HIGH TEMPERATURE DESTRUCTION OF DIOXIN-CONTAINING SLURRIES WITH PRODUCTION OF SECONDARY PRODUCTS

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Great quantities of slurries are formed in neutralization plants of acid waste waters containing toxic organic components during neutralizing them by lime. For example, at industrial Association Chimprom, Upha, at the present time several hunderd thousand tons of the slurry are accumulated in six storage sites. We have examined the characteristics of representative samples from all slurry storages of the enterprise, The typical composition was found to be the following: moisture content 50.2%; ash content 30.9%; total sulphur 0.8%; carbon 4.56%; hydrogen 0.6%; nitrogen 0.3%; total chlorine 0.25%; oxygen 4.07%. Ash composition: SiO_2 - 24.13%; Al_2O_3 - 6.94%; Fe_2O_3 - 6.1%; CaO - 44.9%; MgO - 5.7%; SO_3 - 10.1%; Na_2O - 1.15%; K_2O - 0.4%; the rest - 0.58%.

The concentrations of PCDD and PCDF in the slurries are shown in the Table.

High temperature destruction of abovementioned slurries in special furnaces will entail great capital and maintenance costs. We arrived at a conclusion, that it is advantageous to use high temperature treatment of the slurries in drum rotary furnaces for cement production. This technology has a number of advantages: (1) using equipment with long residence time of raw materials and gases in high temperature zone; (2) successfull combination of the principle cement technology and consumption of excessive calcium for fixing organic chlorine in calcium chloride.

For appreciating a possibility of building a cement production enterprise in the vicinity of the slurry storages ecological tests of the high temperature treatment process were carried out. The lots of the slurries were delivered from Industrial Association Chimprom, Upha, to the pilot plant equipment of the cement mill near Moscow,clinker througput of which being 100 kg/h.

The results of the experiments demonstrated high ecological efficiency of the slurry disposal process with production of the cement having the following characteristics: C_3S - 64%, C_2S - 14%, C_3A - 9%, C_4AF - 13% which comply with 400 DO Portland cement mark.

While dioxin and furan concentrations in the raw materials were up to 3700 ng/kg, the content of these substances in the clinker was only 65 pg/kg.

On the basis of the performed experiments the energy-saving flow-chart of the unit for high temperature treatment of the slurries with cement production was developed. The unit with aggregate capacity of 2 t/h was designed and its building started.

Putting in operation the unit for slurry high temperature treatment with cement production will permit not only significant ecological improvement of the environment in Upha, but also to produce considerable economic return.

It is an addition to early carried out development concerning dioxin disposal during incineration of concentrated halogen-containing liquid wastes (1).

Reference:

1. Bernadiner M.N. et al.: Reduction of PCDD/PCDF Emissions from an Industrial Incinerator. Organohalogen Compounds, vol. 12, 63-64 (1993).

Table. Concentrations of PCDD/PCDF in the slurry, the clinker, ng/kg, and in the flue gases, ng/m^3.

PCDD/PCDF isomers	Slurry	Clinker	Flue gas
2378-TeCDD	3600.0	-	-
12378-PeCDD	1.9	-	0.168
123789-HxCDD	1.2	-	-
123678-HxCDD	1.9	-	0.029
123478-HxCDD	2.3	-	0.097
1234678-HpCDD	1010.0	0.98	0.512
OCDD	9630.0	14.2	0.610
1234-TeCDD	79.5	-	-
1378-TeCDD	480.0	-	-
12368-PeCDD	5.9	-	0.122
123468-HxCDD	-	-	0.918
1234679-HpCDD	490.0	-	0.105
2378-TeCDF	-	-	-
12378-PeCDF	-	-	-
23478-PeCDF	-	-	-
123789-HxCDD	-	-	-
123478-HxCDF	226.0	-	0.075
123678-HxCDF	211.0	-	-
234678-HxCDF	235.0	-	-
1234678-HpCDF	1300.0	2.3	0.247
1234789-HpCDF	-	-	-
OCDF	6800.0	17.6	0.209
PeCDF	625.0	5.1	-
124678-HxCDF	1450.0	-	0.554
134679-HxCDF	436.0	-	0.1
1234679-HpCDF	323.0	-	-
I - TEQ	3708.13	0.0645	0.105