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# A Natural Clay Organic Complex from Andalusian Black Earth

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**Abstract:** Protein complexes of smectites in soils are difficult to detect if the usual smectite tests show no peculiarities. Andalusian black earths are typical examples. Investigation of the alkylammonium derivatives, however, allows detection of adhered macromolecules which might be protein-like although this cannot be proved exactly.

Investigation of artificial clay-protein complexes reveals different types of clay protein interactions. Calcium smectites adsorb proteins mainly on the external surfaces, the macromolecules being anchored in the interlayer spaces. Sodium smectites give partial crystalline products in which the silicate layers are distributed in the protein matrix.

Exchange of alkylammonium ions can be used as a tool for detection of the protein. If this is adsorbed on external surfaces (calcium smectites) the increased layer separation during the cation exchange enables the macromolecules to slip between the layers and the basal spacing of the alkylammonium derivatives are changed in characteristic ways. The partial crystalline sodium clay-protein complexes are reorganized by alkylammonium ions to regular structures. The proteins are not displaced completely from the silicate surfaces so that the basal spacing of the alkylammonium derivatives are enhanced in comparison with pure montmorillonite.

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