THE CHARACTERISTICS OF CONGERNER DISTRIBUTION OF PCDDs/DFs IN AMBIENT AIR AROUND THE IORNWORKS

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Introduction

There are many kinds of chemicals in the atmosphere. Most of these chemical substances intentionally released in the course of industrial activity, but PCDDs / DFs is a substance produced by a unintentional. PCDDs / DFs are a major source of urban waste incineration, pulp production, metal industries, such as open burning, but a major source is known as urban waste incineration.

However, in the case of Australia, The proportion of non-ferrous metals has been reported to have the highest. The purpose of this study is to estimate PCDDs / DFs emission levers and the characteristics of congener distribution in the ambient air around the iornworks.

Materials and Methods

Using high volumn air sampler(Sibata, Japan), air samples were collected. particulate and gaseous substances were collected simultaneously. 2km radius around the iornworks in the four selected points were chosen. The samples were during 24 hours and total flow rate were approximately 1,007 Sm^3 of 0.7Sm^3/min. Collected samples were clean up in according to EPA-8290, and were analyzed by HRGC / HRMS according to EPA-1613

An internal standard cocktail, 1ng of $^{13}C_{12}$-PCDDs/DFs was added to each sample as internal standards prior to extraction. Then, sample was extracted with toluene. Toluene extracts were cleaned up by 5ml of concentrated sulfuric acid 2 or 3 times, followed by silica gel column cleanup eluting 150ml of n-hexane, and basic alumina column cleanup eluting 100ml of 2% dichloromethane in n-hexane(this portion was discarded)and then 150 ml of 50 % dichloromethane in n-hexane. Final eluate was concentrated to a volumn of 1 ml, and further concentrated to about 50ul after spiking 1 ng of recovery standards.

Concentrated eluates of the samples were analyzed by high resolution gas chromatograph/high resolution mass spectrometer(HRGC/HRMS). The HRGC/HRMS set up consisted of a Agilent 6890 GC coupled with Autospec Ultima(Micromass Co.). Selected ion monitoring with electron impact of 37 eV was performed above a resolution of 10,000 with an SP-2331 column of 60m*0.32 mm ID*0.25um［120 ℃ (1mim) → 20 ℃/min to 200 ℃ (3mim) → 5℃/min to 260 ℃ (25mim)］. The eluates were introduced in splitless mode with a flow rate of 2.5ml/min helium, and temperatures of injector and ion source were 260℃ and 270℃ respectively.

Results and Discussion

The Concentration of PCDDs/DFs shown in Table 1. As a result of the analysis, A site 0.002, B site 0.057, C site 0.041, D site 0.002pg-TEQ/Sm^3 are showed. B site is showed the highest level and A, D site is showed lowest level. Point B in the steel mills of the nearest point showed the highest concentration point C to a point near the road and the car shows the highest concentration is expected. Points A and D of the steel mills and the distance of the furthest point represents the lowest concentration. This data indicates a lower tendency than of Korea in 2008(EMC, 2009) 0.000~0.262pg-TEQ/Sm^3. It is very low than Korea standard in ambient air 0.6pg-TEQ/ Sm^3.

Congener Distribution of PCDDs/DFs in ambient air around the iornworks is shown in Figure 1. Accoring to survey on the POPs monitoring in Korea, 1,2,3,4,6,7,8-HpCDF, OCDF, OCDD were major congener in ambient air. On this study, 2,3,4,7,8-PeCDF, 1,2,3,6,7,8-HxCDF, 2,3,4,6,7,8-HxCDF were investigated as major congener. It regarded that due to pollution from iornworks.

Table 1. Concentrations of PCDDs/DFs in each site

PCDDs/DFs (pg I-TEQ/ Sm^3)	# A	# B	# C	# D
2,3,7,8-TCDD	0.0000	0.0000	0.0000	0.0000
1,2,3,7,8-PeCDD	0.0000	0.0000	0.0000	0.0000
1,2,3,4,7,8-HxCDD	0.0000	0.0000	0.0000	0.0000
1,2,3,6,7,8-HxCDD	0.0000	0.0000	0.0000	0.0000
1,2,3,7,8,9-HxCDD	0.0000	0.0000	0.0000	0.0000
1,2,3,4,6,7,8-HxCDD	0.0007	0.0011	0.0009	0.0007
OCDD	0.0001	0.0001	0.0001	0.0001
PCDDs	**0.0008**	**0.0012**	**0.0010**	**0.0008**
2,3,7,8-TCDF	0.0000	0.0000	0.0000	0.0000
1,2,3,7,8-PeCDF	0.0000	0.0000	0.0000	0.0000
2,3,4,7,8-PeCDF	0.0000	0.0321	0.0270	0.0000
1,2,3,4,7,8-HxCDF	0.0000	0.0051	0.0000	0.0000
1,2,3,6,7,8-HxCDF	0.0000	0.0088	0.0058	0.0000
2,3,4,6,7,8-HxCDF	0.0000	0.0071	0.0052	0.0000
1,2,3,7,8,9-HxCDF	0.0000	0.0000	0.0000	0.0000
1,2,3,4,6,7,8-HpCDF	0.0013	0.0026	0.0017	0.0012
1,2,3,4,7,8,9-HpCDF	0.0000	0.0000	0.0000	0.0000
OCDF	0.0000	0.0000	0.0000	0.0001
PCDFs	**0.0013**	**0.0057**	**0.0397**	**0.0013**
PCDDs+PCDFs	**0.002**	**0.057**	**0.041**	**0.002**

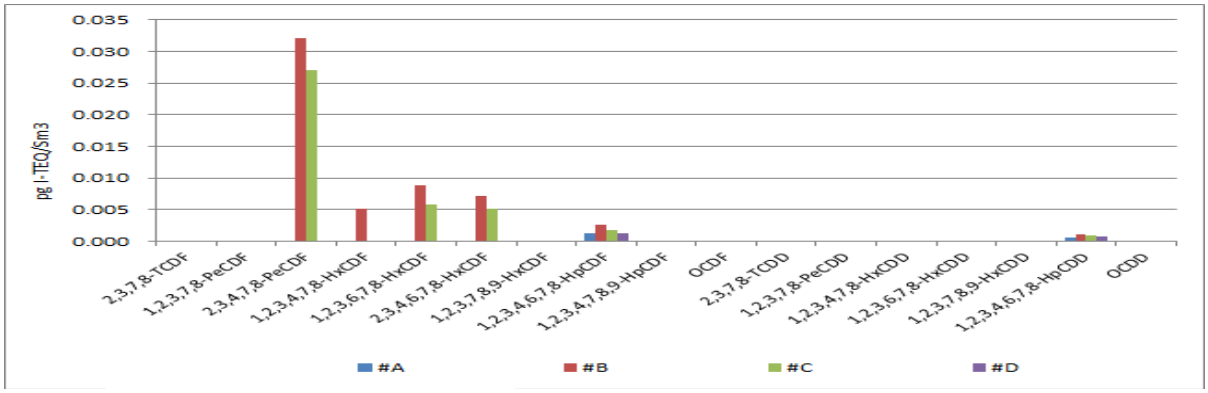

Fig. 1. Congener Distribution of PCDDs/DFs

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