

Hydrogeology of Wales: The Old Red Sandstone aquifer - groundwater chemistry

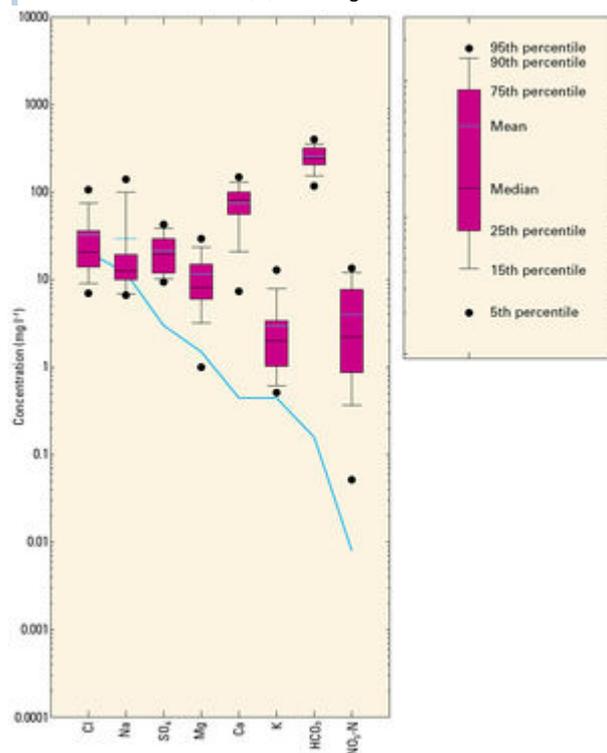
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This page is part of a category of pages that provides an updated review of the occurrence of groundwater throughout Wales.

Author(s): N S Robins and J Davies, British Geological Survey

Contributor(s): D A Jones, Natural Resources Wales and G Farr, British Geological Survey



Range of major ion concentrations in the Devonian sandstone in south west Wales and parts of Herefordshire (after Moreau et al., 2004). P859271.

The chemistry of groundwater in the Devonian sandstone aquifer has evolved by natural processes of water-rock interaction ([Moreau et al., 2004](#)). The dominant process controlling the groundwater chemistry is carbonate mineral dissolution and, in the deeper groundwaters, ion-exchange. Slower silicate dissolution reactions are also important in providing Si, K and Na to the groundwaters. The groundwaters are mostly of Ca-HCO₃ type but Na-HCO₃ types are present in deeper parts of the aquifer (**Figure P859271**). Upland groundwaters show significant rock interaction even where residence times are short. In valleys this is complicated by mixing with older, locally confined groundwaters as well as surface pollutants.

The groundwaters generally have low solute concentrations. The low salinities indicate shallow groundwater flow in uplands areas, where the aquifer is well flushed. Remnants of older formation groundwaters containing higher concentrations of Na, Cl, Br and I as well as salinity occur in valleys beneath mudstones horizons. In these areas ion-exchange of Na adsorbed on clays for solute Ca occurs leading to Na-HCO₃ type groundwaters.

There are some reducing groundwaters. Iron and Mn, however, are generally low reflecting the

dominance of oxidising conditions in most of the aquifer but may be locally high (up to 3.2 and 0.95 mg l⁻¹ respectively). Trace metal concentrations are generally low, reflecting neutral pH and oxidising conditions over much of the aquifer.

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