

REDOX TECH, LLC



"Providing Innovative In Situ Soil and Groundwater Treatment"

Anaerobic BioChem (ABC[®]) The "Green" Substrate

In 2003, Redox Tech introduced its proprietary formulation for anaerobic biodegradation of halogenated solvents in groundwater. The product, Anaerobic BioChem ABC[®], is a patented mixture of lactates, fatty acids, alcohols and a phosphate buffer. ABC[®] contains soluble lactic acid as well as slow- and long-term releasing components. Redox Tech was one of the first companies to recognize the importance of maintaining optimum pH, and for that reason, ABC has always had a phosphate buffer and other alkaline materials, when necessary, to maintain the optimal pH. The phosphate buffer provides phosphates, which are a micronutrient for bioremediation. In addition, the buffer helps to maintain the pH in a range that is best suited for microbial growth.

Since ABC's introduction, millions of pounds of ABC have been used on hundreds of sites throughout the United States and even Europe. Over time, the "essential ingredients" have been slightly modified, but to our knowledge, ABC remains the only carbon substrate on the crowded market that is formulated specifically for each site's own unique geochemistry, biology, and hydrogeology.

"Green" Before Green was Cool

Redox Tech is a niche environmental remediation contractor. Therefore, we have always felt obligated to be environmentally conscious. Before "green" was all the rave, Redox Tech utilized waste streams from green energy processes, such as ethanol and biodiesel production to formulate ABC. Only a small percentage of the components are "virgin" chemicals. The phosphate buffer provides phosphates, which are a micronutrient for bioremediation. In addition, the buffer helps to maintain the pH in a range that is best suited for microbial growth.

ABC[®] Advantages

- **WATER SOLUBLE** - the biggest advantage with ABC is that it is completely soluble in water, even the long-lasting carbon. There is no need to emulsify our product, and thus no worry about an emulsion breaking. Also, because it is a water soluble product, the need for large volumes of "chase" water is eliminated. ABC is typically injected at about 15 to 25 weight percent mixed into about 100 to 200 gallons of water.
- **LONG LASTING** – ABC has C14 to C18 fatty acids that have been shown in the field to last over two years. Emulsified oils break down into C18 fatty acids through hydrolysis, so we are essentially using the same long-lived components of emulsified oils without having to emulsify or wait for hydrolysis to occur.
- **NATURAL CO-SOLVENT** – ABC, through a license with Oregon State University, adds ethyl lactate which is a "green" co-solvent. This helps dissolve the fatty acids, and it also serves as a solvent for sites that may have DNAPL, because the ethyl lactate solvates the DNAPL and promotes rapid treatment.
- **GREEN** – ABC is formulated with byproducts from "green" energy processes, so it is better for the environment.
- **COST-COMPETITIVE** – carbon substrates are becoming commodities, and ABC is priced accordingly. When all factors are considered, ABC is a great value.