

APPLICATION OF THE X-RAY FLUORESCENCE ANALYSIS TO DETERMINE THE ELEMENTAL COMPOSITION OF BRAZILIAN OLYMPIC COINS

*Ana Catarina Koka de Souza Silva, Cibele Bugno Zamboni, Mateus Ramos de Almeida,
Dalton Giovanni Nogueira da Silva
Instituto de Pesquisas Energéticas e Nucleares

In this investigation, the elemental composition of Brazilian Olympic coins was investigated using Energy Dispersive X-ray Fluorescence (EDXRF) analytic technique. From the release of Olympic albums (2014, 2015, and 2016) the demand for these coins has increased and some can be worth up to 7000% more than their normal value. The analysis was performed using a compact X-ray spectrometer model X-123 SDD with Ag target. The characteristic X-ray fluorescent intensity of Ka lines were measured with a Si Drift detector (25 mm² x 500 μm) with Be window (12.5 μm). For the spectrometer calibration, certified standard solutions from Z = 14 to Z = 51 were evaluated. The results were compared with coins in current circulation. All the spectral analysis was performed using WinQxas software. The spectral analysis of Olympic coins shows Cr, Mn, Fe and Cu as majorities and peaks of various elements as traces. The 2014 and 2015 Olympic coins groups exhibited similar surface compositions for majorities and trace elements (V, Ni, Mo, Ag, In, Sn, Ce, Nd, Ir and Pb), while the 2016 group coins exhibited Nb presence as a trace element. Some differences were also identified when the comparison was made with current coins. These data provide curators with information for cataloging as well as being used to identify forgeries (heritage appreciation), important for collectors.