

## Bacteria vs Enzymes vs Chemicals

### What Are Bacteria, Enzymes and Chemicals?

**Bacteria** are living cells which have the capabilities of consuming wastes of different types, reproducing, and actually producing enzymes.

Better said, bacteria are the factories that produce enzymes. When the right bacteria are present in the right quantities and in the right conditions, they produce enzymes much more economically than people can manufacture them.

**Enzymes** are NOT alive. They are complex chemicals produced by bacteria. They cannot reproduce, or actually consume waste. They speed up chemical reactions without getting used themselves. However, enzymes are all 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, solvents, and enzymes. Chemicals do not reproduce themselves.

Chemicals can be used to mimic the properties 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), **Beneficial** bacteria actually produce enzymes to break down the complex waste into simple

**Enzymes** are not capable of consuming waste materials, such as sludge or ammonia. Rather, all that they can do is convert complex wastes into simple 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

**Chemicals** can oxidize sludge and ammonia, but only very harsh and dangerous chemicals can accomplish this job. Less hazardous chemicals are generally not effective in a pond environment for tough jobs like sludge digestion. Also, chemicals have considerable toxicity issues, and

compounds that the **Beneficial** Bacteria can consume.

job done right!

are likely to harm fish, wildlife, and the general pond health.

### Which System is Best for the Environment?

**Beneficial Bacteria** contained are 100% natural, safe, and non-pathogenic.

**Beneficial** 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.

**Beneficial** bacteria also consume phosphates, ammonia, and nitrates. This improves water quality in lakes, ponds, and groundwater.

**Beneficial** is the environmentally superior solution.

**Enzymes** are not necessarily bad for the environment, but they do not have the advantages that the **Beneficial** 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 **Beneficial** over enzyme products!

**Chemicals** are often bad for the environment, and they do not have the advantages that the **Beneficial** bacteria provide. Chemicals can be used for some pond 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.