Evaluation of fluorides in groundwater in an industrial area, Ghaziabad, Uttar Pradesh, India

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Hydrochemical studies were conducted in an industrial area of Ghaziabad city, Uttar Pradesh, India, to explore the causes of high fluorides in groundwater. Water samples were collected from borewells and handpumps for pre-monsoon (June 2009) period and analyzed for different physico-chemical parameters. TDS concentration ranges from 212-3020 mg/l; Na⁺ ranges from 17-1222 mg/l; K⁺ ranges 5-28 mg/l; Mg⁺² 1-178 mg/l; Ca⁺² 13-48 mg/l; Cl⁻ 9-1721 mg/l; SO₄⁻² ranges 7-602 mg/l; HCO₃⁻ ranges 28-1156 mg/l; CO3⁻ ranges 16-192 and NO3⁻ ranges 0.01-157 mg/l in groundwater respectively. The concentration of fluoride in groundwater ranges from 0.7-4.46 mg/l. The Modified Piper diagram reflect that the water belong to Ca⁺²- Mg^{+2} -HCO₃⁻ to Na⁺-HCO₃⁻ facies. Negative chloroalkali indices prove that ion exchange between Na⁺ and K⁺ took place with Ca⁺² and Mg⁺². The interpretation of plots for different major ions and molar ratios suggest that flood plain deposits and water-rock interaction is responsible for major ion chemistry of groundwater in study area. Chemical characteristics and evolution of the fluoride contaminated groundwater is similar to normal waters of other terrain; hence, it can be concluded that industrial waste material play an important role in the contribution of fluoride in to the accompanying water. High fluoride content in groundwater can be attributed to the continuous water-rock interaction during the process of percolation with fluorite bearing minerals used in industries.

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