American Mineralogist, Volume 85, pages 9–13, 2000

Application of INVEQ to the geothermobarometry of metamorphic rocks near a kyanite-sillimanite isograd, Mica Creek, British Columbia

EDWARD D. GHENT* AND TERENCE M. GORDON

Department of Geology and Geophysics, University of Calgary, Calgary, AB T2N 1N4 Canada

ABSTRACT

A kyanite-sillimanite isograd is well-exposed in the Mica Creek area, British Columbia, and both pelitic and basic rocks occur within a few hundred meters of the isograd. This provides us with an opportunity to test geothermobarometry in pelitic and basic bulk compositions against an independent metamorphic equilibrium, kyanite-sillimanite. The kyanite-sillimanite isograd is modeled by a univariant *P-T* curve that passes through the following points (*T* °C, *P* kbar): 564/5; 610/6; 656/7; and 796/10. The quoted experimental uncertainty is 25 °C or about 350 J in ΔG. Samples that bracket the kyanite-sillimanite isograd in the Mica Creek area have the following mineral assemblages: quartz-muscovite-biotite-garnet-plagioclase-kyanite or sillimanite in pelitic rocks; and hornblende-plagioclase-clinopyroxene-garnet-quartz in basic rocks. Using the thermodynamic database of Berman (1988) and the INVEQ program of Gordon (1992), we have calculated metamorphic pressures and temperatures for 17 samples that bracket the kyanite-sillimanite isograd.

For the basic rocks, the *P-T* estimate fell entirely within the kyanite stability field, even for samples containing sillimanite, and the 68.3% confidence region overlapped the ±25 °C uncertainty in the kyanite-sillimanite *P-T* curve. For the pelitic rocks, the *P-T* estimate and the 68.3% confidence region usually fell within the sillimanite stability field and the confidence region overlapped the ±25 °C uncertainty in the kyanite-sillimanite *P-T* curve.