

FACTSHEET



Determination of Heavy Metals in Herbal Drugs and Preparations

Introduction

The medicinal use of plants is one of the oldest therapeutic practices worldwide – from teas and essential oils to various herbal preparations. During their growth, however, plants can absorb heavy metals from the soil, which can subsequently enter the human body through consumption^[1]. Due to their well-known toxic effects, binding limits for heavy metals have been defined by the European Pharmacopoeia (Ph. Eur.).

Interlabor Belp AG offers a validated and reliable analysis of arsenic (As), lead (Pb), cadmium (Cd), and mercury (Hg) for a wide range of herbal drugs and their preparations^[2]. All analyses are performed in accordance with the European Pharmacopoeia, considering the limits specified in the relevant monographs^[3] - ^[3].

Scope of Application

The method was validated using a herbal drug according to Ph. Eur. 07/2014:20427^[2]. In addition, a theoretical risk analysis was conducted, evaluating sample preparation, measurement principle, method parameters, and possible matrix influences.

To further ensure the method's reliability^[2], 150 analyses using two internal control samples were performed between 2018 and 2024.

Based on this thorough validation and risk assessment, the method^[2] can be applied without risk to the following sample matrices:

Herbal Drugs

- Herbal drugs in general (whole, fragmented, broken, cut, dried, or fresh plants or plant parts)
- Algae, fungi, and lichens

Herbal Drug Preparations

These are homogeneous products derived from herbal drugs, processed by extraction, distillation, expression, fractionation, purification, concentration, or fermentation. These include:

- Extracts
- Essential oils
- Expressed juices
- Processed exudates
- Ground or powdered herbal drugs for encapsulation

Herbal Teas

Herbal Drug Extracts

Extracts from herbal drugs are liquid (fluid extracts), semi-solid (soft extracts and oleoresins), or solid (dry extracts) preparations obtained using appropriate solvents.

Measurement Ranges of the Analysis

Results can be reported for all listed matrices within the following concentration ranges (Table 1).

Conversion to other units is possible as required:

Table 1: Ranges of the Analysis

Analyte	Lower Limit [mg/kg]	Upper Limit [mg/kg]
Arsenic (As)	0.10	7.5
Cadmium (Cd)	0.05	1.5
Lead (Pb)	0.25	7.5
Mercury (Hg)	0.05	0.15

Analytical Method by Interlabor Belp AG

An aliquot of the sample is digested using mineral acids (nitric acid, with hydrofluoric acid for silicate-containing samples) under heat and pressure. This results in a clear solution in which organic and silicate compounds are broken down. The solution is then analyzed by ICP-MS for the target analytes.

Conclusion

At Interlabor Belp AG, you are in excellent hands when it comes to reliable analysis of arsenic (As), lead (Pb), cadmium (Cd), and mercury (Hg) in various matrices. Our validated method meets the strict requirements of the European Pharmacopoeia and guarantees the highest precision and quality. An overview of the analytical parameters and matrices we offer can be found in the "Information Sheet – Heavy Metals in Herbal Drugs and Preparations". This document, along with the analysis order form "Cannabis Products", can be combined with this factsheet and is available on our website. With our expertise and commitment, we support you reliably – we look forward to a successful collaboration.

Key Data for Elemental Analysis by Interlabor Belp AG

As an independent laboratory, Interlabor Belp AG offers heavy metal analysis for a variety of products.

- Analytical quality: GMP
- Sample amount: approx. 1 g
- Delivery time: approx. 8-10 working days (standard)
- Analyses price: upon request

For further information or to arrange an analysis, we are at your disposal.

References

- [1] World Health Organization (WHO), (2007) "WHO Guidelines for assessing quality of herbal medicines with reference to contaminants and residues".
- [2] Interlabor Belp AG Validation Document: "Determination of arsenic (As), lead (Pb), cadmium (Cd), and mercury (Hg) in herbal drugs and herbal drug preparations by ICP-MS" (Ph. Eur. 07/2014:20427)", effective as of 10.12.2024.
- [3] European Pharmacopoeia (Ph. Eur.) 07/2014: 20427 „Heavy metals in herbal drugs and herbal drug preparation“.
- [4] European Pharmacopoeia (Ph. Eur.) 07/2017: 1433 „Herbal drugs“.
- [5] European Pharmacopoeia (Ph. Eur.) 07/2010: 1434 „Herbal drug preparations“.
- [6] European Pharmacopoeia (Ph. Eur.) 01/2013: 1435 „Herbal teas“.
- [7] European Pharmacopoeia (Ph. Eur.) 04/2019: 0765 „Herbal drug extracts“.
- [8] European Pharmacopoeia (Ph. Eur.) 07/2024: 3028 „Cannabis flower“.

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