Smart Plastics Guide
Healthier Food Uses of Plastics

Plastics are widely used to store and package food and beverages. They are convenient, lightweight, unbreakable and relatively inexpensive. However, there are both environmental and health risks from the widespread use of plastics.

Environmental problems: Most plastics are made from petroleum, a non-renewable resource. Plastic packaging also creates unnecessary waste. Plastic is bulky—taking up a large volume of landfill space.

Health risks: The use of plastics in cooking and food storage can carry health risks, especially when hormone-disrupting chemicals from some plastics leach into foods and beverages. Plastic manufacturing and incineration creates air and water pollution, and exposes workers to toxic chemicals.

Choose less polluting products to reduce your exposure to chemicals.

PVC—THE POISON PLASTIC: Polyvinyl chloride, also known as vinyl or PVC, poses risks to the environment and human health. PVC is the least recyclable plastic.

- Vinyl chloride workers face an elevated risk of liver cancer.[1]
- Vinyl chloride manufacturing creates air and water pollution near the factories, often located in low-income neighborhoods.
- PVC needs additives and stabilizers to make it useable. Lead is often added for strength, while plasticizers are added for flexibility. These toxic additives contribute to further pollution and human exposure.
- Dioxin in air emissions from PVC manufacturing and disposal, or from incineration of PVC products, settles on grasslands and accumulates in meat and dairy products, and ultimately, in human tissue.
- Dioxin is a known carcinogen. Low-level exposures are associated with decreased birth weight, learning and behavioral problems in children, suppressed immune function and hormone disruption.[2]

What plastic labels mean: The recycling symbol is used primarily on disposable plastic packaging and single use containers. Non-disposable food-use goods like dinnerware, pitchers, flatware and baby bottles usually do not have a recycling label.

NOTE: Not all containers are labeled, and a recycling symbol on a product doesn't mean it's recyclable. Commonly, only plastic products labeled #1 and #2 with narrow necks are recyclable, but some communities recycle other plastics. Check with your local municipality or waste disposal company.

PETE: Polyethylene terephthalate ethylene, used for soft drink, juice, water, detergent, cleaner and peanut butter containers.

HDPE: High density polyethylene, used in opaque plastic milk and water jugs, bleach, detergent and shampoo bottles, and some plastic bags.

PVC or V: Polyvinyl chloride, used for cling wrap, plastic squeeze bottles, cooking oil and peanut butter containers, and detergent and window cleaner bottles.

LDPE: Low density polyethylene, used in grocery store bags, most plastic wraps, Ziplock bags and some bottles.

PP: Polypropylene, used in most Rubbermaid, deli soup, syrup and yogurt containers, straws and other clouded plastic containers, including baby bottles.

PS: Polystyrene, used in styrofoam food trays, egg cartons, disposable cups and bowls, carry-out containers and opaque plastic cutlery.

Other: This is a catch-all category for plastics that don't fit into the #1-6 categories. It includes polycarbonate, bio-based plastics, co-polyester, acrylic, polyamide and plastic mixtures like styrene-acrylonitrile resin (SAN). Number 7 plastics are used for a variety of products like baby bottles and "sippy" cups, baby food jars, 5-gallon water bottles, "sport" water bottles, plastic dinnerware and clear plastic cutlery.

Health concerns with food use of plastics: A variety of petroleum-based chemicals go into the manufacture of plastics. Some can leach into food and drinks, and possibly impact human health. Leaching increases when plastic comes in contact with oily or fatty foods, during heating and from old or scratched plastic. Use of some detergents can degrade plastic, also allowing the chemicals to leach out. Types of plastics shown to leach toxic chemicals are polycarbonate, PVC and styrene. This does not imply that other plastics are entirely safe; these plastics have just been studied more.

Bisphenol A (BPA), a chemical that mimics the action of the human hormone estrogen, can leach from **polycarbonate plastic.**[3] A Centers for Disease Control study detected BPA in the urine of 95 percent of adults sampled.[4] Scientists have measured BPA in the blood of pregnant women, in umbilical cord blood and in the placenta, all at levels shown to cause harm in laboratory animals.[5,6]

While 92 percent of 163 government-funded studies found significant developmental, reproductive or immune effects from low-level exposure to BPA, none of the 13 industry-funded studies found significant effects.[7] **Animal studies document low dose effects at exposure levels hundreds of times lower than the current level considered "safe" by the Environmental Protection Agency.**[8]

Hormones stimulate certain cancers. Bisphenol A stimulates prostate cancer cells[9] and causes breast tissue changes that resemble early stages of breast cancer in both mice and humans.[10,11] Early life exposure to BPA can also cause genetic damage, including chromosomal errors at low levels of exposure in mice, which can lead to spontaneous miscarriages and birth defects.[12] In humans, higher BPA levels in urine have been associated with ovarian dysfunction.[13] Another study found that women with a history of recurrent miscarriages had over threefold higher levels of BPA in their blood compared to women without a miscarriage history.[14]

DEHA [Di(2-ethylhexyl)adipate] is one of several plasticizers (softeners) to which people have daily exposure through food, water, air and consumer products. **PVC cling wrap** contains DEHA, a hormone-disrupting chemical that can leach into oily foods on contact and when heated. DEHA exposure is linked to adverse effects on the liver, kidney, spleen, bone formation and body weight. It is also a possible human carcinogen, affecting the liver.[15]

Styrene can leach from **polystyrene plastic.** Styrene is toxic to the brain and nervous system among workers with longer-term exposures,[16,17] but also adversely affects red blood cells, liver, kidneys and the stomach in animal studies.[18] Aside from exposure from food containers, children can be exposed to styrene from secondhand cigarette smoke, off-gassing of building materials, auto exhaust fumes and drinking water.

Fetuses and young children at greatest risk:

Young children's immature immune systems, rapid development and different eating patterns make them more vulnerable to toxic exposures. Child development is a delicate biological process, guided by the body's own hormones acting at low levels and affecting every cell, organ and function of the human body. Exposures to chemicals like phthalates and bisphenol A during critical times in development can disrupt the body's natural signals and cause effects that may not show up for many years, possibly resulting in diseases such as prostate or breast cancer later in life.

Confused about #7 plastic?

You're not alone. Just a few years ago, most #7 plastic was polycarbonate, a plastic we should avoid. Now many new plastics also fit into the #7 category. If it's labeled # 7-PC, it's unsafe polycarbonate. (NOTE: not all polycarbonate plastics have the PC label.) If it's labeled "PLA" or "compostable," it's a safer, bio-based plastic. Otherwise, you will need to call the manufacturer and ask them what type of plastic it is. Here are a few examples of non-polycarbonate (non-BPA) #7 plastics:

- Gerber baby food containers are an overlay of polypropylene (inside) and polystyrene (outside).
- BornFree baby bottles are made of clear polyamide plastic.
- Polylactic acid (PLA) plastic is made from corn. Consumer demand for a new label to identify bio-based plastics could help distinguish them from polycarbonate and other #7 plastics.
- SAN or Styrene-acrylonitrile resin, a copolymer plastic consisting of styrene and acrylonitrile.
- Nalgene and Camelbak brand water bottles are now made of co-polyester.
- Acrylic plastic dinnerware.

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10 tips for safer, more sustainable food use of plastics

Safer choices for foods and beverages

Avoid

With your food, use 4, 5, 1 and 2. 3 and 6 are not good for you.

1. Avoid #7, labeled PC. PC or polycarbonate plastic can leach harmful bisphenol A (BPA). Other #7 plastics like co-polyester, polyamide, acrylic and polylactic acid (PLA) are safer choices because they don't contain BPA.

2. Avoid using plastic containers in the microwave. Chemicals are released from plastic when heated. Instead, use glass or ceramic containers, free of metallic paint. Note that "microwave safe" does not mean that there is no leaching of chemicals. Avoid using for fatty foods, because there is greater leaching of chemicals into fatty foods.

3. Beware of cling wraps, especially for microwave use. Instead use waxed paper, a paper towel or a plate for covering foods. For plastic wrapped deli foods, slice off a thin layer where the food came in contact with the plastic and re-wrap in non-PVC plastic wrap or place in a container.

4. Use alternatives to plastic packaging whenever possible. Bring reusable bags or cardboard boxes to the grocery store. Purchase products with less packaging.

5. Avoid plastic bottled water (unless you're traveling or live in an area where the quality of water is questionable). Because it is less regulated, bottled water has less certain purity and safety than tap water, and is much more expensive. If you're worried about tap water quality, consider installing a home water filter or use an inexpensive filter pitcher.

6. If you do use plastic water bottles, take precautions. Using a refillable water bottle is a good idea, as it reduces plastic waste, saves energy and non-renewable petrochemical resources, and also saves money. If you use a refillable water bottle, avoid polycarbonate (labeled #7 PC) and instead choose bottles made of stainless steel, glass or safer plastics like co-polyester or polyethylene. If you choose to use a polycarbonate water bottle, avoid use for hot liquids and avoid placing in the dishwasher to reduce leaching of BPA. Discard worn or scratched bottles. Water bottles from #1 or 2 plastics are recommended for single use only. For all types of plastic, you can reduce bacterial contamination by thoroughly washing daily. However, avoid using harsh detergents that can break down the plastic and increase chemical leaching.

7. Use alternatives to polycarbonate plastic baby bottles and "sippy" cups. Knowing what we do about BPA leaching and the real risks to children's health, it might be surprising to learn that many plastic baby bottles and "sippy" cups are still made of polycarbonate. Fortunately, there are alternatives, including baby bottles made of glass, polyethylene, polypropylene or polyamide, as well as "sippy" cups made of stainless steel or safer plastics. For a complete list of safer baby products, see Guide to Safer Children's Products at www.healthobservatory.org or www.healthylegacy.org

8. Avoid buying any products made of PVC (#3) including building materials, toys and other consumer products.

9. Choose bio-based plastic, now available in a variety of plastic products like cutlery, cups, water bottles and take-out containers, for those occasions when it's necessary to use disposable plastic products.

10. Take action: Contact companies that make baby bottles, "sippy" cups, baby food and plastic dinnerware, and urge them to phase out polycarbonate, styrene and PVC in their products. Contact your elected officials and urge them to enact policies that protect public health from toxic chemicals in consumer products, especially those designed for children.

By choosing safer plastics and limiting plastic waste, you can support a healthier, cleaner environment and protect yourself and your family from unnecessary chemical exposures. You can also support companies and public policies that promote safer plastics.

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Green chemistry: Bio-based plastics

The emergence of the bio-based plastic industry holds great potential to eliminate many of the current concerns about petroleum-based plastic production, use and disposal. Although bio-plastics are not yet available for all plastics uses, they are now used in a variety of food and beverage containers. For example Natureworks manufactures Polylactic Acid, or PLA, a corn-based plastic used in a variety of products from containers to bottles to cutlery.[19] EarthShell produces foam laminate made from potatoes, corn, rice or tapioca, which is used for food wraps, plates, bowls and take-out containers.[20] Certified compostable bio-based food ware and packaging can be composted along with food and yard waste in municipal composting facilities. Check with your local facility on collection procedures and product acceptability. For a list of certified products, see http://www.bpiworld.org/

More resources and links at

- **iatp.org**
- **iatp.org/foodandhealth**
- **healthobservatory.org**
- **healthylegacy.org**

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