



PET PET, Polyester

Polyethylene Terephthalate

LOMP

Lake Ontario MicroPlastics Center

Production and Use:

Did you know?

A plastic **beverage bottle** and a **microfiber towel** are made of the same plastic! Chemical additives and processing techniques allow one type of plastic polymer to be used for many diverse products.

PET is **one of the most common plastics**.

- identified with Resin Identification Code 1 (“#1 plastic”)
- commonly made into **beverage containers, food packaging, and textiles**
- **~33 million tons produced** and **32 million tons of waste generated** globally each year¹
- ~10% of global non-fiber plastic production and ~70% of synthetic fiber production¹

About two-thirds of all PET is made into **fibers**,² called **polyester**.

- pellets are melted and squeezed through very small holes to make threads that are spun together to form fibers
- made into clothes, carpets, rugs, microfiber textiles, mechanical belts, hoses



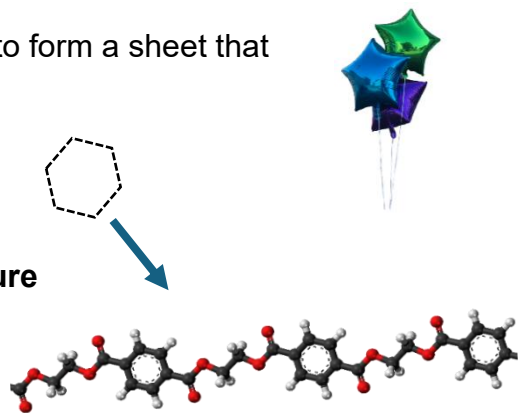
About a third of all PET is made into **containers and packaging**.²

- pellets are heated to very hot temperatures, changing their properties and allowing them to be melted, molded and stretched into three dimensional shapes
- creates strong plastic made into bottles, jars, and other packaging



A small amount of PET is made into **films**.²

- pellets are melted and squeezed through a small opening to form a sheet that can be stretched in two directions into a thin film
- one example is Mylar balloons

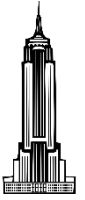


Characteristics:³

- hexagonal benzene rings give PET a **strong, rigid structure**
- **good for food packaging:** PET is resistant to many chemicals and not brittle
- can be opaque or clear, depending on how it is made

Waste:

PET is one of the easiest plastics to recycle. It can be easily separated from other polymers, often has fewer additives than other plastics, and has little risk of contamination.⁴ PET containers can be recycled back into containers or into fibers. Recycled PET costs about the same as new PET.⁴



Still, **most PET waste is not recycled.** Over 5.9 million tons of PET waste was collected in the US in 2019⁵ – the same weight as about **16 and a half Empire State Buildings.**

- 89% of the PET waste was containers and packaging
- only 15% was recycled
- 76% ended up in the landfill and another 9% was incinerated
- Made up 14% of the total plastic waste collected



Other PET waste is not collected. Plastic beverage bottles are commonly found as plastic litter in the environment⁶ and break down into microplastics. Polyester textiles shed microplastic fibers into the air and water during use and washing.⁷ PET is heavier than water, so these microplastics tend to sink to the bottom of waterways.

Researchers in Rochester are studying PET

Researchers at the Lake Ontario MicroPlastics Center (LOMP) study how plastics get into and move around the environment. One way they do this is collect and sort litter in storm drains. PET is one of the common plastics they find, and PET litter is common in aquatic environments.

LOMP researchers also use PET particles to study where microplastics end up in amphibian bodies and how microplastics affect immune health.⁸ Other LOMP researchers collect water samples from Lake Ontario to study how the microplastics interact with human cells. These research projects study how PET microplastics affect the immune system's ability to protect from germs, allergies, and cancer.



Advancing microplastics research

To understand the health effects of microplastics, researchers need to use microplastics like those in the environment. But if they use microplastics from the environment, it is hard to know what is in and on the microplastics that might cause an effect. LOMP researchers are simulating environmental conditions by “aging” microplastic particles. Aging mimics what happens to microplastics in aquatic environments under controlled conditions. Researchers can control the light, temperature, and even add bacteria or other contaminants to the water. This technique will create “aged” particles that can be used to study the health effects of microplastics like those in the environment.



View an infographic about how frogs can teach us about human health at LOMP.urmc.edu.

¹Geyer et al. (2017) *Sci Adv* 3(7):e1700782. ²The Essential Chemical Industry – Online. Polyesters. ³International Association of Plastics Distribution. IAPD Thermoplastics Rectangle. ⁴Welle (2011) *Resour Conserv Recycl* 55(11), 865-875. ⁵Milbrandt et al. (2022) *Resour Conserv Recycl* 183, 106363. ⁶Alliance for the Great Lakes Adopt a Beach: 20 years of Great Lakes Litter Data, 2024 report. ⁷Vassilenko et al. (2021) *PLoS ONE* 16(7): e0250346. ⁸Cai et al. (2024) *Environ Pollut* 356, 124340.