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MECHANISM OF FLUORIDE ENRICHMENT IN GROUNDWATER OF HARD-ROCK TERRAIN IN BHOPALPATNAM AREA, BIJAPUR-DISTRICT, CHHATTISGARH, INDIA

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Abstract

Sixty two groundwater samples have been collected from hand pumps and tube wells in the Archaean terrain of Eastern Ghat Mobile Belt near Bhopalpatnam, during Pre-and Post-monsoon seasons of, 2015. An attempt has been made to determine the hydrogeochemical factors controlling fluoride enrichment in groundwater. Geologically, the study area is underlain by Archaean to Neo-Proterozoic rocks. Parameters like pH, EC and TDS were measured in the field and the average values are 7.28, 1144.89 ìS /cm, 731.98 mg/l and 7.11, 1134.52 ìS/cm, 725.4 mg/l during pre-and post-monsoon seasons respectively. The hardness values varied from 180-1740 mg/l and the average was 415 mg/l and 160-1390 mg/l and average 338.39 mg/l in pre-and post-monsoon seasons. Fluoride concentration ranges from 0.11-3.58 mg/l during pre- monsoon and 0.29-3.13 mg/l in post-monsoon.

The source of fluoride is confirmed by the presence of fluoride bearing minerals like apatite, biotite, fluorite, mica and hornblende by thin section petrography. The study reveals that fluoride concentration is due to geogenic reasons. The higher concentration of fluoride was measured in groundwater in the west to central parts of Bhopalpatnam block. The study area is underlain by granite-gneiss, gneiss, charnockite, biotite-schist and pyroxene-granulites which contain the fluoride-bearing minerals. Due to water–rock interactions, fluoride has become enriched in groundwater by weathering and leaching of F^--bearing minerals. Data plotted in Gibb's (1970) diagram shows the maximum groundwater samples to be confined to rock weathering dominance.

Keywords: Fluoride, Groundwater, Hard-rock terrain, Hydrogeochemistry, Bhopalpatnam.