

Carbon in Groundwaters in Kenya – a Review

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Kenya has a total surface area of 582,648 km², a mean annual rainfall of 620 mm, and an estimated annual groundwater recharge of 12×10^9 m³. Groundwaters occur in aquifers of volcanic, sedimentary, metamorphic rocks, and in unconsolidated sediments, giving rise to a wide range of residence times, temperatures, and chemical composition of the waters.

Most studies on carbon in groundwaters in Kenya have been on the inorganic carbon content, usually measured as HCO₃. Values range from less than 10 ppm where groundwater recharge is presumed to be fairly rapid, to values in excess of 20,000 ppm for some thermal and/or deeply circulating waters in the Rift Valley and near carbonatite centers, particularly at Magadi, around Mount Kenya, around Homa Hills, and around Dzombo hill. Sedimentary aquifers generally have HCO₃ values of less than 500 ppm, as do metamorphic aquifers.

The isotopic composition of dissolved inorganic carbon gives values in the range 0 to –16.5‰, but the interpretation of these values in terms of sources and water/rock interaction processes is complicated by the emission of CO₂ gas from the crust, particularly in the Rift Valley.

Organic carbon is found in groundwater as CH₄, with minor amounts of C₂H₄, and in some instances, C₃H₈. Fulvic and humic acid contents of groundwaters, as well as other organic carbon due to microbe contents are less well documented, and require further research in Kenya.

Key Words: Carbon, Groundwaters, inorganic carbon, organic carbon, Kenya.