

IRON IN SOME ANTARCTIC SILLIMANITES

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Sillimanite from three gneisses (Samples 274A-C) collected in a single outcrop near Molodezhnaya Station (67°40'S, 45°50'E) and from a pegmatite (Sample 556) on Reinbolt Hills (70°30'S, 72°30'E) contains 0.9-1.3 weight percent iron calculated as Fe₂O₃ (electron microprobe analyses). All four samples contain quartz, K-feldspar, plagioclase, biotite, garnet, and ilmenite. Cordierite is present in one gneiss (Sample 274C) and green spinel is present in the pegmatite. A summary of the data is as follows (analyses of rocks by x-ray fluorescence).

Sample	Fe/Al atomic ratio in sillimanite	Weight percent iron in host rock as Fe ₂ O ₃
274A	0.009-0.010	0.5
274B	0.009	11.1
274C	0.010-0.011	15.6
556	0.012-0.014	-

The iron content of the sillimanite appears to be independent of the total iron present in the host rock.

The sillimanite in the Reinbolt Hills pegmatite forms gemmy, yellow-green crystals up to 5 cm long and 2 cm thick. A 6 mm microprobe traverse reveals no zoning with respect to iron. Polarized optical absorption spectra were obtained parallel to the three major crystallographic axes. No indication of ferrous iron was found. Prominent absorption bands were observed in α at 462, 440, and 412 nm, and in γ at 615 and 362 nm. The intensity of these bands ($\epsilon = 1-3$) suggests that much of the iron present is in a tetrahedral site in the sillimanite structure.