Volatilization and Decomposition of Dioxin from Fly Ash with Agitating Fluidized Bed Heating Chamber

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fectively volatilized to the gas phase. In this process other organic compounds can be removed simultaneously with dioxin, thus eliminating sources for dioxin reformation in treated fly ash. Significant suppression of the reformation of dioxin by de-novo synthesis in treated fly ash is expected without a cooling process after the heating chamber. Dioxin in the gas phase is decomposed by the catalyst with high oxidation activity to the stable compounds CO_2 and H_2O. An activated carbon adsorber treats the outlet gas from the catalyst reactor to remove heavy metals evaporated in the heating chamber.

3. Agitating fluidized bed heating chamber

In an ideal fluidized bed, powders and gas form a homogeneous mixing zone and powders circulate intensively in the fluidized bed. These phenomena provide very high contact efficiency of the powders and gas as well as high exchange frequency of the powders against the heating chamber wall. If a fluidized bed is used as a heating chamber for powders, effective heating can be achieved by using either heated gas flow through a distributor or electric heating of the chamber wall.

The use of a fluidized bed heating chamber to heat the fly ash offers several advantages:

(1) Homogeneous temperature in the fly ash in the chamber,

(2) Excess heating of the wall to heat the fly ash to a sufficient temperature for dioxin removal is not needed, and so agglomeration of the fly ash caused by chlorides in the fly ash can be avoided, and

(3) Dioxin volatilization is promoted by good contact efficiency of the fly ash and air.

The fluidization phenomenon strongly depends on the powders and gas velocity, and so it is necessary to optimize the fluidization conditions for the fly ash to obtain the advantages listed above. **Fig.2** shows the classification [illegible] cerning dioxin and heavy metals. The maximum fly ash treatment capacity of the pilot plant is 100kg/h.

Fig.3 shows the structure of the agitating fluidized bed heating chamber. The outside wall of the cylindrical chamber is heated by an electrical heater. Fly ash is fed from the upper part of the chamber and treated fly ash is extracted from the bottom of the chamber. Preheated gas is introduced via the distributor at the bottom of the chamber, and the outlet gas passes through a bag filter to trap accompanying fly ash.

Fig.3 Agitating fluidized bed heating chamber

4. Results and discussion

4.1 Heating efficiency of agitating fluidized bed heating chamber

Table 1 shows the operation results of the agitating fluidized bed heating chamber. When the fly ash feed rate is 60kg/h and the temperature of the electrically heated chamber wall is 425 , the temperature of the fly ash fluidized bed is maintained at 400 . The temperatures measured at six different points in the fluidized bed are within 5 of each other. The heat transfer coefficient from the chamber wall to fly ash is calculated to be

Table 2 Operating conditions of pilot plant

The results of measurements of dioxin in the fly ash are shown in **Table 3**. The TEQ value at the kneading machine outlet (2) was sufficiently low at 0.0085ng-TEQ/g, and was considerably below 0.1ng-TEQ/g. This result showed that the dioxin volatilization and decomposition process with the agitating fluidized bed heating chamber provided high dioxin reduction efficiency. Significant suppression of dioxin reformation by de-novo synthesis in treated fly ash was also confirmed because this performance was obtained without a cooling process.

Table 3