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Biodegradation of Synthetic Thermoplastic Polymers: A Novel Approach

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Introduction

Over 80% of the material comes from land-based sources. Rivers, runoff, atmospheric deposition and direct discharges are the means by which it reaches the oceans. It frequently reaches its highest concentration along the coasts of low- and middle-income nations, often near the coasts. The amount of plastic waste that ends up in the oceans each year is estimated to be 10 million metric tons, making it a component of ocean pollution that is rapidly growing and very visible. In the oceans, mercury is the metal pollutant of greatest concern; It comes from two main sources: small-scale gold mining and combustion of coal. Harmful algal blooms (HABs) spread to previously unaffected regions as a result of the global spread of industrialized agriculture and the growing use of chemical fertilizers. Seas and marine organisms are tainted by chemical pollutants everywhere, from the high Arctic to the deepest oceans [1,2].

Discussion

plastic can be rapidly reduced to its basic components. Through aerobic and anaerobic processes, a variety of microorganisms have great potential to biologically convert certain plastic polymers into simpler products. Microbial biomass could be the final product of complete biodegradation if a biological agent uses the organic polymer as a nutritional substrate for energy and growth. Since synthesized enzymes with simple or multiple toxin systems involve a reduction in activation energy to weaken the chemical bonds in the polymer, it was recently discovered that various microalgae promote biodegradation of polymers and reduce the energy required for degradation. In oil fields, polymers like partially hydrolyzed polyacrylamide (HPAM) are frequently utilized to enhance or enhance crude oil recovery from reservoirs. It works by making the water that is injected more viscous, which makes it more mobile and helps recover oil.

Lake Victoria in Africa is only between 24 and 29°C. Fresh water has a pH value between 6 and 9. Fresh water biological degradation is primarily caused by bacteria and fungi, with fungi typically occurring a few millimeters below the water's surface. Soil has even more distinct biodegradation parameters than other environments. The texture of the soil varies from place to place. In contrast to a compact loamy soil with particle sizes less than 2 m, a coarse sand with particle sizes up to 2 m allows for a significant amount of space for gas diffusion into the surrounding environment. Temperatures and pH levels vary according to the climate and the amount of precipitation

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The ocean, wildlife and human health are all at risk from plastic waste pollution. From 2020 to 2027, the global plastic market is expected to expand at a compound annual growth rate (CAGR) of 3.2 percent, reaching a value of $568.9 billion in 2019. However, the current outbreak of the coronavirus (COVID-19) is elevating the issue of pollution caused by plastic waste to an entirely new level. Due primarily to the pandemic response, projections indicate that the global market for plastic packaging will grow at a CAGR of 5.5% from USD 909.2 billion in 2019 to USD 1012.6 billion by 2021. Despite its potential for recycling and reuse, the majority of this plastic waste ends up in either landfills or incinerators, where it is permanently lost as a resource. The Environmental Protection Agency (EPA) reports that in 2015, 75.4% of the plastic materials produced by municipal solid waste streams in the United States were dumped in landfills, 15.5% were burned for energy and 9.1% were recycled. Dumping plastic waste makes it difficult to keep the environment clean and green.

We establish for the first time that macroplastic transport exhibits significant temporal variation. During the measurement period, the average monthly plastic transport changes by up to a factor of five. Relationships between rainfall, river discharge, the presence of organic material and plastic transport have been investigated because it is unclear what causes the variation in plastic transport. In addition, we report brand-new data on riverine plastic transport's vertical and cross-sectional distribution. We highlight the severity of the emerging plastic pollution thread's impact on riverine ecosystems and present new insights into the origin and fate of riverine plastic transport. To address the environmental issues caused by synthetic plastic waste, numerous studies on plastics' biodegradation have been conducted. A renewed interest in the field of degradable polymers through microbes, namely, has emerged as a result of awareness of the waste problem and its impact on the environment. actinomycetes, fungi and bacteria Certain enzymatic activities that result in the chain cleavage of polymers into oligomers and monomers are responsible for the microbial degradation of plastics [3-5].

Conclusion

The packaging sector. Polysaccharides, on the other hand, still lack the film-forming, mechanical, barrier and protective properties of petroleum-based polymers and plastics. As a result, they must be improved through reasonable material changes (chemical or physical changes). The use of polysaccharide-based materials in edible packaging is the subject of a comprehensive review in this article. The fundamental compositions and properties, functional modifications, applications in food packaging and safety risk assessment of polysaccharides (such as chitosan, cellulose, hemicellulose, starch and polysaccharide gums) are the primary areas of focus. Consequently, to serve as a model for the development of contemporary edible packaging.

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Conflict of Interest

There are no conflicts of interest by author.

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