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Review Article

Review on effects of biological and toxicological impact of dissolved solids in waters.

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Abstract

Total Dissolved Solids (TDS) are the total amount of mobile charged ions, including minerals, salts or metals dissolved in a given volume of water, expressed in units of mg per unit volume of water (mg/L), also referred to as parts per million (ppm). TDS is directly related to the purity of water and the quality of water purification systems and affects everything that consumes, lives in, or uses water, whether organic or inorganic, whether for better or for worse. Dissolved solids" refer to any minerals, salts, metals, cations or anions dissolved in water. This includes anything present in water other than the pure water (H20) molecule and suspended solids. The recent advances in technology and the corresponding increase in the use of nanomaterials to products in every sector of society have resulted in its uncertainties regarding environmental impacts. The objectives of this review are to introduce the key aspects pertaining to TDS and nanomaterials in the environment and to discuss what is known concerning their fate, behavior, disposition, and toxicity, with a particular focus on waters, critiquezing existing positions of dissolves solute and nanomaterial suspension in freshwater, marine, and soil environments.

Keywords: Water,dissolve solids and toxins

Introduction

Some dissolved solids come from organic sources such as leaves, silt, plankton, and industrial waste and sewage. Other sources come from runoff from urban areas, road salts used on street during the e winter, and fertilizers and pesticides used on lawns and farms. Dissolved solids also come from inorganic materials such as rocks , air and nano particle clouds that may contain calcium bicarbonate, nitrogen, iron phosphorous, sulfur, and other minerals. Many of these materials form salts, which are compounds that contain both a metal and a nonmetal. Salts usually dissolve in water forming ions. Ions are particles that have a positive or negative charge. Water may also pick up metals such as lead or copper as they travel through pipes used to distribute water to consumers Hogan and Marc, (1987). The efficacy of water purifications systems in removing total dissolved solid is still a mirrage, so it is highly recommended to monitor the quality of a filter or membrane and replace them when required. People living near the costal area of India-Jamnagar, drinking water faces scarcity in this area, and also the quality of water is quite hard due to ground water many times having total dissolve solides level more then 1000ppm Dezuan, (1997).Considering this challenge the cost of purification to alleviate the level of ppm might be quite high and in the absence of that remedy the water become toxins to lives. Also , a situation where colloidal nano material sequesteres around that water source is inevitable ,it becomes worrisom for water treatment engineer. The threshold of acceptable aesthetic criteria for human drinking water is 500 mg/l, there is no general concern for odour, taste, and color at a level much lower than is required for harm. Most aquatic ecosystems involving mixed fish fauna can tolerate TDS levels of 1000 mg/l Boyd (1999)

Adsorption of ions

The factor which influences the adsorption of gases onto single crystals and films of phthalocyanines, and the consequent changes in their electrical properties has been studied Hogan et al (1973). The implications of these results and of the molecular and electronic structure of the phthalocyanine molecule for the interactions between gases and phthalocyanine surfaces results in the adsorption of gases based on electrical properties of phthalocyanine single crystals and films with particular reference to the chemical and physical factors are being challenged by the magnitude, rate and reversibility of the observed changes in semiconductivity and photoconductivity equaling to chemical charged sensors.

Thermodynamic characteristics of adsorped ions

The influence of readily adsorbable anions such as Cl^- in hindering passivation and in promoting breakdown of passivity is treated in terms of the relative adsorption of anions and water at the metal solution and oxide/solution interfaces, as influenced by anion concentration and electrode potential. Partitioning of metals between filter-retained and filtrate fractions exhibited a dependence on total suspended solids (TSS) concentration. This phenomenon, the particle concentration effect (PCE), has been previously documented almost exclusively in marine and estuarine systems and lab simulations, and mainly for radionuclides Hogan et al., (1973). The partition coefficient, *Kd*, was independent of major ion chemistry and pH, supporting the hypothesis that the PCE is caused by metals associated with colloidal particles but counted with the filtrate fraction. Partition coefficients of the measured metals in fresh waters are predictable across the full range of TSS measured, spanning more than two orders of magnitude. The inferred true partition coefficient for Pb (between solution and particles of all size classes) is greater than 10^7, suggesting that truly dissolved Pb concentrations are extraordinarily low. Freshly precipitated Fe oxyhydroxides partition metals exactly like organic detritus and clays in spite of the great difference in their surface chemistry,the same data rule out the possibility that the PCE could be caused by a decrease in surface area (and surface complexation sites) due to resuspension of larger particles under high TSS conditions.. This suggests that ^{210}Pb and stable lead behave differently from each other in the surface waters studied. One possible explanation is that this dissimilarity may be attributable to differences in speciation that are persistent on a time scale of months, corresponding to the water residence time or Pb removal rate.

Ecological fate and behavior of nanoparticles clouds in waters

Colloid is the generic term applied to particles in the 1-nm to 1-μm size range. The natural NM fraction has been identified as being of particular concern because of the changes that occur in this size range, although the most important size range in terms of environmental processes is not well defined. Aquatic colloids comprise macro-molecular organic materials, such as humic and fulvic acids, proteins, and peptides, as well as colloidal inorganic species, typically hydrous iron and manganese oxides. Their small size and large surface area per unit mass make them important binding phases for both organic and inorganic contaminants. Additionally, high surface energy, quantum confinement, and conformational behavior are likely to be important, although discussion of these parameters currently remains qualitative because of the complexity of colloids or NPs. Although dissolved species are operationally defined as those that pass through a 0.45-μm filter, this fraction also includes colloidal species whose bioavailability is quite different from truly soluble organic or ionic metal species Lead et al., (1997)and more recent work has stressed the necessary separation of dissolved, colloidal, and particulate species (Guo and Santschi, 2006).

In soils, natural NPs include clays, organic matter, iron oxides, and other minerals that play an important role in bio-geochemical processes. Soil colloids have been studied for decades in relation to their influence on soil development and their effect on soil structural behavior Cameron (1915). Particular relevance to manufactured NMs, soil colloids and other porous media may facilitate the movement of contaminants in soils and other porous media. Contaminants sorbed to or incorporated into colloids can be transported when conditions for colloidal transport are favorable. For example, natural soil colloids have been found to be vectors for transport of metals through soil profiles.

Entry of nanomaterials into the aquatic ecosystem

Given the increasing production of NMs of all types, the potential for their release in the environment and subsequent effects on ecosystem health is becoming an increasing concern that needs to be addressed, especially by regulatory agencies. In doing so, it is necessary first to determine the fate and behavior of manufactured NMs in the environment such as retaining nominal nanoscale size and original structure and reactivity in aquatic and soil/sedimentary systems, association existing with other colloidal and particulate constituents effects on solution and physical flow conditions. Adequate protection to ecosystems while permitting the advantages that nanotechnology offers to be fully developed.

Manufactured NMs enter the environment through intentional releases as well as unintentional releases such as atmospheric emissions and solid or liquid waste streams from production facilities. Deliberate release of NMs includes their use to remediate contaminated soils including the use of iron NPs used to remediate groundwater. Emitted particles will ultimately deposit on land and surface water bodies, although treatment to avoid aggregation may result in enhanced buoyancy of these NPs when compared with NPs from other sources, such as the ones arising from diesel emissions and agro aerosols.

Nanoparticles reaching land have the potential to contaminate soil, migrate into surface and ground waters, and interact with biological systems. Particles in solid wastes, wastewater effluents, direct discharges, or accidental spillages can be transported to aquatic systems by wind or rainwater runoff. With increasing control of fugitive releases arising within the manufacturing process, the biggest risks for environmental release come from spillages associated with the transportation of manufactured NPs from production facilities to other manufacturing sites, intentional releases for environmental applications, and diffuse releases associated with wear and erosion from general use. Hence, most of the research to date has focused on the nano-materials in greatest production and metal oxides.

Conclusion

The biological and toxicological posture of underground water in our towns , village and homes now is posing question even at the soldem presence of ozonalized and reverse osmosis approaches in treating waters for domestic usage. The advent of industrial chemical and aerosol manufacturing plants in attempt to industrialized our states is another ugly problem that nano science had to answer speedly else man life span shall be a forecast of radioerosol, radioionic and radioactive inbalane, being that the human body is about 70% water.

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