

UV DOSIMETRY WITH POLYMERIC MATERIALS

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In the last years, UV technology has been developed into one of the most dynamic industrial curing processes of varnishes and inks. UV curing process demonstrates to be less expensive in large scale, due to the low cost installations, technical support during operational time and personnel itself.

In order to develop an UV dosimetry assistance, thin polymeric materials are proposed. Some commercially available nylon-base radiochromic films, widely used in radiation processing⁽¹⁾, are also sensitive to UV radiation. Due to this fact the aim of this work is to verify the possibility to apply them as UV dosimeters. These dye-coated films are UV sensitive due to a particular dye complex (mainly the hexa-hydroxiethyl-parasosaniline cyanide) distributed inside its chemical formulation, which upon irradiation changes in color from light blue to a very dark blue tone.

The present study investigates the FWT-60 films from Far West Technology Inc., that were tested in a curing machine being used in researches⁽²⁾, from Lab Cure - Germatec. This UV machine has a mercury middle pressure lamp that can operate with a linear power of 200 WPI (78 W/cm) or 300 WPI (118 W/cm). Different irradiation speeds can be applied. Films calibration curve were made by means of the integrated imparted energy per square centimeter, measured by means of a radiometer, in mJ/cm². Doses were measured from 50mJ/cm² up to 10³ mJ/cm² depending on the mat speed, which can be fixed between 11ft/min and 100ft/min.

This research is a preliminary investigation of a single batch of films. Before irradiations were performed its optical absorption was measured. The data are plotted for the five dose levels in terms of the net absorbance per unit thickness, $k = \Delta A/\text{mm}$, measured at the radiation-induced absorption band peak ($\lambda=510\text{nm}$). All the measurements were

performed at room temperature of 25°C and relative humidity⁽³⁾ of 75%.

Figures 1 and 2 show the FWT radiochromic film response when irradiated with the mercury lamp at 200 WPI and 300 WPI respectively.

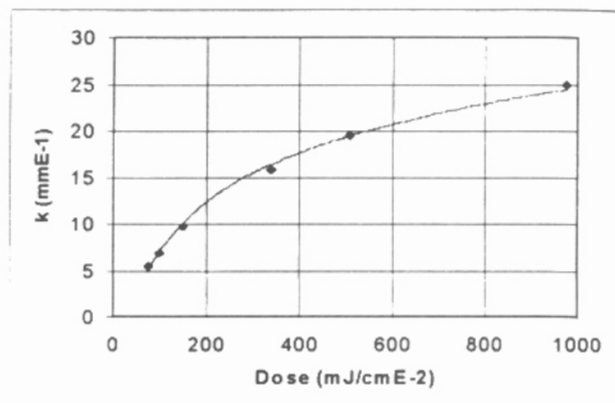


Figure 1: The mercury lamp 200 WPI response curves of FWT-60 film plotted as k vs. Dose.

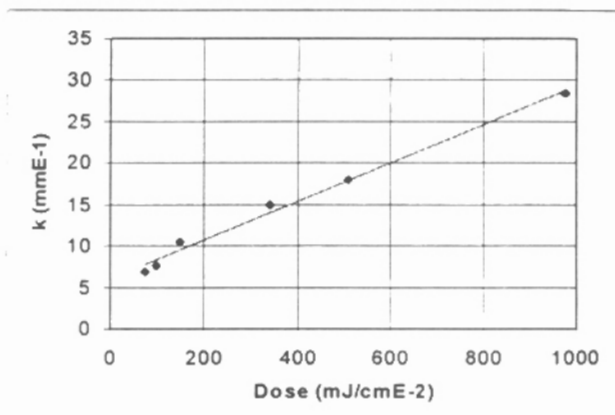


Figure 2: The mercury lamp 300 WPI response curves of FWT-60 film plotted as k vs. Dose.

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