STUDY ON POLLUTION SITUATION OF PCDD/Fs ON URBAN DIFFERENT FUNCTIONAL DISTRICTS

Shi YH, Hu JX, Cheng AL
College of Environmental Sciences and Engineering, Peking University, Beijing 100871, China

Introduction

Because of their high toxicity, persistence and bioaccumulation, Polychlorinated dibenzo–p-dioxins and dibenzofurans (PCDD/Fs) have caused great concerns in the area of persistent organic pollutants (POPs). Researches on the levels of pollution, pollution sources, inventory estimation, risk assessment, and control measures of the kind of pollutants have received considerable attention from the researchers worldwide[1, 2]. Taizhou of Zhejiang Province is a important distributing center of electronic waste dismantling in China. There are large-scale waste incineration Station, power plant and large chemical industry park in Jiaojiang industrial Park of Taizhou. Now, researches on the impacts on the environment and health of electronic waste dismantling have became important in the worldwide. The study areas were Taizhou area of electronic waste dismantling and Jiaojiang industrial Park and the concentrations of PCDD/Fs of soils and plants were measured to analyze the pollution levels. On the one hand, the monitoring datas revealed the pollution levels of PCDD/Fs in a typical region, make up the deficiency of monitoring data of the sample PCDD/Fs pollution in the typical area of China. On the other hand, the study could Preliminary analyse for the pollution distribution pattern characteristic in the functional areas, finding the fingerprint feature of its own distribution pattern, infer the possible sources of pollution, to provide methodologies and theoretical guidance for further identify the sources of pollution research.

Materials and Methods

The samples of soils and plants, which are in chemical plants, power plant, municipal solid waste incineration stations and scrap metal processing companies in Jiaojiang area in Taizhou and electronic waste recycling site in Wenqiao Town, were collected in October 2008. And were dealed with freeze-drying, grinding, sifting(100-200 mesh) in the laboratory. Weighed approximately 1g samples,and added an ^{13}C labelled cleanup PCDD/Fs internal standard. ASE extraction was performed by toluene. The extracts were concentrated by rotary evaporator to 1 mL. If the color of the extracts were thick, cleaned the extracts With about 5 mL concentrated sulfuric acid pickling to the colorless, after concentrated, in sequence dealed with multiplicity silica gel column, acidic aluminum oxide column and active carbon column, and joined ^{13}C labelled injection internal standard, then concentrated to 20 μL, and analyzed by HRGC-HRMS.

Results and Discussion

1. PCDD/Fs pollution level on different functional areas

Concentration ranges of PCDD/Fs of soil and plant samples were 134.68-11272.59 pg/g, 260.86-3292.50 pg/g. The range of their TEQ were 1.81-973.91 pg-TEQ/g, 26.11-369.12 pg-TEQ/g. The pollution levels were significantly higher than the background areas at home and abroad[3,4,5]. The pollution levels of PCDD/Fs on soil

samples from different functional areas were compared, the data revealed that the concentrations from high to low were electronic waste incineration site, electronic waste dumping ground, power plants, municipal solid waste incineration stations, scrap metal processing companies, chemical plants. For plant samples, the turn was chemical plants, scrap metal processing companies, electronic waste dumping ground, municipal solid waste incineration stations, power plants. The laws of PCDD/Fs TEQ of the plant samples were different from soil in different functional areas. Therefore, we should considered the different environments in assessing PCDD/Fs pollution levels on a regional.

2. PCDD/Fs isomers distribution pattern of different functional areas

Fig.1 and Fig.2 showed the concentration of OCDD in the PCDD/Fs isomers was the highest on the soil samples of all functional area. although the concentration of OCDD in all isomers was still at a relatively high level on plant samples, but Percentage was lower than soil samples, and the percentage of the HpCDF, HxCDF, and PeCDF were increased. Fig.1 and Fig.2 revealed that the proportion of allocation model of PCDD/Fs concentrations of the isomers were very similar on Soil and plants, and showed there were had similar sources of pollution.

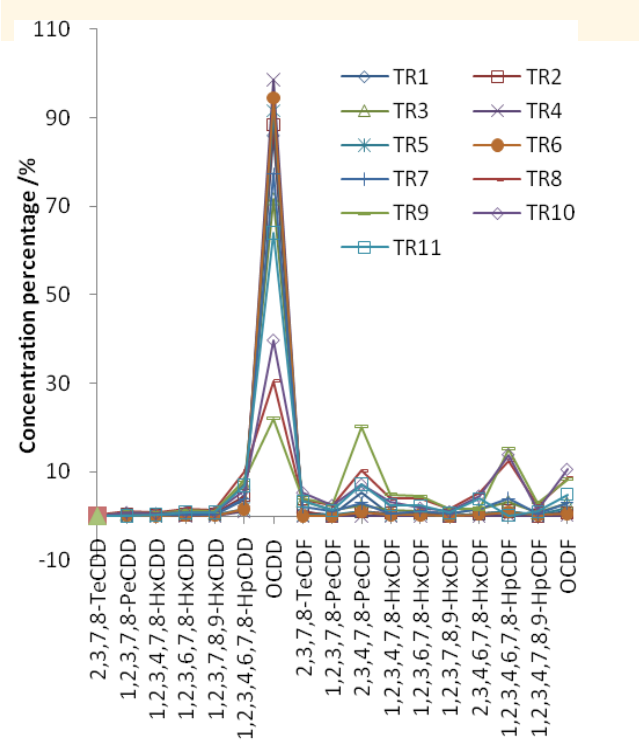

Fig.1 Concentration percentage distribution of PCDD/Fs isomers on soil samples

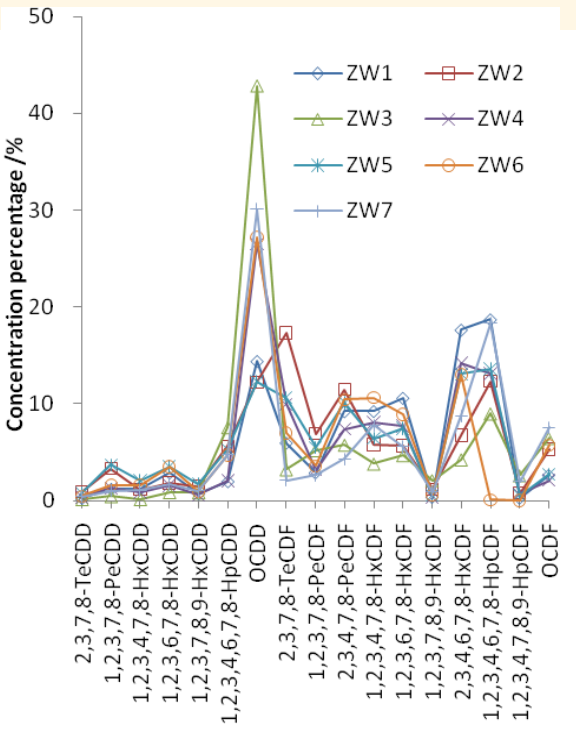

Fig.2 Concentration percentage distribution of PCDD/Fs isomers on plant samples

Fig.3 and Fig.4 revealed that 2,3,4,7,8-PeCDF was the highest in the TEQ of 17 PCDD/Fs isomers on soil samples. The next were 1,2,3,7,8-PeCDD, 2,3,7,8-TeCDF, 2,3,4,6,7,8-HxCDF, 1,2,3,6,7,8-HxCDF and 1,2,3,4,7,8-HxCDF. 2,3,4,7,8-PeCDF was the highest in the TEQ on Soil samples, The percentage was

31%-47%, and an average was 39%, The next were 1,2,3,7,8-PeCDD, 2,3,4,6,7,8- HxCDF, 1,2,3,4,7,8-HxCDF, 1,2,3,6,7,8-HxCDF and 2,3,7,8-TeCDF. It could be seen, the distribution of the toxic equivalency were similar on soil and plant samples, and further proofed that they had similar sources of pollution.

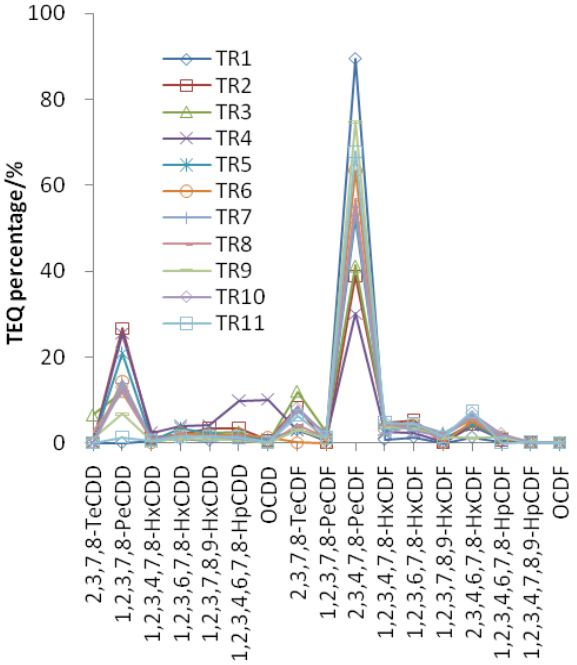

Fig.3 The TEQ percentage distribution of PCDD/Fs toxic isomers on soil samples

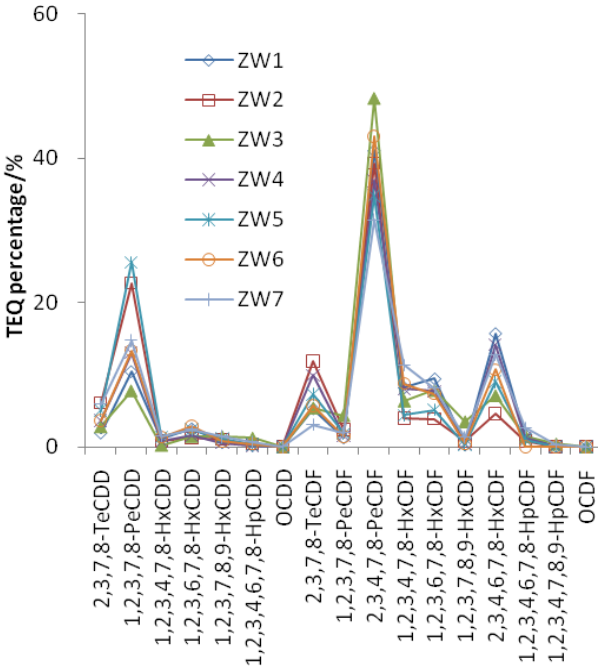

Fig.4 The TEQ percentage distribution of PCDD/Fs toxic isomers on plant samples

Acknowledgements

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