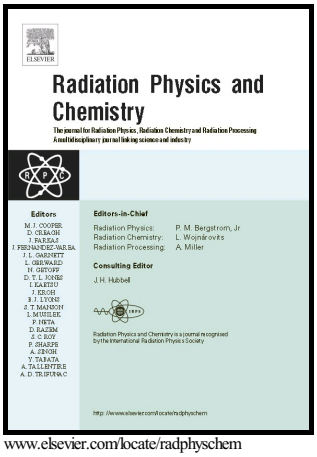
Neutron dose estimation in a Zero Power Nuclear Reactor

S. Triviño, J. Vedelago, F. Cantargi, W. Keil, R. Figueroa, F. Mattea, A. Chautemps, M. Santibañez, M. Valente



www.elsevier.com/locate/radphyschem

PII: S0969-806X(16)30190-6
DOI: http://dx.doi.org/10.1016/j.radphyschem.2016.06.011
Reference: RPC7175

To appear in: *Radiation Physics and Chemistry*

Received date: 17 May 2016
Revised date: 9 June 2016
Accepted date: 16 June 2016

Cite this article as: S. Triviño, J. Vedelago, F. Cantargi, W. Keil, R. Figueroa, F. Mattea, A. Chautemps, M. Santibañez and M. Valente, Neutron dose estimation in a Zero Power Nuclear Reactor, *Radiation Physics and Chemistry*, http://dx.doi.org/10.1016/j.radphyschem.2016.06.011

Neutron dose estimation in a Zero Power Nuclear Reactor

S. Triviño[a,b*], J. Vedelago[a,c], F. Cantargi[d], W. Keil[b,g], R. Figueroa[e], F. Mattea[a,f], A. Chautemps[b], M. Santibañez[e], M. Valente[a,c,e]

[a]Laboratorio de Investigación e Instrumentación en Física Aplicada a la Medicina e Imágenes por Rayos X (LIIFAMIR[x]), Universidad Nacional de Córdoba, Av. M. Allende s/n,Córdoba, Argentina.
[b]Reactor Nuclear RA-0, Comisión Nacional de Energía Atómica, Av. Vélez Sarsfield 1611, Córdoba, Argentina.
[c]Instituto de Física Enrique Gaviola (IFEG) - CONICET, Av. M. Allende s/n, Córdoba, Argentina.
[d]Centro Atómico Bariloche, Comisión Nacional de Energía Atómica, Av E. Bustillo km 9500, Bariloche, Argentina.
[e]Departamento de Ciencias Físicas, Universidad de La Frontera, Francisco Salazar 1145, Temuco, Chile.
[f]Facultad de Ciencias Químicas, Universidad Nacional de Córdoba, Haya de la Torre s/n, Córdoba, Argentina.
[g]Facultad de Ciencias Exactas, Físicas y Naturales, Universidad Nacional de Córdoba, Av. Vélez Sarsfield 1611, Córdoba, Argentina.

Email: trivino@famaf.unc.edu.ar
trivino.sebastian@gmail.com.

*Corresponding author: Sebastián Triviño. Reactor Nuclear RA-0, Comisión Nacional de Energía Atómica, Av. Vélez Sarsfield 1611, Córdoba, Argentina. Tel.: +54 351 433-4429.

Abstract

This work presents the characterization and contribution of neutron and gamma components to the absorbed dose in a zero power nuclear reactor. A dosimetric method based on Fricke gel was implemented to evaluate the separation between dose components in the mixed field. The validation of this proposed method was performed by means of direct measurements of neutron flux in different positions using Au and Mg-Ni activation foils. Monte Carlo simulations were conversely performed using the MCNP main code with a dedicated subroutine to incorporate the exact complete geometry of the nuclear reactor facility. Once nuclear fuel elements were defined, the simulations computed the different contributions to the absorbed dose in specific positions inside the core. Thermal/epithermal contributions of