

NaI(Tl) radiation detection system for laboratorial activities

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In the Nuclear field, the Argonauta research reactor has been playing a major role to promote training of qualified human resources in neutron tomography and spectrometry as well as neutron activation analysis and radioisotopes production areas. As laboratorial activities are of great importance during graduation and post-graduation courses, recently, a new laboratory named LDRAN was implemented in the Argonauta's installations to offer laboratorial practical lessons covering neutron irradiated materials. Therefore, this practical approach will contribute towards the students' formation.

At this laboratory, the NaI(Tl) radiation detection system [1] is a part of the nuclear instrumentation to be used in a dual mode resulting in both displayed data and neutron spectra measurements. In the latter mode, which is not operational yet, a data acquisition electronic board connects the system to software providing energy peaks and their respective integrated areas. Controlled experiments involving the radiochemical and the radionuclidic purity determinations [2,3] of the activated materials such as yttrium 90 or indium 111 will be performed using the NaI(Tl) radiation detection system. Improvements were done in this system with respect to the vial support. As seen on Figure 1, a device was designed using the Solid Works software and manufactured on a Up Plus 2 Tiertime 3D printer with PLA (poly(lactic acid)) as charge.

The purpose of this device is to avoid direct contact between hands and the vial, which fulfills radiation protection requirements.

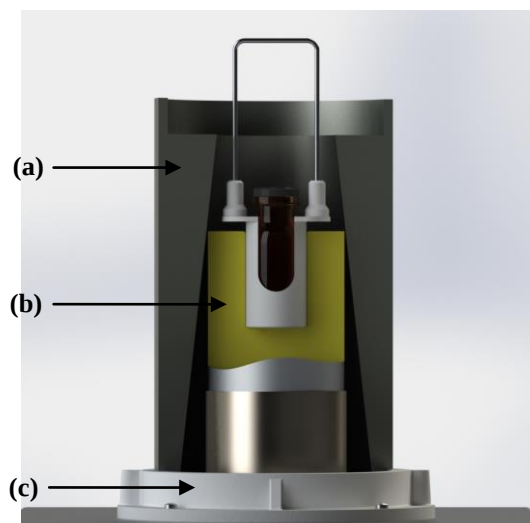


Figure 1. NaI(Tl) detection system probe (a) and the vial support (b). The screw at the bottom (c) was manufactured in the same conditions as the vial support.

From the exposed in this report, this NaI(Tl) radiation detection system is assumed to be suitable for safe, reliable and versatile laboratorial practical lessons concerning neutron activated materials.

References

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