

# International Conference on Nurturing Sustainability through Innovations in Science and Technology for Global Welfare



Contribution ID: 23

Type: Poster

## Optimisation and Purification of the Galactosidase Enzyme from Almond (*Prunus dulcis*): A Study on Process Parameters and Purification Techniques

Galactosidase enzymes, especially  $\beta$ -galactosidase, are important in the hydrolysis of galactosides and influence a large number of industries, especially food and biotechnological processing. Almonds (*Prunus dulcis*) are considered as a natural source of galactosidase, a potentially valuable one that needs to be further exploited to develop extraction and purification protocols. This involves optimization of major process parameters that favor the extraction of galactosidase from almond kernels: pH, temperature, enzyme-substrate ratio, and incubation time. After extraction, various purification methods, including ammonium sulfate precipitation, dialysis, and chromatographic methods such as ion-exchange chromatography and gel filtration chromatography, are adopted for purification of the enzyme to its maximum. The effectiveness of these techniques is evaluated based on specific activity, yield, and purification fold. This work reports the biochemical properties of the purified enzyme, kinetic parameters, and thermal stability. The values obtained provide a good framework for large-scale production of galactosidase from almonds, leading to sustainable and cost-effective development of the enzyme for several industrial applications.

Keywords : galactosidase, almond (*Prunus dulcis*), enzyme extraction, purification techniques, ammonium sulfate precipitation, chromatography, enzyme kinetics

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**Track Classification:** Food and Nutrition