



Test Method

The influence of weathering conditions on the properties of poly(vinyl chloride) for outdoor applications. An analytical study using surface analysis techniques

L.E. Pimentel Real^a, A.M. Ferraria^b, A.M. Botelho do Rego^{b,*}

^a*Laboratório Nacional de Engenharia Civil, Departamento de Materiais, Núcleo de Materiais Plásticos e Compósitos, Av. Do Brasil, 1700-066 Lisboa, Portugal*

^b*Centro de Química-Física Molecular, IST, UTL, Complexo Interdisciplinar I, Av. Rovisco Pais, 1049-001 Lisboa, Portugal*

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Abstract

In the present work, four different PVC formulations, designed for outdoor applications, were submitted to artificial accelerated ageing under xenon light, without and with spray of water, and to natural exposure. The influence of the combined action of water and radiation was evaluated by means of surface analysis using XPS, SEM and colourimetry, permitting comparison of the results obtained under different exposure conditions. Results show that a long preliminary period of irradiation (~2000 h) before the exposure to water increases the resistance of PVC surfaces to weather conditions. The role of that initial irradiation period is to create an erodable layer made of shrunk “PVC” that had lost most of its chlorine atoms and, thence, creating a network of cracks. That layer loses easily adhesion to deeper layers due to erosive action of water spray. The more perfect uncovered surface is better at resisting the effect of radiation.

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1. Introduction

The low cost and good performance of poly(vinyl chloride) products make this polymer very suitable for components of buildings, mainly in outdoor applications, such as window profiles, cladding and siding. The outdoor degradation of such products is complex and not completely understood

for most of the technical formulations. Therefore, the study of the photo-degradation of such products under weather conditions still remains a matter of interest [1].

In previous works [2,3], it was shown by means of techniques of colourimetry and infrared spectroscopy, that there are high increases of conjugated double bonds and carbonyl formation during accelerated artificial ageing with continuous xenon irradiation. It was found that cyclic spraying of water during artificial ageing changes the stoichiometry of the degradation reactions in TiO₂ pigmented PVC formulations, inducing only a low increase

*Corresponding author. Tel.: +351 218419255/7; fax: +351 218464455.

E-mail addresses: luis.pimentel@lnec.pt (L.E. Pimentel Real), amrego@ist-utl.pt (A.M. Botelho do Rego).