

# Polycarbonate Bottles Are Still Safe For Use – In Spite of the Latest Scare Story

January 31, 2008

## Summary

Polycarbonate plastic continues to be the material of choice for reusable water bottles as well as baby bottles. The validity of a recent scare story suggesting that polycarbonate bottles may not be safe for use with hot beverages is not supported by a full review of relevant scientific evidence. Recent research and comprehensive reviews of the safety of bisphenol A by scientific and government bodies worldwide confirm that polycarbonate bottles are safe for use.

## What is the Latest Scare Story About?

A new study from researchers at the University of Cincinnati,<sup>(1)</sup> which was highlighted in a press release and related media articles, examined the level of bisphenol A that migrates into water from polycarbonate plastic sports bottles. The study compared migration from new and used bottles, and also compared migration into water at room temperature with boiling water.

The researchers reported that migration of bisphenol A from used bottles was no different than migration from new bottles. This finding suggests that polycarbonate bottles do not significantly degrade with use over extended periods of time. It was also reported that migration from either new or used bottles was higher when the bottles were filled with boiling water, and that migration remained elevated when the bottles were subsequently filled with water at room temperature. This finding was the basis for the scare story that polycarbonate bottles filled with boiling water may release harmful levels of bisphenol A.

## What Does the New Data Mean?

Although this study was small in scope, the finding of no difference between old and new bottles is good news. A persistent myth about polycarbonate bottles is that they degrade with use. That myth was not confirmed in this study. Even a nine year old bottle was no different from the new bottles.

The finding of increased migration into boiling water is not news at all. It is a well known general phenomenon that migration levels increase with increasing temperature. That phenomenon has been confirmed in many earlier studies of migration of bisphenol A from polycarbonate bottles.

The further finding that migration into room temperature water remained elevated in bottles previously filled with boiling water is only part of the story. Although the researchers suggested that filling a bottle with boiling water might result in long-term effects (e.g., a permanent increase in migration levels), the study only examined migration once after the treatment with boiling water.

In a far more comprehensive study,<sup>(2)</sup> researchers at the University of Athens examined migration of bisphenol A from polycarbonate bottles over repeated cycles to determine what happens during real-life repetitive use of the bottles. These researchers also found, not surprisingly, that migration into boiling water was higher than migration into water at a lower temperature. However, the researchers also found that migration levels quickly declined to a baseline level after only 4-8 use cycles, even when boiling water was used in each subsequent cycle. Contrary to what was suggested, these more detailed findings indicate that increased migration with boiling water is a transient effect that quickly recedes with continued use.

Most importantly though, migration levels comparable to those reported in these new studies (including the University of Cincinnati study) have been reviewed by independent government and scientific bodies

worldwide as part of their comprehensive safety evaluations of bisphenol A. In every case, these evaluations confirm that polycarbonate bottles are safe for use. The measured migration levels are extremely low and are well within safety standards that have been set based on the most recent scientific information for bisphenol A.

For example, the European Food Safety Authority (EFSA) recently established a Tolerable Daily Intake (TDI) for bisphenol A of 50 micrograms/kilogram bodyweight/day, which represents a safe level for daily exposure over a lifetime.<sup>(3)</sup> In comparison, the highest transient level of bisphenol A measured in the migration studies, which would not occur daily over a lifetime, would result in exposure to bisphenol A that is less than 1% of the TDI.

More recently, NSF International, a not-for-profit public health organization, published their comprehensive evaluation of the safety of bisphenol A, which concluded with the calculation of a Reference Dose (i.e., safe exposure level) and a Total Allowable Concentration (i.e., safe concentration)<sup>(4)</sup> for drinking water. Both of these values are applicable to daily exposure over the course of a lifetime. Very similar to the EFSA evaluation, even if the highest transient level of bisphenol A measured in the recent migration studies was experienced every day, exposure to bisphenol A would still be far below the Reference Dose and Total Allowable Concentration.

A complete review of the scientific data, as has been conducted by government and scientific bodies worldwide, reveals that polycarbonate bottles are safe for use. This conclusion is valid for both new and used bottles, and for use of bottles with hot beverages.

<sup>(1)</sup> Le, H. H., Carlson, E. M., Chua, J. P., and Belcher, S. M. 2008. Bisphenol A is released from polycarbonate drinking bottles and mimics the neurotoxic actions of estrogen in developing cerebellar neurons. *Toxicology Letters*. 176(2):149-156.

<sup>(2)</sup> Maragou, N. C., Makri, A., Lampi, E. N., Thomaidis, N. S., and Koupparis, M. A. 2008. Migration of bisphenol A from polycarbonate baby bottles under real use conditions. *Food Additives and Contaminants*. 25(3):373-383. Available on-line at <http://dx.doi.org/10.1080/02652030701509998>.

<sup>(3)</sup> A summary report and full report are available on the EFSA website at [http://www.efsa.europa.eu/en/science/afc/afc\\_opinions/bisphenol\\_a.html](http://www.efsa.europa.eu/en/science/afc/afc_opinions/bisphenol_a.html). A discussion of the EFSA report is also available at <http://www.bisphenol-a.org/whatsNew/20070201EFSA.html>.

<sup>(4)</sup> Willhite, C. C., Ball, G. L., and McLellan, C. J. 2008. Derivation of a bisphenol A oral reference dose (RfD) and drinking-water equivalent concentration. *Journal of Toxicology and Environmental Health, Part B*. 11(2):69-146. Available on-line at <http://dx.doi.org/10.1080/10937400701724303>.