TITLE: ***Clay soil in situ treatment by Fenton's reagent for degradation of residual oil.***

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ABSTRACT

The oil and its products occupy a prominent place in relation to organic compounds that act on environmental contamination. The polycyclic aromatic hydrocarbons (PAHs), constituents of oil, remain the focus of great interest and intense investigation because it can cause irreparable damage to nature and human health. The remediation of contaminated soil is a very difficult and lengthy process for the reason of the difficulty to predict the behavior of a contaminant once in contact with the environment because it is quite complex and heterogeneous. Thus, many physical, chemical and biological processes have been used in to resolve such problems. The advanced oxidative processes (AOPs) have received much attention in this context by being able to convert pollutants into harmless chemical species and its considered a clean process and not selective. Among these cases there is a reaction of Fenton, which is the formation of the hydroxyl radical (•OH), highly oxidizing, where the reaction between the hydrogen peroxide (H2O2) and iron (II) salt and can be reached the complete mineralization of the contaminant, and the use of iron (II) in the presence of hydrogen peroxide under irradiation is called the photo-Fenton reaction. This study aimed to monitor the Fenton and photo-Fenton reactions in soil contaminated by oil, checking the degradation of aromatic fraction (PAHs). We performed analysis of oil in the ground by synchronous fluorescence spectroscopy, analysis by gas chromatography (GC-FID) for quantification of PAHs, measures of soil pH, in addition to monitoring the water by capillary fringe of total phenols, Ferrous iron, temperature, pH, DO levels and synchronous fluorescence spectroscopy to follow the same patterns of variation in the amount and the downstream of remedied area. The results of fluorescence and gas chromatography showed the efficiency of the tested process. The bench tests using kaolinite contaminated with phenol showed that concentrations of 0.02 mol/L for Fe2+ and 1.2 mol/L for H2O2 can promote the degradation of 39% of the pollutant present in 1h of irradiation, can achieve 99% of degradation after 4h of irradiation. The results also showed that there was only the effect of the photo-Fenton process and an absence of the Fenton process in the remedied area, because the absence of light in the lower layers of soil makes it difficult to reduce the present iron, making the degradation process much slower. The physical and chemical

analysis of capillary fringe’s water on the upstream and downstream of the remedied area showed that treatment with Fenton reagents is not affecting the groundwater in the region, allowing the use of it in situ.

Keywords: PAHs, Fenton, OAPs, soil, remediation.