

Metallic Iron (Fe⁰) for Better Drinking Water in Rural Areas of Developing Countries.

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Rural environments in some developing countries are suffering from aching pollution problems from geogenic and anthropogenic nature. Many of the reasons behind the anthropogenic problems lie in changes in the traditional way of life and the ignorance on the toxic potential of manufactured/imported products. Most frequently, the sole available income generation activities are the source of water pollution (mining activities, intensive agriculture). A generalization trend exists within the international community suggesting that water in developing countries is of poor quality. Unfortunately, the water quality is rarely analytically determined and existing potabilization solutions (oxidation, co-precipitation and adsorption onto coagulated flocs, adsorption onto sorptive media, ion exchange and membrane techniques, low-pressure nanofiltration and reverse osmosis) may be prohibitively expensive for the rural populations.

There are three main sources of drinking water in rural areas: (i) rain water, (ii) surface water (spring, stream, river), and (iii) shallow groundwater (well). Since the actual water quality is not known or monitored, efficient and affordable technologies are needed to ameliorate the water quality in the case it may be polluted. For these purposes available water may be filtrated through a filter containing a non-toxic and cost-effective material that removed a large spectrum of contaminant (charged/uncharged, organic/inorganic, living/non-living, redox-sensitive/redox-insensitive). Such a cost-effective material is not yet known. Fortunately, metallic iron (a cost-effective and readily available material) has shown the capacity to remove all possible contaminants (including viruses) from the aqueous solution upon its oxidation (corrosion) during the past 15 years. Metallic iron was originally introduced as filling material for subsurface reaction walls for groundwater remediation.

The present contribution (poster or talk) presents a concept to scale down the conventional iron barrier technology to meet the requirements of households and communities in rural environments worldwide. It is expected that metallic iron may be produced locally by rural communities while using old environmental friendly technologies of blacksmiths.