

Determination of Total Inorganic Arsenic in Drinking Water

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Arsenic (As) is a toxic element that can be found in both anthropogenic wastes and some geochemical environments. It is the most significant water pollutant metalloid and this element has been the chemical villain of more than a few murder plots. The mobility of AsO_4^{3-} in soils depends on several factors including the presence of other anions that compete with As for soil retention sites, for example, phosphate. Arsenic may accumulate in soil through the use of pesticides and application of fertilizers. The application of pesticides and phosphate fertilizers on a wide scale is common agricultural practice. This study examines the presence of total inorganic arsenic in agrochemicals (fertilizers and pesticides) and describe observations relative to competitive adsorption between phosphate and arsenate by soils. The study area is located in Jundiaí, São Paulo, Brasil. The northeastern flank of this municipality is traditionally an area of concentration of Italian immigrants linked to farming and viticulture. Arsenic is present in drinking water at levels ranging from 0.11 to 0.23 mg. L⁻¹. Laboratory studies indicated that the presence of arsenate tended to reduce phosphate adsorption in solution, but the degree of suppression was less phosphate than for arsenate adsorption. The preliminary results indicated arsenate (AsO_4^{3-}) having many chemical similarities to phosphate (PO_4^{3-}). However, the concentrations of phosphate in the soil are far greater than those of arsenate – in this case, the phosphate would win the competition, putting As in favorable conditions to move into the aquifer. The high localized concentration of PO_4^{3-} can unbalance links between metallic ions and minerals and could cause mobility with aquifer contamination.

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