

DUBA, A., Ho, P., and Piwinskii, A. J., Electrical conductivity studies of igneous rocks: fusion of basalt, Eos Trans. AGU 56, 1075 (1975). [UCRL-77320, Abstract]

The electrical conductivity (σ) of Picture Gorge basalt (augite - 50.1%, labradorite - 35.6%, olivine - 0.6%, opaques - 11.5%, glass - 1.2%, clay - 1.0%; modal analysis by A. C. Waters), measured at 1000°C at an oxygen fugacity $f(O_2)$ near the quartz-fayalite-magnetite buffer (100 kPa total pressure), is an order of magnitude lower than previously reported for basalt. This low σ is still 100 times greater than olivine ($Fo_{90}Fa_{10}$) at the same $f(O_2)$ and temperature. The σ increases by two orders of magnitude within an hour when this basalt undergoes partial melting at temperatures up to 1160°C (solidus temperature = $1020 \pm 8^\circ\text{C}$ determined by R. F. Fudali). A kinetic study at 1053°C indicates that an approximate equilibrium σ is attained after about 130 h and that only 50% of the total increase in σ is observed in the first 15 h. Both the time dependence of, and increase in, σ could result from partial melting, disorder phenomena, or some other mineralogical reaction involving the other phases present. Regardless of the cause of the observed σ increase, these data indicate that time is a critical parameter in the interpretation of σ changes associated with phase transitions, and that $f(O_2)$ control is mandatory if laboratory σ data corresponding to geologic conditions are desired for Fe-bearing systems.

Duba, A., JOHNSON, Q., and Shankland, T. J., Orientation of olivine single crystals, Lawrence Livermore Laboratory, Rept. UCRL-77375, Preprint (1975).

Laue photographs of the three principal directions in olivine are presented as an aid in the correct determination of crystallographic orientation.

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Duba, A. and SCHOCK, R. N., The effect of electrical potential on scale formation in Salton Sea brine, Lawrence Livermore Laboratory, Rept. UCRL-51944 (1975).

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Duba, A., SCHOCK, R. N., Heard, H. C., and Stromberg, H. D., The electrical conductivity of polycrystalline olivine to 5.0 GPa (50 kbar), Sixth Lunar Sci. Conf., Houston, March 17-21, 1975. [UCRL-76402, Abstract]