
Zeolite Mineral Reactions in a Tuff in the Laney Member of the Green River Formation, Wyoming

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Abstract: Two diagenetic stages of zeolitic alteration were recognized in a study of a thin bed of rhyolitic ash that was deposited in Eocene Lake Gosiute (Laney Member of the Green River Formation). The ash bed can be traced for 30 km along strike and represents a single volcanic event. The bed was not buried deeply ($<100^{\circ}$ C), and originally it was compositionally homogeneous. Initially, the bed altered to clinoptilolite, heulandite, an intermediate phase between these two zeolites, and mordenite. These early reactions involved the hydration and solution of glass by saline, alkaline solutions and the subsequent precipitation of zeolites. The variation in zeolite mineralogy is due to differences in interstitial fluid chemistry that resulted from either fluctuations in lake-water chemistry or the proximity of spring discharge. These reactions, exclusive of the addition of H_2O , involved only minor amounts of mass transfer over very small distances. Later, after burial, the early-formed zeolites reacted with upward moving sodium carbonate brines that were produced by dewatering of underlying evaporite deposits. The sodium carbonate brines, in equilibrium with trona and nahcolite, elevated the activity of Na^+ and produced analcime. These later dehydration reactions involved significant mass transfer.

Key Words: Analcime • Clinoptilolite • Diagenesis • Green River Formation • Heulandite • Volcanic ash • Zeolites

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