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Tunisian clays: Perspectives of use in the medical field?

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This work has focused on the physico-chemical characterization of three series of clays in the North-West, Central and North-East regions of Tunisia related with medical use. The clays of the region of Nabeul (Northeastern Tunisia) contain 37% of attapulgite with a chemical composition including magnesium and aluminum. These clays show 3.26% of CaO, 15.29% of Al₂O₃, 5.5% of Fe₂O₃ and 49.78% of SiO₂. The percentage of MgO achieves 7.55%. Thanks to their high swelling potential, their low permeability, their cationic exchange capacity, their specific surface, their chemical and mechanical stability, it has a broad spectrum of applications, and one of the most important is medicine field. Principally, attapulgite is known for its excellent absorption property. Therefore, it is considered ideal for drugs that need to control stomach disorders such as diarrhea. The white clays of Ain Khémouda (center-west of Tunisia) show significant levels of alumina, zinc and iron. All these characteristics would allow its identification as hydrated halloysite (10 Å) of the aluminous zinciferous type. The outer surface of halloysite nanotubes has properties similar to SiO₂ while the inner core of the cylinder is related to Al₂O₃. The zeta potential can be roughly described by the superposition of a predominantly negative (at pH 6-7) surface potential of SiO₂, with a small contribution of the positive Al₂O₃ inner surface. The charge of the internal promotes the loading of halloysite nanotubes with negative macromolecules, which are at the same time repelled from negatively charged external surfaces. A wide range of active agents, including drugs, nicotinamide adenine dinucleotide (NAD) and marine biocides, can be trapped in the internal lumen, as well as in the voids of multilayer aluminosilicate casings. The smectitic clays of northwestern Tunisia (Kef area) show a 23.89% of CaO, 10% of Al₂O₃, 4.51% of Fe₂O₃ and 29.48% of SiO₂. The percentage of MgO achieved 5%. This clay has 85% smectite, 10% kaolinite and a specific surface of 577 m²/g and a C.E.C. of 69 meq/100 g. Diosmectite (DSM) extracted from smectite is a purified clay consisting of a double sheet of aluminum silicate and magnesium, indicated for the symptomatic treatment of diarrhea, also an antacid agent and as a protector of the gastrointestinal mucosa.

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