Investigation of analysis methods for sulfur compounds and their isotopic compostions in soils and sediments

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Sulfur-quantitative and isotopic analyses

We investigated the analysis methods for sulfur-compounds quantification and their isotopic compostions. The investigated methods showed high recovery rates.

We have studied geochemical cycles of nitrogen, phosphorus and sulfur in sediments, and our results show that sulfur compounds are involved in the cycles of nitrogen and pohosphorus in sediments. Various quantitative and isotopic analyses methods have been proposed. We sought to apply those methods to those sulfur quantification and isotopic compositions. However, more mature technique is to be needed to get high yeild. Therefore, we tried to reconstruct improved method based on the previous methods proposed by Nriagu and Soon [1], Rice *et al*. [2] and Canfield *et al*. [3].

Results and Discussion

Acid volatile sulfide, elemntal sulfur, pyrite-S and ester sulfate were sequentially extracted by the various methods described above, and the methods that yielded highest recovery rates are summrized in Table 1. Each previously proposed method could not be applied to all sulfur compounds. Thus, we reconstructed the methods that could be handled without high experience, by taking advantage of the strong points in previous works[1-3]. We would like to discuss in this conference if there is any other simpler method which will yield higher recovery rates.

Compounds	Methods	Recovery rates (%)
AVS	Heat with $SnCl_2$ and HCl[2]	116
Elemental S	Acetone extraction[1][2]	91
Pyrite-S	$CrCl_2$ reduction[3]	115
Ester sulfate-S	HI reduction[1]	64
Total S	Eschka fusion[1][2]	128

Table 1: Sulfur recovery rates from chemical reagents by our improved methods
Upper letters indicate the referred methods.

[1] Nriagu and Soon (1985) *Geochim. Cosomochim. Acta* **49**, 823-834. [2] Rice *et al*. (1993) *Chem. Geol*. **107**, 83-95. [3] Canfield *et al*. (1986) *Chem. Geol*. **54**, 149-155.