

# Bisphenol A in “BPA free” baby feeding bottles

Sir,

Bisphenol A, 2, 2 bis (4 hydroxyphenyl) propane, is an organic chemical substance with potentially harmful properties<sup>[1,2]</sup> As antioxidant ingredient, BPA is commonly used in polycarbonate plastics (PC), one of the most physically resistant polymers to environmental stresses. PC is the most used polymer in making baby feeding bottles and other baby specified utensils.<sup>[3-5]</sup> Many studies showed that Bisphenol A can be released from baby bottles in to the content inside the bottle and this migration has been shown to get enhanced by high heat exposure, mechanical pressures, as well as being in contact with high pH detergents used in dish washing.<sup>[6-11]</sup> Nowadays, long time exposure to BPA is identified to induce toxic effects in animal and human. Numerous health hazards now are attributed to BPA; estrogenic activity, endocrine disruption, growth suppression, is the most considered side effects in this regard.<sup>[4,12-14]</sup> Fetus, infants and young children up to 3 years of age are mentioned to be the most vulnerable subjects.<sup>[6,7,15]</sup> World Health Security Agency banned BPA in baby specific cups and bottles as a result of rise in concerns about BPA health hazards,<sup>[16]</sup> as the consequence new PC bottles marked as “BPA-Free” are being presented in the global market.

Although, the presence of BPA has not been considered in the national standard of Iran, imported BPA free products are now being offered in the domestic market. This report is on the detection of BPA in two baby bottles with BPA free logo provided from retail outlets.

The first sample (a) was a 120 ml baby bottle, advertised as one of the USA brand but, made in china. The second one (b) was a 150 ml baby feeding bottle, European made, registered to the health ministry of Iran with the number of 201570110001.

Boiling double distilled water was used as food simulant. Solid phase extraction carried out as previously described by brede *et al.*<sup>[17]</sup> with exception that C18 microcolumns was used instead of ENV+ microcolumn used in the original method, also acetone was replaced by methanol as the eluted solvent. GC/MS chromatography model 7890 A, consisting of a 5975C Inert MSD, with a Triple Axis Detector equipped with a 7890 A gas chromatograph, with a split/splitless injector, was used for analyze.

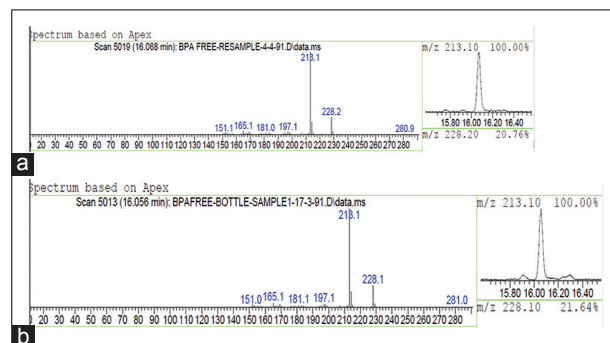
A fused silica column, HP-5 ms (5% phenyl-95% dimethylpolysiloxane; 30 m × 0.25 mm I.D, 0.25 μm film thickness), was employed, with helium (purity 99.995%) as the carrier gas, at a flow rate of 1 ml/min. The analysis was performed in both scan and SIM mode. Two independent Experiments were replicated for each sample.

The GC/MS chromatogram of the tested sample using SIM detector at the m/z ratio of 213 is demonstrated in Figure 1, A typical peak of bisphenol A was detected at 16.06 min after injection of both samples' extracts, The surface area of the identified peaks were counted as equal to 0.78 ± 0.195 μg/Kg and 1 ± 0.180 μg/ Kg of BPA leached into distilled boiling water from the first and the second feeding bottles, respectively.

BPA free baby bottles were first launched in Canada, but very soon it was produced by different manufacturers in other countries in response to raising BPA health concerns and consumer awareness of the side effects. These products may be made of non-PC plastics or have less harmful additives like “Tritan” instead of BPA. Both of which were regulated to carry zero amount of BPA in their structure.<sup>[18]</sup>

As far as we know, for the time being, no specific official standard document has been issued for BPA free feeding bottles or for their counterparts. However, quality monitoring of such products regarding BPA has been conducted on a regular bases in some countries. Expectation is that no detectable BPA must be existed in the food to which they are in contact with.

Recently, a report was released by Health Canada regarding the detection of trace level of BPA in some BPA free products belonging to well known brands, which was legitimized because of very low concentration detected and explained as processing/cross contamination.<sup>[19]</sup> The amount of leaching was in part per trillion, which is many times less than what was



**Figure 1:** Full scan spectra and SIM chromatograms (m/z = 213) at the retention time of BPA (16.06 min) for water extracts from BPA free advertised feeding bottles a) first sample b) second sample

found in the present study. In a European study, 20 out of 27 polyamide made baby bottles labeled as no BPA were identified to release BPA in the range of 0.5 to 250 µg/Kg in the first migration test and of 1 to 330 µg/kg in the second one.<sup>[20]</sup> Comparing such a wide range of migration, to what was found in the present study, the leaching levels detected in this report, could be placed at the lowest concentration of the latter study.

In our primary evaluation, distribution of polymeric baby bottle marked as "BPA free" in an urban society of Isfahan, was assayed and revealed that with an unequal distribution through the city, 15% of the baby shops are presenting BPA free products at quite higher price than that of the traditional ones. They all belonged to a few western brands. Moreover, it was found that BPA knowledge of shopkeepers and distributors is quite low, even those who were in the trade of BPA free products.<sup>[21]</sup>

Here, in this study, it was not clear for us whether possible contamination was occurred for the tested products or the counterfeit sample bottles were examined. It is at least partly due to lack of clear information in the society for characterization of imported baby products, as well as absence of strictly regulated inspections.

However, as affirmed by international safety agencies, using BPA free products would provide larger margin of safety particularly when the safety of infants is of concern. Unfortunately, there is no way to recognize such products other than their BPA-free logo and thus relying on the given mark is inevitable. Because producers must tolerate excess outlay to change their routine production line in order to modify their products, BPA free bottles become more expensive than the traditional ones. Their luxury feature may also be in part responsible for their higher price. Something that may drives fraud and invigorates production of fake products.

This report proposes that the BPA issue must be considered in the national health program, as well as revision of national standards of baby bottle in Iran. Public knowledge must also be improved regarding the BPA health hazards and BPA free products; this can be helpful in the restriction of the possible fraud on such products. Finally, strict inspection on the imported products, as well as regulation and monitoring of BPA in the marketed products is of utmost importance in our society

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