

ClearShield™

*UV Absorber
for PET*

*Energy drink
Flavored and tonic water*



Protecting your products from harmful UV light

Milliken™



ClearShield™

*UV Absorber
for PET*

The Milliken story

With the introduction of ClearShield™ UV Absorber, Milliken brings real value to PET packaging of energy drinks, flavored and tonic water. This technology effectively protects UV-sensitive packed contents from degradation while maintaining the clarity and transparency of PET.

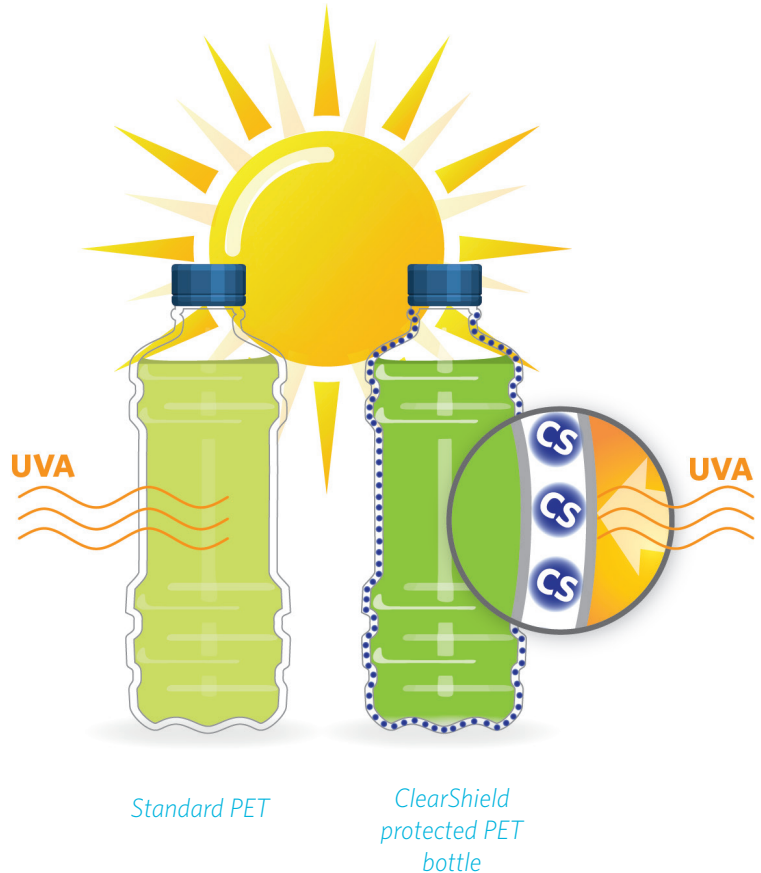


“Our promise is to deliver packaging applications with superior clarity that results in beautiful, versatile, sustainable packaging – and we think that’s a story worth sharing.”

UV protection in PET bottles

ClearShield offers an efficient way to protect against UV exposure by incorporating the UV absorber into the PET package itself. Our UV absorber filters 95% of UV light at up to 390 nanometers and is effective at very low loadings, enabling the use of more highly UV-sensitive natural essences, fragrances and colorants in the packaged products.

“Protecting your products from harmful UV light”



Protecting UV-sensitive colors

To ensure product consistency, and hence brand integrity, the contents of PET packaged goods must be protected from exposure both to sunlight and to indoor lighting during storage, distribution, retail display and post-purchase storage. Exposure to UV light can degrade ingredients, and negatively impact the appearance and color of the content. This is where Milliken is making a difference with ClearShield UV Absorber, protecting UV-sensitive colors from degradation while maintaining the material's clarity and transparency.

“We protect PET packaged goods from harmful UV light degradation.”



**without
UV Protection**
The color fades



**with
UV Protection**
The color stays



Bottles exposed to 45 accelerated UV hours

Your brand integrity is important

Packaging is a key differentiator for consumer goods and can make your products stand out on store shelves. But the value of appealing packaging vanishes quickly if the package fails to properly protect the contents. Product consistency – in appearance, fragrance, color, flavor and nutrient value – is vital to brand integrity. To ensure such quality consistency, the contents of PET packaged goods must be protected from exposure both to sunlight and indoor lighting. Consumers also like to see what they're buying. So having the ability to deliver excellent UV protection in a clear, transparent package offers additional marketing and branding opportunities.



“Don’t let UV light damage your packaged goods or your brand’s reputation. Protect your products with confidence by using clear PET packaging that provides an effective shield from UV rays.”

Protecting flavored water's taste

Flavored waters are growing in popularity. Many such products are made using natural or organic aromas, and - while the research is continuing - it is widely believed that such delicate ingredients react negatively to exposure to ultraviolet light. Brand owners are launching water with nuanced fruit- and herb-infused flavors such as apple, pear, lime, mint or ginger, for example. For the sake of the brand it is vital, therefore, to maintain the integrity of that flavor. Milliken's ClearShield UV Absorber offers excellent UV protection to the contents in clear or light-colored PET bottles. This provides brand owners with a lightweight, recyclable packaging solution.



“Maintaining the integrity of the flavor”

A tonic for your drink packaging

Quinine is bitter, and a key ingredient that gives tonic water its distinctive (if acquired) taste. But if tonic water is left unprotected from ultraviolet light, quinine can degrade and its desired flavor can be damaged or lost. Milliken's ClearShield UV Absorber offers excellent UV protection to packaged contents in clear PET bottles, protecting the product and its ingredients from undesired degradation. The result is a viable, lightweight packaging solution that extends the product's shelf life and quality.

“Protecting quinine from degradation”



Recycling clear, uncolored PET

By enabling greater use of more natural and uncolored PET, ClearShield helps to reduce or eliminate the need to use dark or colored containers to protect the contents. Such opaque and colored PET materials tend to make the recycle stream dark, which can make recycling more difficult and lessen the value of the reclaimed product. All this only further strengthens the argument for using clear, uncolored PET, and ClearShield UV Absorber allows this to happen, with no compromise in product quality.

*Colored PET
recycle stream*



*Uncolored PET
recycle stream*

“Plastics Recyclers Europe trade group warns These ‘colorful’ future trends will weaken the image of PET as a recycled product”

Protecting UV-sensitive vitamins

Exposure to UV light can degrade ingredients, and negatively impact the appearance, color and taste of the content. Most vitamins are sensitive to light, heat, and oxygen in the presence of light (photo-oxidation effect). Vitamin degradation can lead to off-flavor and color shift in the beverage formulation. This is where Milliken is making a difference with ClearShield UV Absorber, protecting UV-sensitive vitamins from degradation while maintaining the material's clarity and transparency.



“Protecting the packaging, preventing the vitamins from UV degradation.”

Extending shelf life

It is possible to protect UV-sensitive food contents from deterioration by choosing bottles made from PET with ClearShield UV Absorber. These UV protected bottles help to extend product shelf life and eliminate the need for protecting the content.

The table shows that Vitamin A is 30 times better protected in the bottle with ClearShield, compared to Standard PET.

Ingredient Shelf Life* improvement compared to Standard PET

| INGREDIENTS | PET BOTTLE WITH CLEARSHIELD 390B |
|------------------------------|----------------------------------|
| Vitamin A | 30X |
| Vitamin B ₆ | >70X |
| Vitamin B ₁₂ | 2X |
| Riboflavin (B ₂) | 7X |
| Folic Acid | 3.5X |
| Blue #1 (E133) | 7X |
| Red #40 (E129) | >>3X |
| Yellow #5 (E102) | >>5X |
| Citral | >>10X |

(*) Ingredient Shelf Life defined as 80% of initial concentration

Interested in UV protection in PET?

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