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As a result of increasing soil anthropisation, large surface areas covered by anthropogenic materials are submitted to environmental factors (*e.g.* climate, organisms). Pedogenesis of the developing Technosols is often characterized by an intense and rapid weathering (1, 2, 3). However, the nature, localization, and extent of the pedogenetic processes occurring in Technosols are still little known.
To assess the soil formation on purely anthropogenic parental materials, a former settling pond of iron industry sludge colonized by vegetation since *ca.* 50 years was chosen. The soil is composed of contrasted layers, and an organic layer has developed at the surface (4, 5, 6). Composition, mineral and organic components and structure of the soil were studied as tracers of the material origin and indicators of early pedogenetic processes. Also, historical records regarding the industrial operations were analyzed. Twelve layers were sampled in the first two meters of the profile. Mineralogy was determined with XRD, IR, Mössbauer spectroscopy, SEM and TEM-EDS. Spectroscopic and molecular analyses were carried out on solvent extractable organic matter. Thin sections were prepared for some layers.
Results showed a stratification of the soil profile resulting from successive sludge supplies. Composition, mineralogy, and structure of the layers of the Technosol were derived from the industrial raw materials and processes. Elemental composition reflected the enrichment in volatile elements, and organic analyses the dumping of oil and combustion by-products. Part of the mineral phases was inherited from raw materials, and others resulted from the industrial processes (*e.g.* high temperature

phases). Pedogenetic processes were obvious with the development of an organo-mineral horizon. In the deeper layers, analysis of microstructure and mineralogy revealed physical (cracks, solute movements) and chemical processes (dissolution, precipitation). These phenomena occurred primarily in cracks and at the interfaces between two layers. Also, roots, which have colonized the whole profile, and developed preferentially in these areas, have induced changes in their rhizosphere (modification of porosity and metal extractability). In conclusion, the Technosol results from successive steps of pedogenesis, driven firstly by drying-wetting cycles and changes of physico-chemical conditions induced by the climatic factor, and finally by biological processes in relation with root development.

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