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Chemical Abstract for RETEC 2026

TITLE: **The Influence of Carbon Black on Dye Photodegradation in Polymer Coloration Systems**

ABSTRACT:

Dyes are commonly used in plastic coloration to achieve bright, transparent, and high-strength colors; however, many organic dyes are susceptible to ultraviolet (UV) degradation, resulting in fading and reduced long-term color performance.

Carbon black is widely recognized as an effective UV stabilizing pigment due to its ability to absorb and dissipate ultraviolet radiation. This study examines the impact of carbon black on the photostability of dye-colored thermoplastics and its ability to mitigate dye degradation during UV exposure.

Polymer formulations containing selected dyes and varying concentrations of carbon black were subjected to accelerated weathering and colorimetric evaluation. Results demonstrated that carbon black significantly reduced the rate of dye fading by limiting UV penetration into the polymer matrix and reducing photo-oxidative degradation.

The degree of protection was influenced by carbon black loading, dispersion quality, dye chemistry, and polymer type. The findings indicate that carbon black can provide a synergistic benefit in colored plastic systems by improving both polymer and dye durability.

These results offer valuable guidance for formulators seeking to enhance weatherability and color retention in applications requiring long-term outdoor performance.

Highest Regards,

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