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FUJIFILM RADIATION FILM

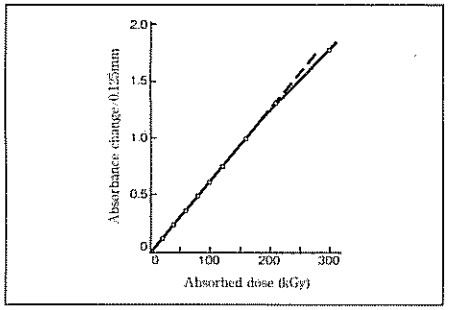
FTR-125

FUJIFILM RADIATION FILM, FTR-125, cellulose triacetate (CTA) dosimeter, is an instrument for dosimetry in the dose region used for radiation processing. A colorless, transparent film made of sensitizer-added CTA is used for the measurement of the region. The measurement principle is based on the increase of the absorbance of CTA (measured at 280nm) accompanying irradiation. The absorbance is determined using a spectrophotometer or dedicated measuring instrument, from which the absorbed dose is calculated.

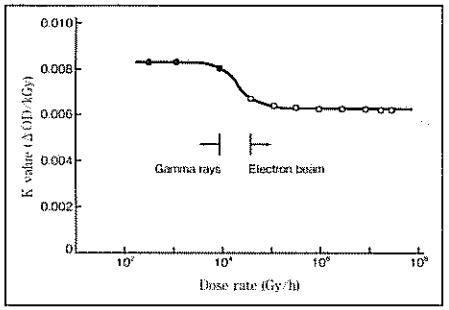
Features of the CTA dosimeter include :
(1) Coverage of the absorbed dose range as wide as 10-300 kGy,
(2) Absorbance change proportional to the absorbed dose at 10-160 kGy,
(3) Small effect (under normal conditions) of temperature and humidity during irradiation or film storage on film sensitivity, and
(4) Ideal for electron beam irradiation, but also usable for irradiation with gamma rays or ion beams.

Basic characteristics of the CTA dosimeter

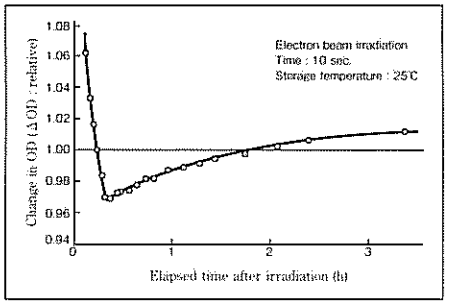
(1) Dependence of absorbance change on the absorbed dose (measured at 280nm)



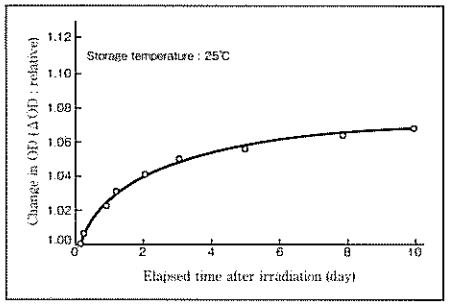
(2) Dose rate dependence



(3) Time dependence of absorbance change after irradiation



(4)



(5) Please refer to the documents listed below for other characteristics, as well as details of operation.

1) Irradiation Development Association, Research Committee on High Dose Measurements (ed.) : Dose measurement of industrial electronic beams, Chijin Shokan (1990) (in Japanese)
2) Tanaka, Mitomo, Sunaga, Matsuda, and Tamura : JAERI-M 82-033 : CTA Dosimeter manual, Japan Atomic Energy Research Institute (1982) (in Japanese)
3) R. Tanaka, et al. : Int. J. Appl. Radiat. Isot., Vol.35, p.875-881, "Effects of Temperature, Relative Humidity, and Dose Rate on the Sensitivity of Cellulose Triacetate Dosimeters to Electron and Gamma Rays" (1984)
4) K. Matsuda and S. Nagai : Appl. Radiat. Isot., Vol.42, p.1215-1221, "Studies on the Radiation-induced Coloration Mechanism of the Cellulose Triacetate Film Dosimeter" (1991)

Principle of dosimetry

The absorbed dose (kGy) by irradiation can be determined by measuring the increase in the absorbance (measured at 280nm) of the film due to irradiation using a spectrophotometer or dedicated measuring instrument (Nisshin High Voltage FDR-01).

$$D = [(OD_a - OD_0) / K] \cdot (0.125 / t) \cdot f ,$$

where OD_0 and OD_a are the absorbance before and after irradiation, respectively. A standard value for OD_0 is approximately 0.10. K is a constant associated with the sensitivity of the CTA dosimeter. Calibration for each batch is generally required; nominal values are :

For electron irradiation : 0.0063
For gamma ray irradiation : 0.0081

For ion beam irradiation : Dependent on the nature and energy of the ion, due to the variability of LET. "T" (mm) is the film thickness. A correction factor, f is needed to compensate for temporal changes due to elapsed time after irradiation. The f value for 1-3 hours after electron beam irradiation is 1.0. For other conditions, compensation is required based on the Fig. (4).

(1) Measurement results given by the instrument indicate the absorbed dose of the CTA, which should be corrected when it is necessary to calculate the absorbed doses for individual specimens.

Precautions

(1) Prolonged product storage may lead to an increase in absorbance, particularly of a few layers on the outer part of the roll. Check the absorbance before use. Do not use any portion with increased absorbance.
(2) It is recommended to store the product in a dark, dry place at ambient temperature.
(3) If you have any questions on the product, please contact to local reseller.

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