Absorption of the Endocrine Disrupter in Environment Water by Reed.

Tuyoshi Ui[1], Noriko Itoh[2], Yoshiharu Iwasaki[3]

[1] Tokyo Met. Industrial Tech. Res.

Tokyo Met. Institute Tech.Intelligent sys, [2] Eng., TMIT, [3] Tokyo Metropolitan Research Institute for Environmental Protection

1. PURPOSE

Diffusion of the endocrine disruptor and agricultural chemicals into wide area of earth is a serious problem. The phytoremediation has been becoming to be reexamined. There are some reports that a reed removes nitogen-containing compounds from lagoon water[1], phosphorus compounds and organic carbon compounds from water[2].It was also reported the concentrations of nonionic surfactants and nonylphenol are independent from the measuring points which were determined from the upper reaches to the lower one of the river in Tokyo. This suggested that the plant might take place into the purification of the river water, in environment.

Thus in this work, we examined to evaluate possibility that a reed absorbs 4-nonylphenol and bisphenolA from environment water.

2.EXPRIMENTAL

2.1 Planting of a reed.The used reed was Phragmites communis Trin collected from bank of Arakawa river, Wako, Saitama prefecture. The roots of 5cm were cut off toward both left and right side from the germinating organ respectively. Every sample was originated from the same root.

The reeds were planted as described in follows.

In the middle of March: Ten planting pots of 10L were prepared so that every pot contains black earth of apparent volume 8L and six tablets of compost. They were kept for one month with weeding out.

In the middle of April:The prepared roots were planted and water was filled up to 5cm on the earth. They were planted one month.

In the middle of May:The endocrine desruptors were added after checking that they were growing well.

In the middle of August:The reeds were pulled out from the pots, the earth were washed out. The whole weights of every plants were 120-150g. Thus 100g of them were presented as specimen for GC-MS analysis.

Ten pots contain different quantities of, and different combinations of 4-nonylphenol and bisphenolA. The number of the pots and the added endocrine desruptors were summarized in Table-1. As the used earth and the reed were natural ones, they might already contain the NP and/or BPA before artificial add. To avoid the overcount, the available BPA-d16 and blind test specimen in the Table-2 were prepared.

The pre-preparations of the reeds for GC-MS was after reference[3]. Fenantholene(Fc) of 1mg was used as an inner standard.

The retention times(RT) of Fc, NP, and BPA were determined in TIC of S sample. The absolute quantities of them in No.1-7 samples could not be determined due to unstable sensitivity of the GC-MS and the insufficient separation of the endocrine desruptor from the existing components in the reed. But relative intensities I(NP)/I(Fc) and I(BPA)/I(Fc) were obtained.

The result is shown in Fig.1

Apparent difference of the intensities among the pots No.1 and No.7 was not seen although added amounts of NP or BPA were 1mg or 0.1mg.

The NP or BPA was clearly detected in the A earth, but not in the B earth. As described above, B reed contains both NP and BPA. This means that a part of the added NP and BPA are absorbed into the reed and another part of them are decomposed by microorganism. The both NP and BPA were detected in the C earth that was the specimen kept for three months without reed. This means that decomposition by only the microorganism was not complete but became complete with help of the reed.

The final result is that (1) a reed has ability of absorbing 4-nonylphenol and bisphenolA from environment water and (2) we can get information about the hysterisis whether such the endocrine desruptors have existed near the habitat of the reed.

Table 1. The number of the pots and the added endocrine desruptors.

No	·nonylphenol (NP)	bisphenolA (BPA)
1	1mg	1mg
2	0.1mg	0.1mg
3	1mg	—
4	0.1mg	—
5	—	1mg
6	—	0.1mg
7	—	—

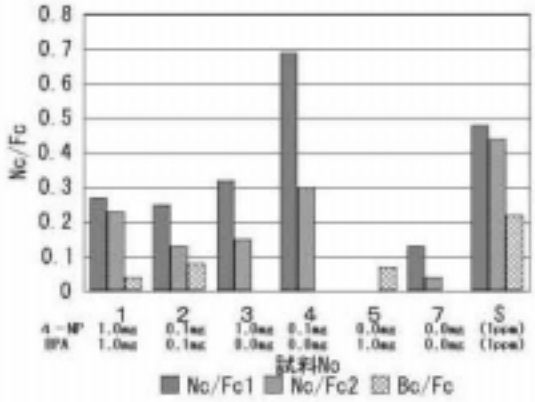

Fig 1.Endocrine Disruptor comparable absorption.

Nc/Fc1 Nc/Fc with RT13:49 peak

Nc/Fc2 Nc/Fc without RT13:49 peak.

Table 2. Blind test specimen.

S	Standard CH2Cl2 solution that contains respective Fc, NP and BPA of 1mg
A	Respective 4-BPA and BP of 1mg was added to the No.2 earth of 10g after grow, and just soon they were recovered for earth standard.
B	The No.2 earth after finishing of growing test.
C	The earth that respective 4-NP and BPA of 1mg was added to without planting to evaluate the degree of decomposition by microorganism.

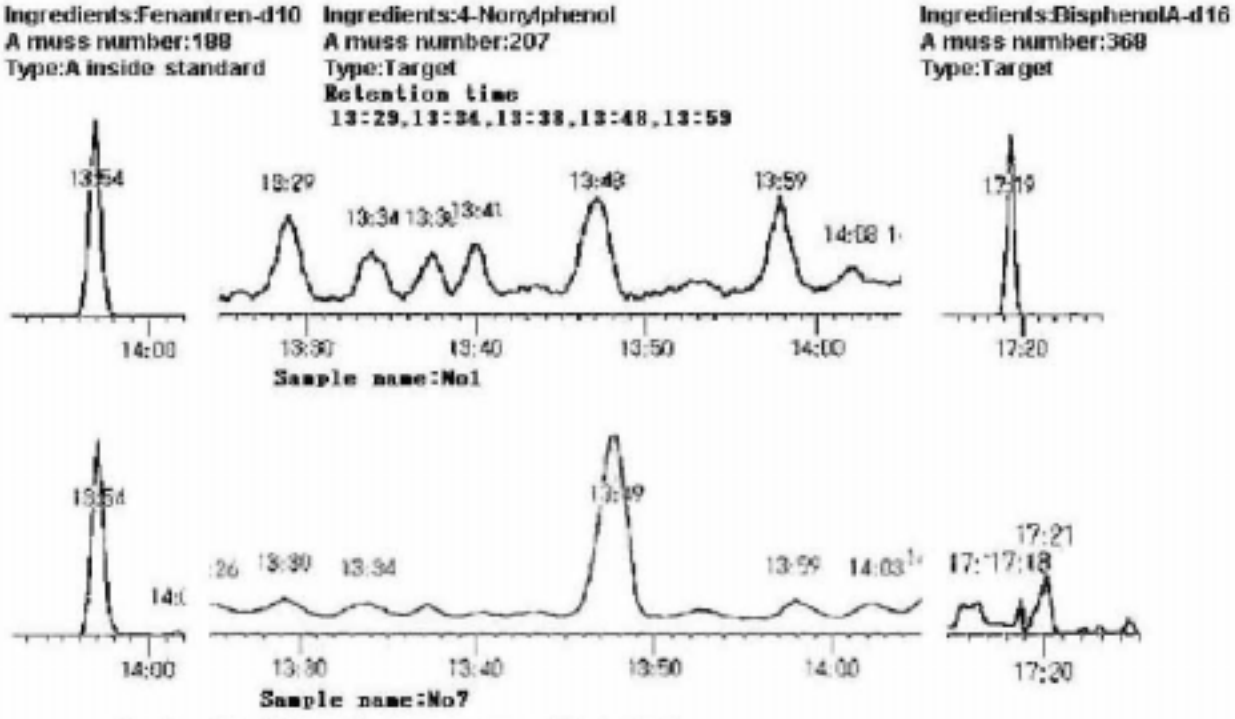

Fig 2. Total Ion Chromatogram of No1,No7.