质谱学报 2008 29 (1): 24-29 ISSN: 1004-2997 CN: 11-2979/TH

技术交流

植物样品中稳定碳同位素的EA-IRMS系统分析方法

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收稿日期 2007-4-24 修回日期 2007-7-21 网络版发布日期:

摘要

通过多组实验对比，分析并讨论了利用元素分析仪-稳定同位素比率质谱仪（EA-IRMS）联用技术测定植物样品中碳同位素比值的实验条件。初步建立了植物样品中稳定碳同位素组成的分析方法，同时对系统分析的稳定性和精密度等进行了检验分析。结果表明：当IRMS真空度为7×10^{-8}kPa，高压3.0 kV，EA系统Carrier-He载气流量在90～100 mL•min-1，Conflo-He载气压力为80 kPa，氧喷条件为110 mL•min^{-1}时，使用Cr_2O_3/Co_3O_4作为EA氧化柱氧化剂填料，在严格控制样品残余和本底空白的条件下，植物样品的测定精密度为±0.20‰测定值与给定值值偏离0.01‰

关键词 元素分析仪-稳定同位素比率质谱仪系统（EA-IRMS） 植物样品 稳定碳同位素

分类号 O 657.63；O 613.71；O 562.6

Measurement of Stable Carbon Isotopic Composition of Plant Samples by EA-IRMS System

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Abstract

The stable carbon isotope composition in plant is a powerful tool for studying on carbon cycle， biogeochemistry and paleoenvironment. Element analysis- isotope ratio mass spectrometry (EA-IRMS) technology is a simple and precise method for measuring stable carbon isotopic composition. EA-IRMS technology was applied to determine carbon isotope composition of sample from environmental and geological fields. The suitable conditions for plant samples measurement on experimental results were chiefly ascertained through comparisons. Moreover， stability and linearity of EA-IRMS system, accuracy and precision of measurement were discussed and analysed. The results show that the measurement precision of carbon isotopes can be less than ± 0.2‰ and the deviation of the measurement value is 0.01‰ when 7×10^{-8} kPa of the vacuum, Cr_2O_3/Co_3O_4 oxidation furnace, 90-100 mL•min^{-1} of carrier-He flow rate, 80 kPa of Conflo-He pressure and 110 mL•min^{-1} of oxygen injection.

Key words elementary analysis-isotope ratio mass spectrometers (EA-IRMS) plant

sample carbon isotope

DOI

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