FLUE GAS TREATMENT IN
ENERGY PLANTS

The produced SO_2 from S combustion that is found in fuel oil burned by energy plants or large steam production units, is oxidized partially to SO_3 which has immediate and harmful consequences both to the plant efficiency and the environment.

$$SO_2 + \tfrac{1}{2}O_2 \longrightarrow SO_3 \xrightarrow[t<130^{o}C]{H_2O} H_2SO_4 \qquad \text{[reaction 1]}$$

> Installation corrosion
> Acid rain
> Acid particles surrounding the installation

SOLUTION

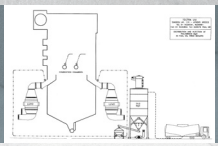
Spraying of magnesia or magnesium hydroxide powder for immediate neutralization of SO_3 and partially SO_2.

$$MgO + SO_3 \longrightarrow MgSO_4 \qquad \text{[reaction 2]}$$

In this application magnesia is the most suitable reagent, because, besides the stoichiometric advantage, as depicted on table [1], its main competitor CaO can not be used due to the formation of gypsum which creates hard deposits, blockage problems and other unit operational problems.

Spraying of fine and reactive magnesia powder at the pre-heaters (LUVO) neutralises SO_3 according to reaction [2] and prevents the formation of sulphuric acid according to reaction [1] thus avoiding the destructive consequences for both the installation and the environment.

Suspensions of magnesia and $Mg(OH)_2$ are usually sprayed at the combustion chamber, which, apart from their basic action [reaction 2], also bind low melting point particles of V, Na, K compounds and other constituents of fuel oil, avoiding in this manner formation of deposits and other problems in the burner.



Flue gas treatment of steam generators using magnesia

STOICHIOMETRIC NEUTRALISATION OF 1kg SO_3

REAGENT			REACTION PRODUCT	
REAGENT	COMPOSITION	QUANTITY (kg)	COMPOSITION	QUANTITY (kg)
1	MgO	0.504	$MgSO_4$	1.504
2	$Mg(OH)_2$	0.729	$MgSO_4$	1.504
3	$Ca(OH)_2$	0.925	$CaSO_4$	1.700
4	Na_2CO_3	1.325	Na_2SO_4	1.772
5	$NaHCO_3$	2.100	Na_2SO_4	1.772

[table 1]