

Fate of Oxytetracycline & Doxycycline in Soil & Underground Water

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Abstract

Pharmaceutical pollution is one of the most serious types of environmental pollution, that attracts increasing attention & lead research studies in recent years. Because of their great impact on aquatic life, soil & under ground water as emerging aquatic micro pollutants that have possibly been affecting the ecological system. It could have major implications on plants, wildlife and humans who may be directly & indirectly be responsible of this type of pollution. In this study two antibacterials were selected, oxytetracycline & doxycycline as examples of pharmaceuticals that are released into the environment, both are marketed in the Palestinian market either for human pharmaceutical industry or the veterinary one. In this research the adsorption behavior of both pharmaceuticals on soil, the effect of organic matter, the effect of magnesium chloride hepta hydrate addition on polluted soil, in addition their effect on characteristics of under ground water, all were studied using the UV-Vis spectrophotometry. The results showed that increasing organic matter increases the adsorption of oxytetracycline more than doxycycline, also showed that the composition of oxytetracycline complex with magnesium ion was more stable than doxycycline complex with magnesium. The study also revealed a higher concentration of doxycycline in leachate water from the soil than those of oxytetracycline, because doxycycline has higher solubility in water. It also showed a decrease of the concentrations for both substances over time in leachate water due to degradation. The degradation of both pharmaceuticals in soil & water would be produced by other substances may be harmful, as the threat of their presence in the soil and groundwater would increase the resistance of bacteria in the soil, in another words that would affect the natural properties of soil and groundwater as well.