

Plastic Water Bottles: The Hidden Dangers

A 2018 study estimated that nearly 482 billion disposable plastic water bottles were sold that year, with 79% of the empty ones ending up in landfills or the natural environment ("So...How Many Plastic Water Bottles Are Used Every Year?"). The single-use plastic bottle carries the same social stigma as disposable shopping bags and plastic straws. With numbers that shocking many eco-minded people search for reusable bottles as alternatives, many of which are also manufactured from plastic; however, stainless steel and glass are popular alternatives. Unfortunately, many of these reusable bottles, particularly the cheap ones, are made from plastics containing chemicals such as phthalates, which are used to enhance the durability of plastics (Leffler). Research has uncovered evidence of possible ties between phthalates and increased rates of liver damage, hormonal imbalances, and certain cancers ("Phthalates Factsheet"). Plastic water bottles have also been uncovered to leech and store other chemicals held inside them or exposed to during the washing process ("Phthalates Factsheet"). Reusable plastic water bottles are unsafe due to their potential to contain phthalates, so a safer alternative made from stainless steel or glass should be used.

Most of the top bottled water brands are sold in plastic containers as they are cheap to produce in any shape, size, or volume and are lightweight, reducing shipping and transportation costs. In the United States, roughly 30% of these are recycled yearly; the rest are in landfills or the oceans ("So...How Many Plastic Water Bottles Are Used Every Year?"). It is estimated that these bottles will take at least 450 years to decompose; scientists are not sure, though, as bottled water is a relatively new concept ("So...How Many Plastic Water Bottles Are Used Every Year?"). However, being eco-friendly, or caring about the environment, is not a new trend, and people have been seeking alternatives to generate less waste for years. Reusable plastic water

bottles are one solution. The reusable water bottle market was worth \$1.8 billion in 2021, with plastic water bottles accounting for 40% of that ("Reusable Water Bottle Market Size Report, 2022-2030"). It is not uncommon to get free water bottles in grab bags, as giveaways, or freebies from anyone looking for promotion. Other studies find that this reduces the average American's waste by 156 single-use bottles per year ("So...How Many Plastic Water Bottles Are Used Every Year?"). However, while this may seem like an ecologically friendly solution, there are hidden dangers many people are not aware of.

Broadly, phthalates are the name for a group of chemicals used to enhance different characteristics of plastics during the manufacturing process like durability, transparency, longevity, and more ("Phthalates Factsheet"). There are hundreds of compounds in this category, all with difficult to pronounce names such as di-ethylhexyl phthalate (DEHP), benzyl-butyl phthalate (BBP), and diisononyl phthalate (DEHP). They are used in various products, from personal-care items to vinyl flooring, toys, and pill coatings ("Phthalates Factsheet"). Phthalates are commonly used in the packaging to ship or store our food in, already exposing us to these harmful chemicals. Increasing our exposure due to our consumer choices when purchasing a reusable water bottle made from plastics only adds to the problem and boosts the amount we are exposed to.

The harm caused by phthalates is well-documented, and lawmakers have recently begun pushing for a total ban of phthalates in anything related to our food supply; many phthalates are already banned for specific uses ("Phthalates Factsheet"). Studies have found that exposure to this group of chemicals can interfere with hormones, causing harmful side effects, from increased cancer rates, increased risk of obesity and diabetes, and asthma (Feldscher). Other studies have uncovered links between some phthalates, like BBP, DEHP, and DINP, and adverse

hormonal effects on someone's health (Astolfi et al.). Despite our knowledge of these possible harms, they are used broadly throughout our food supply, a person's primary exposure.

The plastics used to manufacture many reusable water bottles are treated with these same chemicals. Over time, and with exposure to heat from washing, or UV rays from sunlight, these chemicals can break down and become absorbed by the contents of the bottle, which is then ingested by us, adding to the amount of toxic 'forever' chemicals in our bodies (Astolfi et al.). One research study found that this natural breakdown process can release up to 20 different phthalates, with BBP and DEHP being the most prevalent (Tisler, and Christensen). Compared to reusable bottles made from other materials, such as glass or stainless steel, the trace amounts were significantly lower and attributable to the water supply itself (Tisler, and Christensen). While not the primary source of one's exposure to these compounds, these are not the only dangers reusable plastic water bottles can pose though.

At the microscopic level, plastic will appear slightly porous. Any reusable water bottle will be washed like any other piece of dishware, at least occasionally. Some people will do so by hand; others will toss theirs in a dishwasher. The dangers here come from the chemicals used with the detergents and solvents people use to wash their bottles. Many detergents contain harmful chemicals, which can get into the microscopic pores of the plastics, building up over time and then leeching back into the beverage stored within it, thereby increasing one's exposure to more harmful chemicals (Astolfi et al.). Researchers at the University of Copenhagen detected more than 400 different chemicals and compounds from the plastic bottle present in a sample 24 hours after being taken and over 3,500 from the detergents (Astolfi et al.). The dishwasher cycle can be even more harmful due to the high heat and steam used during their cycles, helping to further embed carcinogenic chemicals into the bottle (Astolfi et al.).

There is nothing wrong with wanting to reduce your ecological footprint by eliminating unnecessary waste from your life. There is also nothing wrong with wanting to save money, as there is often as much as a 2000% markup on bottled water compared to city or municipal water ("The Real Bottled Water Cost"). Reusable plastic water bottles then seem like an excellent investment to accomplish both simultaneously. However, there is a range of alternatives to the cheap, reusable plastic bottle that exponentially reduce the amount of exposure you will get to carcinogenic chemicals from them. Popular brands such as Hydro Flask sell their products in different materials and offer stainless steel versions of their products (O'Neill). Purifyou Premium sells a reusable travel bottle made entirely of borosilicate glass, the same kind used for scientific equipment (O'Neill). When tested and compared against other common materials such as plastics, both glass, and stainless steel showed significantly lower chemicals and accumulated much less contaminants from the washing process as their plastic counterparts did. They offered the same benefits as any plastic one can, although at a more expensive cost (Astolfi et al.).

While reusable plastic water bottles may seem like an excellent alternative to single-use plastics, there are hidden dangers in them that many consumers are not aware of. The phthalates used during the manufacturing process can often leech out into the plastics and become reabsorbed by the fluids held inside, making their way into our bodies. Even chemicals used during the washing process can build up in the porous material and get taken up by our coffee or fluids, making their way into our bodies. The dangers of all these chemicals are well-documented. Due to the possibility of phthalates or other toxic chemicals in reusable plastic water bottles, a safer alternative made of stainless steel or glass should be used instead.

Works Cited

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