

Abstract Submitted
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UV Induced Degradation of Polycarbonate-Based Lens Materials and Implications for the Health Care Field J. RUSSELL HARKAY, JERRY HENRY, Keene State College — Experimental undergraduate research at Keene State College has utilized facilities in physics and chemistry and at Polyonics, a local firm to study the effects of mono- and polychromatic UV radiation from various sources, including a Deuterium lamp, a solarization unit, a monochromator, and natural sunlight to study the photodegradation of polycarbonate-based lens materials used to produce eyewear using spectrophotometry and FTIR analysis. Ophthalmologic literature indicates a correlation between exposure to the UVB band of sunlight and the onset of cataract formation and macular degeneration. It is well known that polycarbonate plastic “yellows” when exposed to intense sunlight and, particularly, UV light either via photo-Fries rearrangement or by a photo oxidative process, forming polyconjugated systems and is a concern primarily for cosmetic reasons. Our data indicates that the “yellowing” is an indication of a more sinister problem in the case of eyeglasses in that spectrophotometric comparison shows it is accompanied by an increase in transmissivity in the UVB band where the wearer expects and needs protection. FTIR results indicate a degradation of molecular stabilizers and the appearance of free radicals that indicate a breakdown of the resin’s chemical structure.

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