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Omnidegradable® Process in Landfills

1. **Aerobic Phase** – In this phase, the enzymes and decomposition chemicals act as a catalyst to the biofilm in the plastic. During this time, aerobic microbes are becoming established and moisture is building up in the refuse. Standard plastic moisture absorption capability is relatively small, but the additive causes further swelling, weakening the polymer bonds. This creates molecular spaces for microbial growth, which begins the aerobic degradation process in which oxygen is converted to CO 2.

2. **Anaerobic, Non-Methanogenic Phase** – After oxygen concentrations have declined sufficiently, the anaerobic process begins. During the initial stage (hydrolysis), the microbe colonies eat the particulates, and through an enzymatic process, reduce large amounts of polymers into simpler monomers. The organic additive causes additional swelling and opening of the polymer chain and increased quorum sensing. This further excites the microbes to increase their colonization and consumption of the polymer chain. As time progresses, acidogenesis occurs where the simple monomers are converted into fatty acids. CO 2 production occurs rapidly at this stage.

3. **Anaerobic, Methanogenic Unsteady Phase** – The microbe colonies continue to grow, eating away at the polymer chain and creating increasingly larger molecular spaces. During this phase, acetogenesis occurs, converting fatty acids into acetic acid, carbon dioxide and hydrogen. As this process continues, CO 2 rates decline and hydrogen production eventually ceases.

4. **Anaerobic, Methanogenic Steady Phase** – The final stage of decomposition involves methanogenesis. As colonies of microbes continue to eat away at the remining surface of the polymer, acetates are converted into methane and carbon dioxide, and hydrogen is consumed. The process continues until the remaining element is humus. This highly nutritional soil creates an improved environment for the microbes and enhances the final stage of decomposition.