

Handling or Working with Enzymes ?

STOP AND READ THIS FIRST!

What are Enzymes?

Enzymes are present in all living organisms. They are proteins that are essential for life in plants, animals, insects, and microbes. Enzymes speed up chemical reactions or are necessary for processes like the digestion of food. Because of their function, enzymes are also important ingredients for industrial processes and consumer products.

Are Enzymes Hazardous?

Enzymes are non-toxic, but they may irritate the skin. More importantly, because they are proteins the body can react to them in the same way that some people might react to inhaling pollen that is in the air. They can cause an allergy similar to hay fever or to asthma. The symptoms of allergy include sneezing, runny nose & eyes, and tightness of the chest.

Exposure and How to Prevent Allergy

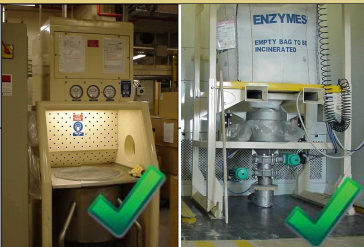
Exposure occurs if enzyme dust or aerosol [fine droplets of liquid] from raw materials or finished products is inhaled. This exposure can be prevented or minimised to a safe level by preventing enzymes becoming airborne, by containing and controlling any airborne dust or aerosol that cannot be avoided, by using the protective equipment provided, and always following the correct operating procedures.

ALWAYS FOLLOW THESE IMPORTANT GUIDELINES

Containment & Control of Enzyme Dust and Aerosol

Enzymes and products containing enzymes must always be handled and processed in ways that avoid the formation of dust or aerosol, and with engineering control measures to contain dust and aerosol should they be produced.

Small quantities of enzymes [$< 1\text{kg}$] may be dispensed manually and dosed into a process manually – but never dispense or dose enzymes without proper containment and ventilation control to prevent the release of dust and/or aerosols



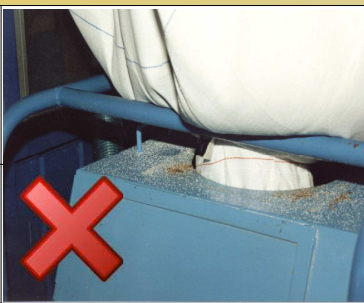
Larger quantities of enzymes [$> 1\text{kg}$] must be discharged, weighed & dosed into a process using fully contained [i.e closed] systems; and any downstream process must also be fully contained to prevent the release of dust or aerosol

If there are any gaps or openings in the process containment then process ventilation control will be required to ensure an inward flow of air into the process and thus prevent the release of enzyme dust or aerosol.



Safe Working Practices

- Any spill containing enzyme products must be cleaned up immediately using the proper procedure
- Empty enzyme containers must be cleaned and disposed of according to instructions
- See "Spillage Clean Up" below



Enzyme granulates must be kept intact to avoid the release of enzyme.

- Do not splash fill containers or vessels
- Do not stir vigorously
- Do not spray enzymes [unless inside a closed process]



Change your work clothes according to company instructions.

- Do not wear contaminated work clothing in the canteen, or at home.
- Wash your hands frequently and before leaving the work area

Avoid aerosol generation from liquid enzymes and liquid enzyme products.

- Do not splash fill containers or vessels
- Do not stir vigorously
- Do not spray enzymes [unless inside a closed process]

Study your local procedures for safe handling of enzymes.

Respiratory and Personal Protective equipment

It may be occasionally necessary to wear Respiratory Protection [e.g. a dust mask] and Personal Protection [e.g. gloves & safety glasses , face shield, etc].

Unless it is an emergency; these should only be considered as secondary protection in addition to other control measures.

- Respiratory Protection must be clean and checked for proper fit and function before use as per manufacturers instructions

- Respiratory Protection must be cleaned regularly and stored correctly – prevent contamination from dust or enzymes.

- For Secondary Protection a P2, FFP2 or N95 respirator is recommended
- For Primary protection during emergencies or for high risk tasks then a P3, FFP3 or N100 is required
- The type and grade of respirator actually required must be established by local task based risk assessment.

In general it is good industrial hygiene practice not to have skin contact with any raw materials or ingredients.

If there is a risk of skin contact then use additional protective clothing such as gloves, safety glasses, aprons, lab coats and face shields

First Aid Measures In Case of Exposure

EYE CONTACT

Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing if eye irritation persists.

SKIN CONTACT

Wash with plenty of soap and water. Remove contaminated clothing

INGESTION

Rinse mouth. If swallowed: call a POISON CENTRE or doctor/physician if exposed or if you feel unwell.

INHALATION

If breathing is difficult, remove to fresh air and keep at rest in a position comfortable for breathing.

General advice : Seek medical advice/attention (local first aid or company doctor) if skin or respiratory irritation persists, or in case of shortness of breath.

Spillage Clean-up / Cleaning Plant and Equipment [Enzymes and Products Containing Enzymes]

- Brushes, brooms, high pressure water and/or compressed air must never be used for cleaning as these will generate airborne dust and/or aerosols
- When dealing with spillages, or undertaking cleaning, always wear respiratory and personal protective equipment
- Smaller spillages of solids should be removed immediately by a vacuum cleaner fitted with two filtration stages, the final filter being Eu13 HEPA (high efficiency)
- For larger spillages put up warning signs, restrict access, & notify emergency spillage team if necessary.
- Larger spillages of solids may need to be carefully shoveled into a robust container suitable for containment of the waste and disposal.
- All liquid spillages may be washed to drain & effluent treatment system using low pressure water – ensure this complies with local legal requirements
- Final cleaning of residues may be done by HEPA vacuum and/or low pressure water to drain. Wet mopping is also acceptable.
- Liquid spillages must not be allowed to dry out to avoid raising aerosols or dust from the dried preparation.
- If there is a risk of airborne enzyme after cleaning, restrict access, ventilate the area and measure for airborne enzyme

