AMFEP AND ETA POSITION ON CONSUMER RISK ASSESSMENTS FOR ENZYME-CONTAINING PERSONAL CARE PRODUCTS AND COSMETICS

PURPOSE:

The purpose of this AMFEP/ETA position is to inform both potential producers and users of enzymes in personal care products and cosmetics of the potential health risks of enzymes and to recommend the framework for conducting risk assessments to help ensure the safety of new enzyme containing products.

Experience in the cleaning products industry demonstrates that the potential risk of adverse effects can be successfully managed by identifying the hazards, carefully assessing potential exposures, characterizing the risk and then applying appropriate risk management. If the risks are not managed appropriately, the consequences may spread beyond a single product or company. This could lead to unwarranted limitations on the use of enzyme technology in other consumer applications. Good stewardship of enzymes involves accurate hazard characterization of enzyme-containing products and proper risk assessment for both existing and new uses to prevent the development of allergy in workers and consumers.

THE CONSUMER RISK ASSESSMENT PROCESS:

This process is divided into four steps, namely, **hazard identification**, **dose-response assessment, exposure assessment** and **risk characterization**. The risk assessment process for enzymes follows this general approach, but benchmark exposures to define effect and no-effect thresholds are used instead of classic dose-response curves. Benchmark values are based on studies in which measured or estimated exposure levels are associated with a demonstrated effect or the lack of a biological effect in the people exposed.

Hazard identification: The toxicology of enzymes is unremarkable; acute and sub-chronic toxicity is not of concern for enzymes.

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The most significant hazard is inhalation allergy (Type 1 hypersensitivity) of the same kind as seen in allergic reactions to other protein allergens from pets, dust mites, pollens, etc. The symptoms can occur immediately or up to several hours after exposure to the allergen. In addition, some enzymes (proteases) in high concentrations may produce skin or eye irritation.

Skin sensitization (Type IV delayed hypersensitivity) is not considered to be associated with enzyme products. This is supported by predictive testing in man (Association Internationale de la Savonnerie, de la Détergence et des Produits d'Entretien (AISE), "Enzymes: Lack of Skin Sensitization Potential," 1995).

The **dose-response assessment** consists of determining the amount of exposure to relevant tissues (i.e., the delivered dose) and the corresponding biological effect. The delivered dose will be a function of the level, duration, pattern and route of exposure. This process is not trivial, since the dose-response relationship for enzymes is not clearly defined for inhalation allergy. Therefore, **benchmark values** rather than more traditional dose-response measures are generally used to support decisions in enzyme risk assessments. Such benchmark values are based on studies in which measured or estimated exposure levels are associated with a demonstrated effect or the lack of an effect in the people exposed.

Exposure assessment establishes the amount of enzyme the user may be exposed to during intended use, foreseeable misuse and accidents. This value is then compared to the benchmark exposure to make risk decisions. When conducting an exposure assessment, several factors can influence exposure which need to be taken into consideration such as formulation and product type, delivery system, route of exposure, habits and practices (frequency of use, duration of use, amount of product per application and demographics of use/misuse) and accidental exposure. As a first step, a conservative theoretical calculation can be made. If this indicates that there is a potential for health effects in comparison to benchmark values, then measurements are carried out.

Benchmark values are based on studies in which measured or estimated exposure levels to enzyme are associated with a demonstrated effect or the lack of an effect in the people exposed. The effect can be the development of enzyme-specific IgE antibody and/or the manifestation of allergic symptoms. For detergent enzymes, the benchmark data have been generated from clinical studies, case studies and prospective monitoring of occupationally exposed populations. In general one should be warned that the exposure data should be relevant to that particular use/misuse, and that the extrapolation from one product type to another may not be appropriate.

A more detailed description of benchmark studies can be found in the SDA document “Risk Assessment Guidance for Enzyme-Containing Products” (SDA, 2005), and the HERA (Human and Environmental Risk Assessment) projects “Risk assessment on Subtilisins (Protease)” and “Risk assessment on •-Amylases, Cellulases and Lipases” (HERA, 2005).

Risk characterization is the examination of the relationship between human exposure (calculated or measured) and the inherent toxicity of a substance to assess the likely incidence and severity of any effect. This step is important because it integrates information regarding the hazard identification and exposure assessment associated with use and foreseeable misuse of a product. Decisions taking during risk characterization become part of the risk management process.

THE CONSUMER RISK MANAGEMENT PROCESS:
The objectives of the risk management process are to determine the significance of risks to human health, to ensure that the product use is and remains within the acceptable risk, and to effectively communicate risks, or lack thereof, to appropriate audiences.

AMFEP/ETA encourages that the appropriate risk assessment process be conducted prior to the introduction of enzymes in personal care and cosmetic products.

More detailed information on this topic can be found in the SDA (Soap & Detergent Association) entitled "Risk Assessment Guidance for Enzyme-Containing Products" (SDA, 2005).