

Environmental Toxicity of airborne Gypsum Particles

While the calcium sulphate in Natural and Flue Gas Desulphurization (FGD)-gypsum is basically non-toxic, metal, metalloid and fluorine impurity profiles were investigated in order to assess risk control for occupationally exposed people as well as for the general public. 20 trace elements and their levels over many years from worldwide samples have been identified. Toxicity threshold levels for them have been collected from the literature. Due to the limited exposure on the oral route in combination with related high toxicity thresholds, and due to the expectation of absence of relevant dermal exposure, the study focused on inhalation toxicity. Any acute and subacute inhalation exposure was way below any toxicity threshold, and accordingly subchronic and chronic exposure was considered.

In the context of the REACH registration requirements, an exposure scenario (ES) according to generally accepted standards was calculated. In addition to that, workplace measurements were performed, which confirmed the model results. Considering the regulatory requirement to distribute the ES with the eSDS, it was kept short and represents therefore a generic level avoiding also sub-scenarios for consumers and workers. Significant refinement should be applicable to the concluded worst case exposure assumptions.

Since a chronic exposure was considered, 95th percentile contents of the trace elements in all samples were used and their molar fraction in airborne gypsum dust particles was assumed to be the exposure. Compared with the established toxicity threshold levels, risk control was demonstrated for all impurities considering the relation of the exposure to non-toxic concentration (RQ). FGD gypsum showed RQ-values below 1 for all trace elements and thus risk control is demonstrated. The evaluation focussed on the today most discussed parameter mercury.