

## The Safe Use of Enzymes in Pulp & Paper mills / the Pulp & Paper Supply Chain

Enzymes are used in many processes within pulp and paper mills saving electricity, water, and chemicals. This leads to cost savings on resources and inputs, as well as reduced environmental impacts for the mills.

Enzymes are able to cause respiratory sensitization, and sensitization may cause respiratory allergy in individuals exposed repeatedly to sufficiently high airborne concentrations of enzyme dust or aerosols. There is no scientific evidence that enzymes are skin sensitizers by skin contact or cause sensitization by ingestion.

Respiratory allergy caused by enzymes is similar to the respiratory allergy caused by well-known allergens like grass pollen, house dust mites or cat dander, and the symptoms from an enzyme allergy are also similar to the symptoms known from allergies towards grass pollen, house dust mites, cat dander etc.

AMFEP (The Association of Manufacturers and Formulators of Enzyme Products) is aware of this potential safety risk for workers in Pulp & Paper mills and is providing safety stewardship to companies using enzyme products. Experience for more than 40 years in the Detergent industry has proven that enzymes can be used safely in work places.

Respiratory symptoms potentially resulting from occupational exposure to enzymes can be controlled by proper process controls, proper formulations of enzyme products, and adequate handling instructions to avoid creation of dust or aerosols. In general, AMFEP recommends the use of low-dusting enzyme product formulations as the first resort of controlling exposure to enzymes.

Controlling enzyme exposure in Pulp & Paper mills will definitely reduce the likelihood of work related respiratory symptoms. It is of key importance to prevent enzyme handling activities which are generating enzyme dust or creating enzyme aerosols, especially if processes are not closed and with only general or no ventilation. A qualitative exposure assessment should be conducted as part of the risk assessment.

Explicit guidelines for controlling enzyme exposure in production facilities can also be found in the “Guidelines for the safe handling of enzymes in detergent manufacturing” published by the international Association for Soaps, Detergents and Maintenance Products ([AISE, 2015](#)).

This guideline was developed for the Detergent industry but the principles stated in there are generally applicable and can be used by other industries.

Enzyme suppliers can advise on the use of specific enzyme preparation and offer support in conducting a qualitative and/or quantitative exposure assessment.

On behalf of AMFEP  
April 2017  
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