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A note on the pH of groundwater in Southwestern Iceland

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A NOTE ON THE pH OF GROUNDWATER IN SOUTHWESTERN ICELAND

Thorspring taps water from boreholes at Myllulækur in the Heiðmörk area SE of Reykjavík. The bedrock of the catchment, upward from and around the spring area consists of young basaltic rocks. Holocene lava flows, which generally lie above the groundwater table, constitute the youngest unit. Interglacial lava forms a bulky unit below the Holocene lavas. The flow of the groundwater is mainly associated with the interglacial lava where scoriaceous flow partings provide most of the primary permeability. In addition, there is a very effective secondary permeability due to extensional fissures and faults in the interglacial lavas.

The water used by Thorspring is typical of cold, deeply circulating groundwater in SW Iceland. The basaltic rocks of the catchment area are primitive in the sense that they are derived mostly from little evolved magmas. Accordingly, their concentrations of radioactive elements and heavy metals in general are low.

The pH of the precipitation in Iceland averages around 5.4. When the water circulates in the deep aquifers, it reacts with the rock to a slight degree. In particular, there occur ion exchange reactions in which hydrogen ions in the water are replaced by sodium, potassium, calcium, and magnesium ions from the rock. As a result, the pH rises, and the fluid becomes undersaturated with respect to atmospheric carbon dioxide. The lavas contain significant amounts of basaltic glasses, which are relatively reactive, so these reactions can proceed fairly rapidly.

Because of the low concentration of dissolved solids, the buffering capacity of the water is also small, and so only a small amount of reaction is necessary to raise the pH significantly. In deep, confined aquifers in Iceland, the pH of cold water typically reaches 8.5 – 9. In thermal waters it is commonly higher than this.

The pH of the Thorspring water is thus quite normal for Icelandic spring water.

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