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## QA/QC Activities on Filter Pack Method of EANET

Network Center for EANET

### 1. Introduction

Technical Document for Filter Pack Method was endorsed at the Third Session of Scientific Advisory Committee (SAC3). In the committee, Network Center (NC) presented the report on the review of existing QA/QC activities on filter pack method. SAC3 recommended implementing inter-laboratory comparison on filter pack method as one of the QA/QC activities. SAC3 also suggested that the activities should be started after the test studies in NC.

After SAC3, NC has implemented a) filter stability test and b) addition and recovery test using standard materials. The tests were performed only for alkali-impregnated filter (F2) and acid-impregnated filter (F3) because it is difficult to keep free them from contamination comparing with other filters (F0 and F1).

The results of these studies are summarized and preliminary plan of 1<sup>st</sup> inter-laboratory comparison survey is proposed in this document.

### 2. Results of Test Studies

#### a) Filter Stability Test

Two kinds of impregnated filter (F2: K<sub>2</sub>CO<sub>3</sub>, F3: H<sub>3</sub>PO<sub>4</sub>) were prepared at same time and were kept under four kinds of condition (Table 1). In the table, "Filter case" can keep some filters at once; "Petrislide" can keep one filter in a case. These filters were analyzed at when filters were prepared, two weeks after, and 1/2/3/6 months after. Fig. 1, 2 and 3 show the analytical results for SO<sub>4</sub><sup>2-</sup>, Cl<sup>-</sup>, and NH<sub>4</sub><sup>+</sup> respectively. These results show that filters can keep without contamination by sealing up within at least three months.

Table 1 The condition of sample storage

	Case	Packing	Place
A	Filter case	Polyethylene bag + Aluminum coated bag	Refrigerator
B	Petrislide		Refrigerator
C	Petrislide		Room
D	Open	No use	Room

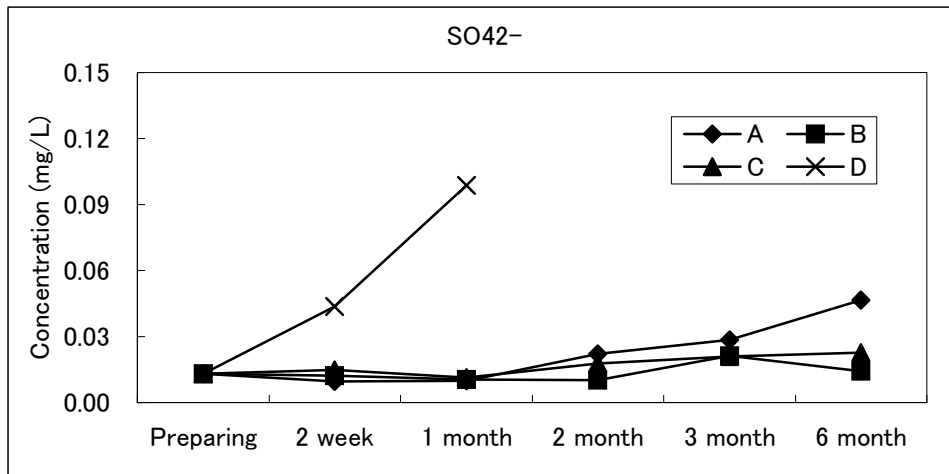


Fig. 1 The result of filter stability (SO<sub>4</sub><sup>2-</sup>)

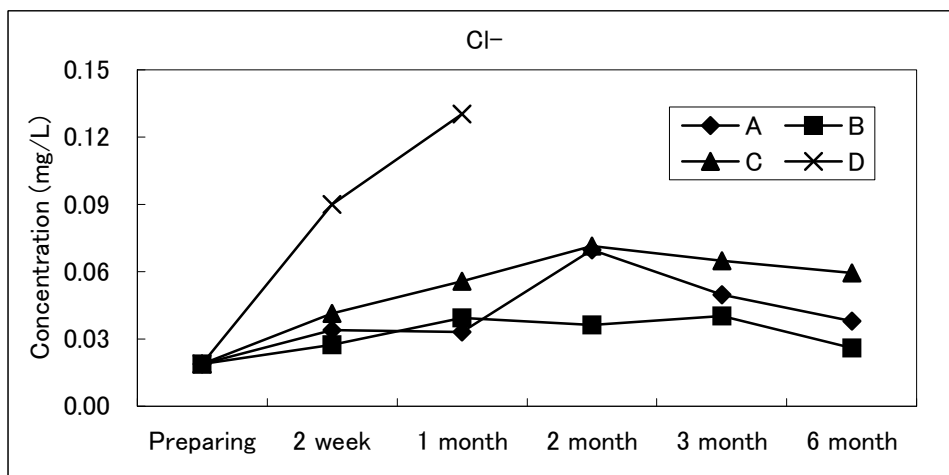


Fig. 2 The result of filter stability (Cl)

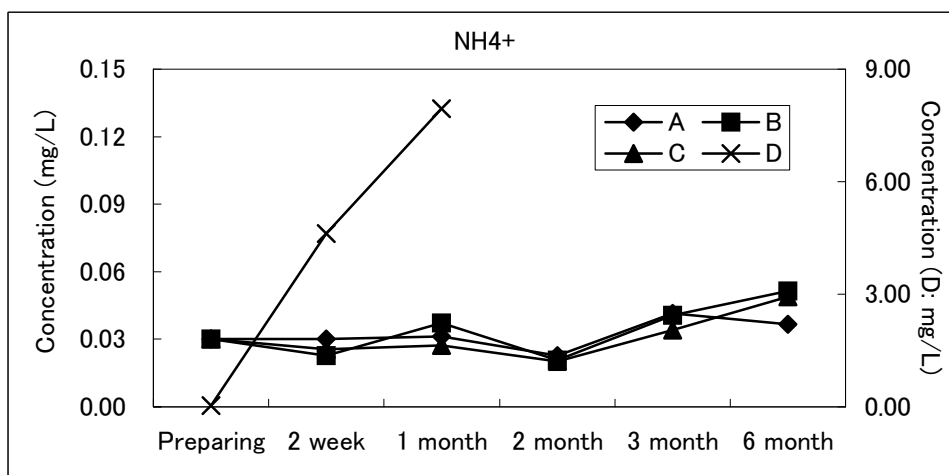


Fig. 3 The result of filter stability (NH<sub>4</sub><sup>+</sup>)

b) Addition and recovery test using standard materials

Two kinds of standard solution, high and low concentration, were prepared for F2 and F3, each other. The standard solutions were added to the impregnated filters (Table 2). These filters were kept in petrislide individually, sealed with polyethylene bag and aluminum-coated bag, and stored in the refrigerator. Analyses of these filters were implemented at when filters were prepared, two weeks after, and 1/2/3 months after. Fig. 4 shows the recovery of standard materials ( $\text{SO}_4^{2-}$ ,  $\text{Cl}^-$ ,  $\text{NH}_4^+$ ). These results show that approximately  $95 \pm 5\%$  of standard materials were recovered.

Table 2 The added amount of standard materials

(Unit:  $\mu\text{g}/\text{Filter}$ )

	F2 ( $\text{K}_2\text{CO}_3$ )		F3 ( $\text{H}_3\text{PO}_4$ )
	$\text{SO}_2$ (as $\text{SO}_4^{2-}$ )	$\text{HCl}$ (as $\text{Cl}^-$ )	$\text{NH}_3$ (as $\text{NH}_4^+$ )
High Conc.	300	80	50
Low Conc.	100	20	10

Note:

The added amount of standard materials on the filters corresponds to the following concentration of  $\text{SO}_2$ ,  $\text{HCl}$ , and  $\text{NH}_3$  in the air assuming that sample volume is  $25 \text{ m}^3$ .

$\text{SO}_2$	2.67-8.00 $\mu\text{g}/\text{m}^3$	(0.93-2.80 ppb)
$\text{HCl}$	0.82-3.29 $\mu\text{g}/\text{m}^3$	(0.51-2.02 ppb)
$\text{NH}_3$	0.38-1.89 $\mu\text{g}/\text{m}^3$	(0.50-2.49 ppb)

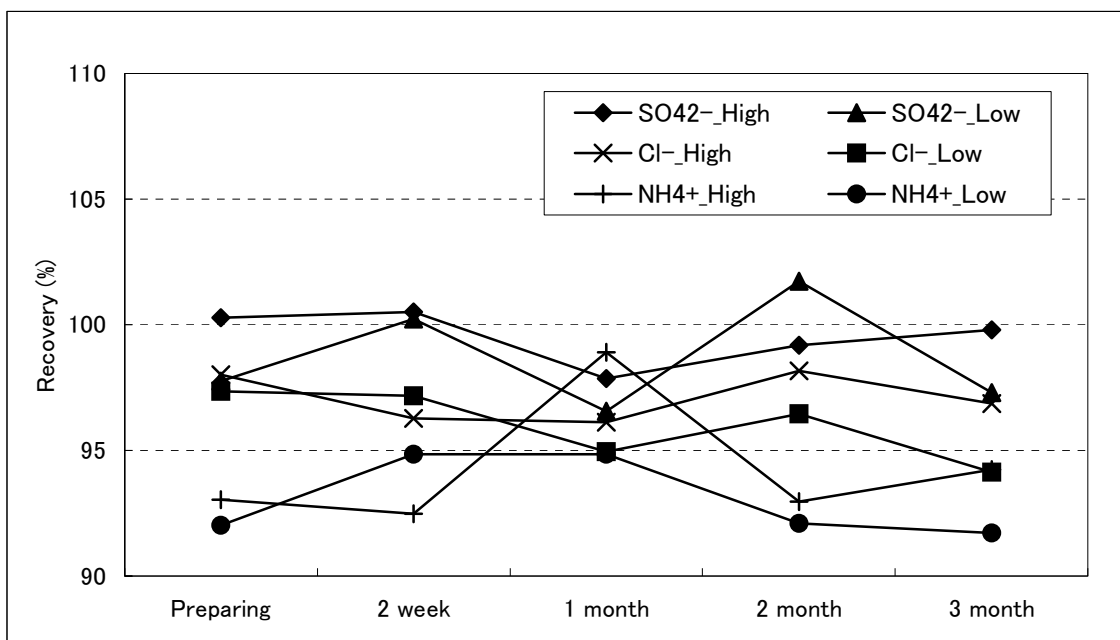


Fig. 4 The result of standard materials

### 3. Conclusion

The results of filter stability test and addition and recovery test gave no disturbance on the implementation of the inter-laboratory comparison survey. Since transportation test also has to be performed to confirm filter stability during sample shipping, NC has been implementing the test. The result will be reported on the STM6 and SAC5 with the program of inter-laboratory comparison on filter pack method.

### 4. The Preliminary plan of 1<sup>st</sup> inter-laboratory comparison survey

NC proposes the preliminary plan of 1<sup>st</sup> inter-laboratory comparison survey as follows taking the result of studies and time schedule of the other inter-laboratory comparison survey into account.

- 1) Sample distribution: Same time of the survey of wet deposition
- 2) Limit of the report: After 3 months
- 3) Program:

Stage	Type and Number of Filter		
	High Conc.	Low Conc.	Blank
F2 (K <sub>2</sub> CO <sub>3</sub> )	1	1	3
F3 (H <sub>3</sub> PO <sub>4</sub> )	1	1	3

- 4) Analyzed components:
  - F2: SO<sub>2</sub> (as SO<sub>4</sub><sup>2-</sup>), HCl (as Cl<sup>-</sup>)
  - F3: NH<sub>3</sub> (as NH<sub>4</sub><sup>+</sup>)
- 5) Sample shipping: Under consideration