



## **PET – WHAT IS IT AND WHERE DOES IT COME FROM?**

### **FREQUENTLY ASKED QUESTIONS:**

#### **WHAT IS PET?**

PET is the common name for a unique plastic belonging to the polyester family. PET polyester is formed from ethylene glycol (EG) and terephthalic acid (TPA), sometimes called "purified terephthalic acid" or PTA. PET's full chemical name is polyethylene terephthalate.

#### **WHERE DOES PET COME FROM?**

The raw materials for PET are derived from crude oil and natural gas. A common misconception is that plastics and chemicals are the primary consumers of crude oil. However, combined they account for *less than 10%* of the global annual usage.

#### **HOW IS PET USED FOR PACKAGING?**

The PET bottle is the modern, hygienic package of choice for many food products – particularly carbonated soft drinks and water. The primary reasons for its popularity are its glass-like transparency, ability to retain carbonation and freshness, and a toughness-to-weight ratio which allows manufacture of lightweight, large-capacity, safe break-resistant containers. The proportion of package weight compared to the contents allows very favorable distribution economics which reduces overall costs.

#### **HOW DOES PET IMPACT THE ENVIRONMENT?**

PET is widely recycled as a material, making a large contribution to the recycling targets that are becoming requirements for plastics by various state and federal agencies. PET can be recovered, and the material reused, by simple washing processes or by chemical treatment to break down the PET into raw materials or intermediates. These intermediates are then purified and converted into new PET resins. A final option for PET that is unsuitable for material recycling (e.g., very dirty, or too contaminated to clean) is to use it as an energy source (thermal recycling). When recycling is not undertaken, in landfills PET is stable and inert with no leaching or groundwater risk. Bottles are crushed to very small volume, take up relatively little space, and generally add a degree of stability to the landfill.



### **ALMOST ALL BOTTLED WATER IS NOW PACKAGED IN PET. WHY IS THIS?**

PET is lightweight, very strong and does not adversely affect the quality of the water. The use of a lightweight container such as PET ensures that the water is distributed safely with optimized fuel consumption. Recent focus on healthy lifestyles and the dangers of dehydration have led to people carrying drinking water throughout their day. A PET container is shatterproof, light and can be resealed once opened.

### **CAN PET BE USED TO PACKAGE MILK, YOGHURT AND SIMILAR DAIRY PRODUCTS?**

Yes. PET is already used to package milk and dairy products. Dairy products normally have a very short shelf life and are sold and consumed within a few days. Because of its clarity, PET is often used to create the image of a “premium product” in the supermarket or convenience store refrigerated case.

### **I HAVE SEEN JUICES PACKAGED IN PET IN REFRIGERATED CASES AND ON THE SHELVES, ARE THEY THE SAME?**

Probably not. The refrigerated juice has a short sell-by and use-by date. These are timed so that the juice is consumed before oxygen from outside and the air in the container headspace react with the juice and cause it to start to deteriorate. The juice on the shelf is packaged under aseptic conditions. Everything is sterile and therefore the juice is protected from deterioration for a much longer time. The PET containers for these juice products are likely to have been modified to have a better barrier to oxygen permeation. Once an aseptically filled container has been opened it is important that the contents are refrigerated and used quickly.

### **WHAT ABOUT THE PACKAGING OF BEER, CAN PET BE USED HERE?**

Again, this depends on the shelf life requirements. PET grades used for soft drinks do not quite have the oxygen barrier properties to ensure complete protection against deterioration in taste and maintain the quality of the beer for the shelf-life (time from packaging to consumption) demanded by the brewers and consumers. Beer packed in single serve bottles made from standard grade PET is becoming common at concerts, sporting events and other large gatherings where safety is paramount. As the beer is bottled for the event and consumed on the premises there is no time for the quality of the beer to deteriorate. New developments in barrier technology for PET mean that there are many different ways to slow down the diffusion of oxygen (in) and carbon dioxide(out) through the container walls. So the benefits of PET can now be used to package and transport beer much more widely than before.



**PRE-COOKED FOODS ARE NOW SOLD IN PET TRAYS SUITABLE FOR REHEATING IN CONVENTIONAL OR MICROWAVE OVENS. IS THIS ALSO NORMAL PET?**

The PET grades used for "dual ovenable trays" have the same basic chemical formula but have special additives that crystallize and toughen the PET during the sheet extrusion process. In this form, PET has a much higher temperature resistance and it can be safely heated to more than 350°F, in a conventional oven as well as used in microwave cooking.

**WHAT HAPPENS TO THE CATALYSTS USED IN MANUFACTURE OF PET, ARE THESE HAZARDOUS?**

The metal catalysts used in PET manufacture are used at very low levels, below any legal limits, and are non-toxic and non-hazardous.

**PLASTICS OFTEN CONTAIN PLASTICIZERS AND STABILIZERS WHICH CAN TRANSFER TO FOODS, DOES PET CONTAIN ANY SIMILAR ADDITIVES?**

PET used for food and beverage bottle applications is a very pure form and free of any plasticizers or added stabilizers. There are no additives of this type which could migrate into or effect the packaged food or beverage.

**CAN PET ITSELF REACT WITH FOODS?**

PET is a very inert material and does not react with any known food products. It is for this reason that PET is a good choice for all kinds of food packaging.

**DO ECO-PROFILES OR LIFE-CYCLE ANALYSES SHOW WHICH PACKAGING MATERIALS ARE BEST FOR THE ENVIRONMENT?**

When looking at environmental criteria - unless each effect is categorized, classified and ranked in order of importance - a clear answer can not be given. However, overall reductions in consumption are generally beneficial. PET, because of its lightweight and general toughness offers less material per unit of packaged product which in general reduces the overall environmental burdens.

**IS RECYCLING OF PET COMPARABLE WITH GLASS?**

Yes. Glass has been recycled virtually continuously since its invention and is a well established industry. PET can be collected in the same way and recycled by washing and re-melting in a similar manner to glass.



### **WHAT HAPPENS TO PET IF IT IS DUMPED INTO LANDFILLS?**

It will stay there, inert, similar to glass. It will not degrade biologically -- one of the reasons it is such a good choice for packaging foods is its resistance to attack by micro-organisms. It will be crushed flat without fragmenting and occupy less space than the more rigid glass. It is resistant to the chemical species found in landfills and will not give rise to any harmful leachates. In fact, these very properties are utilized in stabilization of landfills and processed baled PET bottles have been used for stabilization of the foundations for road works.

### **WHAT HAPPENS IF PET IS BURNED OR USED AS A SUBSTITUTE FUEL?**

PET is organic and will eventually burn like paper, wood and coals. It is very difficult to ignite and usually melts away from any flame sources. In this respect is it little different than most natural organic materials. It does have the same calorific value as soft coal and can be used with effect in up to date "Waste to Energy" power generation facilities.

### **ARE PLASTICS A MAJOR USER OF SCARCE OIL RESOURCES?**

No. Most (88%) of the oil extracted from the earth is used as a fuel for transport systems, heating appliances or for generation of electricity. The amount used for chemicals and plastics is small in comparison. In fact, the use of plastics actually saves those resources as a result of lighter containers being transported from the filler to the retailer.

### **HOW DO I DISTINGUISH PET FROM OTHER PLASTIC BOTTLES?**

Virtually all plastic carbonated soft drink and water bottles are made from PET. Usually the PET container is marked with an identification symbol in the form of three arrows making a triangular shape with a number "1" in the center of the triangle and the acronym PETE under the base of the triangle. The symbol can be found either printed on the label or molded on the base or shoulder of the bottle.

**CONCLUSION:** PET is the packaging material of choice for many food and non-food products due to its environmental friendliness, glass-like transparency, ability to retain carbonation and freshness, chemical inertness, and a toughness-to-weight ratio which allows manufacture of lightweight, large-capacity, safe break-resistant containers.