



BIOMIN, INC.

State of the art water filtration media

We will lower operations costs by 50%, and bring them into compliance with discharge regulations.

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Makers of OilSorb™ and Other State-of-the-Art Filtration Media

Technical Advisory #26

Emulsions

Oil and other petroleum hydrocarbons such as diesel, gasoline, and jet fuel are not miscible in water. They form globules, spherical structures, which rise to the surface after coagulation. If sediments, particularly clays and colloidal clays, are present, the oil or fuel will settle to the bottom because of the extra weight added by the sediment. The sediments are water wet. Thus the oil (fuel) droplets cannot coagulate (come together) because the fine mud particles are single charged, ie have a high zeta potential, and prevent this from happening. The oil (fuel) globules may be in a loose state of packing, with the clay particles adhering to them. The presence of organic acids decreases the sediments settling capacity, possibly through a lowering of their interfacial tension at the oil-water interface.

The interfacial tension between oil and water is very high, about 50 dynes/cm. A surfactant lowers that to 10 dynes/cm. The emulsifier molecules are adsorbed at the oil/water interface and form a skin about the oil droplet, acting as a physical barrier and preventing the droplets from coagulating/coalescing when they collide. Since the emulsion droplets carry a small electrostatic charge, this mutual repulsion contributes to the stability of the emulsion. This stability can be maintained only in low salinity (low conductivity) water.

The stability of an emulsion increases with the viscosity of the continuous phase (water) because the number of collision between the droplets is decreased. Similarly, the stability decreases with increasing temperature because the number of collisions increases. A mechanical emulsion is achieved by forcing the components through a small orifice under high pressures, such as

pumping it through a diaphragm pump, which exerts shear, or the shearing of the water due to vacuum extraction.

Stable emulsions can be formed by the addition of clays, CMC, starches and other colloidal materials at the oil/water interfaces. A skin of solid particles is thus formed around the dispersed droplets, which prevents their coalescence. These colloids act as mechanical emulsification agents, provided there is sufficient mechanical agitation. These types of emulsions are not as stable as chemical ones.

If the water is not heated, such emulsified fuels are difficult to remove because such emulsions are hard to break. However, by passing the water through a column of organoclay (Oilsorb™) at a very slow rate, engendering a long retention time (10 minutes or more), the emulsified oil or fuel is effectively retained by the Oilsorb™.

Also, natural chemical emulsions do occur in groundwater because some of the degradation products of decaying plant matter convert into surfactants, which then act as chemical emulsifiers.

18th International Activated Carbon Conference (IACC-18)

George Alther, President of Biomin Inc., will provide a workshop on organoclays October 20, 2006 in conjunction with IACC-18. The 6 to 9 PM workshop is titled "Organoclays Extend Activated Carbon Life." Mr. Alther will also provide an oral presentation "Newest data on organoclay sorption capabilities" You can [register to attend IACC-18](#).

Please visit <http://biomininc.com> for additional technical information.

To order OILSORB contact Biomin Inc. by writing to Biomin@aol.com

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