

Ageing and characterisation of PVC-based compounds utilised for exterior applications in the building construction field

2: Artificial accelerated ageing with xenon light

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Abstract

This set of articles describes the behaviour of formulated polyvinylchlorides in various conditions of photoageing, including exposition in artificial and in natural conditions. In this article, the modification of the infrared and UV-visible spectra of PVC films irradiated with a xenon light are reported © 2001 Elsevier Science Ltd. All rights reserved.

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1. Introduction

The low cost and the good performance of poly(vinyl chloride) products have increased the utilisation of this polymer in buildings, mainly in exterior applications, such as window profiles, cladding structures and siding. However, the ultimate user acceptance of the PVC products for outdoor building applications will depend on their ability to resist deterioration of their mechanical and aesthetic properties over long periods of exposure. To ensure the weatherability of these materials, the PVC resin needs to be compounded and processed properly, using suitable additives, leading to a complex material whose behaviour and properties are quite different from the PVC resin by itself.

Although the basic mechanism of photo-degradation

of PVC is now fairly well described in the literature [1], research concerning this subject has been carried out, in most cases, on carefully prepared solvent cast PVC films exposed to artificial light sources. However, there is no evidence that the results from these studies can be expanded, in their totality, so as to include extruded PVC compositions that are commonly used in outdoor building applications, especially in the cases that the compositions include recently developed stabilisers. Furthermore, the outdoor degradation of such products is complex and is not yet completely understood for most of the technical formulations, so the study of the photo-degradation of such products still remains a matter of interest.

Thus, in the present work we used four different types of stabilised PVC designed for outdoor applications. First, we performed thermal ageing in air in an oven with forced ventilation using different temperatures. Subsequently, we performed an artificial accelerated weathering test, using specimens of the same sample films that were exposed to thermal oxidation.

Two spectrometric techniques (infrared and visible)

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