**HYDROCHEMISTRY SIGNATURES ANALYSIS OF GROUNDWATER QUALITY OF NORTH-EASTERN HARYANA, INDIA**

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**Abstract:** Groundwater qualityis analysed from Yamunanagar and Ambala districts, Haryana, India. Sub-surface water samples identified and collected from 30 sites from the study region were appraised for TDS, pH, Mg, Ca, K, Na, Cl, HCO3, NO3, F, and SO4. The outcomes of the hydro-chemical appraisal indicated that the sub-surface water is alkaline in character and are principally featured by Ca-Mg-HCO3, Na-HCO3 and Na– Cl hydro-chemical indices. Sub-surface hydro-chemistry reflected the water-rock interaction/dominance and is subsequently improved by anthropogenic activities, which are supported by hydro-geochemical relations and genetic geo-chemical evolution. Further, the hydro-chemical constituents (TDS, pH, Mg, Ca, HCO3, Na, SO4, NO3, F, and Cl) were benchmarked with the BIS. The Kelly’s ratio (KR), magnesium ratio (MR), permeability index (PI), sodium adsorption ratio (SAR), residual sodium carbonate (RSC) and percent sodium (%Na) were calculated and Doneen’s, Wilcox and USSL plots were also drawn for assessment of sub-surface water pre-eminence for agriculture purposes. For industrial purpose, the SO4,Cl, TDS, HCO3, and pH were used to evaluate the influence of corrosion and incrustation activities on metal-surfaces. In some of the groundwater samples, it is found that the sub-surface aqua pre-eminence is unsuitable for industrial, agricultural and domestic purposes due to one or more hydro-chemical elements traversing their guideline ranges. Hence, sub-surface aqua monograph remedies were recommended to improve the aqua pre-eminence.

**Keywords:** Sub-surface water quality, Domestic use, Agricultural purpose, and Industrial use.