UNIVERSIDADE FEDERAL DE VIÇOSA
CENTRO DE CIÊNCIAS EXATAS E TECNOLÓGICAS
DEPARTAMENTO DE TECNOLOGIA DE ALIMENTOS
**Secretaria da Pós-Graduação em Ciência e Tecnologia de Alimentos**
*Campus Universitário – Viçosa, MG – 36570-900 – Telefone (31)3612-6705/6760 – E-mail: tca@ufv.br*

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# IMPACT OF ULTRASOUND ON ENZYMES AND PROTEINS

**Pós-graduando:** Danielly Aparecida de Souza
**Orientador:** Bruno Ricardo de Castro Leite Júnior
**Nível:** ( ) MS (x) DS

The growing demand for efficient and sustainable industrial processes in the food and biotechnology sectors is driving the adoption of unconventional technologies, such as ultrasound, to overcome limitations related to enzymatic instability and the limited availability of plant biomatrices. The application of this technology is based on the phenomenon of acoustic cavitation, characterized by the formation, growth, and collapse of microbubbles, which generates shear stress, turbulence, and localized variations in pressure and temperature within the reaction system. These mechanical effects promote the disruption of molecular interactions and hydrophobic bonds, resulting in protein disaggregation, exposure of functional groups, and significant alterations in the structural and molecular conformation of the matrices. At the macrostructural level, sonication induces a reduction in particle size and polydispersity index, as well as modifying surface charge and intrinsic fluorescence, which favors colloidal stability and catalytic accessibility. These molecular transformations do not translate into the enhancement of essential techno-functional properties, including increased solubility and water- and oil-interaction capabilities, as well as improved emulsifying and foaming performance. The structural modulation allowed by sonication offers a robust strategy for the functionalization of ingredients and the potentiation of enzymatic processes, ensuring greater efficiency and industrial yield. Therefore, ultrasound is consolidated as a versatile and sustainable technological tool, capable of adjusting the physicochemical characteristics of biological systems to meet the specific requirements of large-scale commercial applications.

**Orientador (a)** **Orientado(a)**

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