

GEOGENIC DISTRIBUTION AND BASELINE CONCENTRATION OF URANIUM AND FLUORIDE IN GROUND WATER IN PARTS OF PUNJAB, INDIA

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Abstract

This paper describes the geological environment and characterization of ground water in parts of Bhatinda, Mansa, Faridkot and Ferozpur districts of Punjab. One hundred and sixty five samples were collected and analysed for major cations (Ca^{+2} , Mg^{+2} , Na^+ , K^+) and anions (F^- , CO_3^{-2} , HCO_3^- , Cl^- , SO_4^{-2}) along with pH, conductivity, Uranium and some of the toxic elements viz. As, Pb, Cr and Ni. However, the toxic elements show below detection limit concentrations and are not discussed. Statistical analysis techniques have been applied to discriminate baseline concentration and anomalous concentration of elements. The study was carried out to understand the role of these elements in terms of adversely affecting the health of inhabitants, with special reference to the geological factors responsible for higher elemental concentrations. The study reveals that ground water of the area is generally alkaline in nature and U content in general is higher than the permissible limit with a wide variation, recorded at a few places particularly in the proximity of Bhatinda town. About 45% of the samples show F^- concentration ($<1 - 19 \text{ mg/l}$) which is higher than the permissible limit specified by WHO (2006). Alkalies ($\text{Na}^+ + \text{K}^+$) exceed alkaline earth metals ($\text{Ca}^{+2} + \text{Mg}^{+2}$) in a majority of the population of ground water samples. Ground water in the study area is dominant in cations and anions viz. Na^+ , K^+ and HCO_3^- . Since the presence of uranium and fluoride in the environment impose risk to both the eco-system and human health, we evaluated the labile pool and availability of non-anthropogenic factors which suggests that weathering of rock forming minerals constituting the uranium rich granites of Tosham area couple with evaporites including limestone/dolomite present in the area are mainly responsible for ground water composition of the area.

Keywords: Water, uranium, fluoride, Bhatinda, Faridkot, Mansa, Punjab.