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Plastics

Definition: Materials that, at some point in their manufacture, can be molded into various shapes

Serious environmental issues are raised in both the manufacture and the disposal of plastics. Most plastics are made from oil, the use of which can have negative impacts on the environment, and the available methods of disposing of waste plastic all have detrimental impacts of their own.

Plastics are generally divided into two types: thermoplastics and thermosetting plastics. Thermoplastics can be repeatedly softened by heating and molded into shapes that harden upon cooling. Thermosetting plastics are also soft when first heated and can be molded into shapes, but when reheated, they decompose instead of softening. Both kinds of plastics are used widely around the world to make all kinds of products.

plastic litter By 808 Mālama pono (Own work) [CC-BY-SA-3.0](http://creativecommons.org/licenses/by-sa/3.0)
Because the primary raw material for making plastics is oil, the reliance on plastics is part of the world's dependence on the drilling for and transport of oil, both of which are related to environmental problems, among them oil spills, tanker accidents, and air pollution from oil refineries. Another important way in which plastics affect the environment is in the difficulty they pose for disposal. The very properties that make plastics so useful—their stability and resistance to attack by chemicals and bacteria—make them almost indestructible. Unlike metal, wood, and paper, plastics do not corrode or decay. They contribute to unsightly litter along roadsides and can be found floating on the surfaces of the ocean everywhere. Because plastics are light, they account for a large proportion of the volume of the world's solid waste. For example, while plastics account for only 7 percent of the total weight of solid waste generated in the United States, they make up about 20 percent of its volume.

A number of solutions to the problem of disposing of plastics have been found and tried, but each solution has had its own adverse effects. The plastics industry and governments have therefore been using a combination of solutions to mitigate the effects of plastic pollution on the environment. One problem associated with disposal is related to the chemicals that must be added to some plastics when they are manufactured to improve or alter their properties; these chemicals may contaminate the environment when the plastic is discarded. Plastics that would otherwise be hard and brittle are often made soft and pliable through the addition of compounds called plasticizers. For example, polyvinylchloride (PVC) treated with plasticizers can be used to make raincoats and drapes. Plasticizers, as a result of their widespread use, have been detected in virtually all of the world's soil and water ecosystems, including the open ocean. A study published in 2015 found that in 2010, eight million tons of plastic trash entered the ocean, the equivalent of five grocery bags' worth of trash for each foot of coastline. The study estimated that this amount would increase to ten times as much by 2025 if plastic disposal practices were not changed.

**Methods of Disposal**

No single way has yet been found to solve the problem of disposal of plastics, but a number of methods have lessened the impacts of plastics on the environment. The first of these is recycling, which helps reduce the amount of new plastic that is made and the energy needed to make it. More than three-fourths of all plastics are thermoplastics that can be recycled through melting and remolding. In order for recycling to be successful, however, used plastic items must first be separated according to type. Different plastics melt at different temperatures, and molding machines work only if they are fed with pure materials. In 1988 the Society of the Plastics Industry developed a uniform coding system to simplify the sorting of waste plastic; most US states require plastics manufacturers to place the codes on the items they make, and the system is now in use internationally.

Uses have been developed for recycled plastic that take advantage of this material's low cost and durability. Plastic products with short service lives, such as packing foam, wrap, and containers, can be made into products with long lives, such as construction materials and plastic pipe. Recycled soft-drink bottles are used to make carpeting and insulation for parkas. Disposable cups and plates are converted to plastic "lumber."

The incineration of plastics to produce energy is another approach to disposal, but this method has the drawback that certain plastics release toxic gases when burned. Proponents of incineration nevertheless assert that it is safe and causes little negative impact to the environment as long as the process is carefully monitored and controlled; they note that this method of disposal can generate much-needed energy while resulting in a large reduction of plastic waste.
The plastics industry is continually seeking ways to make plastics more degradable. Certain elements are introduced into plastics during the manufacturing process to make them susceptible to bacterial attack (biodegradability) or decomposition by light. Modern landfills, however, are constructed to keep out light and bacteria. This prevents any material, even natural wastes, from decomposing while in a landfill. Biodegradable plastics are also not recyclable.

The remaining option for reducing the amount of waste plastic, source reduction, appears simple and direct. The idea is to mitigate the problem by decreasing the quantity of plastics produced and consumed. Even this option is far more complicated than it appears, however. The problem is that in many cases something else must be used to replace the plastic, and this substitution may be more expensive, may pose greater danger to the environment, or may produce more waste than would the plastic. Looking for ways to reduce the amount of packaging used by industry appears to be a solution with fewer problems; this approach has been used successfully in Europe.

**Single-Use Plastics**

Societies around the world have become increasingly dependent on single-use plastics, which are products such as packaging, straws, water bottles, and bags that are designed typically to be used once and then disposed of or recycled. According to the nonprofit Plastic Oceans, of the millions of tons of plastic produced annually, about 50 percent is meant for single use. Such single-use plastics are often the types of plastic that are thrown away rather than recycled or consist of plastics that are not recyclable. According to a 2018 report by the United Nations Environment Programme, as of 2015, only 9 percent of plastic waste ever produced had been recycled.

Consumer concerns have driven many changes. Environmentally conscious shoppers have turned to reusable shopping bags. In some cities in the United States, single-use plastic bag bans have been instituted. In March 2019, the European Parliament approved a measure to ban a number of single-use plastics, such as straws and cutlery, in the European Union, and in May, Maine became the first US state to prohibit businesses from using Styrofoam. Pressure to save wildlife led manufacturers to create edible plastic six-pack rings made of barley and wheat, which are used in the beer brewing process.

**Bibliography**


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