

Biodegradability.

Biodegradability is the ability of organic substances and materials to be broken down into simpler substances through the action of enzymes from microorganisms. If this process is complete, the initial organic substances are entirely converted into simple inorganic molecules such as water, carbon dioxide, and methane.

Biodegradation is ~~the~~ part of the earth's natural life cycle, which is based on carbon. Thanks to photosynthesis by plants and algae, and the inexhaustible energy of the sun, carbon dioxide is absorbed from the atmosphere to synthesise sugar and other substances used by plants to grow and develop. The flow of substances and energy passes through the food chain from plants to herbivores and from herbivores to carnivores. When plant and animal organisms die, microorganisms present everywhere in the environment feed on organic material through biodegradation processes and release water and carbon dioxide into the atmosphere, thereby closing the cycle.

By imitating and improving upon these natural processes, organic waste from human activities can also be removed through biodegradation.

For this operation to be effective it is first necessary to identify the ideal environment in which the process can reach maximum efficiency; and an 'industrialisable' duration must be established that is compatible with the rate at which organic waste is produced. In nature all organic waste takes a certain amount of time to biodegrade, for example straw and wood take longer than starch and cellulose. Similarly; in cold/dry environments the processes of biodegradation are slower than in hot humid environments. This means that biodegradation is strongly influenced by the chemical

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nature of the substance or material to be biodegraded and by the environment in which this process takes place.

The environments in which biodegradation occurs at a consistent pace, and in which it can be managed industrially, are those of composting and anaerobic digestion. In these systems it is therefore possible to process solid organic waste, including man-made substances.

(such as biodegradable plastic) for which the speed of biodegradation is compatible with these processes. Composting will produce

mature compost (which is a fertilizer) while anaerobic digestion (followed by stabilization through composting) will produce biogas (and therefore energy) as well as compost.

Another biologically active environment is soil: some materials can be completely biodegraded in soil, and this property can be explained in specific applications such as mulching.

Biodegradability may be explained as:

The 'bio' part of the word means that the process is helped along with biological organisms, such as fungi and bacteria, which digest the material. So a 'biodegradable' object is one that will breakdown quickly and safely into harmless compounds by using the action of microorganisms.

Simply we can say that "Biodegradation is the breakdown of organic matter by microorganisms, such as bacteria and fungi."

Measurement of biodegradability.

Scientists then measure the biodegradability of a sample based on how much carbon dioxide is produced during a set time period. Although organic matter is measured using respirometry plastic bags and other man-made materials cannot be tested in this way - as microorganisms do not eat things such as polyethylene.