Ain Shams University

Faculty of Girls for Arts

Science and Education

Physics Department

Spectroscopic Analyses of Soil in East Delta region of Egypt

A Thesis

Submitted for the Requirements of

The M.Sc. Degree in Physics

Presented to

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Ain Shams University,

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Approval Sheet

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The M.Sc. Degree in Physics

This thesis has been approved by supervisor committee

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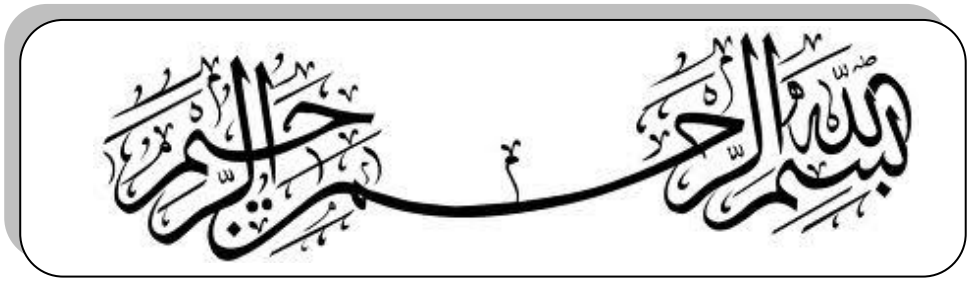
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Abstract

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Key words :- FTIR; FTNMR; Molecular modeling; Nile Delta and soil pollutants.

Soil in Egypt especially around Delta is suffering from an increase in the level of pollutants which are affecting adversely on soil fertility and stability. Soil samples were collected from and close to drainage from surface and various depths. Consequently, Fourier transform infrared spectroscopy (FTIR) was used to characterize the molecular structure of soil and sediment samples. Humic Acids (HAs) as a main part of soil organic matter (SOM) represent the heart of the interaction process of inorganic pollutants with soil. Extraction method was used to extract HAs then both NMR and FTIR were utilized for HAs investigation. A model based on ab initio calculations was utilized to describe the mechanism of interaction between organic as well as inorganic structures in soil.

Both molecular modeling and FTIR data indicate that there is a possible interaction between inorganic pollutants and humic substances mainly humic acid, which is manifested by the formation of metal carboxyl band. Samples from surface and bottom soil indicate that the carboxylate and/or metal carboxylate of humic acid may lead to the transport of pollutants from surface to bottom soil, which of course may be a source of contamination for groundwater in the area of study.

All data confirm that soil HAs may be responsible for contaminants transportation from surface to subsurface reaching the ground water which represent high risk on public health.

Summary