Accepted Manuscript

The effect of ultraviolet radiation on ultrasonic properties of polyurea

Ian Whitten, George Youssef

PII: S0141-3910(15)30131-2

DOI: 10.1016/j.polymdegradstab.2015.11.009

Reference: PDST 7788

To appear in: *Polymer Degradation and Stability*

Received Date: 14 September 2015

Revised Date: 7 November 2015

Accepted Date: 10 November 2015

Please cite this article as: Whitten I, Youssef G, The effect of ultraviolet radiation on ultrasonic properties of polyurea, *Polymer Degradation and Stability* (2015), doi: 10.1016/j.polymdegradstab.2015.11.009.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

ACCEPTED MANUSCRIPT

The Effect of Ultraviolet Radiation on Ultrasonic Properties of Polyurea

Ian Whitten[1] and George Youssef [1,2,3]

[1]California State University Northridge, Mechanical Engineering Department

[2]San Diego State University, Mechanical Engineering Department

Abstract

Polyurea is used in military and civilian applications where exposure to the sun is commonly of long duration, which can deteriorate its mechanical performance to suboptimal levels. This study reports on the ultrasonic properties of polyurea as a function of ultraviolet radiation exposure duration and temperature. Six sets of samples were continuously exposed to ultraviolet radiation for different durations up to 15 weeks. Control samples were also tested that did not receive UV exposure. The ultrasonic properties were measured using high-frequency contact ultrasound transducers in pitch-catch configuration. All exposed samples exhibited significant color changes from transparent yellow to opaque light brown. Changes of color were observed as early as 3 weeks of UV exposure. Nonetheless, crazing was only observed in samples of 6, 9, 12, and 15 weeks of continuous exposure. The size of the surface cracks increased as the duration of exposure continued. The effect of extended UV radiation on the acoustic properties was noted to be minimal, where elastic and shear moduli decreased monotonically after an initial increase during the first 3 weeks of exposure. The attenuation properties were measured at 23°C and 40°C. The p-wave attenuation did not show any notable change, while the s-wave attenuation monotonically decreased as the temperature and UV exposure duration increased.

Keywords: Polyurea; Artificial weathering; Ultraviolet radiation; Ultrasonic properties.

[3]Corresponding author: Tel.: +1- 619-594-6649. Fax: +1-619-594-3599. E-mail: gyoussef@mail.sdsu.edu

Download English Version:

https://daneshyari.com/en/article/5201237

Download Persian Version:

https://daneshyari.com/article/5201237

Daneshyari.com