

Dioxin sources in Hungary

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Introduction

Combustion of Municipal Solid Waste or Hospital Solid waste in Municipal or Hospital Waste Incinerators (MWIs and HWIs) yields products of incomplete combustion (PICs) such as polychlorinated-dibenzo-p-dioxins (PCDDs) and polychlorinated-dibenzo-p-furans (PCDFs). Since 1977 when these products were first analysed in fly ash samples of MWIs (1) and later in fly ash samples of HWIs, it became clear that these incineration techniques are one of the main sources of PCDD/PCDF.

In Hungary - in centre of Middle-Europe - combustion has become an important means of waste management. At present, about 35 % ($3 \cdot 10^5$ tons) of the total household waste of Budapest ($8 \cdot 10^5$ tons) and about 25 - 30 % ($1.5 \cdot 10^5$ tons) of the total hospital waste ($6 \cdot 10^5$ tons) of country are combusted by one Municipal Waste Incinerator and about 100 - 150 Hospital Waste Incinerators. The Municipal Waste Incinerator is situated in Northeast Region of Budapest and it can be say, that all of the hospitals - in country side and in Budapest - have a small waste incinerator. The capacity of Municipal Waste Incinerator about $3 \cdot 10^5$ tons/year and capacity of hospital waste incinerators between 150 - 750 tons/year/incinerator. These incinerators are batch type instruments and most of them has a poor gas cleaning system (eg. cyclone). Present total emissions into the air of polychlorinated-dibenzo-p-dioxins and furans (PCDD/PCDFs) are estimated at about 5 - 10 g/year from MWI and 3 - 15 g/year from HWIs.

Materials and Methods

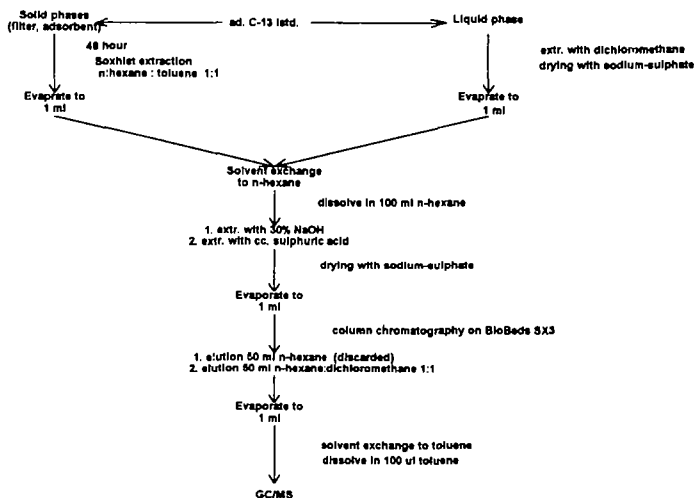
Instruments and Materials

- Emission Parameter Analyser instrument based on EPA-5 sampling Method
- Soxhlet extractor
- Gas-chromatograph (HP-5890A)
- Mass spectrometer (HP-5989 MS Engine)
- C-13 internal standards (2)
- Florisil, BioBeds SX-3, sodium-hydroxide, sulphuric-acid, sodium-sulphate

Sampling and clean-up

Stationary source samples are collected using a procedure based on US EPA Method 5 for the isokinetic sampling of stack gas emissions. The sampling train consist in sequence of a heated filter compartment, cooled ethylene-glycole impingers followed by Florisil trap (Florisil was activated on 130 °C, 12 hours).

In general, after carried out 5 - 10 m³ (2 -5 Nm³) stack gas through the sampling system the different phases of the sample - filter, adsorbent and absorbent - were extracted by the next scheme (3):



Mass spectrometry: quantification was carried out in EI (70eV) multigroup selected ion monitoring mode on two isotope peaks of analytes and internal standards (4).

Results and discussion

The average concentration of PCDD/PCDF compounds in stack gases of estimated 25 Hospital Waste Incinerators are between 0.1 - 70 TEQ/Nm³. These instruments have different exhaust gas cleaning systems, some of them very old - eg. cyclone - but one incinerator has a new system, which consist of dry scrubber, baghouse filter and charcoal filter. Only this instrument has emission parameters, that agree with regulation in Hungary (0.1 ng TEQ/Nm³). The emission of others is between 10 - 70 ng TEQ/Nm³.

Conclusion

The Hospital Waste Incinerators in Hungary are very different. Only one of them has a powerful stack gas cleaning system and the others are very poor. These instruments are emitting a high level of dioxins and furans to ambient air. Some of these old instruments were shut down nowadays and some of them have to be reconstruct or rebuilt and equip with new gas cleaning system.

Aknowledgement

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Literature

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