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QUANTITATIVE ANALYSIS OF LIGHT ELEMENTS USING COMPACT XRF SPECTROMETERS

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The use of analytical techniques to investigate specific ions in body fluids has increase in last year's presenting significant progress in clinical tests. This motivated us to check the performance of two compacts XRF spectrometers (X-123SDD, Amptek) consisting of Ag and Au X-ray mini-tubes associated with a Si Drift detector (25 mm^2 x 500 μm) with Be window (12.5 μm) for this clinical finality. Using the Energy Dispersive X-Ray Fluorescence technique (EDXRF) specific ions of clinical relevance, such as, Ca, Cl, Fe and K were investigated using standards (certified solutions). A simplified sample preparation procedure was proposed, i.e., the liquid samples were dripped in filter paper (Whatman, n° 41) and dried for a few seconds using infrared lamp and dry for few seconds using infrared lamp. The performance of these spectrometers were checked by evaluation of several parameter (linearity, reproducibility, accuracy, precision, sensitivity and detection limit) usually considered for validation procedures on analytical methods, in according to ISO 17025 and EURACHEM/CITAC norms. For simultaneous determination of these ions, the optimized excitation condition was established by 300s using 5μA and 30kV. The method was proved to give reliable results with limits of detection at levels of 0.23 to 0.58 mgL^{-1} for. Considering that the ranges of the body fluids, such as: blood, saliva, serum and urine, are in the order of hundreds of $mg\ L^{-1}$, this procedure is very promising for ions dosage requiring a small amount of sample (50μL, 10 times less comparatively to the conventional tests), simultaneous analysis, short time of analysis (minutes) and simple sample preparation. In addition, this procedure offers a non-destructive alternative for clinical usage. Finally, these compact spectrometers have potential use when the biological material is scarce, case of the pediatric practice in newborns and premature infants (blood collection is the main cause of transfusions) and *in vivo* tests, in small size animal model (mice and rats), in order to evaluate the safety of new drugs, vaccines and others medical supplies.

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