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Application of pharmacopeia tests on an Algerian Bentonite to assess its potential suitability as a pharmaceutical substance

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The purpose of this study is to explain the phenomena that occur at the level of the raw structure of Ca-Bentonite from the Hammam Boughrara deposit in the region of Maghnia (northwest Algeria) by applying pharmaceutical tests to assess their potential suitability as materials in pharmaceutical applications.

The pharmaceutical industry is increasingly interested in bentonite for its high cation exchange capacity as well as for its exceptional swelling rate. These are naturally hydrated phyllosilicates containing clayey minerals of the smectite group (Montmorillonite).

The structure of the Montmorillonite consists of a stack of sheets (composed of two tetrahedral layers and between them an octahedral layer), each of which is separated by an interfoliar space. The Montmorillonite network is negatively charged, mainly due to isomorphous substitutions within the structure that create a permanent load deficit offset on the outside of the sheet by compensating cations [1].

Before use in the pharmaceutical industry, raw bentonite samples must conform to recommendations and directives of pharmacopeia. A set of technological tests were investigated with the samples, such as pH, sedimentation volume and swelling capacity.

The pH test reveals the type of stacking of the sheets following the hydration of the montmorillonite. The sedimentation test evokes the interactions that occur during hydration without any external action. The swelling capacity indicates the type of network formed as a result of thermal activation of cation exchange.

In view of the results obtained, Montmorillonite could be applied to formulate various drug delivery systems to control and/or improve the pharmaceutical properties of drugs, including solubility, dissolution speed, and absorption.

References:

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