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Sources of extent of groundwater pollution in shallow aquifer: A case study from Nellore district

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Twenty six countries including India are now classified as water deficient and nearly 230 million people are affected with water shortage. At prediction is that by 2025, one quarter of the worlds' population will face severe water shortages. Due to rapid urbanization and industrialization of Nellore district, the need for ground water is increasing. Therefore in the present study five mandals of Nellore district, Andhra Pradesh situated near to sea coast is selected for this study because to examine the study area effected by seawater intrusion and other contaminations due to irrigation return flows, fertilizers, latrines, animal excreta etc. 49 water samples are collected covering the entire study at various depths varying from 5 m to 25 m below ground level. The samples are analysed for various chemical parameters like EC, Hardness, Chloride, Alkalinity etc., and compared with IS Standards. From this result it is observed that due to the indiscriminate placement of wells closer to contamination sources such as near to sea coast, agricultural land, livestock raring areas and pit latrines electrical conductivity shows high values. There is no correlation between actual depths of the wells to contamination sources. The spatial distribution of EC shows high values nearer to coast. The brahmadevam village of muthukur mandal shows the high values of EC, chloride Hardness and alkalinity. Though the nitrate contamination is very low in the study area 50% of the samples shows the high values of electrical conductivity, hardness and alkalinity. Development of a groundwater management strategy is essential for the sustainable management of ground water resources in terms quality by establishment of ground water protection zones.

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Synthesis, characterization and pentavalent arsenic sorption capacity of cerium aluminium nanostructured mixed oxide

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Arsenic is a metalloid of great environmental concern because of its highly toxic nature and colossal abundance. For the mitigation of arsenic contamination, several technologies such as oxidation-precipitation, coagulation, precipitation, membrane filtration, surface sorption and ion exchange have been applied for the treatment of the contaminated water. Among them, the surface sorption method has been accepted well for its simple operation procedure, low recurring cost, very high removal efficiency, and little by-products. The objective of the present study was the synthesis and characterization of nano-structured cerium aluminium mixed oxide and its arsenic(V) sorption behavior from the aqueous solution. Two solutions of ammonium ceric nitrate and aluminium chloride were mixed in 1:1 mole proportions and the material was prepared by the method of chemical precipitation. The material was characterized in Scanning Electron Microscope, Field Emission Scanning Electron Microscope, Transmission Electron Microscope, Atomic Force Microscope, X Ray Diffraction, Fourier transform infrared spectroscopic analysis and Raman Spectra analysis. Batch method was used for the As(V) sorption kinetics. The isotherm experiments were conducted separately at temperatures 288K, 303K, 318K at pH 7.0 (±0.2) by batch sorption procedure. The oxide surface was rough and crystalline in nature. From the TEM analysis, it was found that the material was agglomeration of particles of 40-90 nm. The presence of nanoparticles in TEM image could indicate high surface to volume ratio of the material, which can be useful for adsorption purpose. In the study of kinetics of arsenic(V) sorption, the sorption percentage remained almost unchanged upto pH=9.0. After that, a small decrease in sorption percentage was observed. The equilibrium data were analyzed by the Langmuir and the Freundlich isotherm models, which are usually used to describe the equilibrium sorption data. It was found that the Langmuir model was the best fit model for the sorption reaction. The Ce-Al binary oxide was very much effective in removing As(V) from water within wide range of pH. The monolayer sorption capacity of the binary oxide was quite comparable to the other As(V) adsorbents reported previously. Thus the present oxide could easily be utilized as a sorbent for arsenic removal from arsenic contaminated ground water.

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