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The Safety of Polyethylene Terephthalate (PET)

For more than 100 years, plastic products have revolutionized the way we live. Polyethylene terephthalate, or PET, is a particularly notable example. Because it provides an excellent barrier against oxygen and carbon dioxide, PET has become a material of choice for bottling beverages, such as mineral water and carbonated soft drinks. It also is used for microwave food trays and food packaging films.

Regulating Food-Contact Materials

The U.S. Food and Drug Administration (FDA) is responsible for the stringent regulations that assure the safety of our food. FDA's responsibilities include informing the public about the nutritional content of food and beverages, alerting the public to food product recalls and ensuring the safety of the materials that package our food, among others. Each of these responsibilities has a foundation in science – that is, scientific testing provides the basis for FDA regulations.

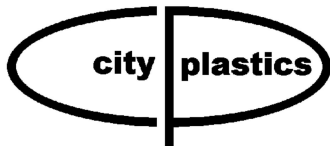
The FDA regulates materials intended to come into contact with a food or beverage, including plastic packaging, as "indirect" food additives.¹ According to FDA, indirect food additives "are substances that may come into contact with food as part of packaging or processing equipment, but are not intended to be added directly to food."²

Regulations covering plastic packaging generally set limits for using a material based on available safety tests and a manufacturer's intended use of the plastic packaging. Companies that manufacture plastics conduct much of the testing on plastic packaging materials. Additional testing is conducted at government laboratories, such as FDA's National Center for Food Safety and Technology at the Illinois Institute of Technology.

Demonstrating the Safety of PET through Scientific Testing

Polyethylene terephthalate, or PET, has become the plastic packaging of choice for many food products, particularly beverages like bottled water and carbonated soft drinks. This is due in part to its inherent properties that are well suited for lightweight, large-capacity and shatter-resistant containers. Like any indirect food additive, the scientific testing of PET is based on two key principles: establishing that there is a minimal amount of transfer of substances between the plastic packaging and the food and establishing that any substances that may transfer from the plastic to the food do not pose a risk to human health.

As a result of advances in analytical chemistry, even the most miniscule level of migration from the plastic to foods can now be measured. Tests to determine the levels of compounds that have the potential to transfer from the plastic into food are conducted using conditions that simulate the actual use of the material. These tests have found that the migration of any components of PET plastics under laboratory conditions is well below applicable safety levels.³ Therefore, FDA has determined that PET is acceptable to use in the applications for which it has been tested.



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The toxicological properties of PET and compounds that migrate under test conditions have also been well studied. The International Life Sciences Institute (ILSI) – a nonprofit organization dedicated to advancing the scientific understanding of issues related to nutrition, food safety, toxicology, risk assessment and the environment – has comprehensively reviewed the scientific and technological aspects of PET.

In a report on PET for food packaging applications issued in July of 2000, ILSI summarizes the large body of test data that demonstrates the safety of PET resins and compounds for food and beverage containers:

“PET itself is biologically inert if ingested, is dermally safe during handling and is not a hazard if inhaled. No evidence of toxicity has been detected in feeding studies using animals. Negative results from Ames tests and studies into unscheduled DNA synthesis indicate that PET is not genotoxic. Similar studies conducted with monomers and typical PET intermediates also indicate that these materials are essentially nontoxic and pose no threats to human health. . . . It is important to stress that the chemistry of compounds that are used to manufacture PET shows no evidence of oestrogenic activity. There is a significant body of evidence that demonstrates that the use of PET is not a concern and is perfectly safe in this respect.”⁴

In 1994, ILSI published a “White Paper on Refillable Plastic Packaging Made from PET.” According to ILSI, “PET polymer has a long history of safe consumer use, which is supported by human experience and numerous toxicity studies.” In its review of migration studies, ILSI concludes:

“[T]he levels of migrants potentially present in beverages packaged in PET bottles are below applicable international extraction limits that are based on safety considerations and orders of magnitude lower than levels causing adverse effects in toxicity studies. The use by consumers of PET polymer in food packaging, therefore, is demonstrated and considered safe.”⁵

Safely Using PET Packaging

As with any material used to package food and beverages, consumers should be aware of any limitations on the use of PET indicated by the manufacturer. These will be clearly indicated on the label of the product. For example, most PET microwave trays are intended for single use and should not be used to store or prepare foods other than those for which they were intended.

Also, consumers should be aware that, once opened, bacteria can grow in virtually any packaging material if a food or beverage is stored in conditions suitable for bacterial growth. Therefore, it is best to clean any container with hot soapy water and to dry thoroughly before reuse.

¹ 21 CFR 177

² FDA's Center for Food Safety and Applied Nutrition: <http://www.cfsan.fda.gov/~dms/opa-indt.html>

³ Castle, L. Migration of Polyethylene Terephthalate PET Oligomers from PET Plastics into Foods During Microwave and Conventional Cooking and into Bottled Beverages. *Journal of Food Protection*; 1989, 52 (5): 337-342.

⁴ Packaging Materials: 1. Polyethylene Terephthalate (PET) for Food Packaging Applications. International Life Sciences Institute; 2000, Washington, DC, p. 11.

⁵ White Paper on Refillable Plastic Packaging Made from PET (Polyethylene Phthalate). International Life Sciences Institute (ILSI) – North America; 1994, p.58.