

GEO/CHE 475
Homework due 10/15/07

Applications to Differentiation Calculations

We are interested in constraining the sources of a granite pluton. One possibility is that the granite was derived from partial melting of rocks like those currently exposed in the area of the pluton (its country rocks are sillimanite facies schists). Our goal is to use our melting models to assess the potential that the granite and the schists are related, using two abundant, well-characterized elements: Rb and Ba. The rocks have the following concentrations:

granite: Rb = 16-220 ppm; Ba = 1010-1450 ppm

schist (representative): Rb = 292 ppm, Ba = 650 ppm

The following modes (mineral %) were determined petrographically and theoretically to represent a plausible residual mineral assemblage in the melt source:

min	mode	Kd (Rb)	Kd (Ba)
Kfs	1.2	0.31	6.00
Pl	21.9	0.04	0.27
Q	50.0	0.00	0.00
Ms	8.9	0.85	6.60
Bt	11.0	2.00	3.00
Sil	7.0	0.00	0.00

Using these data, make a plot of Rb versus Ba which includes the schist datum and a field for the granites. On the diagram, plot calculated values of C_1 , using the schist as C_0 . Perform the calculations for a variety of F that span the range we might anticipate in nature, connect the model data, and label the points on the diagram with their respective F values.

Using these data and the plot, what can you say about the hypothesis that the granite was produced by melting of rocks like those exposed in the area?