

Abstract Submitted
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Physical Aging And Non-Exponentiality In A Crosslinked Coating Subjected To Degradative Weathering. B.M.D. FERNANDO, X. SHI, S.G. CROLL, North Dakota State University — Polymeric coatings provide protection and aesthetics for many materials and equipment, and, in service, they must fulfill their roles for extended periods in a predictable manner. Molecular relaxation in a polymeric coating that is degrading during weathering is affected both by the ambient conditions and concurrent chemical degradation by ultraviolet radiation or other aggressive species. Purely physical aging was contrasted with the effect of concurrent chemical degradation by measuring non-exponentiality which showed some differences according to whether it was determined from ‘enthalpy recovery’ or stress relaxation measurements. Less directly determined parameters, such as ‘non-linearity’ and the size of ‘co-operatively relaxing regions’, also changed. Changes in fictive temperature at each level of degradation demonstrated that physical aging was in competition with the effect of chemical degradation in the crosslinked network. Relaxation times measured in this coating extended longer than cycle periods typical of accelerated weathering tests, suggesting that frequency effects might be important when resolving differences in outcome between natural and laboratory, accelerated weathering cycles.

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