TITLE: ***Utilization of Sphag Sorb peat in the petroleum contaminated soil treatment: physical chemistry and spectroscopic evaluation.***

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ABSTRACT

It becomes more and more urgent the need to develop and to apply technology capable to minimize the current environmental impacts of the contamination of derived of petroleum in soils. Thus, this work was accomplished with the objective of evaluating the potential of the Sphag Sorb peat as absorbent of the aromatic fraction of residual petroleum in the soil through the fluorescence spectroscopy, as well as, to evaluate the physical and chemical characteristics of the polluted and of the treated soil with the peat. The soil contaminated with petroleum, treated or not with the peat it has loamy texture (~70% of silt + clay), while the reference soil is sandy (~61% of sand). Due to the texture, the reference soil, destined to the plantation, has humidity around 33%, while in the contaminated soil the humidity varies from 53 to 58%. The polluted soil treated with peat showed humidity from 40 to 43%. The petroleum turns the loamy soil more raincoat, retaining water in the surface. The treatment with the peat, due to its porosity, makes the more permeable soil, retaining less water in the surface. As for the pH, the residues of the vegetation impose acidifying effect to the reference soil (pH=3.7). The peat inserted in the soil areas contaminated with petroleum tends to lower the pH value, where in the Area I of 6.9 the pH went to 5.2; and in the Area II, the pH went from 7.4 to 6.7. The HS polar group of the peat contributes to increase the concentration of H+ in the soil solution. The reference soil, due to the vegetation, showed larger text of OM (113 g/dm3) than the soil areas contaminated with petroleum (Area I with 88 g/dm3 and Area II with 74 g/dm3) and even those treated with peat (Area I with 64 g/dm3 and Area II with 88 g/dm3). The density of particles did not change in the polluted or treated with peat soil in relation to the reference soil. As for the density of the soil, the values determined in all the valued soils varied from 0.6 to 1.0 g/cm3, in other words, values usually attributed to humic soils. The analysis of the peat by EPR identified paramagnetic species as Fe3+, Mn2+ and organic free radical. The fluorescence in the organic extract of the soil and of the peat it happened in the spectral range of the red (visible), due to the high aromaticity degree and fluorophores groups show in the humic acids which compose to SOM and the absorbent material. The fluorescence in the organic extract of the polluted soil, due to PAH, polar and asphaltene

of the petroleum, decreased considerably due to the treatment with the peat, because through chemical sorption it retains PAH and others derived of the petroleum contributing to its immobilization. During two years of treatment of the contaminated soil with the peat, the decrease in the fluorescence of the petroleum was of 75% in the Area I and 76% in the Area II. The aromatic constituents of the petroleum were mainly concentrated in the superficial layer of the soil (0-10 cm) in the Area I. The aromatic components of the petroleum in Area II of the soil were concentrated in the subsuperficie (10-20 and 20-30 cm). The effective cation exchange capacity (ECEC) in the soil contaminated with petroleum was of the 30 cmolc/dm3 and in the treated soil with peat of the 35 cmolc/dm3. The capacity of the peat in retaining nutritious and to increase the concentration of the same ones in the solution of the soil, it can promote the growth of the vegetation and recomposition of the environmental matrix.

Keywords: absorbent, Sphag Sorb, fluorescence, petroleum, soil