

Types of Plastics and their Uses

There is increase in production of plastics because of the wide application. There are various types of plastics which can be used for

different purposes. Their insulating and anti-corrosion properties make them suitable to be widely used in daily life. Different types of plastics and their uses are listed in the Table 1 given below:

- Plastic is completely degraded and releases carbon dioxide, water and other metabolites [17,21].

Microbes, if hydrophilic, can attach to the plastics' surface. After getting attached to the surface microbes grow by using plastic as carbon source. Compounds with low molecular weight like monomers, oligomers are formed by microbial degradation of compounds with high molecular weight. These compounds can also get diffused into the microbial cells [4,22].

Factors Involved in biodegradation of plastics

There are various factors which affect the process of biodegradation. Chemical and physical characteristics are important and play an important role in biodegradation. Compounds with side chains are difficult to degrade as compared to the compounds without side chains. Similarly, it is also difficult to degrade high molecular weight compounds. The other factors include temperature at which plastic melts morphology and crystallinity. If melting temperature is high, then it will be hard to degrade the plastic. The amorphous compounds can easily be degraded as compared to crystalline one. All these factors must be kept in mind before initiating the process of plastic biodegradation [23].

Listed below are the physical and chemical characteristics which affect the biodegradability of plastics

- Presence of functional groups responsible for hydrophobicity (hydrophobic degradation is slower than hydrophilic).
- Morphology of plastic.
- Density and molecular weight of plastic.
- Presence of bonds which can easily be broken like amide or ester bonds
- Molecular composition.
- Complexity in the structure e.g. Branches in long chains
- Hardness
- Physical form e.g. Powder, films etc [20,21,24].

There are certain exposure conditions upon which biodegradability also depends

Moisture: The process of biodegradation can be influenced by the moisture content because of its requirement for microbial growth and reproduction. Therefore, the biodegradability can be enhanced by providing enough moisture [25].

pH and Temperature: pH can also influence the rate of biodegradation as it changes the acidic and basic conditions of the

Future Prospects

Use of biodegradable plastic is most innovative and environmental friendly method to eliminate the plastic pollution. Biodegradable plastic can be used in packaging industry, health and agriculture industry. They can be efficiently degraded in the environment with the help of microorganisms. The microorganisms which are able to degrade the plastic should be isolated and screened to test their degrading potential. Characterization of microorganisms at molecular level is also needed. There are some extracellular enzymes that have capability to degrade plastics. There is a need to characterize these enzymes and also identify the genes responsible for enzymes. Then these genes can be used to improve the biodegradability of other microorganisms. After field application, microorganisms with efficient degrading potential should be multiplied to degrade plastics at larger scale.

Conclusion

It is concluded that plastic is widely used in our daily life for packaging our goods due to its quality and durability. However, its accumulation in the ecosystem is a great threat. Marine animals die due to blockage in their intestines and gills caused by plastics. In the literature, various methods are present to degrade the

- 30 Tan GYA, Chen CL, Ge L, Li L, Tan SN, et al. (2015) Biocconversion of styrene to poly (