



## CERTIFICATE OF PARTICIPATION

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# Valorization of Potato Peels as a Green Substrate for Sustainable Hyaluronic Acid Production

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## **Abstract**

Potato peels, an agro-industrial byproduct, were utilized as a renewable and eco-friendly carbon source to develop an optimized culture medium for sustainable hyaluronic acid (HA) production under anaerobic conditions. Their rich composition provides an economical alternative to conventional carbon sources, promoting microbial growth while enhancing waste valorization and reducing environmental impact.

The optimization process involved fine-tuning nitrogen sources, essential vitamins, cofactors, and precursors to improve HA yield. Fermentations were conducted in Erlenmeyer flasks under strictly anaerobic conditions, with the medium pre-reduced using a nitrogen or carbon dioxide atmosphere, and cysteine HCl added to lower the redox potential. Anaerobic conditions were further maintained using gas-generating sachets and sealed incubation systems.

A sustainable bioprocess strategy was developed through an experimental industrial plan, evaluating key parameters such as salt tolerance, nutrient efficiency, and anaerobic stability. Optimization approaches included testing various culture conditions, implementing a fed-batch system to regulate nutrient supply, and monitoring HA production via viscosity changes and specific staining techniques. The optimized conditions led to a significant improvement in HA biosynthesis, demonstrating the potential of agro-industrial waste as a green material for biotechnological applications.

This study highlights the integration of circular economy principles into bioprocess engineering, offering an innovative approach to waste upcycling and sustainable bioproducts development.

**Keywords:** Waste valorization, Hyaluronic acid production, Anaerobic fermentation, Biotechnological applications, Sustainable bioprocess