

# Textural and Chemical Characteristics of Diagenetic and Hydrothermal Alteration in Glassy Volcanic Rocks: Examples from the Mount Read Volcanics, Tasmania

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## Abstract

The Mount Black and Sterling Valley Volcanics comprise a complex Cambrian succession of originally glassy, felsic to mafic, submarine volcanic facies in western Tasmania. The Mount Black and Sterling Valley Volcanics have been modified by the combined effects of diagenesis, hydrothermal alteration, and regional metamorphism. Metamorphosed diagenetic and hydrothermal alteration facies have been distinguished, using a combination of alteration mineralogy, overprinting relationships, texture, distribution, intensity, and whole-rock geochemistry.

Alteration facies that are interpreted to be the regionally metamorphosed equivalents of diagenetic clays and zeolites are regionally extensive and overprinted by the regional cleavage. Although widespread, their distribution is patchy and their intensities are highly variable, reflecting the complexity of the original textures in glassy volcanic rocks. Thin films of sericite, carbonate, and chlorite-sericite-hematite replace clays that coated original glassy surfaces at the onset of diagenesis, prior to compaction. Feldspar-quartz-sericite, chlorite-sericite, and chlorite-sericite-hematite alteration facies replace zeolites and clays that filled pore space and altered glass, prior to and synchronous with compaction. The final diagenetic alteration facies, chlorite-epidote, began after compaction and continued during metamorphism. Diagenetic alteration involved significant mineralogical and textural changes but only minor changes in chemistry. The chemical changes associated with diagenetic alteration facies are consistent with the interaction of rhyolitic and basaltic glass with seawater during burial.

Alteration facies that are interpreted to be hydrothermal are local in distribution, crosscut stratigraphic boundaries, and involve significant changes in texture, mineralogy, and composition. Early hydrothermal alteration facies (quartz-sericite and calcite-quartz-hematite) predated compaction and were synchronous with diagenesis. Chlorite-calcite-magnetite and chlorite-pyrite alteration facies were synchronous with regional - deformation and are associated with tectonic breccias, faults, and shear zones. Chlorite-quartz-calcite alteration facies postdated regional deformation.