Hydro-geochemistry around waste disposal site at Pattulaguda, Hyderabad, India

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Open Waste disposal sites are the huge source of potential contamination and the contaminant present covers the spectrum of organic and inorganic compounds. Migrations of contaminants from waste disposal sites to surrounding ecosystem is a complex process; and are governed by various geological and hydrogeochemical reactions within the system. The trace elements and other pollutants present on the surface of waste disposal sites are readily leached [1] and subsequently contaminate the aquifers [2]. Since water is the main contamination arrow in the underground, it is necessary to evaluate the inorganic traces to detect pollution at waste disposal sites.

An open dumpsite at Pattulaguda, Hyderabad, India spread over 100 acres receives ~ 2000 tons of solid wastes per day, and has been selected for the current study. The groundwater samples were collected and analyzed using high resolution-ICP-MS technique for heavy and trace elements to delineate the extent of contamination of groundwater resources in the study area. The pH and electrical conductivity of groundwater in the study area ranges from 6.6-7.8 and 347.7-1868 μScm^{-1} at 25 °C respectively, and the trace and heavy metals concentration ranges are Cr (0.728-1.718μg/l), Mn (0.521-146.68μg/l), Fe (84.399-633.56μg/l), Ni (1.908-8.79μg/l), Cu (1.28-65.68μg/l), Zn (2.19-2295.5μg/l) and Pb (0.93-21.58μg/l), which can behave as major contaminants in the groundwater at elevated concentrations. The concentration of Mn and Fe are above the (USEPA)-specified maximum contaminant level, which may cause potential health hazards. Whereas Cr, Ni, Cu, Zn and Pb are found to be under permissible limits. However, continuous and cumulative addition of these metals by wastes has the affinity to contaminate the groundwater in future. To assess the impact of dumpsites, this study suggests periodic monitoring of groundwater samples for trace and heavy metals from areas around dumpsites from time to time.

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Electrical resistivity of clinocholre at high-pressures up to 8 GPa

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Chlorite is an important constituent of the oceanic crust and one of the most water-rich of the major silicate minerals. Mg-rich chlorite is likely to be important in the transport and storage of water in cold-old subduction zones. Hence the study of physical, thermal and structural properties of Mg-rich chlorite from the plate-boundary fault is of fundamental interest in understanding the role of dehydration as a response to subduction processes at convergent plate boundaries and also in determining the temperature of metamorphic processes. A natural sample of Clinochlore from the Longitudinal Valley area of Northeastern *Taiwan* has been characterized by using the powder X-ray diffraction, (XRD), and Differential Thermal Analyses (DTA) and thermogravimetry techniques. The lattice parameters of the monoclinic (IIb) clinochlore with the composition $(Mg_{2.988}\ Al_{1.196}\ Fe_{1.6845}\ Mn_{0.026})_{5.8945}\ (Si_{2.559}\ Al_{1.441})_4\ O_{10}\ (OH)_8$, have been calculated from the powder XRD data and are found to be a = 5.347 Å, b = 9.223 Å, c = 14.250 Å, β = 97.2^0 and Z = 2.[1] The thermal behaviour of the sample showed the typical behaviour of clinochlore with a hydroxyl content of 12.5 wt%. The hydrous components were also charcetrized by Fourier transform infrared spectroscopic technique. High-pressure electrical resistivity measurements were carried out on the clinochlore up to 8 GPa at room temperature., bu using the standard Brigman opposed anvil cell technique [1-2].The electrical resistivity of the clinchlore sample show an abrupt increase at about 6 GPa, indicating a pressure-induced phase transition. The hydrous component of high-pressure phase was found to be much less than the starting sample, indicating the pressure-induced dehydration of the clinochlore.

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