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Evaluation of ground water quality of residential areas on the basis of chemical parameters

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ABSTRACT - A laboratory study was analyzed to observe the ground water quality of residential areas (Higher Income Group, Minimum Income Group, Lower Income Group, Juggi Jhopari, and Industrial Area) of Kanpur metro by examining the chemical parameter like calcium (Ca^{+2}), magnesium (Mg^{+2}), sulphate (SO_4^{-2}), chloride (Cl^-), fluoride (F^-) and nitrate (NO_3^-) as per the method assessment of ground water quality described in Standard methods for the examination of water and wastewater Indian Council of Medical Research (ICMR) and WHO. The result revealed that much variation was observed during October to April, most parameters decreased during summer and increase during the rainy season and then began to decrease again in winter followed by summer. HIG groundwater appeared to be the best ground water available in Kanpur metro.

Key words - Ground water, Chemical parameters, Residential areas, Kanpur city, Pollution

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Groundwater is precious and most widely distributed mineral resource of the earth and is annually replenished from the rainwater precipitation. Industrial and municipal effluents, landfills, septic tanks, mining and agricultural practices can potentially contaminate groundwater with toxic chemicals. Contamination also depends on geology and hydrology of the area. Chemicals pass through different hydrological zones as they migrate through the soil to the groundwater systems. The pores in unsaturated zones are occupied by both air and water. So flow in this zone for liquid contamination is downward by gravity. In the upper region of the unsaturated zone, some chemicals are retained by adsorption into organic matter and chemically active soil particles. These adsorbed chemicals get decomposed through oxidation and microbial activity. Below the soil zone, the pore spaces are also unsaturated and as chemicals pass downward, oxidation and aerobic biological degradation occur. In the capillary zone, spaces between soil particles may be saturated by water rising from water table. Lighter chemicals float on the top of the water table in this zone and move in different directions and rates with respect to dissolved contaminants. Once dissolved contaminants reach the water table, they may flow in both horizontal and vertical directions depending on hydraulic gradients. All the pore spaces between soil particles below the water table are saturated and lack dissolved oxygen and limits the oxidation of chemicals and groundwater flow is laminar with minimal mixing occurring as the groundwater moves. Since groundwater involves laminar flow, dissolved chemicals flow groundwater and form distinct plumes. These plumes of contaminated groundwater may be upto several miles downstream of the pollution source. Generally average rate of plume movement is less than 30 cm a day. The situation is aggravated by the problem of pollution or contamination. Aquifer pollution from both point and nonpoint sources is becoming extensive worldwide. Nearly 45 million people around the world are affected by water pollution marked by