

On the Trail of **Water Bottle Toxins**

What does the government's decision on BPA mean for reusable water bottles?

<http://www.leas.ca/on-the-trail-of-water-bottle-toxins.htm>

For years, some of the most popular reusable water bottles have been made from a hard, clear plastic called **polycarbonate**. The problem is that one of the key components of polycarbonate is the endocrine-disrupting chemical bisphenol-A (BPA). **A growing body of research has shown that polycarbonate bottles can leach bisphenol-A into the liquid they contain, making the hard plastic containers toxic water bottles.**

Bisphenol-A mimics the female hormone estrogen and has been shown to cause defective cell division during development, even at extremely low doses. A growing number of studies have linked bisphenol-A **to other kinds of reproductive and developmental damage, as well as breast cancer in women and prostate cancer** in men. Recent research has also suggested it may play a role in the development of Alzheimer's disease and even diabetes, because of its effect in causing insulin resistance.

The demand from consumer health and environmental groups for regulatory action against BPA prompted the federal government to fast-track a screening assessment of BPA in 2007. That assessment was finally released April 18, 2008 and declared that BPA was CEPA-toxic under the provisions of the Canadian Environmental Protection Act. BPA was declared to be a substance posing a danger to both human health and the environment. Health Minister Tony Clement also announced that following a 60-day comment period, the government would introduce legislation to ban the sale and importation of polycarbonate baby bottles in Canada.

Even before the announcement, several retail chains, led by Mountain Equipment Co-op, had taken polycarbonate water bottles off their shelves because of health concerns over **BPA**. Retailers also removed polycarbonate baby bottles. In addition, the biggest manufacturer of polycarbonate water bottles, whose products are sold under the Nalgene name, announced that it would no longer be making polycarbonate bottles, opting for a new plastic polymer instead.

However, the government has not taken any action to limit the sale of polycarbonate water bottles and has not offered any advice to consumers **other than to suggest**

that pregnant women should not put hot water or other liquids in their polycarbonate water bottles.

Making it even more confusing for consumers, at least one outdoor equipment store in Manitoba announced that it was putting the toxic water bottles back on store shelves.

Even though major retailers won't be carrying them, it's likely that some stores will still stock polycarbonate bottles, especially if cheap imported bottles move in to replace those Nalgene used to make.

The best choice for a re-useable water bottle is one made from stainless steel. They can handle most liquids, can be cleaned easily and, most important, **and don't leach any chemicals.**

Aluminum bottles are also an option but not just any aluminum bottles. **Some aluminum bottles have an epoxy resin lining,** which can also leach chemicals, including BPA. Two bottles that have shown no leaching in independent tests are Laken and Sigg. Both use proprietary formulas for their coatings.

If you want a plastic bottle, the safest bottles to use are made of high-density polyethylene, or HDPE (identified by the number 2 in the recycling triangle symbol on the bottom), low-density polyethylene, or LDPE (#4) or polypropylene (#5). Nalgene makes a number of styles and sizes of bottles made from UVPE, which is a version of HDPE designed to withstand UV radiation from sunlight, which can cause plastic to deteriorate over time.

Nalgene and another major manufacturer, Camelbak, are both planning to bring out a new line of bottles made of a plastic polymer from Eastman called Tritan copolyester. It's designed to replace polycarbonate and will be similar, providing hard plastic bottles that can be clear or coloured. It also claims to be BPA- and phthalate free.

However Tritan copolyester hasn't been independently tested yet to verify the claims or rule out any other chemical leaching.

The new plastic, expected to be on the market this year, will also make it a bit trickier for consumers to navigate



the recycling numbers on the bottom of the bottle. Like polycarbonate, it will carry the **number 7** in the recycling triangle (#7 is a catch-all category for a number of plastics not otherwise identified). So potential buyers will have to make sure they're buying the new material and not polycarbonate. Nalgene and Camelbak will undoubtedly be marketing the new bottles as BPA-free, making that job a little easier.

What about plastic baby bottles?

Until recently, many plastic baby bottles were also made from called polycarbonate. As we noted in the question above, minute amounts of bisphenol-A, which is used in the manufacture of the plastic, tend to leach into the liquid stored in the bottles. **When the bottle and the liquid are heated (as in a microwave oven), that leaching effect may be increased.**

A number of independent tests of baby bottles that showed BPA leaching drew increasing media attention -- prompting consumers to stop buying the bottles. In response, many retailers took them off their shelves, offering instead glass bottles and those made by a company called Born Free, which uses an alternative BPA-free-plastic.

Another compound invented during that era, diethylstilbestrol, turned out to be more powerful as an **estrogen**, so bisphenol A was shelved... until polymer chemists discovered that it could be polymerized to form polycarbonate plastic.

Unfortunately, the ester bond that links BPA monomers to one another to form a polymer **is not stable** and hence the polymer decays with time, releasing **BPA into materials with which it comes into contact, for example food or water.**

Bisphenol A is now deeply imbedded in the products of modern consumer society, not just as the building block for polycarbonate plastic (from which it then leaches as the plastic ages) but also in the manufacture of epoxy resins and other plastics, including polysulfone, alkylphenolic, polyalylate, polyester-styrene, and certain polyester resins.

Its uses don't end with the making of plastic. Bisphenol A has been used as an inert ingredient in pesticides (although in the US this has apparently been halted), as a fungicide, antioxidant, flame retardant, rubber chemical, and polyvinyl chloride stabilizer.

These uses create a myriad of exposures for people. Bisphenol A-based polycarbonate is used as a plastic

When the federal government released its screening assessment of BPA in April, 2008, the health minister announced he would soon introduce legislation to ban the sale and import of polycarbonate bottles in Canada. He said that the margins of safety were too small to take risks with babies' exposure to BPA, since infants are far more sensitive to the effects of toxic chemicals.

Although most retailers have already pulled polycarbonate baby bottles from their shelves, the legislation will be necessary to make sure that polycarbonate bottles don't show up in discount or other stores.

Glass is still the preferred option for baby bottles and many companies are now offering glass. Various companies, including Adiri, and Born Free offer plastic alternatives such as polyamide that claim to be BPA, phthalate and PVC (polyvinyl chloride) free.

There hasn't been any independent testing to verify the claims but both companies' products are expected to meet the proposed new law in San Francisco that bans BPA from any products intended for children under three.

coating for children's teeth to prevent cavities, as a **coating in metal cans** to prevent the metal from contact with food contents, as the **plastic in food containers, refrigerator shelving, baby bottles, water bottles, returnable containers** for juice, milk and water, **micro-wave ovenware** and **eating utensils.**

Other exposures result from BPA's use in "films, sheets, and laminations; reinforced pipes; floorings; water main filters; enamels and vanishes; adhesives; artificial teeth; **nail polish**; compact discs; electric insulators; and as parts of automobiles, certain machines, tools, electrical appliances, and office automation instruments" ([Takahashi and Oishi 2000](#)).

BPA contamination is also widespread in the environment. For example, **BPA can be measured in rivers** and estuaries at concentrations that range from under 5 to over 1900 nanograms/liter. Sediment loading can also be significant, with levels ranging from under 5 to over 100 µg/kg (ppb) BPA is quite persistent as under normal conditions in the environment it does not readily degrade ([Rippen 1999](#)).

What this all means is that most of your life you are within arm's length or closer to bisphenol A.

No wonder [the debate](#) over its toxicity is so intense.

What's in your water?

