

DEGRADATION OF CLAY MINERALS AND SOILS IN THE SODA WORKS: A POST-INDUSTRIAL AREA POLLUTED WITH ALKALINE SOLUTIONS

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The XRD, TEM, SEM, FTIR and ESCA methods as well as sorptive and chemical examination have been applied to studying changes in structure, morphology and porosity of mineral and soil samples treated with alkaline solutions. The main purpose of our studies was to explain the nature of the dramatic environmental transformations on the plot of the former Kraków Soda Works “Solvay” in the southern part of Kraków.

Research covered both examination of polluted soil samples and experimental studies on clay minerals (smectite, kaolinite and illite) degraded with NaOH solutions in different periods of time.

It was found that alkaline solutions influence very strongly the properties of soils, causing degradation of their microstructure and chemical composition as well as transformation of mineral substances. Changes in soil microstructure included mostly breakdown of the pore systems, decomposition of soil aggregates and destruction of soil stability. Changes in the chemical composition of polluted soils were connected to the removal of soil organic matter (mostly of humic type) and dissolution of mineral components. Transformation of the mineral components of soil comprise evolution of fine-grained mineral fractions (mostly clay minerals), leaching of chemical components, deep etching and partial dissolution of clay flakes and aggregates, and also crystallization of secondary mineral phases (among others of zeolite type).