

Nutrition News

Department of Human Nutrition

 **K-STATE** Research and
Extension

July 2007

Benzoates Preserve Soft Drinks, Other Foods – But Are They Safe?

Benzoates are added to many beverages and foods in order to inhibit the growth of bacteria, yeasts, fungi and molds.

In the U.S., soft drinks contribute the highest amount of benzoates to the diet, according to the International Programme on Chemical Safety.

Benzoates are also used as a preservative in some juices, in foods such as salad dressings, soy sauces and pickles; and in toothpastes, mouthwashes and other products.

Small amounts of dietary benzoates come from those that are naturally present in some fruits and their juices, such as most berries, apples and prunes; and in other foods, including nuts, dairy products, honey, cinnamon and cloves.

Vitamin C, also called ascorbic acid, is another ingredient that is often added or that is naturally present in some beverages and foods. It also helps to prevent spoilage or is added to provide additional nutrition.

Benzene may form

A problem may occur under some conditions. Benzene may form in beverages and foods that contain both benzoates and vitamin C. Certain amounts of benzene can cause cancer (leukemia) in humans, and can cross the placenta to affect an unborn baby.

According to the U.S. Food and Drug Administration (FDA) and the Health Protection Branch in Canada, low levels of benzene in food and beverage products do not pose a safety concern for consumers.

The U.S. Environmental Protection Agency (EPA) has set five parts per billion (5 ppb) as the maximum allowable contaminant level for how much benzene can be present in drinking water. However, the FDA has no regulatory limits for benzene in any beverages except bottled water, for which the FDA uses the EPA's quality standard of 5 ppb.

The FDA found that benzene levels were high (from 7 to 89 ppb, much higher than the acceptable 5 ppb limit) in ten of the almost 200 soft drinks and other beverages they have tested since 2005.

Nine of the high-benzene beverages contained both added benzoates and ascorbic acid. Another beverage – a cranberry juice beverage that had naturally-occurring benzoates, but no added ones, and had added ascorbic acid – also tested high for benzene. The beverages found by the FDA to have high benzene levels have been reformulated to meet acceptable limits for benzene.

The presence of benzoates and vitamin C as ingredients in a product doesn't mean that benzene has formed or will form. For more than 100 other soft drinks and other beverages – including those containing both benzoates and ascorbic acid – the FDA found either

nodetectable amounts of benzene or benzene levels that were below the EPA's acceptable limit. Similar results were found in samples of hundreds of beverages tested previously by other national and international government agencies and the beverage industry.

Benzene levels can vary a great deal from one product lot to the next. The FDA found that even products from the same lot but collected at different locations had different benzene levels, depending on many factors.

An elevated temperature and the presence of light during shipping, handling or storage makes the formation of benzene more likely.

Benzoate safety questioned

There may be a second potential problem with benzoates. Preliminary research done in England on yeast cells showed that benzoates increase the need for antioxidants because it increases oxidative stress. Benzoates may also damage part of the cell's ability to use oxygen properly, according to unpublished research from the same laboratory.

What can be done?

More research is needed on this important issue.

According to the International Programme on Chemical Safety, the current documentation of health effects of benzoates is limited and inadequate.

The FDA, the International Council of Beverages Associations, and the American Beverage Association are working with the beverage industry to avoid or minimize benzene formation in beverages.

The FDA plans to continue its testing program for benzene in soft drinks and other beverages to monitor levels. The agency states that it will inform the public as new data become available.

Consumers concerned about getting too many benzoates, or about possibly getting benzene from reactions occurring in their foods and beverages, can take action now to reduce their intake. The estimated U.S. intake by high consumers of benzoates is 7.3 milligrams per kilogram body weight per day, according to the International Programme on Chemical Safety.

Here's how you can reduce your exposure to dietary benzoates:

- Read the ingredient labels on favorite beverages and foods to identify which products contain added benzoates.
- Reduce your consumption of products containing added benzoates. For instance, limit soft drinks. For juice, you might prefer concentrates that are frozen without added benzoates.
- Reduce consumption of products containing both added benzoates and ascorbic acid.
- Store soft drinks and juices preserved with benzoates that also contain ascorbic acid at cool temperatures, out of direct light. Do not store them for an extended time, but rather consume them soon after purchase.

- References (accessed 7/16/07): 1. FDA, updated July 12, 2007; [Questions and Answers on the Occurrence of Benzene in Soft Drinks and Other Beverages](http://www.cfsan.fda.gov/~dms/benzqa.html); www.cfsan.fda.gov/~dms/benzqa.html
2. International Programme on Chemical Safety, 2000, [Benzoic acid and sodium benzoate](http://www.inchem.org/documents/cicads/cicads/cicad26.htm#PartNumber:1), www.inchem.org/documents/cicads/cicads/cicad26.htm#PartNumber:1
3. Piper PW, 1999, Yeast superoxide dismutase mutants reveal a pro-oxidant action of weak organic acid food preservatives, *Free Radic Biol Med*, 27(11-12):1219-1227

For more information about healthy eating, contact your local extension office.

The Food Assistance Program can help people of all ages with low income buy nutritious foods for a better diet.

To find out more, call toll-free 1-888-369-4777.

Contents of this publication may be freely reproduced for educational purposes. All other rights reserved. In each case, credit Mary Meck Higgins, Ph.D., R.D., L.D., CDE, Associate Professor, Department of Human Nutrition; Kansas State University; *Benzoates Preserve Soft Drinks, Other Foods – But Are They Safe?*; July 2007.

K-State Research and Extension is a short name for the Kansas State University Agricultural Experiment Station and Cooperative Extension Service, a program designed to generate and distribute useful knowledge for the well-being of Kansans. Supported by county, state, federal and private funds, the program has county Extension offices, experiment fields, area Extension offices and regional research centers statewide. Its headquarters is on the K-State campus, Manhattan. This material was funded in part by USDA's Food Stamp Program through a contract with Kansas Department of Social and Rehabilitation Services. Brand names appearing in this publication are for product identification purposes only. No endorsement is intended, nor is criticism implied of similar products not mentioned. Kansas State University is an equal opportunity provider and employer. **Kansas State University Agricultural Experiment Station and Cooperative Extension Service, Manhattan, Kansas.** Kansas State University, County Extension Councils, Extension Districts, and the U.S. Department of Agriculture cooperating.