

NIEVAS-1: BNCT in Argentina: New contributions in analytical chemistry

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In the Argentine BNCT project, the boron chemistry area participates in collaboration with other areas in basic and applied research, pre-clinical protocols and clinical applications. Most collaborations in the aforementioned tasks involve analytical chemistry procedures, where quantifying different borated compounds in tissue, cell and nano-vehicle samples from research protocols are needed. To accomplish these goals, in this area, over the years, different analytical methods were developed that can be applied to the various samples mentioned, both organic and inorganic. These methods undergo periodic updates aimed at improving the quality of measurements or adapting old methods to new equipment.

Inductively-coupled plasma optical emission spectroscopy (ICP-OES) is one of the most widely used methods for boron analysis. This method combines important features such as the possibility of high sample throughput, very low detection limits, and practical sample preparation prerequisites. This technique has been adopted by most of the international centers dedicated to the subject, and is only surpassed in analytical performance indices by plasma source mass spectrometry (ICP-MS). Sample introduction for these methods generally requires liquid phases, which after passing through a nebulizer are finally injected as aerosols. Samples that are not liquid in the first place, must undergo digestion or a comparable dissolving process.

This work describes the updates of the methodologies used for the determination of total boron in cell cultures of tumor and normal cell lines, biological tissues and whole blood from the current protocols that study the uptake of this element depending on different boron delivery compounds.