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FTIR Analysis on Aging Characteristics of ABS/PC Blend under UV-irradiation in Air

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ABSTRACT: Fourier Transform Infrared Spectroscopy (FTIR) is adopted to study the aging characteristics of poly(acrylonitrile–butadiene–styrene)/polycarbonate (ABS/PC) blend under UV-irradiation in air by analyzing the variation of the three main absorbance at about 967cm^{-1} , 1720cm^{-1} and 3420cm^{-1} associated with carbon-hydrogen bonds belonging to 1,4 butadiene, carbonyl and hydroxyl groups, respectively. Results indicate that, under UV-irradiation in air, the photo-oxidation of the blend is not a simple combination of the photo-oxidation of corresponding ABS and PC themselves and takes place predominantly at the ABS component. Due to the interaction between the two components and the Fries rearrangement taken place in the PC component during the UV-irradiation in air, the ABS/PC blends behave higher photo-stability than ABS has.

Key Words: ABS/PC blend; UV-irradiation; Structure change; FTIR analysis

INTRODUCTION

Poly(acrylonitrile–butadiene–styrene)/polycarbonate blends (ABS/PC blends) are widely used in demanding applications such as automotive parts, home appliances, consumer electronics and 3D printing. ABS is sensitive to light since the presence of the double bonds in butadiene unit, resulting in an obvious deterioration in structure and performance^[1-3]. Though ester groups in the backbone of PC is susceptible to moisture environment, particularly under an acidic condition, PC has a relative stability to light^[4]. For ABS/PC blends, to reveal the problem whether the coexistence of the two polymer components would result in different aging tendency from either single polymer has a great significance for the application of this polymer blend. Fourier transform infrared spectroscopy (FTIR) is a fast and accurate analytic tool of following the structural change occurring throughout the polymer aging since it can detect the change of the absorption of typical groups and then to study the kinetic process involved in natural and accelerated weathering^[5,6,7]. However, most of the studies focused on the single-component polymer system and minimal FTIR data concerned with the multi-components polymer system. In this study, the FTIR technique will be applied to detect the structure change of the two-components polymer system, i.e., ABS/PC blend which will be aged by photo-oxidation, and then to reveal the influence of PC on the ABS during the photo-oxidation aging.

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