

HYDROGEOCHEMISTRY AND GROUNDWATER QUALITY ASSESSMENT OF POONCH DISTRICT, JAMMU AND KASHMIR, INDIA

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Abstract

Hydrogeochemical assessment of twenty-two groundwater samples collected from various locations in the Poonch district of Jammu and Kashmir State, India was carried out to understand the sources of dissolved ions and to evaluate its suitability for drinking, domestic and irrigation purposes. All the samples were analyzed for total dissolved solids (TDS), electrical conductivity (EC), and pH, major anions (F^- , Cl^- , NO_3^- , SO_4^{2-} , PO_4^{3-}) and major cations (NH_4^+ , Na^+ , K^+ , Ca^{2+} , and Mg^{2+}). The pH of water samples ranged from 6.86 to 7.90 (avg: 7.31) indicated the slightly alkaline nature of water. Total hardness ranged from 61.25 to 224.77 mg/l (avg: 150.85), whereas EC varied from 110.30 to 485.89 $\mu S/cm$ (avg: 319.27 $\mu S/cm$). Cation abundances in the groundwater followed the order of $Ca^{2+} > Na^+ > Mg^{2+} > K^+$ whereas anion varied as $HCO_3^- > SO_4^{2-} > NO_3^- > Cl^- > F^-$. Piper plot of the major ions showed that the groundwater in Poonch region predominantly belonged to $Ca-HCO_3$ group. The Gibbs ratios indicated that rock weathering is the major driving force controlling the groundwater chemistry. Irrigation suitability of groundwater was evaluated using water indices such as percent sodium (%Na), electrical conductivity (EC), sodium adsorption ratio (SAR), residual sodium carbonate (RSC), magnesium hazard (MH) permeability index (PI), chloroalkaline indices (CAI) and Kelly's index.

Keywords: Groundwater, hydrogeochemical, major ions, sodium adsorption ratio, residual sodium carbonate