Key findings from the comprehensive review of natural hydrogen

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A recent review article published in Earth-Science Reviews combines data and ideas on natural hydrogen from almost five hundred scientific publications and books (Zgonnik 2020). It presents for the first time perspectives on hydrogen from the literature of the former Eastern bloc with that of the West, including rare hardcopies and recent studies.

The review conclusively shows that hydrogen is much more abundant in nature than previously thought. The review summarizes and classifies discoveries of hydrogen as a free gas in different environments, as inclusions in various rock types, and as dissolved gas in ground water. Hydrogen has been detected at high concentrations, often as a major gas, in a wide variety of geologic settings including sediments, basement metamorphic and igneous rocks, mineral orebodies, coal mines, aquifers and hydrocarbon reservoirs.

It is suggested that a deep-seated source is the most likely explanation for the abundance of hydrogen in nature. An estimate of 23 Tg/year for a total annual flow of hydrogen from all geologic sources is proposed by combining available data. This value is an order of magnitude greater than previous estimates but most likely still not large enough to account for recently discovered worldwide diffusive seepages.

Natural hydrogen takes part in a variety of natural processes. The review discusses and highlights the critical importance of deep-seated hydrogen for models of the Earth's structure and composition and documents hydrogen's influence on a wide variety of natural phenomena ranging from volcanism to mineral formation, from atmosphere to climate and ozone layer integrity. Hydrogen is an essential energy source for many microorganisms and it plays an important role in developments in both the shallow and deep biosphere. Testing for hydrogen can be used for the surveying of natural environments, for the monitoring and prediction of earthquakes, for mapping of faults and the search for minerals.

Hydrogen of geologic origin has the potential to become the renewable energy of the future, with exploratory projects ongoing at the present time.

Zgonnik V. (2020) The occurrence and geoscience of natural hydrogen: A comprehensive review. Earth-Science Reviews 203:103140. doi:10.1016/j.earscirev.2020.103140