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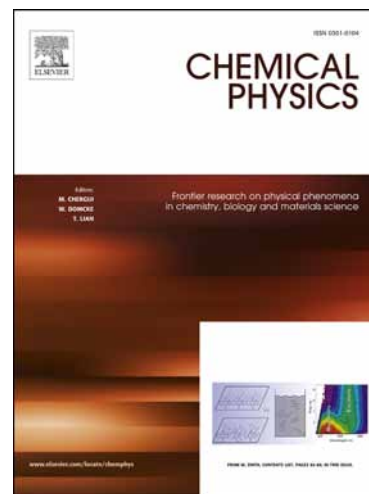
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Kinetic study on UV-absorber photodegradation under different conditions

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Abstract

The photodegradation kinetics of two benzophenone derivative UV-absorbers (UVAs)- BP-4 (benzophenone-4) and 4-HBP (4-hydroxybenzophenone), as additives in polyvinyl acetate (PVAc) films, were studied. Solution-processed PVAc films were irradiated in different environments in order to study oxygen and atmospheric humidity influence on UVA photodegradation. Photodegradation was traced by absorption intensity loss via UV-VIS spectroscopy. Both UVAs exhibited excellent photostability in an inert atmosphere. Rate constants showed that BP-4 has better permanence in absence of oxygen. Both film types experienced rapid absorption loss, when irradiated in an oxygen containing atmosphere. UVA degradation was treated as a two-stage process. The photodegradation kinetics in the first stage agreed with the adopted complex rate law, but the second stage was best described by pseudo-first order kinetics. BP-4 exhibited better stability. Oxygen was established as the main accelerating factor for photodegradation of benzophenone derivatives UV-absorbers in thin PVAc films.

Keywords: 5-benzoyl-2-hydroxy-4-methoxybenzenesulfonic acid; 4-hydroxybenzophenone; Polyvinyl acetate (PVAc) thin films; Kinetic study; Photodegradation; Accelerated weathering; UV-VIS spectroscopy.

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