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ACTIVITY DETERMINATION OF SE-75 RADIOACTIVE SOLUTION BY ABSOLUTE METHOD

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1) **Introduction** - ^{75}Se is an important radionuclide due to its applications in medicine, industry and agriculture. Moreover, it has several gamma lines in the 66-400 keV energy interval, useful for calibrating HPGe spectrometers. The present work describes the procedure adopted by the Nuclear Metrology Laboratory (LMN) at IPEN, São Paulo, to measure the disintegration rate of ^{75}Se . The radioactive solution has been sent by the Bureau International des Poids et Mesures (BIPM), France, for an international comparison of this radionuclide in collaboration with the LNMRI, in Rio de Janeiro.

2) **Materials and Methods** - The measurements were carried out in a 4π (PPC) X- γ coincidence system consisting of a pressurized proportional counter, coupled to a 3" x 3" NaI(Tl) crystal. Two gamma ray energy intervals were selected: 150 to 450 keV and 340 to 450 keV. The radioactive sources were prepared by depositing aliquots of the master solution of Na_2SeO_3 on a $10 \mu\text{g}/\text{cm}^2$ thick COLLODION substrate, previously coated with a gold layer $10 \mu\text{g}/\text{cm}^2$ thick. The activity of the solution has been obtained by linear extrapolation of the observed disintegration rate to 100% efficiency of the 4π proportional counter, changing the electronic threshold above 2 keV.

3) **Results** - The value obtained for the specific activity of ^{75}Se was (1.2281 ± 0.0165) MBq/g. This result agrees reasonably with other laboratories as shown in a preliminary report published by the BIPM.

4) **Conclusions** - The method developed by the LMN at IPEN, can be considered satisfactory and be used to calibrate ^{75}Se with an accuracy in the order of 1.3%.

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STANDARD CALIBRATION OF BRACHYTHERAPY SOURCES IN TERMS OF AIR-KERMA REFERENCE K_r

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[**Introduction**] We are optimizing the service supplied by the ENEA (Ente Nazionale per le Energie Alternative) for the calibration of source strength of brachytherapy sources in terms of reference air kerma K_r [$1 \mu\text{Gy h}^{-1}$ at 1 meter]

[**Material and method**] Figure 1 reports the scheme for the calibration of dosimeters to be used for K_r determination. At moment in the Enea laboratory a primary standard (P.S.) a PTW-LS01 spherical ion chamber (s.i.c.) is used to calibrate field dosimeters (F.D.) for brachytherapy dosimetry in terms of K_r of brachytherapy sources. F.D. like (s.i.c.), cylindrical ion-chambers (c.i.c.) and well ion-chambers (w.i.c.) can be calibrated by following two different procedures. Figure 1 reports the instrument hierarchy involved in the dissemination of the K_r unity. A direct procedure of F.D. calibration with a P.S. implies that the fully-equipped primary laboratory, should store the appropriate radiation sources. At present, we think that this procedure can be carried out for low activity sources used by manual, after-remote loading treatments (wire, tube and seed sources). An indirect procedure requires a "mobile" secondary standard (S.S.) (s.i.c.) for the calibration of F.D. instruments. This procedure can be used for K_r determination of low and high activity sources used by after-remote systems which work by using sophisticated consoles to move the sources from a safe container into flexible or rigid guides. At the moment it is not possible to store these systems in Enea laboratories.

[**Results**] The accuracy of direct and indirect calibration procedures have been evaluated following intercalibration measurements carried out in seven hospital centers.

[**Conclusion**] The level of K_r uncertainty is about 2% (1σ) against the 5% (1σ) supplied by the manufacturers.

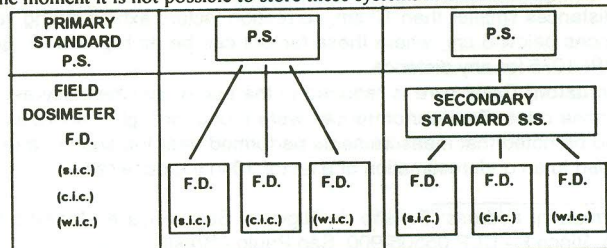


Figure 1- Scheme for calibration of dosimeters to be used for K_r determination.