Abstract

Currently, groundwater is largely becoming the main source of fresh water in most developing countries. However, various deleterious impacts resulting from anthropogenic activities beneath the earth's surface have significantly affected groundwater quality, as evidenced in several areas endowed with mineral and hydrocarbon deposits, agricultural activities, and industrial processes. The possible etiological impacts may include cancer and genetic aberrations which result from the toxic effects of organic waterborne contaminants ingested by humans and animals over time. The motivation behind this study was to identify and determine the concentration profiles of various organic pollutants in the wells located along the Kerio Valley water basin near the exploratory wells for hydrocarbons and mining activities. Therefore, this study is necessary in unraveling the level of organic contaminants in the sampled borehole water, which can then be extrapolated to cover other boreholes within the Kerio Valley basin. The study was carried out during the dry season of December 2022. The water samples from the boreholes were extracted using a solid phase extraction procedure and characterized using a gas chromatograph interfaced with a mass selective detector. The findings indicate that benzene derivatives which were mainly xylenes, 1,3,5-trimethylbenzene, 1-ethyl-3-methylbenzene, 1-methyl-2-propylpentylbenzene and polycyclic aromatic hydrocarbons such as naphthalene, phenanthrene, fluoranthene, azulene, and pyrene were found in most of the boreholes sampled. Furthermore, long-chain hydrocarbons were present in all groundwater samples with varying concentrations. The concentration of benzene derivatives ranged from 2.84 to 20.47 ppm. However, polycyclic hydrocarbons exhibited the highest concentrations of all organic pollutants, with pyrene giving a concentration of 23.14 ppm, fluoranthene (18.54 ppm), phenanthrene (14.13 ppm) and anthracene (11.06 ppm). According to the findings reported in this study, most of the borehole water in the Kerio Valley basin is contaminated and may be unsafe for drinking. Most of the reported concentration levels were several times higher than the standards of the U.S. Environmental and Protection Agency. However, it is necessary to develop a policy framework on the assessment and monitoring of water quality in the region and propose urgent measures to ensure a clean water supply for the benefit of residents.