

Metasomatic instability of compositional banding in regional metamorphic rocks

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Time scales of metasomatic banding composed of albite, epidote, and chlorite in low grade metamorphic rocks are approximated to be of advancing velocity of the metasomatic process and thickness of the compositional bands. The advancing velocity is also inferred by the characteristic wavelength of metasomatic bands resulted from metasomatic instability. To obtain relations of time scales and advancing velocities of the metasomatic bands, it shows that across the advancing boundary of the bands stable chemical relations of mineral assemblages should be broken by competing diffusion of related ionic species in grain boundary solution and growth velocity of advancing bands. This metasomatic instability is just similar to the Mullins –Sekerka instability. The Mullins –Sekerka instability takes the waveform boundary of the albite, epidote and chlorite bands in basic metamorphic rocks and thus the time scales of metasomatic banding in regional metamorphic rocks are estimated from 10^5 to 10^6 years for 1-10mm thickness of the bands in the conditions of 350 - 400 °C.

Keywords: time scale of metasomatic bands,, waveform boundary, metasomatic Mullins-Sekerka instability