

Author's Accepted Manuscript

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PII: S0039-9140(18)30922-6
DOI: <https://doi.org/10.1016/j.talanta.2018.09.011>
Reference: TAL19025

To appear in: *Talanta*

Received date: 27 March 2018
Revised date: 30 August 2018
Accepted date: 4 September 2018

Cite this article as: Yu Haiyan, Chaimbault Patrick, Clarot Igor, Chen Zilin and Leroy Pierre, Labeling nitrogen species with the stable isotope ^{15}N for their measurement by separative methods coupled with mass spectrometry: a review, *Talanta*, <https://doi.org/10.1016/j.talanta.2018.09.011>

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Labeling nitrogen species with the stable isotope ^{15}N for their measurement by separative methods coupled with mass spectrometry: a review

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Abstract

Nitrogen and its numerous hydrogenated and oxygenated derivatives are of main importance in our environment and in living cells as well in both qualitative and quantitative aspects. Their monitoring is needed to evaluate all disturbances occurring in the nitrogen cycle and in pathophysiological events related to variations of nitric oxide (NO) bioavailability. Many analytical methods are devoted to the measurement of nitrogen species, especially those related to NO, in the environmental, biological and pharmacological fields, and they have already been compiled and discussed in numerous reviews. Nitrogen isotope (^{15}N) is stable and has a low level of natural abundance. Labeling nitrogen species with ^{15}N associated with mass spectrometry (MS) gives rise to more mechanistic information and improved analytical performances compared to conventional methods. The present review is dedicated to the ^{15}N labeling of related nitrogen species to monitor their interconversion and metabolism, the different chemical probes used for their derivatization and the corresponding separative methods coupled with MS for analyzing resulting adducts. The fragmentation mode of the different adducts and the resulting selectivity and sensitivity are discussed.

Graphical abstract

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