

**FAR WEST TECHNOLOGY**

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Product Application Literature  
PAL-5 August 2004

**ABSTRACT**

*This PAL discusses the use, handling, and calibration of the FWT series of Alanine Pellet Dosimeters.*

**I. GENERAL****A. Dosimeters**

This sheet contains information on the FWT-50 series of dosimeters for both reference and routine dosimetry. This includes:

FWT-50-10                      2 Gy to 200 kGy

No known dose rate dependence up to  $5 \times 10^7$  Gy/s

**B. Manufacturing**

The FWT-50 series of dosimeters are manufactured by Gamma Service Produktbestrahlung GmbH for distribution by Far West Technology (FWT) in Goleta, California, USA.

**C. Chemical Composition**

The FWT-50 dosimeters are composed of the amino acid alanine and a binder material.

**D. Dosimeter lot numbering**

The lot numbers are provided to Far West Technology by Gamma Service.

**II. HANDLING THE DOSIMETERS****A. Physical handling**

Alanine dosimeters are small pellets that are compact and easy to handle. The dosimeters should be handled cautiously to prevent physical damage such as chipping. They are most easily handled with tweezers or by fingers with fingercots.

**B. Ambient light**

Protect the dosimeters from Strong daylight.

**C. Other precautions**

Protect dosimeters from Water (H<sub>2</sub>O).

**D. Packaging**

The dosimeters are packaged in plastic trays containing 96 wells with 3 dosimeters per well, 288 dosimeters per tray.

**E. Properties and Dimensions**

The dosimeters are approximately 4.8 mm in diameter and 3 mm height. The dosimeter mass and density is approximately 65 mg and 1.17 g/cm<sup>3</sup> respectively.

**F. Storage**

We recommend storing the dosimeters at room temperature and humidity (15-30°C and 35-55% RH.)

**III. USING THE DOSIMETERS****A. Temperature and Humidity**

The dosimeters are characterized by low influence of temperature, and humidity.

**B. Dosimeter Protection**

The dosimeters can be used as is, or be placed in phantoms designed to fit the specific application.

**IV. READING DOSIMETERS****A. Electron Spin Resonance**

Irradiating the amino acid alanine with ionizing radiation causes the production of radicals (unpaired electrons), of which the number of unpaired electrons is proportional to the dose absorbed over a wide dose range.

The non-destructive readout of the radiation induced measuring signal is performed by the procedure of electron spin resonance (ESR). With careful adjustment of the ESR-spectrometer and by using the appropriate dosimeters dose values within the range of 2 Gy to 200 kGy can be determined (overall uncertainty of 3.5%, at a confidence level of 95% has been achieved).

**V. CALIBRATION**

The dosimeters are manufactured in lots and each lot will need to be calibrated separately. Each reader, if more than one ESR unit is used, will also need to be calibrated. The general procedure for calibration is as follows.

1. Determine how many calibration absorbed dose values are needed.
2. Send all the dosimeters to an irradiation facility whose dose-rate is traceable to national or international standards.
3. Measure the alanine/marker ratio (response) for each dosimeter and each dose level on all ESR units to be used.
4. Plot the response curve versus dose. Examine the calibration for goodness of fit. Repeat the calibration procedure at intervals not

to exceed 12 months or after repair of the ESR unit if the manufacturer recommends it.

5. Calibrate all alternate and backup ESR units.
6. Keep your dosimeters.

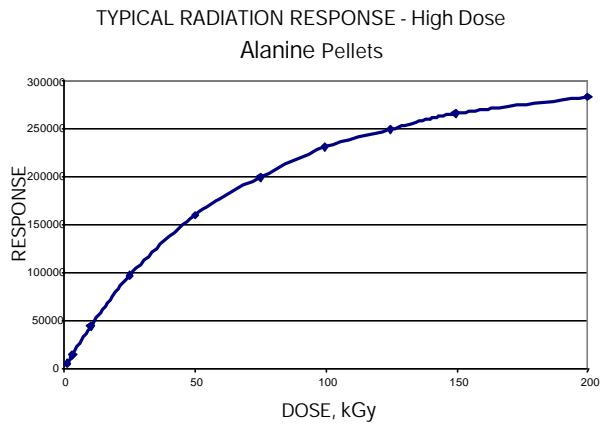


Figure 1 Typical High Dose Response Curve

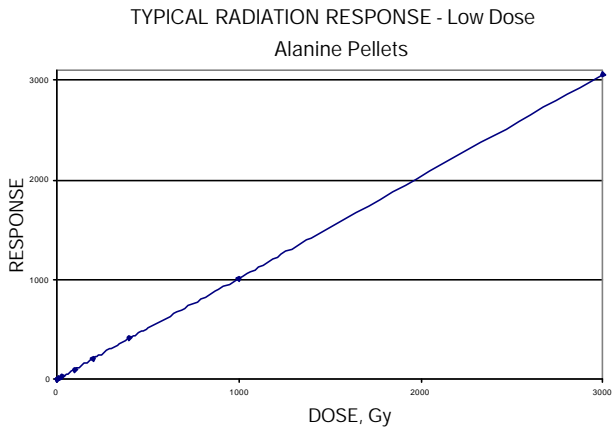


Figure 2 Typical Low Dose Response Curve