

## 干法灰化和湿法消解植物样品的铜锌铁同位素测定对比研究

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引用本文: 李世珍,朱祥坤,吴龙华,骆永明.2011.干法灰化和湿法消解植物样品的铜锌铁同位素测定对比研究[J].地球学报,32(6):754-760.

DOI: 10.3975/cagsb.2011.06.14

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基金项目:国土资源部公益性行业基金(编号:201011027-1E); 国家自然科学基金创新群体项目(编号:40921001)

中文摘要:测定有机样品中元素含量和同位素时,处理样品常用的方法有干灰化法和湿法两种。目前,测定样品中Cu、Zn、Fe同位素时,多采用湿法处理样品。相对于湿法处理样品,干灰化法溶样迅速、耗酸量少,适合处理大量样品,但高温灼烧过程可能会导致样品中Cu、Zn、Fe同位素的分馏。本研究利用海州香薷植株,以湿法为基础,对干灰化法和湿法处理植物样品的Cu、Zn、Fe同位素组成进行了对比研究,结果如下,在所用实验条件下:1)对于海州香薷的根样品,干灰化法不会导致样品中Cu、Zn、Fe同位素的分馏;2)对于海州香薷的茎样品,灰化法不会导致样品中Cu、Zn同位素的分馏,但会导致Fe同位素的分馏;3)对于海州香薷的叶样品,干灰化法会导致Cu、Fe同位素的分馏,但对样品中Zn同位素没有明显的影响。因此,测定植物样品中Cu、Zn、Fe同位素时,需要根据所测样品和元素的特性,对干灰化法的实用性进行审慎评估。研究结果也表明了干灰化过程中,Cu、Zn、Fe同位素分馏效应不同,表明挥发组分中元素的流失是导致同位素分馏的一个因素,但全样和挥发组分中元素同位素组成的差别及元素损失的相对量影响了干灰化过程导致的同位素分馏程度。

中文关键词:植物样品 干灰化法 湿法 Cu,Zn,Fe 同位素 MC-ICPMS

## A Comparative Study of Plant Sample Preparation by Dry Ashing and Wet Digestion for Isotopic Determination of Cu, Zn and Fe

**Abstract:** Dry ashing and wet digestion are common methods for determining the content and isotopic composition of elements in organic samples. Wet digestion has been used mostly to dissolved samples for determining Cu, Zn and Fe isotopes. Relative to wet digestion, dry ashing is not only more efficient in sample preparation, but also uses less acid, thus suitable for bulk treatment. However, under high temperature, it is possible to cause isotope fractionation of Cu, Zn and Fe during sample processing because of evaporation. A comparative study of elsholtzia splendens samples prepared by using dry ashing and wet digestion was carried out. The results show that: 1) for the elsholtzia splendens roots, the process of dry ashing does not cause isotope fractionation of Cu, Zn and Fe; 2) for elsholtzia splendens stems, the process of dry ashing does cause isotope fractionation of Fe, but no fractionation of Cu and Zn isotopes occurs; 3) for the elsholtzia splendens leaves, the process of dry ashing does cause isotope fractionation of Cu and Fe, but no fractionation of Zn isotopes occurs. In a word, the suitability of the dry ashing method for plant sample digestion needs to be evaluated specifically according to the features of the sample and the element studied. The loss of the elements in volatile components is a main cause leading to different fractionation effects of Cu, Zn and Fe, as in dissolving the organic samples by using dry ashing process. Both of the two factors, i.e., the isotopic difference between volatile components and the whole sample and the relative variation of the elements, result in different isotopic fractionation effects in the process of volatilization.


**keywords:** plant samples; dry ashing; wet digestion; Cu Zn Fe; Isotope; MC-ICPMS

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