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ABSTRACTS

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MECHANICAL CELL DISRUPTION OF MICROORGANISMS

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Abstract:
The cell disruption on an industrial scale is employed during the extraction of beta-glucan from the shells of brewing yeast, the production of biofuel from microalgae, and the production of insulin from Escherichia coli bacterial cultures.
Cell disruption, unlike the grinding of solid materials, has a unique nature where the key aspect is not complete grinding but rather damaging the cell wall.
Methods such as ultrasonic, osmotic shock, chemical, and others have been proven limited in their use on large industrial scales. Possible reasons for this limitation include high energy consumption, process efficiency instability, or difficulties in scaling and integrating these methods into production conditions.
Among various mechanical cell disruption methods, pressure application through a gap and mechanical grinding in bead mills are the most widespread. For effective yeast cell disruption, bead mills are recommended, while methods utilizing pressure are preferred for algae. These methods are chosen for their efficiency in breaking down specific cell types and their suitability for industrial conditions.
On an industrial scale, cell disruption utilizes mechanical methods, particularly in bead mills and under pressure in gaps, aimed at disrupting the integrity of the cell wall. While chemical agents may serve as supplements to intensify the process, the ultrasonic method remains confined to the laboratory, as its application on an industrial scale is complicated by high energy costs and rapid equipment wear.

Key words: *bead, cell, disruption, grinding, pressure, mill.*