Mini Review
Volume 6:5, 2022

Journal of Environmental Hazards

ISSN: 2684-4923

Open Access

Waste Polystyrene Acetylation Modification and its Application as a Crude Oil Flow Improve

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Abstract

HPAM can be removed using a variety of chemical and thermal methods, but they are not very good for the environment and can be quite pricey. Biodegradation with the help of single or mixed microbes known as biofilms is touted as one of the various treatments that can be used to solve the problem without causing any negative side effects. In both laboratory-scale and field-scale studies, numerous researchers have investigated and reported the potential of such bioremediation technology with varying HPAM removal efficiency from oil field produced water.

Keywords: Biodegradability • Bioeconomy • Carbon footprint

Introduction

Not only do the discarded plastics put human lives in danger, but they also pose a serious threat to the lives of animals, birds, fish and other wildlife. There hasn't been a good way to quickly degrade these plastic wastes since the plastics industry started. The majority of plastics are slow to degrade due to their chemical structure, which makes them resistant to numerous natural processes of degradation. In addition, the low cost and durability of plastics led to a high production rate. The combination of these two characteristics has resulted in a significant amount of plastic pollution in the environment. In this paper, we first suggest making an oil-adsorbing polymer foam from recycled polystyrene plastic. A one-pot high internal phase Pickering emulsion was used to make the foam. To obtain the foam without freezing, vacuum drying, or other complicated procedures, this method was accessible and convenient [1,2].

Discussion

Especially during the current COVID-19 (SARS-CoV-2 coronavirus) pandemic, an increase in plastic-related pollution and their weathering can pose a serious threat to human health and the sustainability of the environment. The weathering-driven alterations in their physical-chemical attributes and the presence of hazardous pollutants mediated through adsorption exacerbate the planetary risks posed by plastic waste from various sources. In addition, the sorption of toxic chemical contaminants and pathogenic microbes onto the "plastisphere" (i.e., the plastic-microbe/biofilm-environment interface) causes plastic polymers to act as vectors. The sorption and desorption dynamics of micro- and nanoscale plastic (MPs/NPs) polymers for emerging contaminants

As a result, the in-depth analysis of the complex associations between weathering and plastics' physicochemical properties and toxicological chemistry ought to assist us in improving our understanding of plastics' transport, behavior, fate and sustainable remediation strategies. 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. However, the plastic and petrochemical industries are anticipated to benefit from a profit-pool growth of USD 60 billion from the reuse and recycling of plastic waste. A petrochemical company should develop a waste collection system to adapt plastic waste recycling strategies in order to make money.

Due to the low solubility of methane and oxygen in aqueous solutions (22 mg/L at 20 °C and 9 mg/L at 1 atm, respectively), methane-based PHB production faces particular difficulties. PHB synthesis and cell density are both greatly limited by low gas-liquid mass transfer rates, preventing methanotrophs from producing PHB in large quantities. utilized pressure bioreactors to improve the efficiency of the mass transfer and the PHB content reached 51%. increased the cell density of methanotrophs from 1.4 g/L to 5.0 g/L and decreased the liquid medium from 0.5 L to 0.1 L. Although high pressure would significantly increase the solubility of methane, creating such conditions can be costly and harmful to microorganisms. Another study found that while vigorous agitation resulted in a smaller bubble size and a gas-liquid volumetric mass transfer coefficient (kLa) of 102.9 h1, it also increased the power consumption of the operation impeller and caused a high shear stress that damaged cells. Using bubble column bioreactors (BCBs) and vertical tubular loop bioreactors, Methylocystis hirsuta produced PHB from natural gas with contents of 42.5 percent and 51.6 percent, respectively. PHB accumulation of up to 73.4% can be achieved under ideal conditions when Methylocystis hirsuta is grown at a high cell density in a BCB using natural gas. Under optimal engineering parameters and operating conditions, a BCB produced a 25% w/w PHB content. Utilizing ultrafine bubble diffusers with micropore sizes of less than 0.5 m enables suspended-growth BCBs to circumvent the limitations imposed by mass transfer [3].

In the absence of enzyme catalysis, ethylene glycol can be converted to acetaldehyde in acidic conditions following the hydrolysis that is driven by bacteria and results in the production of ethylene glycol. Second, bacterial alcohol dehydrogenases converted ethylene glycol into acetaldehyde to

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Received: 28 August, 2022, Manuscript No. jeh-23-85949; **Editor assigned:** 30 August, 2022, PreQC No. P-85949; **Reviewed:** 15 September, 2022, QC No. Q-85949; **Revised:** 21 September, 2022, Manuscript No. R-85949; **Published:** 29 September, 2022, DOI: 10.37421/2684-4923.2022.6.179

produce the acetaldehyde. The presence of small alcohol groups that can be converted into acetaldehyde is a sign of plastic degradation and alcohol dehydrogenases are found in all five genomes of the members of our consortium. Finally, random scission of the in-chain ester linkage during PET processing results in the formation of a vinyl ester and carboxyl end group due to thermal degradation. Acetaldehyde may be produced when these groups are hydrolyzed. Acetaldehyde was found in only the bacteria-treated but not the leached PET samples, indicating that the acetaldehyde was produced by bacterial enzyme catalysis instead [3-5].

Conclusion

It is thought that the genetically manipulated production of PHBs, particularly in plants, could be a less expensive alternative to prokaryotic production. Among other organisms, Saccharomyces cerevisiae, S. diastaticus, Candida krusei, Candida tropicalis, Kloeckera apiculata, Kluyveromyces africans, K. lactis, Rhodotorula glutinis and Ralstonia eutropha were all implicated in the production of PHB. Recent research has demonstrated that some plants and invasive weeds are producers of PHAs. In addition, it has been demonstrated that plant biomass as well as metabolites produced by plants can be utilized as raw materials for the production of PHB using eukaryotic microorganisms.

Acknowledgement

None.

Conflict of Interest

There are no conflicts of interest by author.

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How to cite this article: Selim, Samy. “Waste Polystyrene Acetylation Modification and its Application as a Crude Oil Flow Improve.” J Environ Hazard 6 (2022): 179.