

Model Studies of the Solubility of Inorganic Fluoride and Aluminium in the Polluted Coastal Marine Environment in the Vicinity of a Large Aluminium Smelter

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Summary

Detailed model calculation was performed using SOLGASWATER program to describe the possibility of fluoride removal in the industrial process and also to calculate the fluoride speciation in various stages of the system of the wet scrubbing equipment and in the sea water to which fluoride and aluminium are discharged.

Results: A large aluminium smelter operating at the Adriatic coast of Yugoslavia uses a scrubbing system in which aluminium cell gases are dissolved in saline water (around 50% sea water) in recirculation. About 5-8% of the regenerated water is discharged into the factory sewage system and then into the sea. Alusuisse process originally designed for river water, with lime slurry process to remove fluoride ion as insoluble calcium fluoride¹, was found to be inadequate for the only avai-

lable saline water used in recirculation system. Problems have already been discussed^{2,3}. The extent of scrubbing of gases, solid particles sedimentation and fluoride removal were rather poor. Fluoride was discharged into the sea in known and aluminium in unknown quantities. Recent literature reports negative effects of both elements, when the concentrations are exceeding natural⁴. Pankhurst et al.⁵ have found that fluoride loaded effluent was affecting the encrusting community for up to 400 m from the point of input. The present paper describes some experimental results together with some model calculations to point the existing problems. SOLGASWATER program⁶ was used to calculate speciation and equilibrium conditions in the different parts of the industrial process, and also to predict the kind of disturbance of a natural sea water system by adding fluoride and aluminium by man's activity.

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