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**DETERMINATION OF THE GERMANIUM DETECTOR EFFICIENCY FOR MEASUREMENTS OF THE RADIONUCLIDE ACTIVITY CONTAINED IN A RADIOACTIVE WASTE DRUM.**

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One of the features in the characterization of a drum containing radioactive wastes is to verify the activity of radionuclides contained in the drum. An HP Ge detector can be used for this measurement. However, it is necessary to perform an efficiency calibration for all geometries involved.

In the framework of a joint project between the Departamento de Ingeniería Química y Nuclear (Universidad Politécnica de Valencia, Spain) and the Fachbereich Angewandte Naturwissenschaften und Technik (Fachhochschule Aachen, Abteilung Jülich, Germany), different configurations for a drum containing radioactive sources have been implemented in the laboratory.

A cylindrical drum of 850 mm height, a diameter equal to 560 mm and 3 mm of steel thickness has been used in the experimental measurements. The drum contains a clay ceramic matrix whose chemical composition is 55% SiO<sub>2</sub>, 40% of Al<sub>2</sub>O<sub>3</sub> and 5% of TiO<sub>2</sub>. Several vertical PVC tubes having a diameter of 30 mm are inserted in the drum at different distances from the central axis. In the experiment, a pack of point sources with Ba-133, Co-60 and Cs-137 is introduced into each one of the tubes. A ring-shape distributed source is generated by rotating the drum around its axis during the measurement. The detector efficiency is determined experimentally for these configurations.

On the other hand, a Monte Carlo model, using the MCNP code, has been developed to simulate the drum, the clay matrix and the PVC tubes. The effect of the drum spinning has been reproduced simulating a ring source with different diameters. The model also includes detailed detector geometry.

Using this Monte Carlo model, the detector efficiency is calculated for each configuration implemented in the laboratory. Comparison of results from Monte Carlo simulation and experimental measurements should permit the validation of the MCNP model. Consequently it will be possible to obtain efficiency curves without experimental measurements. Therefore, these curves can be used to determine the activity contained in a radioactive waste drum from a simple counting measurement. The theoretical efficiency curves will also allow optimizing the experimental procedures to obtain the wanted detection limits under different conditions.