

ENVIRONMENTAL LEVELS - POSTERS

MONITORING OF AIR POLLUTION BY POLYCHLORINATED DIBENZO-*P*-DIOXINS AND POLYCHLORINATED DIBENZOFURANS IN KOREA USING PINE NEEDLES

Gon Ok, Sung-Hee Ji, Sang-Jo Kim, Hyo-Bang Moon¹, Young-Kyo Kim, Young-Seup Kim, Young-Ho Han

Faculty of Earth Environmental Sciences, Pukyong National University, Nam-gu Daeyeon3-dong 599-1, Pusan 608-737, Korea

¹National Fisheries Research and Development Institute, Pusan 619-900, Korea

Introduction

Polychlorinated dibenzo-*p*-dioxins(PCDDs) and polychlorinated dibenzofurans(PCDFs) have been recognized as persistent and ubiquitous environmental pollutants.¹ Recently, these compounds are known as the endocrine disruptors and persistent organic pollutants(POPs). These emitted from various sources undergo transport, and the process of wet and dry deposition in atmosphere.²⁻³ For these reasons, many researchers have investigated on the air pollution level of PCDDs/DFs as environmental media using soil and vegetation instead of air sampler.⁴⁻⁵ Therefore, the objective of this study is the assessment of contamination degree by PCDDs/DFs in atmosphere of Korea using pine needles as passive sampler.

Experimental methods

Sampling

Pine needle samples were collected at 30 sites from 5 city of Korea in September, 1998 and 1999. Sampling sites and numbers are illustrated in Fig. 1.

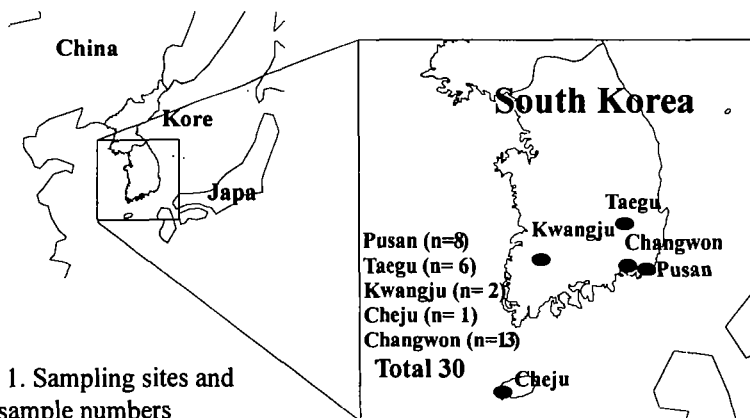


Fig. 1. Sampling sites and sample numbers

Analytical procedures

Pine needles were dried at room temperature and then cut into a size of about 1cm. After spiking of internal standards(EDF-8999, CIL Inc.), samples(ca. 30~50g) were extracted with toluene for 5 hours under reflux. The extracts were filtered to remove a bulk of chlorophyll using silica gel. The

ENVIRONMENTAL LEVELS - POSTERS

filtrate was concentrated and transferred to n-hexane. The solution was purified by a multi-layer silica gel and activated alumina chromatography. The purified extracts concentrated and analyzed by HRGC(HP6890)/HRMS(JMS 700). Analytical methods and conditions described in previous several papers.⁶⁻⁷

Results and discussion

Concentration

Total and I-TEQ concentration of PCDDs/DFs measured at each area is showed in Fig. 2.

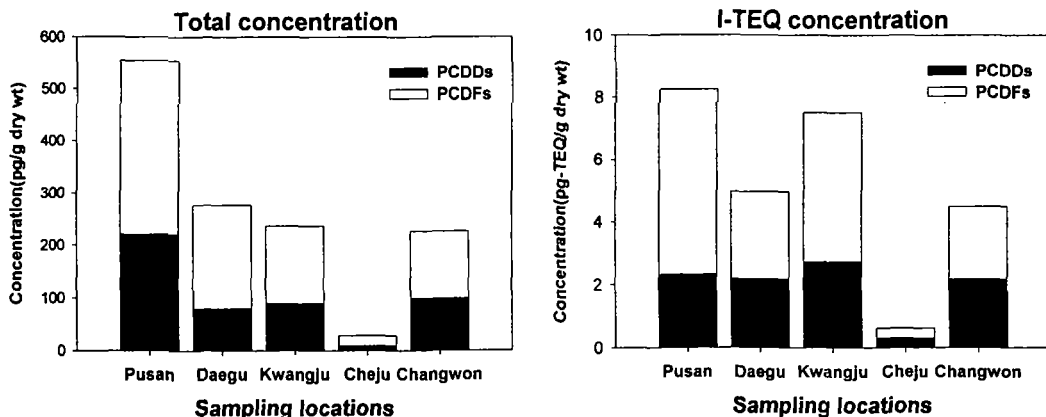


Fig. 2. Total and I-TEQ concentration of PCDDs/DFs at each site.

As shown in Fig. 2, total and I-TEQ concentration of PCDDs/DFs represented the highest value at Pusan city. Pusan site is that population density and traffic volume is highest area as compared with other sites. Total concentration of PCDDs/DFs ranged 105.35~2087.68pg/g and I-TEQ concentration was 2.19~26.88pg-TEQ/g. Levels at Taegu city was 26.18~475.46pg/g and I-TEQ was 0.64~9.09pg-TEQ/g. Kwangju site represented 137.22~335.92pg/g and 2.05~5.46pg-TEQ/g for total and I-TEQ concentration, respectively. Changwon showed concentration range of 81.88~539.57pg/g for total concentration and 1.23~9.78pg-TEQ/g for I-TEQ concentration. Cheju island represented the lowest value, because this site is famous for the background area in Korea as an aspect of environment.

Congener profiles

The congener profiles of total and I-TEQ concentration presents in Fig. 3. As illustrated in Fig. 3, profiles of total and I-TEQ concentration had a similar pattern for all sites. This indicates that all sites influenced by the same source. The low chlorinated compounds such as TCDDs and TCDFs are the predominant congener for total concentration. This means that automobile is the main source for all sites, because these sites are the large city in Korea relatively. Congener profile of I-TEQ concentration showed that HxCDDs and PeCDFs had the highest ratio.

References

1. J. M. Czuczwa and R. A. Hites (1984) Environ. Sci. Technol. 18. 444-450

ENVIRONMENTAL LEVELS - POSTERS

2. B. D. Eitzer (1993) *Environ. Sci. Technol.* 27. 1632-1637
3. O. Isamu, M. Shigeki and N. Junko (1999) *Organohalogen Compounds.* 41. 443-446
4. O. Aozasa, M. Ikeda, T. Nakao, S. Ohta, H. Miyata, C. W. Huang and H. T. Tsai (1996) *Organohalogen Compounds.* 28. 181-186
5. W. A. Ockenden, E. Steinnes, C. Parker, and K. C. Jones (1998) *Environ. Sci. Technol.* 32. 2721-2726
6. J.-R. Lu, H. Miyata, C.-W. Huang., H.-T. Tsai, V.-Z. Sheng, T. Nakao, Y. Mase, O. Aozasa and S. Ohta (1995) *Chemosphere.* 31. 2959-2970
7. G. Ok, H. J. Suk, S. H. Ji, H. B. Moon and H. H. Lee (1998) *The Korea Society for Environmental Analysis.* 1(1). 33-40

ENVIRONMENTAL LEVELS - POSTERS

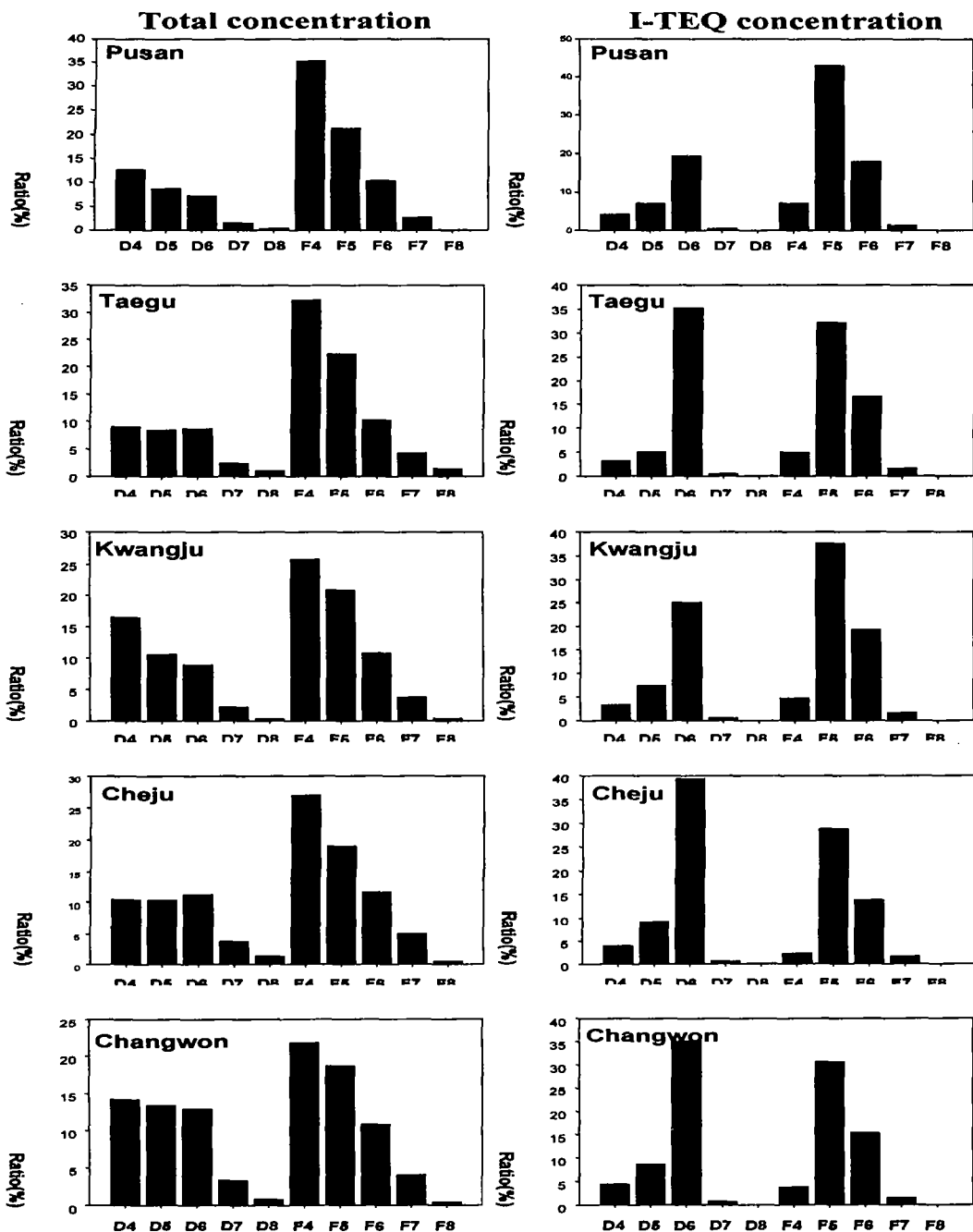


Fig. 3. Congener profiles of total and I-TEQ concentration for each site.