Assuming that total pressure is equal to fluid pressure, then the total pressure is also the sum of the partial pressures of the gas species, i. e.:

$$P = P_{H_2O} + P_{CO_2} + P_{CH_4} + P_{CO} + P_{H_2} + P_{O_2}$$
$$= \frac{f_{H_2O}}{\gamma_{H_2O}} + \frac{f_{CO_2}}{\gamma_{CO_2}} + \frac{f_{CH_4}}{\gamma_{CH_4}} + \frac{f_{H_2}}{\gamma_{H_2}} + \frac{f_{O_2}}{\gamma_{O_2}} \quad (7)$$

where γ_i is the appropriate fugacity coefficient for species i at 700° K and a total pressure P. For the purposes of this note fugacity coefficients of all species except H_2O are taken as unity whereas the fugacity coefficients of H_2O are interpolated from values tabulated by Burnham, Holloway and Davis (1969). By making the appropriate substitutions the following two equations can be obtained from Eqs. (2—7).

$$\log f_{H_2O} = -23.74 + 0.117 \times 10^{-3} (P-1) - \log f_{O_2}, \quad (8)$$

$$f_{H_2O} + B/A\, f_{H_2O}^2 + \frac{C-P}{A} = 0$$

where

$$A = K_2 K_1^{-2} f_{O_2}^{-1}, \quad B = \gamma_{H_2O}^{-1} + K_1 f_{O_2}^{-\frac{1}{2}}, \quad C = K_3 f_{O_2} + K_4 f_{O_2}^{-\frac{1}{2}} + f_{O_2}. \quad (9)$$

Knowledge of f_{O_2} allows Eqs. (8) and (9) to be solved graphically for the two remaining variables by plotting f_{H_2O} versus P.

Coexisting magnetite-graphite and ilmenite-graphite in adjacent pelitic rocks are compatible with an oxygen fugacity in the range 10^{-35} to 10^{-26}. In the absence of definitive oxide assemblages from the pelitic-carbonate assemblage we have used this latter value in the calculations (Table and Fig. 1).

The total fluid pressure (sum of the partial pressures) obtained with this procedure is extremely sensitive to the value of f_{O_2} chosen. This is illustrated in Fig. 1 where calculated total pressure (= fluid pressure) is plotted against f_{O_2}. As shown, a variation in f_{O_2} of $10^{0.2}$ from the chosen value of 10^{-26} results in a variation of calculated total fluid pressure of approximately 1,000 bars. If, for example, the value selected for f_{O_2} were $10^{-25.5}$ instead of 10^{-26} the calculated fluid pressure would be greater than 10,000 bars instead of 6,000 bars. A value of more than 10,000 bars is much greater than the load pressure of 3—6 kb consistent with the occurrence of kyanite and almandine in higher grade rocks.

Table. *Fugacities, partial pressures and total fluid pressure of gas species in equilibrium with the calcite-quartz-plagioclase-paragonite-graphite assemblage at 700° K and* $f_{O_2} = 10^{-26}$

Species	Fugacity	Fugacity coefficient	Partial pressure
H_2O	925	0.336	2,752
CO_2	3,162	1	3,162
H_2	2.5	1	2.5
CH_4	52.5	1	52.5
CO	11.0	1	11.0
			P=5,980 bars