

A Review of The Impacts on Environment of Microplastic Beads Vs Biodegradable Beads Used in Cosmetics and Personal Care

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Abstract

Our research deals with the impact of microplastic beads used by the international cosmetic companies for the production of organic cosmetics. During the production of these beads, they are highly released into water resulting into contamination of the same. The pollution of the water is highly dangerous on the species that are consuming it, indirectly affecting the entire ecosystem. It is everybody's responsibility to contribute to safer and cleaner environment for the coming generation.

A reference showing that bio-degradable beads are safer, environmental friendly and readily available has been outlined here to support our claim that microplastic beads should be replaced by bio-degradable beads.

Keywords: Microplastics in cosmetics; Plastic pollution; Aquatic pollution; natural beads; Alternative of microplastics; Bio-degradable report

Introduction

Great Lakes, beaches, wastewater - all of them show presence of plastic particles. The diameter of these particles are less than 5mm. All of these are the result of consumer-level plastics abrasives in products of personal care, these are referred as microbeads. The standard waste water processes used to remediate the microplastics are not 100% effective and hence they pass unchanged through treatment facilities. Since, mechanical exfoliation process does not provide smoother skin, people developed abrasive scrub cleansers as an alternative. The reason for its success was it is made up of synthetic and natural materials that included polyethylene beads. As these beads gave more smoother skin with less side-effects as compared to the materials such as ground fruit pits these were used more commonly as per American Academy of Dermatology. The size of these were between 4 µm to 1 mm in size, which are classified as Microplastics. Microplastics entering the wastewater stream from facial cleansers are of a severe danger to marine life as they persist in food chain, serve as surface on which the organism culture.[1]

Substitute to Microplastic Beads

“Bio-degradable micro beads” are the materials that are safe and should be used as a replacement to the Microplastics beads, since the use of microplastic beads in cosmetics is harmful to environment. A recent study shows that around 5.25 trillion particles of plastics weighing around 270,000 tons are floating on the sea surface. Eliminating such huge pile of plastics is impossible as it will involve huge cost and time. In addition, it might even remove the essential microscopic planktons and other flora required for the smooth functioning of the marine ecosystem. This, the only solution is to use ‘Bio-degradable micro beads’ which are free of plastic. These beads are made from cellulose that forms the tough fibres and are found in wood and plants. As these beads are naturally made they do not pose any threat to marine life.[2]

Rules On Banning the Usage of Microplastic Beads:

Illinois was the first US state to enact legislation banning the manufacture and sale of products containing microbeads in 2014. Based on the reports of microplastics pollution in North Shore Channel and Great Lakes, the ban was imposed.. The two-part ban will be effective from 2018 and 2019, respectively. Other US states, including New Jersey and Maine had passed similar

legislation. These legislative efforts have broad support from the American Chemistry Council's Plastics Division, consumer product manufacturers and environmental groups. The Netherlands, Austria, Luxembourg, Belgium and Sweden expressed the situations as of utmost priority and issued a joint call to ban the microplastics used in personal care products. All these countries took a joint call which was targeted towards protection of marine ecosystem and seafood from getting contaminated. ‘Beat the Microbeat’, is one of the most prominent campaigns focused on getting rid of microplastics from personal care and cosmetics products.

Uses

Microbeads have been seen in personal care products such as deodorants, toothpaste, shaving creams etc. Apart from personal care products they are also found in consumer products such as printing toner, cleaning products. They are also part in industrial products such as plastic blasting, textile printing and medical applications. Some of these products are used on a daily basis in our houses that could lead to around 95,000 microbeads particles released to water, as per study. A Canadian Cosmetic, Toiletry, and Fragrance Association (CCTFA) survey says that annual volume of microbeads within Canada ranged from 30 Kg to 68,000 kg per year.[3]

Sources Of Micro Plastic Beads

Cosmetics and Personal care industries utilise thermoplastics and thermoset plastics that include silicones. These are used for manufacturing several products like shampoo, toothpaste, soap, lipstick, etc. These are useful in many purposes like skin conditioning, formation of film, regulating viscosity and much more.. The microplastics responsible for the marine pollution have the following properties in common with other microplastic litter: [1] They are synthetic polymers and/or copolymers [2] they are not liquids i.e. they are solid phase materials, [3] they cannot be dissolved in water, [4] they are small in size, and [5] they cannot be degraded biologically. There are several types of microplastics present in the environment. These do not essentially come from cosmetic industries. For example, a single load of laundry has more than 1900 fibers of microplastics. These fibers adapt to other chemicals easily in the ambient environment and eventually become more toxic in nature. Microplastics can be derived from physical, biological and chemical breakdown. These come from the debris of plastic from both at sea and on land also referred as Secondary Microplastics.”There are several activities

across sea-shores/ oceans like movement of Ships, dumping of sewage sludge, tourism across the coasts which acts as sources of wastes in the form of plastics into the aquatic environment. These introduce secondary microplastics on degradation into the aquatic ecosystem.[4]

Results and Discussion

Biodegradable Report of Micro Plastic Beads:

The production of plastics has increased globally since 1975 and was estimated to be around 288 million metric tonnes by the year 2012 (Jambeck et al., 2015). This is around 620% rise. To add to the misery, poor waster management practices added to the increase in the plastic litter (See Figure 1 – below).

There are various sources through which waste can enter into marine and water streams, majorly of which originate from land-based activities (GESAMP, 2015). Shoreline recreational activities, poor waste management infrastructure, adding preservatives in products and unlimited waste release has been seen as the major reason of plastic pollution. These are mainly from industrial and commercial activities. These sources produce several types of plastics. They can be ranging from plastic bags to bottles and microplastics to microbeads.[5]

Effects of these plastics on the environment is

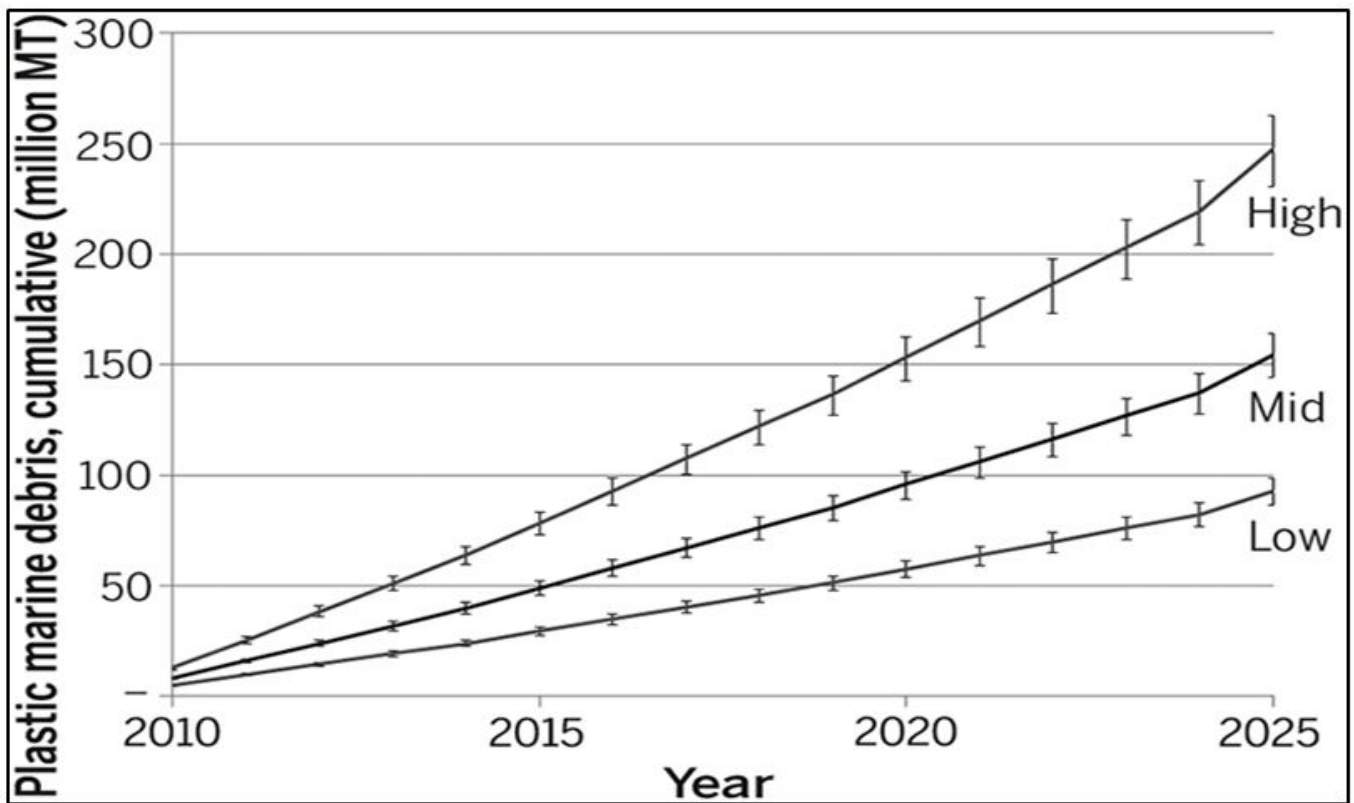


Figure 1: Projected graph of Group of Experts on the Scientific Aspects of Marine Environmental Protection showing increase in plastic waste per year (high, 40%; mid, 20%; low, 15%)

more complex. The sizes in which microbeads are manufactured range from small to big, also the chemical composition used on these microbeads also differ, the most common of which are polyethylene, polyethylene terephthalate, polypropylene, polyamide, polyesters, polystyrene, and polyvinyl chloride. The content may include left over chemicals from their manufacturing and pollutants absorbed in their life cycle stages. These plastics remain in the environment for many years. A study done by Andrady in 2011, shows that, polyeth-

ylene and polypropylene used to measure microbe-mediated degradation in Bay of Bengal showed degradation less than 3% after a period of 6-months. However, these plastics further degrade in the environment through several processes which are chemical and physical. These processes can be water hydrolysis, water erosion, wind erosion, etc. which result in breakdown of larger particles into more tiny particles.[5][6].

Biodegradable Report of Biodegradable Beads:

TEST REPORT NO: MUM 28811/2019
DATE : 28.06.2019

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MUMBAI

SPRAYS/SPRINKLES IN MULTICOLORED BEADS
(RED, PINK, WHITE, YELLOW, GREEN, BLUE,
BROWN, ORANGE)

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TEST REPORT NUMBER : MUM 28811 / 2019		MUMBAI
ULR NO. : TC583519200008783F		
NAME OF CLIENT: M/S UMANG PHARMATECH PVT. LTD.		
Address: Survey No. 146, H. No. 1 (PT), Vasai phata Highway Junction, Pelhar, NH8, Vasai (E) 401208, Maharashtra, India Contact Person : Komal Kambale Tel. No.: +91-9152014792/94/96/97/98/99 E-mail : ipr@umangpharmatech.com	Date Of Sample Submission : 27-05-2019	
	Date Of Test Start : 28-05-2019	
	Date Of Test Completion : 28-06-2019	
	Date Of Reporting : 28-06-2019	
Product Name : Sprayspheres SE Multicolored beads (Red, Pink, White, Yellow, Green, Blue, Brown, Orange)	Product Form : Beads	

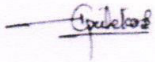
TEST REPORT

1) **Biodegradability:** (OECD 301 D)

(Test Method: The Test mixture contains inorganic medium & activated sludge. Biodegradability is determined on the basis of BOD measurement at different stages of the test period. Period lasts 28 Days.)

	Test Results
%	76.23

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CHANDRAKANT PALEKAR
TECHNICAL MANAGER




VERIFIED BY

Conclusion: On the basis of 28 days study as above, it has been found that the sample is 76.23% Biodegradable.

--- END OF THE TEST REPORT ---

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Conclusion

Umang Pharmatech Pvt. Ltd, has manufactured a product referred as – SPRAYSPHERES-SE is known as a biodegradable beads . The main features of this product is it gently exfoliates and deep clean skin while protecting and nourishing it at the same time. It also helps restore skin beauty. In addition to this, it is natural, non-toxic and most important biodegradable. This product also comes in different colors. Umang Pharmatech Pvt. Ltd are committed to using natural and organic materials, work processes and technologies on the international market under the umbrella of sustainable development by showing examples for the smaller ones. People are eager to live in a more health- and environmentally conscious way which is why they opt for natural care instead of cosmetics of high chemical content. These beads are uniform in size which provides an advantage of proper application on the skin.

As per Umang Pharmatech Pvt. Ltd, bi-degradable report, the product SPRAYSPHERES-SE (biodegradable beads) proved that its bio-degradability is 76.23 %. This will not pollute the environment. Hence we can conclude that bio-degradable beads are far more superior to the microplastic beads and less harmful to the environment. In addition, Umang PharmaTech Pvt. Ltd has already commercialized this product at larger scale for better environment of our mother earth. and is available at cheaper cost. To conclude, this product has been found biodegradable so it is environment friendly.

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