

Organoclays-an alternative to Activated Carbon.

George Alther
President
Biomin, Inc.
P. O. Box 20028
Ferndale, Michigan 48220
Phone: 248-544-2552, Fax: 248-544-3733
Web Site: <http://www.biomininc.com>

ABSTRACT

Organoclays, also called organically modified clays, are primarily bentonites which are modified with quaternary amines. In this manner they have become non-ionic surfactants with a solid base. The quaternary amine is cationic, the bentonite holds cations such as sodium and calcium on its surface, which are exchangeable. The nitrogen ion on the hydrophobic (organophilic) end of the quaternary amine chain exchanges onto the bentonite with sodium, calcium and magnesium. The carboxylic head from the hydrophilic side of the amine chain sticks out from the clay into the water, and is thus neutral. This neutral, or non-ionic function allows the organoclay to remove organic hydrocarbons of low solubility from water, and fixate them. Such compounds include oil and greases, PCB, PNAH, BTEX, chlorinated phenols, and chlorinated compounds such as trichloroethylene.

At the same time, since not all charges on the surface of the bentonite are satisfied by the nitrogen end of the quaternary amine, the bentonite acts also like a natural ion exchange resin, removing heavy metals such as Pb, Ni, Cd, Cr³⁺, Cu, iron, Hg and so on. Thus the organoclay can serve a dual function, removing inorganic and organic compounds. Anions such as Cr⁶⁻ are also removed. The organoclay is used either in granular form, to clean up ground water and waste water, or in a powdered form to stabilize contaminated soils and clean up waste water in the batch mode. This presentation describes some of these applications.