-76406, Abstract]

The electrical conductivity (σ) of single crystals of olivine has been measured to 1660°C under controlled oxygen fugacity. At temperatures between 1200°C and 1660°C , the activation energy for conduction increases; thus the σ extrapolated from low temperature data is the minimum σ possible at higher temperatures. If the σ data measured for olivine below 1200°C were extrapolated to obtain the temperature of the lunar interior, a temperature of $1575 \pm 225^\circ\text{C}$ is obtained at a lunar radius of 1000 km. However, the data measured at higher temperatures indicate that the lunar temperature at 1000 km is $1450 \pm 60^\circ\text{C}$.

If we assume that pyroxene is the major phase at depth in the moon and that there are no unusual effects associated with grain boundaries and/or distribution of mineral species, the σ of the lunar mantle will be controlled by the σ of pyroxene. We report here σ data to 1025°C for orthoenstatite from Bamle, Norway ($\text{Mg}_{0.86}\text{Fe}_{0.14}\text{SiO}_3$) under controlled oxygen fugacity near that expected for the lunar interior (10^{-12} at 1200°C). At temperatures much in excess of 1025°C , orthopyroxene inverts to protoenstatite at atmospheric pressure. This transition will probably not occur in the moon because of the strong pressure dependence - $800^\circ\text{C}/\text{GPa}$ of this transition.

However, the σ results below 1025°C have been extrapolated to obtain a selenotherm. In doing so, we obtain a temperature of $1360 \pm 180^\circ\text{C}$ at a lunar radius of 1000 km. We would expect the lunar temperature calculated from σ measured at higher temperatures to be less than 1360°C with a smaller uncertainty.