

Single Use Plastics in the Cosmetic Industry: New Packaging on the Horizon

When walking down store aisles filled with products to pick out a new body wash or deodorant, has it ever occurred to you how much plastic is used in the cosmetic industry and how much plastic you throw away when using personal care items? In the U.S, it has grown into a \$90 billion industry, and by 2017, the cosmetics industry produced 76.8 billion plastic packaging units. That same year, there were 238 million Americans using body wash alone.¹

With that amount of people using just body wash, not including any other products, averaging around 6 bottles per year, it works out to 1.4 billion plastic bottles per year thrown away by consumers. Within the last few years, new ways of packaging products without plastic have been developed but have not been implemented industry wide. The cosmetic industry is a large contributor to the single-use plastic issue and must step up to find a solution in eliminating plastic packaging for products that is cost-effective and sustainable, but still provides adequate delivery to the consumer.

Are YOU affected?

As humans living on planet Earth, we are all directly affected by this problem, whether we realize it or not. Plastic waste contributes to harmful chemicals affecting human and environmental health. All of these effects are impacting us as humans, whether we are consumers who use products packaged in plastic, retailers who sell the products, people who transport the products, workers who produce the products, businesspeople who decide how the products should be marketed, or the scientists who create the products.

1: Borunda, Alejandra. "The Beauty Industry Generates a Lot of Plastic Waste. Can It Change?" The Beauty Industry Relies on Plastic. Can It Change?, National Geographic, 18 Apr. 2019. www.nationalgeographic.com/environment/2019/04/beauty-personal-care-industry-plastic/.

Globalization of the Beauty Industry

Throughout history, beauty products have developed into their own industry, changing the way we look at hygiene and health. This surge in the cosmetics industry began in the nineteenth century in the United States and Europe with the industrial revolution at its peak and technological advancements in manufacturing of soap making.

Between World War I and World War II, the beauty industry increased significantly. In 1915, the industry in the United States was \$45 million, and in 1920 it reached \$129 million. By the 1950s, North America accounted for two-thirds of the consumption of makeup and personal care products.²

With the development of technology in the 1960s and 1970s, the potential for growth and globalization of this industry emerged. In this process during the 1970s, companies began to build factories and manufacturing facilities throughout the world, including developing countries. Companies who participated in this worldwide surge included Gillette, Palmolive, Nivea, Maybelline, and Unilever.² With this increasing demand for products across the globe, a cheap and reliable packaging method was needed; plastic was the answer.

Today, the beauty industry heavily relies on the dependable and reproducible look of plastic packaging. With the expansion of e-commerce, the practicality of packaging is becoming more important while the volume, weight and handling during transport are becoming crucial. Plastic is still the industry's answer.

2: Drobac, Jelena, et al. "Green Face of Packaging – Sustainability Issues of the Cosmetic Industry Packaging." 7th International Conference of Materials and Manufacturing Engineering, vol. 318, 14 Aug. 2020, doi:10.1051/mateconf/202031801022.

Current Plastic Waste Disposal

Landfills

The amount of plastic packaging on U.S. products (not just on personal care items) has increased by over 120 times since 1960—with almost 70 percent of that waste piling up in landfills.¹ Landfills are the conventional approach to waste management, but space for landfills is becoming scarce in some countries.

Once plastic makes way into landfills and the open environment, it does not go anywhere. Most plastics are not biodegradable. Sunlight breaks degradable plastic down into microscopic bits, known as “microplastics.” However, many of the environmental impacts of these microplastics on natural environments, including freshwater and marine ecosystems, are fatal to the Earth.

Incineration

With space running low in landfills, many corporations have turned to incineration of plastic waste. Most of the time, solid waste containing about 12% of plastics is burnt, releasing toxic gases like dioxins, furans, mercury, and polychlorinated biphenyls into the atmosphere. Burning certain plastics also liberates hazardous halogens and pollutes air, which heavily contributes to greenhouse gases in the atmosphere. The toxic substances released from incineration are posing a threat to vegetation, human and animal health, and the environment.³

Recycling

This is a familiar term to most Americans, but it is not as helpful to the plastic waste problem as we think. All used plastic can be turned into new things, but picking it up, sorting it out and melting it down is expensive. Plastic also degrades each time it is reused, meaning it cannot be reused more than once or twice. Once its recyclability point is reached, the plastic still ends up in landfills or incinerated.³



Figure 1. bales of recyclable waste in Seattle

The Hazards of Plastic Waste

Human Health Impacts

Plastics contain many hazardous substances such as Bisphenol A (BPA), phthalates, flame retardants, and poly-fluorinated chemicals. BPA is a main building block of plastics, and in the last few years, has been replaced with other substances due to its harmful effects in humans. Studies have shown that BPA is an endocrine-disrupter, which mimics hormones in our bodies, and has been associated with ovarian chromosomal damage, decreased sperm production, rapid shifts in immune responses, and cancer in reproductive organs.⁴ This is just one example of the impact that harmful chemicals from plastics have on human health.

Environmental Impacts

The toxic chemicals leeching into our bodies are also affecting wildlife. These chemicals can cause reproductive problems in animals, which could lead to extinction if it goes on long enough. Plastic waste itself can be confused for food by animals, or can entangle and trap them, causing death. The manufacturing of plastic releases a huge quantity of dangerous gases into the air, including carbon monoxide, dioxin, and hydrogen cyanide.³ There are many instances where plastic has affected the environment; these are only a few.

3: Verma, Rinku, et al. “Toxic Pollutants from Plastic Waste- A Review.” *Procedia Environmental Sciences*, vol. 35, 2016, pp. 701–708. Google Scholar, doi:10.1016/j.proenv.2016.07.069.

4: Proshad, Ram, et al. “Toxic Effects of Plastic on Human Health and Environment : A Consequences of Health Risk Assessment in Bangladesh.” *International Journal of Health*, vol. 6, no. 1, 2018, pp. 1–5. Google Scholar, doi:10.14419/ijh.v6i1.8655.

Plastic Packaging Alternatives

Glass

The most straightforward approach to eliminating plastic packaging is simply to switch to glass due to its infinite recyclability, however, it is not a cost-effective switch. Glass packaging costs nearly 10 times more than comparable plastic packaging, and has other costs associated with it such as shipping costs and carbon emissions in shipping the heavier material.¹ Glass is also prone to breaking during shipping, so the product may not always reach the consumer in usable condition. Recently, more alternatives to traditional petroleum-based plastic packaging have appeared, including primarily biodegradable and bio-sourced plastic materials.

PLA

Resin that comes from corn, known as polylactic acid (PLA), started to be widely used in packaging. Producing PLA uses 65 percent less energy than conventional plastics and generates 68 percent fewer greenhouse gases, however, it poses more of a problem than a solution. PLA is said to decompose into carbon dioxide and water in a “controlled composting environment” in fewer than 90 days, but the “controlled environment” is a large facility where the composting that occurs needs to reach 140 degrees Fahrenheit for 10 consecutive days. Most consumers do not have access to a facility to dispose of their packaging. Elizabeth Royte, a renowned American nature and science writer for the Smithsonian states that “despite PLA’s potential as an environmentally friendly material, it seems clear that a great deal, probably the majority of it, will end up in landfills, and there is no evidence it will break down any faster or more thoroughly than any other form of plastic.”⁵

5: Royte, Elizabeth. “Corn Plastic to the Rescue.” Smithsonian Magazine, 2006, www.smithsonianmag.com/science-nature/corn-plastic-to-the-rescue-126404720/.

6: Sikorska, W, et al. “Part V: Prediction Studies of Aliphatic-Aromatic Copolyester and Polylactide Commercial Blends in View of Potential Applications as Compostable Cosmetic Packages.” *Polymers*, vol. 9, no. 12, 2017, p. 257. EBSCOhost, Academic Search Complete, doi:10.3390/polym9070257.

Biodegradable Polymers

Polymers are the chemical compounds that make up large chains, which link together and repeat to create the stable structures. Plastic is a man-made polymer, but there are many other organic polymers, meaning they are made from materials from the earth, that could be implemented instead of synthetic polymers. A group of Polish polymer and carbon materials scientists invented a biodegradable polymer, known as polybutylene adipate terephthalate (PBAT).

They decided to blend PLA with PBAT to test the degradability and shelf life of this potential solution to conventional plastics and found that a blend with 12% PLA and the rest PBAT showed good shelf life when used with oily cosmetic products and degrades faster when put into landfill environments than just PLA alone.⁶

Other Various Materials

The possibilities for plastic packaging seem to have no end! Some companies have switched to more traditional aluminum tins or post-consumer cardboard, while others have ventured into other alternatives. Bamboo, seaweed, cornstarch, mushroom fibers, and avocado pits have gained popularity recently as alternatives to plastic packaging.²

One of the most interesting current innovations is called SOAPBOTTLE, which is a biodegradable, zero-waste packaging entirely made from soap. Each bottle is made of 80 grams of soap and can hold up to one liter of liquid for approximately one month. Once the “bottle” is empty, it can be used as hand soap or laundry detergent.²



Figure 2. SOAPBOTTLE packaging

Altering the Products Themselves

The reduction of single-use plastics might occur by changing the product itself, rather than the packaging. There is the potential of switching to “waterless” products, rather than trying to put traditional products in alternative packaging. Solid shampoo and conditioner bars have recently swept through the cosmetics industry, and companies are trying to reimagine traditional products that contain mostly water into solid form.⁷ Lotions, shampoos, conditioners, body washes, moisturizers, and other products can be made into a concentrated solid form and either be sold without any packaging, such as bars of soap, in post-consumer recycled cardboard boxes, or recyclable aluminum tins.

7: Cinelli, Patrizia, et al. “Cosmetic Packaging to Save the Environment: Future Perspectives.” *Cosmetics*, 15 Apr. 2019, pp. 1–14. Google Scholar, res.mdpi.com/d_attachment/cosmetics/cosmetics-06-00026/article_deploy/cosmetics-06-00026.pdf.

Think Twice Before Buying

For any change in the cosmetics industry to occur, there needs to be substantial kickback from the consumer. The cosmetic industry is a large contributor to the single-use plastic issue and must step up to find a solution in eliminating plastic packaging for products that is cost-effective and sustainable, but still provides adequate delivery to the consumer. Consumers need to become more aware of this billion-dollar industry and the waste that it produces, and how the “buy-and-throw-away” mentality must stop. Even if half of the consumers switched to alternatives to traditional body washes or shampoos, such as a shampoo bar or bar of soap wrapped in plastic-free packaging, there would be a significant change in the amount of plastic thrown away. Humans are stubborn, but without reimagining daily personal care routines to reduce single-use plastics, nothing will change.

To Learn More About Single-Use Plastics in the Cosmetic Industry and Alternatives, Visit:

www.nationalgeographic.com/environment/2019/04/beauty-personal-care-industry-plastic/

<http://jonnbreitenhuber.de/soapbottle.html>

<https://www.beatthemicrobead.org/plastic-free-beauty-the-new-normal/>

<https://www.unenvironment.org/resources/report/plastics-cosmetics-are-we-polluting-environment-through->

Figure References

1. Ang, Wigan. “Bales of Recyclable Waste in Seattle. American Waste Managers Are Struggling to Find Plants to Process Their Recyclables.” *The New York Times*, The New York Times, 29 May 2018, www.nytimes.com/2018/05/29/climate/recycling-landfills-plastic-papers.html.
2. Breitenhuber, Joanna. “SOAPBOTTLE.” *Packaging Insights*, 17 Jan. 2020, www.packaginginsights.com/news/zero-packaging-personal-care-soapbottle-paves-the-way-to-waste-free-hygiene-products.html.