Technique of Monitoring Dioxins in Flue Gas from MSW Incinerators using Dioxin Precursor Analyzer

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The dioxin precursor analyzer developed by NKK was experimentally adopted at a running MSW (Municipal Solid Waste) incinerator to measure the concentrations of dioxin precursors continuously for a period of 70 days. It was verified that the concentration of a specific type of dioxin precursor and that of dioxins were closely correlated, hence it is possible to estimate the concentration of dioxins by measuring that of a dioxin precursor.

1. Introduction

There is an urgent need to reduce dioxins emitted from MSW (Municipal Solid Waste) incinerators and other sources. The Law Concerning Special Measures against Dioxins obligates the concentration of dioxins to be measured at least once a year, but to reduce the emissions of dioxins from waste incinerators and other sources, measurement only once a year is inadequate; more frequent measurement and comprehensive control of facility operations are required. For this purpose, a technology for quickly measuring the concentration of dioxins and monitoring it continuously is needed. In the past, the analysis of dioxins required much manpower, time, and cost. In order to link the measurement of dioxins with the operation control of a waste incinerating facility, directly monitoring the emissions of dioxins on site would be effective, but no technology has yet been established for analyzing dioxins directly and quickly.

In view of the close correlation found between the concentration of dioxins and those of dioxin precursors, particularly chlorobenzenes, a dioxin precursor analyzer that can measure the concentrations of dioxin precursors quickly, economically, and continuously was developed. This paper reports the results of applying the newly developed analyzer at a running MSW incinerator for measuring the concentrations of chlorobenzenes continuously for a period of 70 days.

2. Outline of the dioxin precursor analyzer

The concentrations of dioxin precursors in the flue gas were measured at a running MSW incinerator by the GDX-2000 dioxin precursor analyzer developed and commercialized jointly by NKK and Toa DKK.

This instrument is composed of the analyzing system and sampling system as shown in **Fig.1** and **Photo 1**[1),2)]. The analyzing system has a temperature programmed process gas chromatograph containing an ECD (Electron Capture Detector) and a sample concentration mechanism.

an R^2 value of 0.97 in oxygen 12% equivalent and 0.91 in TEQ (Toxicity Equivalent). These strong correlations suggest that the concentration of dioxins can be estimated based on the concentrations of dioxin precursors. The correlation diagrams with 1,2,4-trichlorobenzene that indicated the highest correlation are shown in **Fig.6** (in oxygen equivalent) and **Fig.7**