

Determination of sulfur and selected trace elements in metallothionein-like proteins using capillary electrophoresis hyphenated to inductively coupled plasma mass spectrometry with an octopole reaction cell

First published in:

**Analytical and Bioanalytical Chemistry (2003) 377,
pp. 132–139**

**© Springer-Verlag, Heidelberg
All rights reserved.**

– Reprint –

Authors:

***D. Pröfrock
P. Leonhard
A. Prange***

Abstract

The determination of sulfur in biologically relevant samples such as metalloproteins is described. The analytical methodology used is based on robust on-line coupling between capillary electrophoresis (CE) and octopole reaction cell inductively-coupled plasma mass spectrometry (ORC-ICP-MS). Polyatomic ions that form in the plasma and interfere with the determination of S at mass 32 are minimised by addition of xenon to the collision cell. The method has been applied to the separation and simultaneous element-specific detection of sulfur, cadmium, copper, and zinc in commercially available metallothionein preparations (MT) and metallothionein-like proteins (MLP) extracted from liver samples of bream (*Abramis brama L.*) caught in the river Elbe, Germany. Instrumental detection limits have been calculated according to the German standard procedure DIN 32645 for the determination of sulfur and some simultaneously measured trace elements in aqueous solution. For sulfur detection limits down to $1.3 \mu\text{g L}^{-1}$ (^{34}S) and $3.2 \mu\text{g L}^{-1}$ (^{32}S) were derived. For the other trace elements determined simultaneously detection limits ranging from 300 ng L^{-1} (^{58}Ni) to 500 ng L^{-1} (^{66}Zn , ^{55}Mn) were achieved. For quantification of sulfur and cadmium in a commercially available MT preparation under hyphenated conditions the use of external calibration is suggested. Finally, the need for proper sample-preparation technique will be discussed.

Keywords

Inductively coupled plasma mass spectrometry · Capillary electrophoresis · Hyphenation · Collision cell · Metallothionein · Speciation · Biomolecules

Daniel Pröfrock · Peter. Leonhard · Andreas Prange

GKSS Research Centre Geesthacht,
Institute for Coastal Research,
Max-Planck-Strasse 1, 21502 Geesthacht, Germany
e-mail: andreas.prange@gkss.de