



ADVANCED BIOCATALYTICS CORPORATION Core Technology Outline

Advanced BioCatalytics Corp. currently supplies five core products to its various industrial clients:

- **Accell[®]**;
- **Accell3[®]**;
- **AccelClean[™]**;
- **AccelGreen[™]**;
- **STR** (surface tension reducer).

These products are all waterborne and have one ingredient in common:

- A yeast fermentation derived mix of low molecular weight proteins and some other minor ingredients present in the fermentation extract. This “Ferment” is stabilized against bacterial degradation. The Ferment is now manufactured in two forms: original brown-colored liquid, and a faint-yellowish “Clear Ferment”. The latter is designated for consumer-oriented applications, when deep color is undesirable.

Other ingredients are synthetic surfactants, stabilizers, binders, and pH adjustment compounds (in different products, pH is set at either 4-4.5, 7-8, or 8-8.5. All ingredients are food-grade or permitted for food contact. Synthetic surfactants form tight complexes with the protein synergist component of the system (protein-surfactant complexes). This complexation profoundly alters the properties of surfactants involved. Products are neutral per se, but stable in a broad range of pH (1 to 13), resistant against heating (96 hours at 100 C does not deteriorate surface activity of these blends, tolerant to some strong oxidants such as chlorine bleach or hydrogen peroxide.

Accell[®] and its *ca.* 3-fold concentrated version, **Accell3[®]**,
Have been developed initially to enhance waste water treatment, although they are also applied as general cleaners and for odor control.

They both contain, besides yeast-derived extract, anionic sodium laurethsulfate and non-ionic alcohol ethoxylate. Accell3, in addition, contains propylene glycol as a binder.

Accell[®] and Accel3[®] are commonly applied at varying dilution rates of 3 to 20 ppm, depending on the conditions in the water processing plant.

They also showed excellent results at biofilm control and removal, e.g. in reverse osmosis and other water treatment membranes, and have been certified by the National Sanitary Foundation for potable water applications, at up to 60ppm on continuous feed mode.

They were successfully tested for acceleration of the bioremediation of soil contaminated with petrol oil hydrocarbons.

AccellClean™

is an industrial cleaner that contains, besides stabilized Ferment, nonionic surfactants of the alcohol ethoxylate class, anionic sodium dioctylsulfosuccinate and sodium sec-alkyl sulfonate, and hexylene glycol as a binder.

Accell Clean™ has a broad range of applications as a cleaner in chemical cargo tanks, and in many other industrial environments. It has been approved by the US Coast Guard for application in cleaning of the ocean chemical cargo tanks and certified for the same purpose worldwide by the International Maritime Organization (November 2009)

It has been recently successfully tested in cleaning beaches contaminated by the Gulf oil spill and allowed for that application for the environment protection authorities. It was also shown efficient as oil dispersant.

AccellGreen™

is applied predominantly for cleaning rotisserie ovens and other related equipment for high-temperature food processing.

Besides stabilized ferment, it contains up to 7% hydrogen peroxide and several synthetic surfactants: non-ionic alcohol ethoxylates, and anionic alkyl sulfonate and alkyl sulfosuccinate.

All the above products greatly reduce both surface tension, and especially interfacial tension between aqueous and oil phases.

STR

was designated predominantly to reduce surface tension of aqueous solutions. It contains about one half of Ferment, anionic surfactants: sodium laureth sulfate and dicotylsulfosuccinate, and hexylene glycol as a binder.

Besides the above commercialized products, ABC continuously collaborates with various potential consumers in development of new products.

In particular, for the EOR purposes, it developed a product that displays a record low interfacial tension in water/petrol oil system (2×10^{-4} mN/m).

Among other effects, besides direct and immediate cleaning, the protein-surfactant complexes were found to uncouple oxidative phosphorylation in bacterial cells, forcing microbes to accelerate nutrient consumption. In waste water treatment, biofilm control and soil bioremediation, this results in amore efficient removal of organic contaminants which serve nutrients for the bacteria, while limiting the growth of bacterial biomass.