The Use of Lignite Coke

for Flue Gas Cleanup in Refuse Incineration Plants

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Incineration represents the central technology for solving today's refuse problems. Highly automated combustion control systems and efficient flue gas cleanup systems minimize pollutant emission. Despite this fact refuse incineration has never before recorded such a low level of acceptance among the population. So increasingly stringent environmental protection laws impase new standards for the emission of toxic substances which are cleaned only insufficiently by conventional cleanup plants so that small quantities are still emitted /1/.

These emissions, including above all organic pollutants, such as dioxins and furans, gaseous and dust - bound metals such as Hg, Cd, Pb and remainders of SO_2, HCl, HF, can be reduced by extending the flue gas cleanup system by a lignite coke filter stage. In numerous pilot, test and demonstration plants using different process systems the excellent separation rates for all these pollutants were confirmed as shown in tab. 1 /1,2,3,4/.

The separation mechanisms observed are as diverse as the properties of the various substances. In addition to mere filtering, as for example of dust, adsorptive reactions take place (e.g. SO_2, HCl); also catalyst reactions (e.g. SO_2 - H_2SO_4) and chemical bindings to basic constituents (e.g. H_2SO_4 - $CaSO_4$; HCl - $CaCl_2$) can be observed. Some of this effects interact; so e.g. the formation of H_2SO_4 is prefered while the adsorption of HCL take place in back regions of the bed (fig. 1). In counter flow reactors this effect of different regions of pollutat separation allows the coke layers laden for example with dust and mercury to be discharged seperately from the other layers.

The investigations to determine the separation capacity of lignite coke were carried out in various practical tests made for a period of several thousand operating hours in industrial - scale and demonstration plants of the refuse incineration plant Düsseldorf.

The main results with regard to the reduction of dioxin and furan emission are shown in fig. 2 and fig. 3. The concentration of 2378 - TCDD is reduced to a level below the detection limit of 4 pg/m^3. A limit value of 0,1 ng/m^3 for the toxicity equivalent according to the Federal Board of Health, wich is beeing discussed at the moment, can be maintained with any problems.

For the varity of possible combinations of conventional gas cleanup systems with coke filters different ways to get rid of the loaden coke are developed /2,5/, e.g. thermal desorption.

Due to this diversity lignite coke is excellently suitable for gas cleanup and for refuse incineration plants where it can be used as an additional final cleanup stage and "police filter" at the end of the existing cleanup chains. It also offers new and economically interesting ways to reduce refuse residues of conventional cleanup systems /5/.

Literature:

/1/	B. Kassebohm G. Wolfering	Realisierung einer weitergehenden Rauchgasreinigung durch Einsatz von Koks VGB Kraftwerkstechnik 70 (1990) Heft 8
/2/	G. Ritter J. Bewerunge	Braunkohlenkoks zur Reinigung von Rauchgasen aus Abfallverbrennunsanlagen GVC - Tagung 4/6.12.1989 Baden - Baden
/3/	U. Cleve	Stand der Technik und Wirtschaftlichkeit des Einsatzes von Aktivkoks zur Rauchgasreinigung in Abfallverbrennunsanlagen Müllverbrennung und Umwelt, Bd.3, 1989
/4	/B. Kassebohm P. Asmuth G. Wolfering	Möglichkeiten der weitergehenden Rauchgasreinigung hinter Müllverbrennungsanlagen VGB Kraftwerkstechnik 69 (1989) Heft 1
/5/	M. Eicken W. Esser-Schmittmann G. Ritter J. Lambertz	Braunkohlenkoks zur Rauchgasreinigung und Reststoffminimierung von Abfallverbrennungsanlagen submitted paper to: Brennstoff, Wärme, Kraft BWK, 10/1990

Cleaning Capacity of Lignite Coke.

Input:			Clean Gas:
SO_x:	20 - 2000	mg/m^3	<detection limit
HCl:	15 - 5000	mg/m^3	<detection limit
HF:	1 - 20	mg/m^3	<detection limit
Hg,Cd,Pb,.:	0.05 - 0.7	mg/m^3	<detection limit
Dust:	10 - 100	mg/m^3	<detection limit
PCDD/PCDF - TE (BGA)			<0.1 ng/m^3
H_2S:			<detection limit

Tab. 1

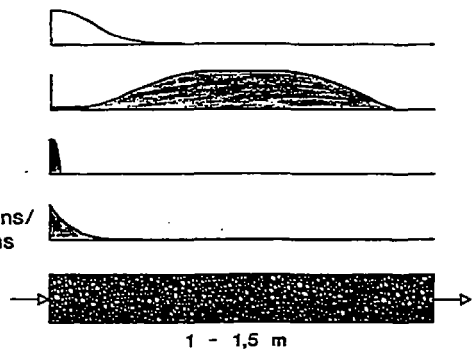

Figure 1 Load profile

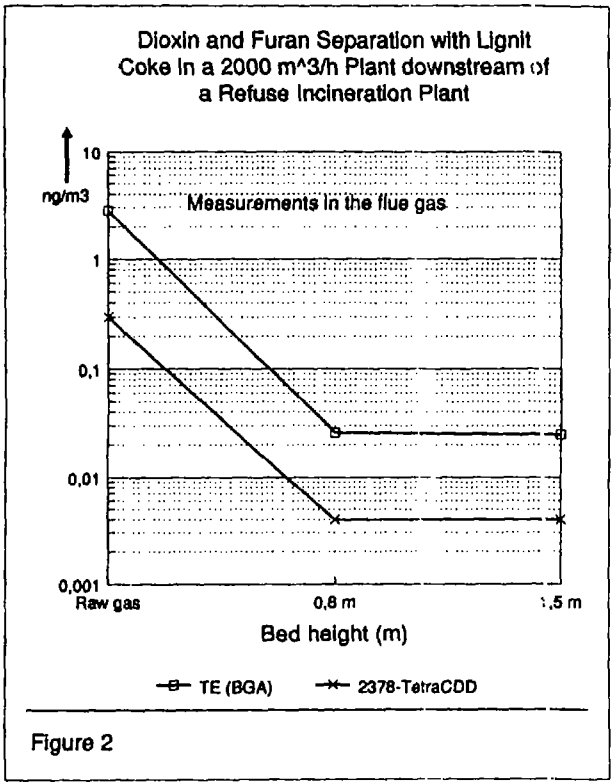

Figure 2

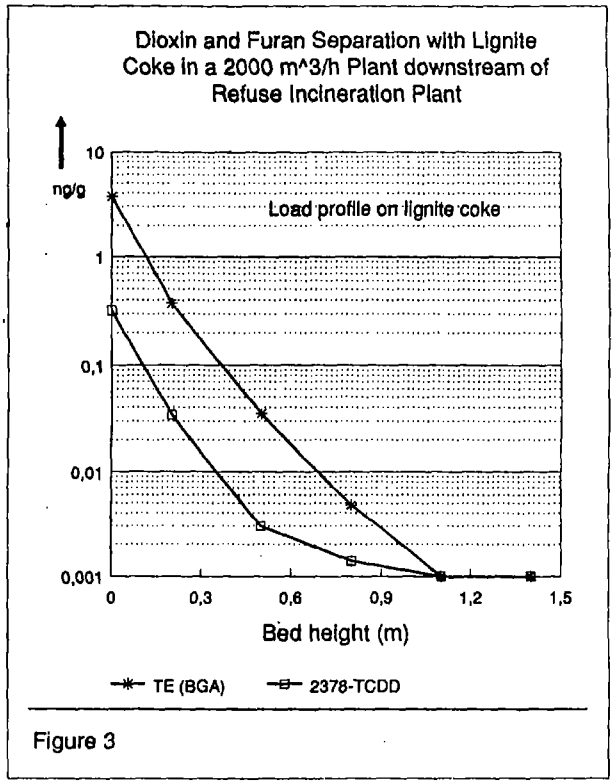

Figure 3