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Mineral and thermal water

4.2
Origin of mineral and thermal waters

title: **Origin of high bicarbonate and cold carbonated mineral waters of central Victoria Australia**

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The major ion chemistry of Victorian groundwater is known from 150 years of data collection. This resource has been examined and illustrates that a statistical continuum exists in the concentrations of bicarbonate in the groundwater.

Several different geochemical facies can be identified based on cation–anion predominance. Simple geological lithological associations have been identified in local and extensive aquifer systems. High bicarbonate waters may be associated with many different aquifer types and flow systems. The most frequent lithological association are with mixed sediments such as arkose–greywacke–lithic sandstone and ligneous sands.

In Central Victoria the carbonated mineral waters are a small flux sub facies of the high bicarbonate waters and possess low chloride and sulphate concentrations. The elevated bicarbonate content is influence by carbonate solution, sulphate reduction and by ferrous–ferric equilibria controlling water pH. The waters rise from a thermodynamically closed to an open system. In the discharge zones where the waters are developed at “springs” the ascension processes can mask the nature of the rising water due to the varying role of isothermal evaporation, reflux mixing, degassing and carbonate precipitation. Taking these processes into account contiguous flow systems with evolving water chemistry have been identified in the bedrock aquifers of Central Victoria. The chemistry of the low flux deep circulating waters can be related to hydrolysis of silicate minerals, clay mineral reactions, carbonate solution and sulphate reduction and evolves down fracture based flow systems that may be traced 10–35 km from the principle recharge areas in the uplands of the catchments.



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