

Hydrogeology of Wales: Ordovician and Silurian aquifers - 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.

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The chemical composition of the groundwater in the Ordovician and Silurian strata is variable. This reflects the range of residence times as well as pH and redox. The rocks are dominated by poorly reactive minerals such as illite, chlorite and quartz, and the groundwaters tend to be weakly mineralised ([Shand et al., 2005](#)). The presence, locally, of sulphide and carbonate minerals form an important control on the evolution of the water chemistry. However, the largest variations are likely to occur with depth and boreholes that abstract waters from a variety of fractures at different depths produce waters of contrasting chemistry. The groundwaters are young, varying in age from weeks/months to a few decades.

The chemistry of the groundwater varies from very dilute waters dominated by Na, Cl and SO₄ (reflecting an important atmospheric input) to Ca-HCO₃ and mixed types. They vary from acidic to alkaline (pH 4.9 to 8.8) and from oxidising to reducing (Eh-79 to 514 mV). The pH is largely controlled by the degree of water-rock interaction, sulphide oxidation (producing acidity) and carbonate dissolution (producing alkalinity). The dominant process in most groundwaters is silicate dissolution, due to the lack of carbonate minerals present in the bedrock. In the western part of the Teifi Valley, the occurrence of carbonate shelly debris and calcite in the Irish Sea-derived drift has had a marked influence on the concentrations of Ca, Mg, HCO₃ and Sr.

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