



Safer Alternatives to Bisphenol A (BPA)

Bisphenol A (BPA), a chemical that is produced in excess of 2 billion pounds per year in the United States, is widely used in certain kinds of plastics and epoxy resins, including those commonly found in baby bottles and used to line metal food containers. Research has shown that BPA, a hormone-disrupting chemical, leaches into food and drink from those containers and is ingested by individuals. According to the U.S. Centers for Disease Control and Prevention, 93 percent of Americans have detectable levels of BPA in their bodies. More than 200 independent scientific studies show that exposures to low doses of BPA are associated with a wide range of adverse health effects in later life. These effects include increased risk of breast and prostate cancer, infertility in men and women, early puberty in girls, metabolic disorders such as type-2 diabetes and obesity, and neurobehavioral problems such as attention deficit hyperactivity disorder (ADHD).

Due to growing scientific and public concern about BPA, leading U.S. retailers as well as chemical manufacturers have created safer, cost-effective alternatives to this toxic chemical. It is important to note that most plastics are petroleum-based and will rarely pose *no* threat to the overall environment. The products below are safer for human health and the environment when compared to BPA polycarbonate plastics.

BPA-Polycarbonate Plastic Alternatives (Bottles and Containers)

Glass and Stainless Steel

Many alternatives entering the market are simple materials that have been used safely for decades, including glass and stainless steel. Glass baby bottles and stainless steel water bottles like those made by Dr. Brown's and Klean Kanteen are BPA-free, reusable and environmentally friendly alternatives. Glass and stainless steel are so stable that individuals can heat and cook food or beverages in both materials safely without any health concerns.

Tritan Copolyester™ (Eastman Chemical)

Tritan is one of the newest polycarbonate alternatives released on the market and is now used in many products, including Nalgene bottles, Weil-Baby Bottles and Camelback, as an alternative to BPA-polycarbonate plastics. Toxicological studies conducted by Eastman Chemical assert copolyester is not carcinogenic and that the monomers used in Tritan do not demonstrate an affinity to bind to hormone receptors, nor a potential to cause endocrine disruptive effects. In addition, no other chemicals utilized in its production are known or suspected endocrine-disrupting compounds (EDCs).¹ Copolyester has not been tested for environmental impacts, but based on Eastman Chemical's submission to the FDA's Food Contact Substance Notification program, it was designed specifically to be a non-carcinogenic food-contact article.ⁱⁱ

High Density Polyethylene (HDPE)

HDPE or #2 plastics are primarily used for non-reusable containers that hold milk, juice, water and other beverages. HDPE is a non-carcinogenic plastic and was approved for use in food-contact applications in 1998 by the FDA.^{iii iv v} Currently, HDPE is largely used in single-use food and beverage containers, but in the past has been used by Nalgene and other companies to produce water bottles that have a "cloudy" appearance.

Polypropylene Homopolymer (PP)

Polypropylene has a long history of use in food containers and reusable water bottles and is therefore a good candidate for replacing polycarbonate bottles. Polypropylene Homopolymer is utilized by Medela, Nuby Whittelstone and Dr. Brown's for baby bottles and sippy cups. Based on the information provided to the FDA for

The Breast Cancer Fund works to identify and eliminate the environmental causes of the disease.

415 346.8223 www.breastcancerfund.org info@breastcancerfund.org

registration of this plastic, it appears to be safer for human health and the environment than BPA polycarbonate plastics.

Polyethersulfone (PES) and Polyphenylsulfone (PPS)

Polyethersulfone and polyphenylsulfone are thermoplastic polymers that are increasingly being utilized as alternatives to polycarbonate plastics due to their stability and, as a result, ability to withstand very high temperatures. Companies such as Born Free, Green to Grow, Green Bebe and Think Baby have all utilized these plastics as alternatives to polycarbonate baby bottles. Tests conducted by Union Carbide have shown that PES and PPS can withstand very high temperatures without breaking down or releasing ingredient chemicals, and therefore have been utilized as alternatives to polycarbonate baby bottles.^{vi}

Polyethylene Terephthalate (PET)

Polyethylene terephthalate or #1 plastics are commonly used in single-use soda and water bottles. While PET plastics are cost competitive with other BPA-free alternatives, they do not perform as well under high temperatures and multiple uses. Increased efficacy testing and innovation may produce a viable reusable PET alternative to polycarbonate plastic bottles.

BPA Alternatives in Food Packaging

Metal Can Alternatives

Aluminum and steel cans are lined with a BPA-epoxy resin to seal the inside of food cans. Once these bonds break, BPA leaches out of the can lining, entering the food and ultimately people. Below are alternatives to BPA-epoxy resin can liners.

Polyester Coatings (DAREX Polyester, PET Film)

Polyester coatings have been used instead of BPA in can linings since the 1990s, when Japanese can manufacturers voluntarily reformulated their can coating process due to public concern about BPA. Polyester coatings can be used in place of BPA liners or as an overlay on an epoxy undercoating, which reduces leaching capabilities of BPA by up to 95 percent into food and beverages.^{vii} Full disclosure on epoxy adhesives used in conjunction with PET film will allow a better understanding of the overall health and safety of this product.

Baked-on Resins (Oleoresin)

Natural oils and resins can be used as an alternative to BPA linings. Oleoresin is a natural mixture of an oil and a resin extracted from various plants, such as pine or balsam fir.^{viii} Increased transparency regarding the technology of oleoresin linings is needed to fully evaluate the environmental safety of this product. While these cans cost 14 percent more than the industry-standard BPA-lined cans, the cost will likely decrease as more companies make the switch and these alternative technologies achieve economies of scale. Oleoresin only works for low-acid canned foods such as beans and vegetables. Currently no viable BPA-free alternative has been identified for use in aluminum and steel can packaging of highly acidic foods such as tomatoes, although major companies like Heinz and Hain Celestial are actively researching safe alternatives for all canned food. Eden Foods, the oldest natural food company in North America, is already using oleoresin linings for its bean products.

Tetra Pak

Tetra Paks are a packaging alternative to aluminum or steel cans. Tetra Pak is made of 70 percent paperboard combined with thin layers of LDPE (low density polyethylene) and aluminum foil.^{ix} Tetra Paks are used widely throughout Europe and have been utilized in the United States for juice, soups, liquid dairy products and even wine.

*The Breast Cancer Fund works to identify and eliminate the environmental causes of the disease.
415 346.8223 www.breastcancerfund.org info@breastcancerfund.org*

Baby Food Jar Alternatives

Some glass baby food jar lids have BPA epoxy resin liners. Below is an alternative to this packaging.

Polyethylene (PET) and Polystyrene (PS)

Some baby food companies have switched from glass jars to Polyethylene (PET) and Polystyrene (PS) plastics for their baby food containers. Gerber Inc., for example, who has made a wholesale shift toward producing BPA-free plastic packaging for its baby food containers, uses #1 (Polyethylene or PET) and #6 (Polystyrene or PS) layered plastic instead. Concerns have been raised about PS, however, because styrene, an animal mammary carcinogen and a chemical listed as “possibly carcinogenic to humans by IARC,” can leach from polystyrene. Therefore, use of any polystyrene in food packaging should be encased in another safe and stable plastic to prevent leaching of styrene into food and beverages.

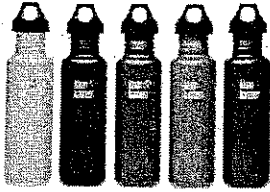


Canned Infant Formula Alternatives

Infant formula packaged in aluminum cans makes up a very small portion of the total U.S. market. However, infant formula packaged in this manner utilizes a BPA epoxy resin liner that leaches BPA into the infant formula. Abbott Laboratories stated in a July 2009 press release that 91 percent of its Similac formula products are BPA-free and 80 percent of Nestle Gerber’s infant formulas do not contain BPA, according to the company’s Web site. Below are three alternatives to this packaging.

Polyethylene (PET), High Density Polyethylene (HDPE) and Polypropylene (PP)


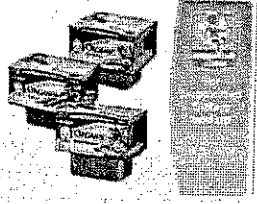

Safe plastic containers have been utilized by numerous companies as a replacement to aluminum cans for liquid infant formula. Similac as well as many other liquid formula producers have switched to plastic bottles using polyethylene, high density polyethylene and polypropylene plastics.

Alternatives Chart

BPA Application	Example of BPA Product	BPA Alternative	Alternative Product	Alternative Product
Polycarbonate reusable food and beverage containers	Sippy cups, baby bottles, reusable water bottles, reusable food storage containers	Tritan Copolyester, stainless steel, glass, and HDPE, PP, PET, PES plastics	Klean Kanteen stainless steel water bottles, Dr. Weil baby bottles, Nalgene Tritan Copolyester water bottles	
Canned foods (non-infant)	Beans, soups, corn, peaches, mushrooms, peas, tuna fish	Polyester Coatings (DAREX Polyester, PET Film), Baked-on Resins (Oleoresin), Tetra Pak	Eden Organic Canned Foods utilize oleoresin to line all of their non-acidic canned foods	
Canned foods – highly acidic	Tomatoes, pineapple, fruits	Tetra Pak	Tetra Pak, a safe alternative can be used for highly acidic foods	

The Breast Cancer Fund works to identify and eliminate the environmental causes of the disease.

415.346.8223 www.breastcancerfund.org info@breastcancerfund.org

BPA Application	Example of BPA Product	BPA Alternative	Alternative Product	Alternative Product
Liquid infant formula containers	Enfamil as well as other companies produce some liquid infant formula that is sold in aluminum cans	Plastic bottles (PP, PET, HDPE) for liquid formula	Similac as well as many other liquid formula producers have switched to plastic bottles instead of aluminum cans	
Infant food containers	Glass baby food jars contain BPA epoxy coatings on the lids to seal the jars	HDPE, PET and PP plastics are viable BPA-free alternatives	Gerber baby food plastic containers are made with #1 (Polyethylene or PET) and #6 (Polystyrene or PS) layered plastic	
Glass jars with aluminum lids	Glass food jars contain BPA epoxy coatings on the lids to seal the jars	Tetra Pak	Corelli diced tomatoes, Trader Joe's tomato sauce	

The Breast Cancer Fund gratefully acknowledges the National Workgroup for Safe Markets, whose research and resources contributed to this fact sheet.

ⁱ Eastman Chemical Company (2008). "Endocrine disruption potential of monomers used in Eastman Tritan™ copolyester." Retrieved November 11, 2009 from http://www.greendepot.com/greendepot/assets/images/docs/KOR_WATER_EndocrineSpecSheet.pdf.

ⁱⁱ FCN 729 2007. Inventory of FDA Food Contact Substances FCN # 729. Retrieved January 28, 2010 from <http://www.accessdata.fda.gov/scripts/fcn/fcnDetailNavigation.cfm?rpt=fcsListing&id=729>.

ⁱⁱⁱ Institute for Agriculture and Trade Policy (September 2008). "Smart Plastics Guide: Healthier Food Uses of Plastics." Retrieved November 12, 2009 from <http://www.healthobservatory.org/library.cfm?refid=102202>.

^{iv} International Plastics Task Force (2000). "High-Density (low-pressure) Polyethylene." Retrieved November 12, 2009 from http://www.ecologycenter.org/ipf/plastic_types/HDPE/SCIENCE.html.

^v Lyondell Basell Polymers (2009). "Bottles for Consumer Goods." Retrieved November 13, 2009 from <https://polymers.lyondellbasell.com/portal/site/basell/menuitem.81bd1022b7c8ec5bbaabbd10e5548a0c/?VCMChannelID=1dc7b1594f9d5110VgnVCM100000646f3c14&productQueryText=&filterType=application&application=1600&resin=18®ion=>.

^{vi} Union Carbide Corporation. "Comparison of degradation resistance (as measured by weight loss over time) of various polymers immersed in a 95 degree C, 10% aqueous solution of sodium hydroxide."

^{vii} As You Sow (2009). "Seeking Safer Packaging: Ranking Food Packaged Food Companies on BPA." Retrieved November 16, 2009 from <http://www.asvousow.org/publications/2009/bpa-scorecard-2009.pdf>.

^{viii} Eden Foods (2009). "Eden Foods: Environment." Retrieved November 16, 2009 from <http://www.edenfoods.com/about/environment.php>.

^k Tetra Pak Corporation (2009). "Carton Structure and Purpose." Retrieved November 16, 2009 from http://www.tetrapakrecycling.co.uk/tp_structure.asp.

*The Breast Cancer Fund works to identify and eliminate the environmental causes of the disease.
415 346.8223 www.breastcancerfund.org info@breastcancerfund.org*