

Executive Summary

Recent Achievements in NAA, PAA, XRF, IBA and AMS Applications

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Methods that are non-destructive and non-invasive are crucial for cultural heritage research. A wide range of concepts and methods are available in nuclear physics that can be applied to the goal. They cover interactions between matter and ion, neutron, and other forms of radiation. These technologies have advanced so much in recent years that they now commonly provide multi-elemental or multi-species determination with excellent spatial resolution and very low detection limits. As a result, they are increasingly used in the description of artifacts from cultural heritage that aid in our understanding of the way of life and accomplishments of past civilizations. In this book, examples of recent successes using the different strategies, or their combinations are offered along with a brief description of the facilities that are available.

Samples between several mg and several hundred mg in mass are heat-sealed inside PE disk-shaped capsules with a diameter of 25 mm for irradiation lasting between 10 s and 5 h. These capsules are made by joining two 0.15 mm thick, acid-cleaned PE disks. Samples should be placed within high-purity quartz glass ampoules for prolonged irradiation durations lasting several hours. The related sections include descriptions of specific sample preparation techniques. It is possible to quantify element contents using either relative or k₀-standardization methods. The earlier technique relies on irradiating calibrators of elements that will be determined concurrently with the samples.

When considering the most stated hair growth rate of 10 mm per month, the hair samples examined reflect the intake (exposure) of Hg and other metals throughout the roughly 2-month period preceding to Brahe's passing. Figure 6 shows the progression of Hg values through time in three samples of Brahe's hair and contrasts it with the median (solid line) and upper and lower ranges (dashed lines) for the current, unexposed population. The information shows that in the weeks before his death, Brahe was not exposed to (or given) fatal levels of mercury. For the elements Fe, As, Ag, and Au, similar concentration temporal trends were discovered, with beginning values exceeding those of the current population and declining near Brahe's demise.

Investigations into cultural legacy have made excellent use of the distinctive arsenal of nuclear analytical techniques available at the Nuclear Physics Institute (NPI), "e," including ion, neutron, and photon beams. In some situations, these techniques have even become crucial. Notably, the arsenal of nuclear analytical techniques available at NPI has found numerous applications in several fields of science and technology other than cultural heritage investigations.



These fields include material research, environmental control, and monitoring, geo- and cosmochemistry, agriculture and nutritional research, as well as quality control and the preparation of reference materials, as has been discussed in several papers.

Source: [Physics](#)

KEYWORDS

Neutron activation analysis; photon activation analysis; X-ray fluorescence analysis; ion beam analysis; accelerator mass spectrometry; cultural heritage

