Technical Bulletin #33

Reducing Your Activated Carbon Costs

"OILSORB": Is approved by the U.S. Dept. of Defense, the U.S. Dept. of Energy and the Florida EPA.
"Oilsorb" has a national stocking number

Remove gasoline from water, up to 7 times more effectively, while cutting operations costs by 50%, with **"Oilsorb".** See our testimonials and case histories at Biomin's web site: www.biomininc.com. For further references, please contact us directly. "Oilsorb" is an organically modified clay, also called "Organoclay." Removal mechanism is by partition.

For best results in the removal of gasoline from water: A vessel filled with "Oilsorb" Organoclay, followed by one or more filled with activated carbon.

How it Works:
While carbon acts as a sorbent for xylene, toluene and benzene, a phenomenon called "roll off", or "displacement" occurs, which will result in causing a hazardous material to occur in the water, leaving the water contaminated. This happens after a certain amount of these compounds have been sorbed, and benzene reappears in the effluent. That is because toluene and xylene manage to kick the benzene off the carbon. Now you have hazardous benzene in the effluent water, and have not achieved the purpose of cleaning it.

Avoid this hazardous material phenomenon by placing a vessel filled with "Oilsorb" in front of the carbon. If you are already using two vessels of carbon, simply replace the carbon in the first vessel with Oilsorb.

For best results in the removal of toluene and xylene: Use "Oilsorb" at higher levels of BTX, and polish with carbon at the tail end of the operation. "Oilsorb" will remove most of the toluene and xylene, while carbon will remove the benzene with maximum efficiency.

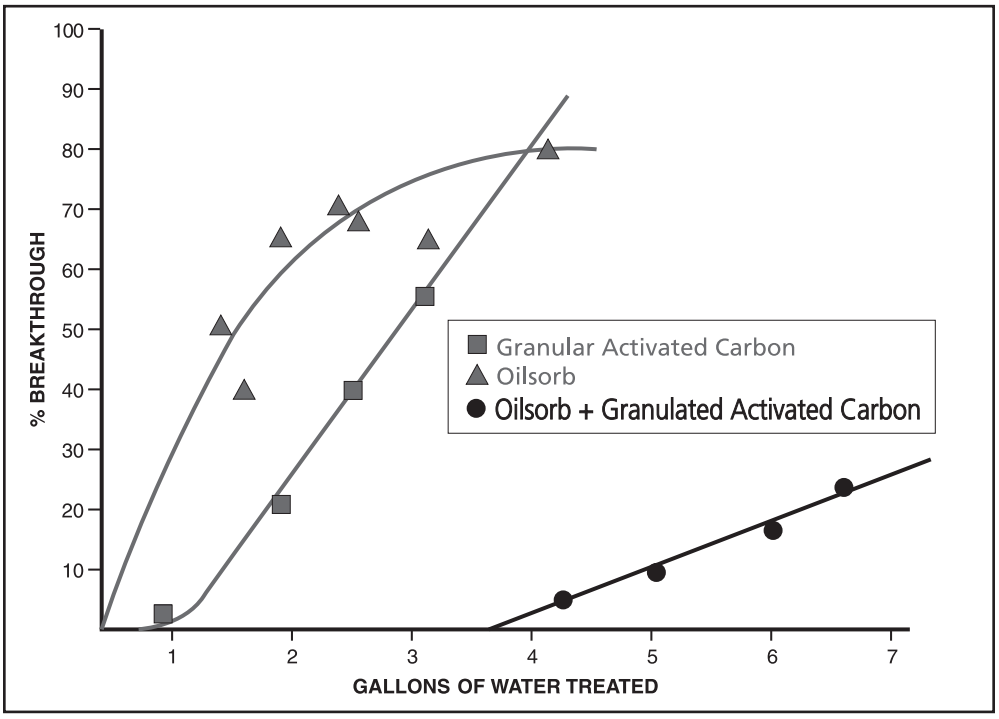

Figure 1

Figure (1): Shows how much better the "Oilsorb"/carbon synergistic combination works than either "Oilsorb" or carbon alone.

If diesel fuel or jet fuel has contaminated water, pre-treating with "Oilsorb" is even more important. Table (1) illustrates a case history at a UST site, where the data shows how effective "Oilsorb" is in the removal of xylenes and toluene, and how effective carbon is in the removal of benzene.

Air strippers are used for removal of VOCs from water, followed by vapor phase carbon adsorption. However, if there is any oil in the water, the media inside the air stripper is quickly fouled. Avoid this problem with a vessel filled with "Oilsorb" in front of the air stripper. The stripper now operates ***much*** longer and more efficiently, with less frequent cleanings. Vapor phase carbon now lasts much longer. Using "Oilsorb" will result in a reduction of up to 50% in operation costs.

Table (1): Exhibits the accelerated efficiency "Oilsorb" has on the removal of oil from water as opposed to carbon. "Oilsorb" is 7 times more efficient, while the end user saves 50% in operation costs, due to less frequent change outs.

Disposal of spent "Oilsorb"
If the spent "Oilsorb" is non-hazardous, it can be disposed of in the nearest dumpster and land filled. It must only pass the liquid paint filtration test. Check with the nearest gas station on how they dispose of their "Floorsorb".

continued on next page

REMOVE UP TO 7 TIMES MORE GASOLINE *(continued from page 1)*

1. If the spent media is deemed hazardous, for example due to the presence of benzene or PCB, it must be incinerated.
2. **"OILSORB"** has a Btu value of 15,000. Fuel blenders and asphalt producers can be contacted which will use the spent media as fuel.
3. When in doubt, contact the local regulatory agency. If you have questions, or would like to obtain Biomin's Disposal Guide, please contact us. ***A copy of our disposal guide can be found on our website: www.biomininc.com***

To request more information, or to acquire a copy of our "Oilsorb" interactive spreadsheet which will enable you to calculate your savings on a per job basis, using "Oilsorb":

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Web: http://www.biomininc.com

"OILSORB" CASE STUDY

Treatment of Storage Tank Condensate

At a bulk storage terminal, J-P4 jet fuel is stored in large above-ground tanks. Periodically it is necessary to remove the condensate (water) that accumulates in the bottom of the tanks. The condensate typically contains large amounts of J-P4 in solution which must be removed prior to its permitted discharge to a nearby river.

The permanent treatment system at this terminal facility consists of an oil/water separator, a 30-inch column of "Oilsorb", and another column containing activated carbon for final effluent polishing. The entire system is operated at a rate of 15 gpm whenever an unacceptable amount of condensate accumulates.

The following table presents performance results for this system. All values are in ppm.

Contaminate	Influent	After "Oilsorb"	After Carbon
Oil and Grease	5.1	0.5	0.5
Benzene	69	29	0.25
Toluene	74	0.25	ND
Xylenes	36	ND	ND

By combining the "Oilsorb" treatment with the activated carbon, the efficiency of the carbon was preserved, and the performance of the overall system was maintained. The overall reduction in treatment costs is approximately 50% in comparison to the use of activated carbon alone.

Table 1

Summary Report of Experiments Investigating the Sorption and Desorption of Benzene to EC-199 Organoclay

This report presents Tables and Figures summarizing the results from a column experiment studying the sorptive capacity of EC-199 to an aqueous-benzene solution. A 13-inch long (33.1 cm) by 1.5-inch diameter (3.8 cm) glass column was used and filled with the sorbent material to be studied. A peristaltic pump forced an aqueous-benzene solution containing 860 mg/L (PPM) of benzene.

After the sorption phase was complete, a desorption test was carried out. Water without any organic compound was pumped through the column instead of the aqueous-benzene solution.

Samples were collected periodically at the outflow of the column and analyzed using gas chromatography with a flame ionization detector.

The data show that higher solubility compounds like benzene are not displaced by lower solubility compounds to a significant degree.

Results in this report are presented in Tables 1, 2 and 3 and in Figures 1, 2 and 3 as identified on the following pages:

Table 1. Sorbent mass, porosity, flowrate and residence time information for the EC-199 column experiments.

Sorbent	Mass Sorbent		Porosity	Flow Rate		Residence
	(kg)	(lb)		(mL/min)	(gal/hr)	(min)
EC-199	0.121	0.242	0.4	7.5	0.121	20

Table 2. 95% breakthrough for the EC-199 given in pore volumes and minutes along with estimated mass of benzene sorbed per mass of sorbent in mg/kg, lb/lb and percent basis.

Sorbent	Breakthrough			Mass sorbed		Mass Sorbed/Mass Sorbent		
	PV	BV	min	(mg)	(lb)	(mg/kg)	(lb/lb)	(% by sorbent)
EC-199	150	60	3000	11814	0.026	96050	0.096	9.07

Table 3. Desorption of benzene from a column of EC-199 given in pore volume, bed volume and minutes along with the estimated desorbed mass

Sorbent	Time			Mass desorbed		
	PV	BV	min	(mg)	(lb)	(mass desorbed/mass sorbed)
EC-199	69.4	27.4	1915	2463	0.0054	0.21

Figure 1. Breakthrough curve of benzene through a column of EC-199

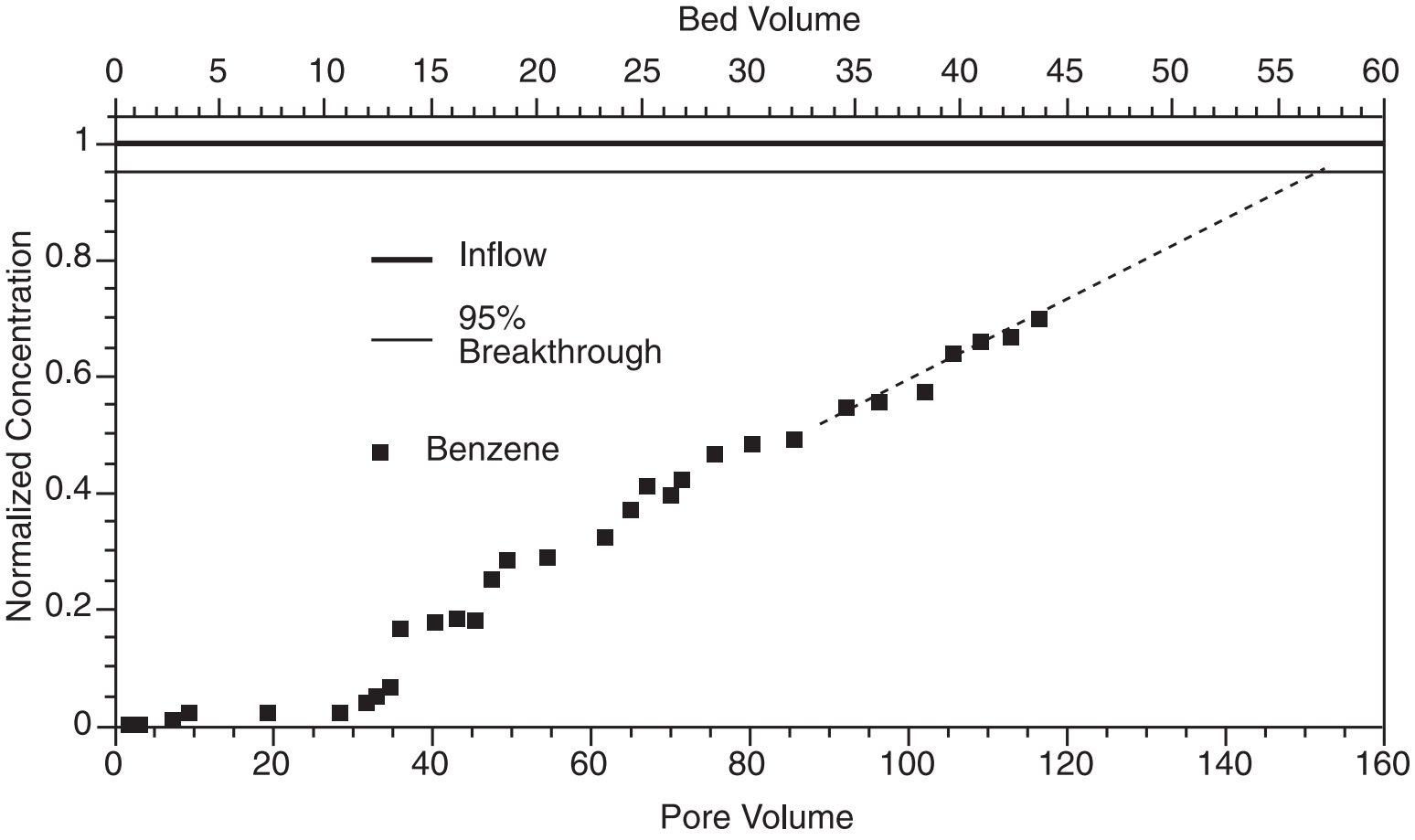

Figure 2. Desorption of benzene from a column of EC-199

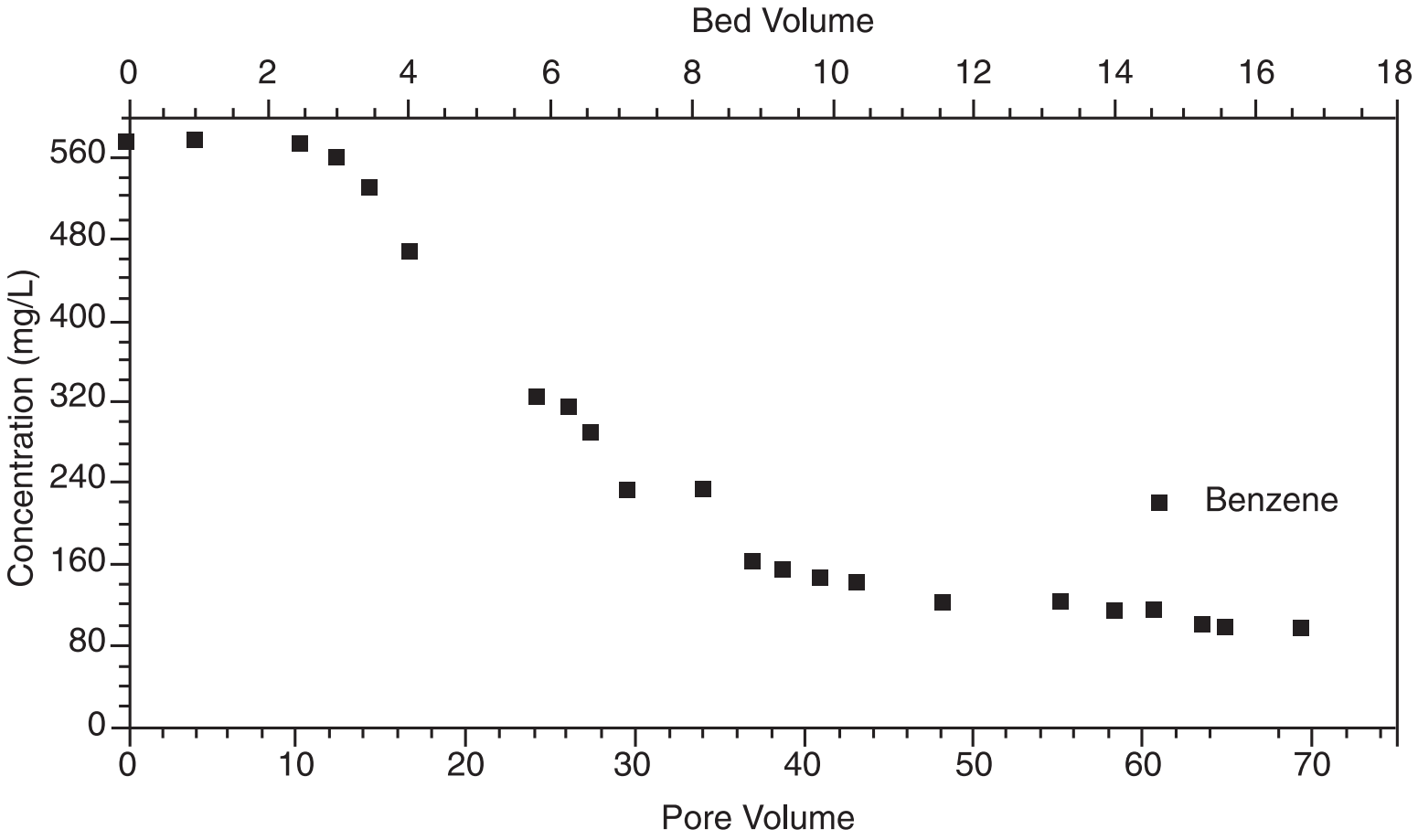

Figure 3. Desorption of benzene from a column of EC-199 using an aqueous-toluene solution