



Contribution ID: 235

Type: **Talk**

## Chlorine determination in archaeological iron artefacts by PGAA

*Tuesday, 8 December 2020 14:05 (25 minutes)*

Archaeological iron finds often undergo a secondary destructive corrosion process after excavation. Since chlorine is supposed to play a major role in this process, it is important to have a method for determining the chlorine content of such objects non-destructively, both for assessing the danger of corrosion and to verify the efficiency of methods trying to remove the chlorine. Neutron activation analysis (NAA), and prompt gamma activation analysis (PGAA) in particular, is the method of choice for the Cl determination in archaeological iron artefacts. By PGAA, sizeable pieces can be studied in a non-destructive manner with a detection limit of about 10 ppm. Since hardly any long-lived radioactivity is produced, the objects can be returned to museum collections within weeks after the analysis. We will report on studies of a large number of mainly Celtic iron artefacts from Bavaria that were excavated in the past 150 years and are in various states of preservation. Space-resolved Cl determination helps to understand details of the corrosion process. The efficiency of the removal of Cl from ancient objects by heating and leaching processes has been studied. The Cl removal from artificially corroded iron specimens prepared in the laboratory was studied in order to obtain a better understanding of the chemical bonding of the Cl that can be removed by the different methods.

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**Session Classification:** MLZ Users 2020 - Neutron Methods

**Track Classification:** UM: Neutron Methods