Common Q&A on the Safety of High Quality PET Packaging

PET is an excellent barrier material.
PET bottles are widely used for beverages and liquids and have been used since its invention in 1973.
Contrary to popular opinion PET does not contain polyethylene plastic although it shares similar chemical nomenclature.
PET plastic starts to decompose at temperatures above 300 °C (570 °F).
When PET degrades the plastic becomes discoloured, the optical properties are altered and acetaldehyde is formed.
Acetaldehyde is a naturally occurring chemical (colourless substance with a fruity smell) usually found already present naturally in foodstuffs and fruit juices.
Roseneath uses high quality pharmaceutical grade PET for all of its packaging which does not generally contain contamination from the waste recycling stream and is therefore considered pure and un-contaminated.
Roseneath does not load boiling fluids into PET plastic packaging.
Roseneath does not use micro-waves in any part of its herb and/or product processing stages.

Regarding the Goethe University study (Frankfurt, Germany) on bottled water and endocrine disruptors …

The Goethe study investigated endocrine disruptor activity in mineral water.
The mineral waters studied were packaged in glass, PET and Tetra pack.

Independent analysis of the study conducted by the German BfR (Federal Institute for Health Risk Assessment), released March 18, 2009 stated :
"Samples of various different brands of mineral water showed considerable differences in the test system used. Differences with respect to the package (glass compared to PET) cannot, however, be inferred from the data. The possibility discussed by the authors that these substances originate from the plastic PET itself is rather doubtful because comparable hormonal activity was measured both in water samples from glass bottles and in water samples from PET bottles of the same mineral water brand."

Ongoing research into the safety of PET containers and the presence of endocrine disruptors will shed more light on this issue in the future. Issues such as the acidity of the contents and high temperature long term storage are considered key areas of current research work.

Is refilling a PET bottle safe?

Generally Yes

PET poses no danger when refilled.
PET is an inert plastic provided it is stored appropriately and is not subjected to extended period of high heat.
PET plastics may be adversely affected by the presence of acidic, low pH, contents.

Research on PET indicates that it does not generally leach harmful materials into its contents -- either when stored unopened, or when bottles are refilled or frozen.

PET containers have undergone rigorous testing under FDA guidelines to ensure safety as food and beverage containers suitable for either storage or reuse. They have been safely used for many years.

Once opened PET bottles can harbor bacteria, as will any other beverage container.
PET bottles are no more likely to promote bacterial growth than any other packaging, including glass.

Is it safe to freeze beverages in PET bottles?

Yes

There appears to be no danger when freezing PET bottles.

There is no truth to the rumor that dioxins are leached from frozen PET bottles into bottle contents.
Dioxin is a chlorine-containing chemical that has no role in the chemistry or manufacture of PET.

Dioxins are part of a family of chemicals formed only by combustion at temperatures well above 370 °C (700 °F). Dioxins are not formed at common storage temperatures or lower temperatures.

PET packaging is generally selected by manufacturers because it is safe, recyclable and convenient
PET packaging is perfectly suitable for food and beverage.
The U.S. Food and Drug Administration (FDA) has reviewed PET testing data and has subsequently concluded that PET containers do not leach harmful amounts of substances under generally accepted conditions of use.

Is it safe to leave a PET bottle in the heat (eg the car on a hot day)?

PROBABLY OK BUT MORE RESEARCH REQUIRED

Roseneath would suggest that keeping your PET container in a hot environment, such as your car, would not be a wise thing to do as the heat will destroy the integrity of the product contained within.
We would also suggest that for your safety and enjoyment it would not be wise to leave drinking water in the heat for an extended period of time as it may promote bacterial growth and/or degradation of the plastic.

Does PET contain Bis-phenol A (BPA)?

No

There is no connection between PET plastic and Bis-phenol A.
Bis-phenol A is not used in the manufacture of PET
Bis-phenol A is not used as a chemical building block for any of the materials used in the manufacture of PET.
Bis-phenol A is used to make polycarbonate plastics which are different plastics from PET.

Do I need to worry about phthalates in PET?

No

"Phthalates" are a broad family of chemicals which includes three subsets.
Each phthalate subset has distinctly different properties.
PET or polyethylene terephthalate belongs to one of these three phthalate subsets
The subset containing PET is not the one most commonly associated with discussions on phthalates and human safety.

Orthophthalates are the phthalate subset most commonly referenced and discussed in popular literature and on internet sites. Orthophthalates have been the subject of some negative press. Orthophthalates are often used to make various plastics more flexible. These orthophthalates are usually referred to as a plasticizer.

High quality PET does not contain plasticizers or orthophthalates.
Plasticizers are never substituted for terephthalates used in the manufacturer of high quality PET containers, nor are the two ever mixed.

High quality PET packaging is selected by companies for a wide variety of product applications because it is safe, strong, shatter-proof, and recyclable.

Is there a risk from antimony used to make PET?

Antimony is often used as a catalyst in the production of PET plastic.
Antimony catalysts speed chemical reactions and are generally used to ensure that a process happens fast enough to make it commercially practical.

Antimony is used in PET manufacture as the antimony oxide.
Antimony oxide in PET manufacture has been used and researched for decades.
Metallic antimony is not used.

Antimony oxide was chosen as it is very effectiveness as a catalyst and has few, if any, adverse effects.

Toxicologists have performed studies on antimony oxide in PET.
A 1997 study showed that antimony oxide has very low toxicity.
Antimony oxide is relatively inert and does not generally participate in biological life.
Long term studies indicate that very little antimony oxide is released from PET.
A report by the International Life Sciences Institute showed "less than five parts per billion" being released into liquid contents. This is compliant with the Environmental Protection Agency's National Primary Drinking Water Standard.

The Swiss Federal Office of Public Health investigated the amount of antimony migration, comparing waters bottled in PET and glass. The antimony concentrations of the water in PET bottles is generally higher than those found in glass packaged products. Even though antimony levels were higher in PET packaged fluids than glass contained fluids the level was well below the allowed maximum concentration.The Swiss Federal Office of Public Health concluded that small amounts of antimony migrate from both the PET and the glass into bottled water, but that the health risk of the resulting antimony

concentrations resulting from PET packaging is negligible (approx 1% of the "tolerable daily intake" as determined by the World Health Organisation).

The WHO has published a risk assessment for antimony in drinking water which concludes that "Antimony compounds have various therapeutic uses…… Daily oral uptake of antimony appears to be significantly higher than exposure by inhalation, although total exposure from environmental sources, food and drinking-water is very low compared with occupational exposure." Furthermore the WHO states "… the most common source of antimony in drinking-water appears to be dissolution from metal plumbing and fittings." Based on this is would be reasonable to conclude that metallic house plumbing fittings contribute more to our antimony uptake than PET bottles generally do.
The WHO report also states "Although there is some evidence for the carcinogenicity of certain antimony compounds by inhalation, there are no data to indicate carcinogenicity by the oral route."

Exposing PET to boiling fluids or microwaving fluids in PET can increase the levels of antimony present in the fluid significantly, possibly above USEPA maximum contamination levels. The drinking water limit in the USA for antimony is 6 parts per billion. Antimony oxide is of low toxicity when taken orally but its presence is still of concern at higher levels.

Multiplied together, antimony oxide's very low toxicity combined with very low occurrence means very, very low risk when the PET plastic is used responsibly and not subjected to temperature extremes or microwaves.

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