

An Introduction to Microbial Treatment

Scotmas manufacture a variety of products that utilise the principles of microbial treatment – that is harnessing naturally occurring, bacteria and plant life in order to degrade waste products into harmless components. This document serves as a general introduction to the principles behind the design of these products.

WHAT ARE BACTERIA?

“BACTERIA” is the name given to a large group of single-celled organisms –neither plants nor animals that are too small to see with the human eye. Some bacteria are able to live without Oxygen, or in extreme environments – 10km below the ocean, in boiling hot springs, or on the outer reaches of the atmosphere. In the presence of a good food source, they are able to reproduce – doubling their population every 20 minutes. Despite their small size (approximately 1 trillion bacteria weigh 1 gram), bacteria play a vital role in our lives.

Most bacteria use organic (carbon) compounds for energy and growth, although some are able to use inorganic compounds or light energy. The type of food digested by bacteria depends on the type of bacteria and the conditions in which it is living. All bacteria produce specific enzymes that break down their food compounds into smaller parts, so they can be digested and used by the bacteria. The resulting compounds from this digestion are carbon dioxide (CO₂) and water (H₂O).

ARE BACTERIA SAFE?

There are good and bad bacteria. Most bacteria are harmless to humans, and are essential to plant and animal life. Most bacteria attack organic matter only after it -is dead. Only a small fraction of bacteria causes disease. The Bacteria used in BK products are all natural species, and are classified according to international standards as safe (US FDA “GRAS” Status).

Should you be concerned about using bacteria – just remember that the next time you eat yoghurt or certain cheeses that these too are made from bacteria, and have been regarded as safe for many hundreds of years.

WHY SHOULD I CARE?

Without bacteria, there could be no other living thing in the world – no waste materials would decompose, and be recycled into the environment. Perhaps of more immediate commercial interest, however - is where bacteria can be harnessed to do useful work for us in industry.

By selecting particular bacteria that are able to digest waste products into harmless components, we are able to tap into a powerful, all natural, industrial waste disposal mechanism. Of the many thousands of different bacteria found in the environment, only a very small proportion is really efficient at degrading industrial wastes such as grease, fats and hydrocarbons, phenol and ammonia. The multiple strains of bacteria included in BK Products are selected as being the most efficient for the job. Our laboratories identify and isolate natural bacteria suitable for the job, before growing them in pure cultures, under laboratory conditions. Blends of these cultured bacteria are then mixed with biodegradable “starter” chemicals, and packaged into finished products.

CONDITIONS FOR GROWTH OF BENEFICIAL BACTERIA

With highly specialized bacteria such as those found in BK Products, it is necessary to match the most effective bacteria to the waste, otherwise the process will become very inefficient. For instance, there may be a culture produced to digest animal fats, but if it is used to digest paper or proteins it will take that culture much longer to do the job and it will not be as efficient.

It is also necessary to avoid conditions that will damage the bacteria. High temperature usually kills bacteria. Most bacteria that do not form spores are destroyed by boiling water and can also be killed by various disinfectants, antiseptics and many chemicals.

BACTERIA, ENZYMES AND CHEMICALS

Enzymes are the biological catalysts that increase the rate at which waste is degraded. Enzymes are very specific chemicals, and each enzyme usually catalyzes only one particular kind of reaction. Enzymes are the chemicals produced by bacteria – THEY ARE NOT LIVING THEMSELVES.

Bacteria are living things, and are capable of adapting to the environment they are in, just like we are. As a result they can produce many thousands of different enzymes which are capable of dealing with the waste materials present. In addition, by combining the action of a number of different types of bacteria, this broad spectrum activity is increased even further.

A number of companies sell enzyme solutions as “biological” products. These are made by extracting the enzyme from killed bacteria. By their very nature, these products are unable to reproduce and adapt to changing conditions. A liquid enzyme product will only contain at most 3 or 4 different enzymes, whereas a bacteria can produce many thousands.

Also remember that once an enzyme is washed away, it has no means of naturally reproducing – whereas bacteria will grow naturally. Enzymes that are manufactured to digest grease will only liquefy the grease, putting it in a soluble state so that it can carry through the drainage system to some point further down the line (often a leach field, septic tank or waste treatment plant), where the same problems occur again. Pure enzyme products do not solve the problem – they merely pass it further on down the line.

Chemical products for waste treatment are often harsh, and will damage tanks or pipework. They are falling out of favour with Environmental Authorities, and strict controls are placed on their use. Other chemicals are sold to “mask” the odour, through the use of strong perfumes or fragrances. These products do nothing to address the root cause of the problem, and are a stopgap measure at best.