

# What Are Some Differences Between Bacteria vs Enzymes vs Chemicals

**Bacteria** are living cells that consume wastes of different types. **Bacteria** reproduce by splitting into two (fission). Bacteria produce a variety of enzymes that allow for complex chemistry to occur. **Bacteria** are actually the factories that produce enzymes. When the right bacteria are present, in the right quantities, and under the right conditions, they produce enzymes much more economically than people can manufacture them.

**Enzymes** are NOT alive. They are complex chemicals made up from amino acid subunits. **Enzymes** cannot reproduce themselves. They speed up chemical reactions without getting used up themselves.

All **enzymes** are proteins, and some **enzymes** attack proteins. Therefore, enzyme usefulness is limited by digestion from other enzymes

**Chemicals** are NOT alive. **Chemicals** include soaps, harsh acids and bases, oxidizing compounds, solvents, and enzymes. **Chemicals** do not reproduce themselves. **Chemicals** can be used in place of bacteria or enzymes, but they are either environmentally harmful, not as efficient, or both.

## How Do Bacteria, Enzymes and Chemicals Work?

**Bacteria** consume waste materials. When bacteria consume waste, they convert the waste into safe by products - carbon dioxide and water. When the waste materials are very complex (such as pond sludge), **bacteria** actually produce enzymes to break down the complex waste into simple compounds that the bacteria can consume.

**Enzymes** are not capable of completely consuming waste materials, such as sludge or ammonia. Instead, enzyme products convert complex wastes into simpler wastes. Bacteria are still needed to consume the waste material - enzymes alone will not do the job. An enzyme product only has half the tools necessary to get the job done right!

**Chemicals** can oxidize sludge and ammonia, but only very harsh and dangerous **chemicals** can accomplish this job. Less hazardous **chemicals** are generally not effective for tough jobs like sludge digestion. Also, **chemicals** have considerable toxicity issues, and are likely to harm fish, wildlife, and the general health of aquatic systems.

## Which Approach is Best for the Environment?

**Bacteria** sold by TLC Products are 100% natural, safe, and non-pathogenic. TLC bacteria are not genetically engineered or altered in any way. Since bacteria both degrade complex waste AND consume the by-products, less pollution is discharged to the environment. TLC bacteria also consume phosphates, ammonia, and nitrates. This improves water quality in lakes, ponds, and groundwater. Using TLC bacteria is the environmentally superior solution.

**Enzymes** are not necessarily bad for the environment, but they do not have the advantages that TLC bacteria provide. Again, enzymes do not actually consume wastes, they simply break complex compounds into simpler compounds. Bacteria are still needed to finish the job. **Enzymes** cannot help in removing pollutants such as phosphates, ammonia, and nitrate. Therefore, enzymes have limited benefits. For the complete solution, choose TLC bacteria over enzyme products!

**Chemicals** are often bad for the environment, and they do not have the advantages that the TLC bacteria provide. **Chemicals** can be used for some water treatment, such as chlorine removal, heavy metal removal, and pH adjustment. But they are neither effective, economical or environmentally appropriate for removal of ammonia, nitrite, or sludge.