

Enabling durable plastics and coatings for outdoor and long-life applications. A history of Light Stabilizers in polymer stabilization

When plastics began to be used outdoors in the mid-twentieth century, sunlight proved to be among their most damaging adversaries. Ultraviolet radiation initiates photodegradation breaking polymer chains, fading colour, and progressively destroying mechanical properties until the material cracks, chinks, or fails entirely. The earliest responses were blunt instruments: carbon black and inorganic pigments absorbed or scattered UV radiation effectively but confined manufacturers to a narrow range of colours and opaque designs. They worked, but they imposed severe constraints on where and how plastics could be used.

The decisive shift came in the 1960s and 1970s with the development of organic UV absorbers benzophenones and benzotriazoles among the first which intercepted UV radiation and dissipated it as heat before photodegradation could initiate. For the first time, transparent and light-coloured plastics could withstand sustained outdoor exposure, opening applications in construction glazing, automotive components, agricultural film, and consumer goods that carbon black could never have served. A further advance followed with the introduction of hindered amine **Light Stabilizers**, or HALS, which operate by a different mechanism entirely: rather than absorbing UV radiation, they interrupt the radical chain reactions that UV exposure triggers, and do so catalytically, regenerating themselves through the stabilization cycle. The combination of a UV absorber and a HALS one preventing initiation, the other suppressing propagation became the industry standard for demanding outdoor applications, delivering weathering performance neither could achieve alone.

Today, **Light Stabilizers** are not optional additives for outdoor and long-life applications they are a prerequisite. Without them, most commercial polymers and coatings exposed to sunlight would degrade within months. Every agricultural film protecting a growing season, every automotive fascia retaining its appearance after years of UV exposure, every construction profile, roofing membrane, and architectural coating performing reliably over decades exists because light stabilizer chemistry keeps it photochemically stable through service life and, increasingly, through the demands of reprocessing and reuse.