Catalytic spectrophotometric determination of iodine in vegetable matter digested by pyrohydrolysis

L. LIU, D. WU*AND P. LI

College of Environmental and Chemical Engineering,
Nanchang University, Nanchang 330031, PR China
(*correspondence: dswu@ncu.edu.cn)

Revolutionary New Method

The low I contents, complexity of the matrix, chemical interferences, possibility of contamination, and loss during sample dissolution are some of the potential limiting factors for the determination of I in vegetable matter [1]. The reported analytical methods (except RNAA) have the lower detection limit ranging from 5μg/kg to 3 mg/kg [2-6]. Thus few methods can be adapted to determine I in the inland vegetable matter, which usually has I content of a few μg/kg. We have developed a method that combines pyrohydrolysis digestion with catalytic spectrophotometry (CS) to determine I in vegetable matter. The pretreatment program of pyrohydrolysis was designed to decompose the vegetable matter steadily and completely. The conditions of CS were optimized to enhance the sensitivity of iodine determination. Excellent limit of detection has been achieved and meet the analytical requirements.

Discussion of Results

The conditions of pyrohydrolysis optimized through orthogonal experiment are as follows: 0.5 g vegetable matter sample, a temperature of 1100 °C, 20 minutes for pyrohydrolysis, 100 mL/min of oxygen flux and 15 mL 0.2 M NaOH of absorption solution. The conditions of CS are optimized as follows: reaction temperature of 45 °C and reaction time of 35 minutes. The limit of detection and quantification are 0.3 ng/g and 0.9 ng/g, respectively. Hence it can be applied to determine trace I in vegetable matter. Precision and accuracy were evaluated by the analysis of Chinese vegetable matter reference materials.

Owing to the low cost of instruments and analysis, low limit of detection, high accuracy and precision, pyrohydrolysis-CS method is very suitable for the daily analysis of the iodine contents in vegetable matter.

[1] Rao & Chatt (1991) *Anal. Chem* **83**, 1298–1303. [2] Schnetger & Muramatsu (1996) *Analyst* **121**, 1627-1631. [3] Niedobova *et al.* (2005) *Microchim. Acta* **150**, 103–107. [4] Tagami *et al.* (2006) *Anal. Chim. Acta* **570**, 88–92. [5] Varga (2007) *Microchem. J* **85**, 127–131. [6] Bhagat *et al.* (2009) *Food Chem* **115**, 706–710.

Accumulation of organic carbon in typical hillslope soils in karst area, Southwest China

T.Z. LIU*, C.Q. LIU, X.D. LI AND C.L. TU

State Key Laboratory of Environmental Geochemistry,
Institute of Geochemistry, Chinese Academy of Sciences,
Guiyang 550002, China
(*correspondence: liutaoze@mails.gyig.ac.cn)

The content of soil organic carbon (SOC) has long been recognized as a key characteristic of soil quality. During an earlier survey, we observed that a lot of SOC stocked in a hillslope under natural conditions for 10 years of revegetation in karst area, Southwest China. Here, we analyzed the content and ^{13}C isotope of SOC in size-fractionated particles (mainly as sand 53μm~2000μm, silt 2μm~53μm, clay <2μm) of soils in this hillslope, to elucidate the generation and stability of organic carbon.

The results showed that the content of SOC in the upper hillslope was higher than that in down hillslope area. Though the larger SOC accumulation was found in the sand fraction in the upper hillslope, the organic carbon pool was unstable. Oppositely, in down hillslope area, the organic carbon was mainly stored in the slit and clay fraction and has been in relatively stable state (Fig.1). Comparing the $\delta^{13}C$ values of SOC in soil and its three fractions (sand, silt, clay) with $\delta^{13}C$ values of litters, we found that $\delta^{13}C$ values of SOC in sand fraction were strongly correlated with the values of litters, which implying sand fraction was more sensitive to the change of vegetation types in the hillslope.

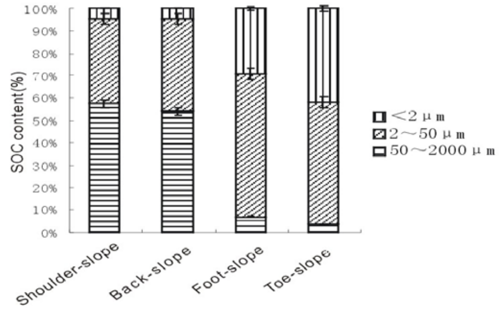

Figure 1: Proportion of organic carbon of different fraction in soil profiles

Our findings indicate that revegetation on hillslope can increase SOC stocks, but distribution has significant difference. And $\delta^{13}C$ value of SOC should be a good tracer for assessing the formation and stability of organic carbon.

This work was supported by the National Natural Science Foundation of China (Grant No. 41003008 and 40721002).