
Zeolites in Eocene Basaltic Pillow Lavas of the Siletz River Volcanics, Central Coast Range, Oregon

Terry E. C. Keith and Lloyd W. Staples

U.S. Geological Survey, 345 Middlefield Road Menlo Park, California 94025
Department of Geology, University of Oregon Eugene, Oregon 97403

Abstract: Zeolites and associated minerals occur in a tholeiitic basaltic pillow lava sequence that makes up part of the Eocene Siletz River Volcanics in the central Coast Range, Oregon. Regional zoning of zeolite assemblages is not apparent; the zeolites formed in joints, fractures, and interstices, although most occur in central cavities of basalt pillows. The zeolites and associated minerals identified, in general order of paragenetic sequence, are smectite, pyrite, calcite (small spheres), thomsonite, natrolite, analcime, scolecite, mesolite, stilbite, heulandite, apophyllite, chabazite, mordenite, calcite (scalenohedra and twinned rhombohedra), laumontite, and amethystine quartz. Common three-mineral assemblages are: natrolite-analcime-stilbite, stilbite-heulandite-chabazite, stilbite-apophyllite-chabazite, and natrolite-mesolite-laumontite.

Alteration of basaltic glass, which was initially abundant, appears to have been an important factor in formation of the zeolites. Isotopic data suggest that zeolitization occurred during a low-temperature (60° – 70° C) submarine hydrothermal event, or by reactions of cold (~10° C) meteoric water with basalt over a long time. The occurrence of different mineral assemblages in cavities of adjacent basalt pillows indicates that these minerals crystallized in closed systems that were isolated as fractures and joints were sealed by deposition of smectite and early zeolites. Although the total chemical composition of the mineral assemblages in cavities is similar, different mineral species formed because of the sensitivity of zeolite minerals to slight variations in physical and chemical conditions within individual cavities.

Key Words: Analcime • Apophyllite • Isotope abundance • Laumontite • Mesolite • Pillow lava • Smectite • Zeolites

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