



## NEED OF BIOPOLYMERS AND APPLICATIONS OF POLYHYDROXYBUTYRATE(PHB): A SHORT REVIEW

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### Abstract:

*The current review focuses on the need of biopolymers which has gained a significant role in recent years as they are naturally occurring, biodegradable, temperature resistant, ecofriendly, durable, biocompatible compared to the synthetic polymers which has many drawbacks. Among many biopolymers the polyhydroxybutyrate (PHB) a representative of polyhydroxyalkanoates has many applications in various fields such as medicine, agriculture, pharmacy, food processing and packing and industry etc.,*

**Keywords:** *Biopolymers, biodegradable, ecofriendly, durable, biocompatible, medicine, agriculture, pharmacy.*

### Introduction:

Due to many drawbacks of synthetic polymers such as more expensive for the

production, non-biodegradable, production of toxic substances during their disposal, harmful to the living stock, non durable, non biocompatible etc., the biopolymers are gaining much more interest in recent years; the biopolymers are polymers obtain from the biomass. Most of the biopolymers are obtained from the plants and in recent days they are produced by microorganisms.

Among many biopolymers the polyhydroxy butyrate (PHB) is gaining more and more importance in various fields like medicine, agriculture, pharmacy, food processing, industry etc PHB is biocompatible, temperature resistant and durable. Due to the above characteristics it is solving many drawbacks of synthetic polymers. Many

researchers' efforts have led to the large scale production of PHB from microorganisms with less cost. The present review focuses on the need of PHB as biopolymer in future.

### **Biomedical and Pharmaceutical applications of PHB:**

The need of biopolymers is increasing day by day in the field of medicine and pharmacy due to its biocompatibility, PHB can be used as medical devices in dental (Guided tissue regeneration Membrane and bone regeneration, Void filler following tooth extraction), cranio maxillofacial, orthopaedic (Pins, Rods, Screws, Tacks, Ligaments), hernioplastic (surgical meshes), skin surgery, cardiovascular (Cardiovascular Stents, Vascular Grafts, Pericardial patch, Heart valve), wound coverings (Sutures, Staples, Clips, Adhesives, Surgical meshes)etc.

PHB is used as drug delivery systems for the release of many drugs into the human system for the management of dosage and to reduce the side effects of other synthetic polymers and drug carriers. It is used as drug carriers of anti-inflammatory

drugs (indomethacin), antiproliferative drugs (Dipyridomole), antibiotics (gentamycin, tetracycline, rifampicin, metronidazole, levofloxacin, Sulperazone, ciprofloxacin), anticancer drugs (paclitaxel), anti-hypertensive drug (midodrin-HCl), vaccines. PHB as more importance in pharmacy as microspheres, mirocapusules, nanospheres and nano capuslues and controlled release of the drug and for long term delivery of the drugs with no side effects.

### **Applications of PHB in agriculture:**

Due to the change in the environment, less rainfall and decrease in the fertility of the soils humans are facing many a problems in growing the crops and trees. The use of synthetic chemicals as fertilizers is changing the nutritive value of the crops and also becoming very toxic to the living stock. The PHB as a biodegradable polymer is promising the growth of the crops and also solve the problems of the scarcity of the water by releasing the absorbed water slowly for the long time. In recent years many researchers are trying to increase much

more the applications of PHB in agriculture.

### **Applications of PHB in food processing and packing:**

The conventional plastics made from petroleum based synthetic polymers unable to degrade in landfill or compost-like environment had led to serious environmental issues. The PHB acts as ideal packing material with excellent mechanical properties, physical properties and is completely biodegradable. It has oxygen barrier properties, better water vapour barrier properties, fat and odour barrier properties and thermal resistance. Compared to the conventional polymers PHB doesn't react with the food materials and increases the shelf life of the food. The importance of biopolymers is to be increase in food processing and packing.

### **Industrial applications of PHB:**

The biopolymers have an application in textile industry for production of home based and automotive textiles which have biodegradability.

### **Conclusion:**

The study on bioplastics has been increasing in the world today due to their applications which are rapidly growing in all

fields. It is expected that bioplastics will become cheaper, ecofriendly particularly as consequence of the development of new technologies and by achieving the goals of required economy.

### **References:**

1. Alyaa Hamieh, Zakia Olama and Hanafi Holail. *Global Advanced Research Journal of Microbiology* Vol. 2(3) pp. 054-064, 2013.
2. Wagner Mauricio Pachekoski, José Augusto Marcondes Agnelli, Lauriberto Paulo Belem. *Materials Research*, Vol. 12(2)pp. 159-164, 2009.
3. Sabbir Ansari, Tasneem Fatma. *International Journal of Innovative Research in Science, Engineering and Technology*, Vol. 3(2) pp.9494-9499, 2014.
4. Hankermeyer CR, Tjeerdema RS. "Rev Environ Contam Toxicol, Vol 159, pp. 1-24, 1999.
5. Joshi J R, Patel R.P. *International J Current Pharma Research*, Vol.4 (4) pp. 7481, 2012.
6. Akshay S. Jirage, Vyankatesh S. Baravkar, Vaishali K. Kate, Santosh A. Payghan, John I. Disouza. *International Journal of Pharmaceutical & Biological Archives*, Vol. 4(6) pp. 1107 – 1118, 2013.



7. *D.Latha, Sandya, Shahina, Rekha.*  
*American journal of Biochemistry*  
*and Molecular Biology, 2013.*