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An Efficacy of Combination Process on Select Solid and Liquid Food

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ABSTRACT

The efficacy of combination processes on select solid and liquid foods has emerged as a critical area of interest in food science. Combination processes involve integrating multiple preservation or processing techniques, such as thermal and non-thermal methods, to enhance food quality, safety, and shelf life. For solid foods, techniques like sous-vide combined with high-pressure processing can ensure uniform cooking, retention of nutrients, and elimination of pathogens. In liquid foods, combinations such as pulsed electric fields (PEF) with mild heat treatment are effective in reducing microbial loads while preserving sensory and nutritional attributes. These methods address limitations of standalone processes, such as excessive nutrient loss in conventional heating or incomplete microbial inactivation in certain non-thermal techniques. Moreover, the synergistic effects of combination processes optimize energy usage and improve overall efficiency. For instance, integrating UV radiation with filtration in liquid foods not only enhances microbial safety but also maintains product clarity and flavor. Similarly, in solid foods, combining modified atmosphere packaging with antimicrobial treatments can significantly extend shelf life. These advances align with consumer demand for minimally processed, nutrient-rich, and safe food products. As research progresses, the implementation of tailored combination processes for specific food matrices continues to offer transformative potential in the food industry.