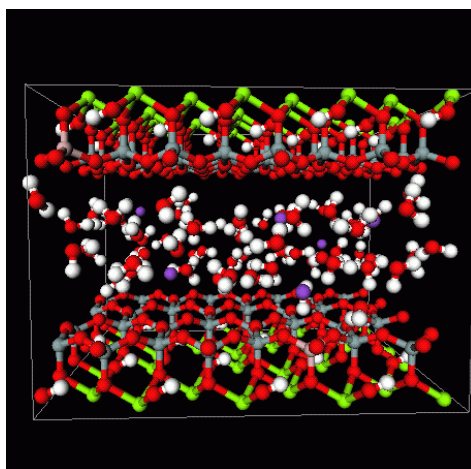


## Phyllosilicates as oral and topical delivery systems

Prof. Valentina Iannuccelli - University of Modena e Reggio Emilia – Consorzio TEFARCO Innova

Based on the high Cation Exchange Capacity (CEC) as well as swelling, clays have been proposed as materials for modulating drug delivery where the control of the drug release rate is mainly due to ionic exchange mechanism involving the intercalation of the drug within the interlayers of the inorganic carrier.



*Montmorillonite clay molecular arrangement*

### 1. Description of the product

Clays are common ingredients in pharmaceutical and cosmetic formulations as active substances (gastrointestinal protectors, osmotic oral laxatives, antidiarrhoeaics, topical antibacterials and antiinflammatories) and excipients in solid forms (tablet, capsules, powder), liquid forms (suspensions, emulsions) or semisolid forms (ointments, creams). Only some clay minerals, a combination of Al or Mg octahedra and Si tetrahedra (phyllosilicates), including kaolin, talc, smectites and fibrous clays have beneficial effects in dermatological and cosmetic applications (geotherapy, palotherapy) according to their rheological and thermal properties as well as cation exchange capacity (CEC) and absorption. Moreover, the mobility of the exchangeable ions is the most studied property in the perspective of oral and topical pharmaceutical applications. As a result of clay structural and chemical characteristics, smectites are 2.1 layered silicates, characterized by octahedral and tetrahedral substitutions, high CEC and high specific surface area. Consequently, they exhibit drug-carrying capability.

### 2. Innovative aspect of the product

The intercalation of several drugs or cosmetic substances in smectites could represent an advantageous approach to design delivery systems for both oral and topical use. Clay-drug interaction affects the properties of both the dosage form (viscosity, flow property) and the intercalated drug (stability, release, absorption).

### 3. Main advantages of the offer

Clay minerals are naturally occurring inorganic cationic exchangers and so they may undergo ion exchange with basic drugs in solution or adsorb acidic and non ionic compounds. The obtained organoclay produces desired effects on drug stability, absorption, dissolution and release.

### 4. Technology key words

Organic clays, oral administration, topical application

### 5. Current Stage of Development

Development phase with antibacterial drugs

### 6. Intellectual Property Rights

The product is not covered by patent

### Technical and scientific publications

Bellini A., Iannuccelli V., Coppi G. Characterization of phyllosilicates for pharmaceutical and cosmetic uses. PBM World meeting, Malta, 8-11 marzo 2010.

Bellini A., Coppi G., M. Montorsi, G. Ori, Iannuccelli V. Montmorillonite as drug delivery system for gentamicin. Skin Forum Meeting, Edinburgh, Scotland, 6-7 luglio 2010.

### CONTACT

[info@biopharmanet.eu](mailto:info@biopharmanet.eu)

Tel.: +39 0521 905073 Fax: +39 0521 905006