Thermo and Photo-Oxidation Degradation of Poly (4-Vinylbiphenyl) in Solid Films

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Abstract

The photo and thermal stability of thin films of poly (4-vinylbiphenyl) were studied by irradiation with UV light, in presence of air at room temperature and solid films were heated in vacuum oven, at different temperatures. Irradiated and thermally heated samples were investigated with absorption, fluorescence and FT-IR spectroscopic methods. The influence of phthalate and terephthalate plasticizers on photo-oxidative and thermo-oxidative degradation processes was also investigated. It has been found that the stability of the polymer decreases with the increase of the irradiation and heated times, and increases by the increase of the amount of added plasticizers. Irradiated and thermally heated pure and blended polymer solid films resulted in the appearance of new fluorescence bands at longer wavelength, as well as, quenching and change in the shape of the fluorescence spectra. The FT-IR spectra of irradiated and heated films of pure and blended polymer with phthalate and terephthalate plasticizers showed a decrease in some absorption bands and increase in the other bands, this is also another factor for the occurrence of photo and thermal degradation of the irradiated and heated polymer. The UV-irradiation effects on stability of poly (4-vinylbiphenyl), in dichloroethane, dichloromethane, tetrahydrofuran, and N, N-dimethyl formamide solutions were studied in the presence of dissolved air by fluorescence spectroscopy. Fluorescence quenching and a change in the shape of the fluorescence spectra were noticed, which indicate the occurrence of photodegradation of polymer chains.

Keywords: Thermo, Photo-Oxidation