

# REDOX TECH, LLC

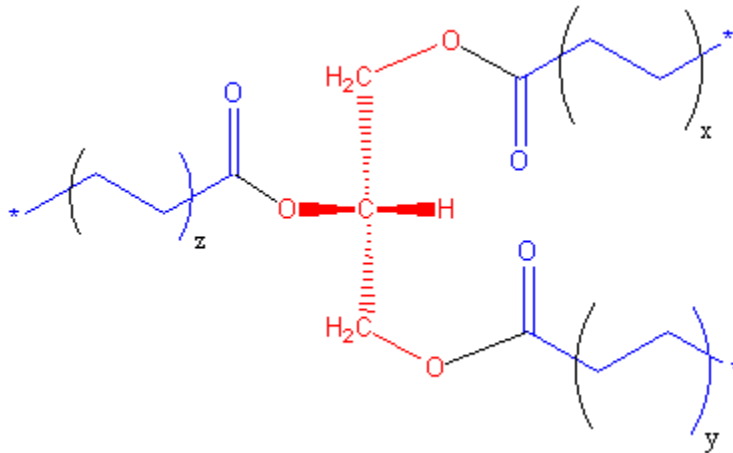


*"Providing Innovative In Situ Soil and Groundwater Treatment"*

## **Anaerobic BioChem (ABC<sup>®</sup>) and Fatty Acids**

ABC<sup>®</sup> is a patented mixture of carbon substrates that historically included lactates, lactate esters (ethyl lactate), fatty acids, and a phosphate buffer. The lactate components serve as the short-term (more quickly consumed) components and the fatty acids served as long-term releasing components. The phosphate buffer provide phosphates, which are a micronutrient for bioremediation. Also, a proper pH range (5.5 to 8.5) is crucial for complete dechlorination.

Redox Tech has always used both water soluble and insoluble oils in ABC<sup>®</sup>. The insoluble oils were dissolved into ethyl lactate (versus an emulsion). Some of our competitors provide vegetable oil based products. Vegetable oils are predominantly triglycerides. The chemical formula for triglycerides is  $\text{RCOO-CH}_2\text{CH(-OOCR')CH}_2\text{-OOCR''}$ , where R, R', and R'' are longer alkyl chains. The three fatty acids  $\text{RCOOH}$ ,  $\text{R'COOH}$  and  $\text{R''COOH}$  can be all different, all the same, or only two the same. Chain lengths of the fatty acids in naturally occurring triglycerides can be of varying lengths but 16, 18 and 20 carbons are the most common (x, y, and z are the alkyl chain lengths).



The name triglyceride come from three fatty acids (blue in figure above) attached to glycerol (red above). In the environment, triglycerides are hydrolyzed to glycerol and three fatty acids. Redox Tech has used C-10 to C-20 fatty acids directly to circumvent the hydrolysis step. This provides a more soluble long lasting carbon source that is more easily distributed in the subsurface environment.

In summary, the ABC<sup>®</sup> produced offers these competitive advantages:

- Completely water soluble so no emulsion that can become unstable
- Well buffered with micronutrients
- Extremely cost-effective (roughly \$1 to \$1.50 per pound)
- Long-lasting because of the long chain fatty acids
- Water soluble so it is better distributed upon injection and doesn't require large volumes of "chase" water

Please call us today for a free sample, quotation or to order product. Redox Tech can also combine ABC<sup>®</sup> with zero valent iron (ZVI) to create a powerful chemical and biological reducing environment.