

Wet scrubbers – a potential PCDD/F source ?

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1. Introduction

Several authors report about increasing PCDD/F concentrations in the clean gas of waste incineration plants downstream of the wet scrubbing systems. At the same time, a change of the congener profile is observed. According to RAPPE ¹⁾, these results can only be explained by the formation of PCDD/F in the scrubbers. By application of statistical methods, it is demonstrated by PEDERSEN ²⁾, however, that the deviation of the measured values must be attributed solely to accumulated errors during sampling and analysis. Due to these contradictory results, a measurement program has been started at the KfK test facility for waste incineration, TAMARA ³⁾, to settle this question.

2. Experimental

The exhaust gas cleaning system of TAMARA (Fig. 1) consists of a fabric filter and two scrubbers operated at a variable pH value at a temperature of about 60 °C.

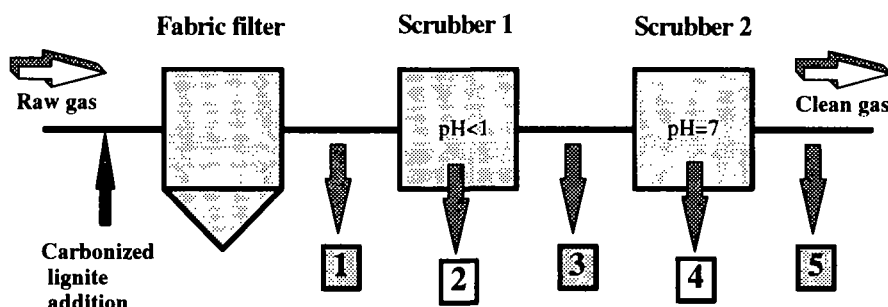


Fig.1: Flue gas cleaning system with sampling positions

During our test, samples were taken at the positions indicated in Fig.1 and analyzed for their PCDD/F content. It was the objective to record the exact mass balance of the scrubbing sys-

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tem. Two test series were performed. During the test series 1, the typical PCDD/F levels in the flue gas TAMARA downstream the fabric filter were found. In test series 2, carbonized lignite dust was injected upstream the fabric filter. Thus, Σ PCDD/F concentrations of $< 5 \text{ ng/Nm}^3$ were obtained downstream of the fabric filter. Several measurements were carried out.

3.Results

In the scrubbing water taken at positions 2 and 4, only trace amounts ($< 1\%$ of the total inlet mass flow) of PCDD/F were detected. In Fig. 2 and Fig. 3 the local concentrations measured

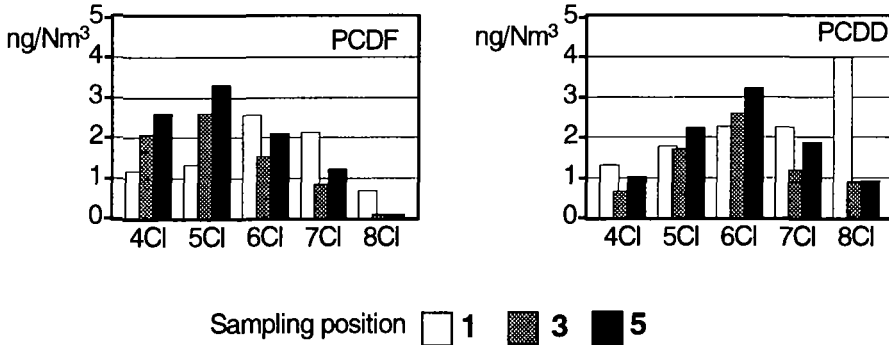


Fig.2: Results of test series 1 (without carbonized lignite addition)

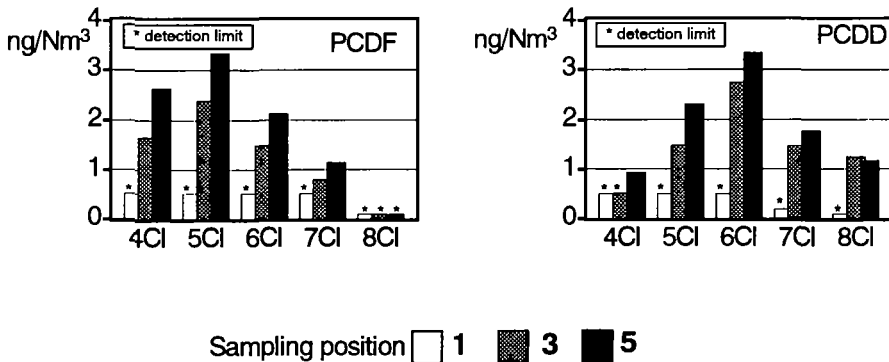


Fig.3: Results of test series 2 (with carbonized lignite addition)

at the positions 1,3 and 5 are plotted for both test series. It is obvious from these plots that the total PCDD/F concentrations measured at the positions 1 through 5 during test series 1

had not changed within measurement accuracy. Downstream of scrubber 1, however a considerable shift of the congener profile was to be observed. PCDD/F concentration is slightly increased by scrubber 2, the congener profile is not affected. In test series 2, Σ PCDD/F concentration downstream of the fabric filter (sampling position 1) was found to be below the detection limit of $<5 \text{ ng/Nm}^3$. At the positions 3 and 5, however the concentrations and the congener profile corresponded to those of test series 1.

After having obtained the results, the investigations were also performed to the materials used as components in our flue gas cleaning system. It was found out, that polypropylene has a significant temperature dependent absorption potential for PCDD/F. It was demonstrated by further experiments that also other plastics exhibit these properties. Within the framework of this lecture detailed results shall be presented with regard to the absorption and desorption behavior of polypropylene, polyethylene and technical rubber.

4. References

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- 3) Merz. A., Vogg H.: TAMARA - a KiK research tool for refuse incineration. Int. Conf. on Incineration of Hazardous, Radioactive and Mixed Wastes, San Francisco, Calif., May 3-6, 1988 Proc.