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1-Supercritical Extraction Techniques for Obtaining Biologically Active Substances from a Variety of Plant Byproducts

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Abstract

Supercritical fluid extraction (SFE) techniques have garnered significant attention as green and sustainable methods for obtaining biologically active substances from a diverse array of plant byproducts. This paper comprehensively reviews the use of supercritical fluid extraction (SFE) in obtaining bioactive compounds from various plant residues, including pomace, seeds, skins, and other agricultural byproducts. The main purpose of supercritical fluid extraction (SFE) is the selective isolation and recovery of compounds, such as polyphenols, essential oils, vitamins, and antioxidants, that have significant health-promoting properties. Using supercritical carbon dioxide as the solvent, supercritical fluid extraction (SFE) not only eliminates the need for hazardous organic solvents, e.g., ethanol, and methanol, but also protects heat-sensitive bioactive compounds. Moreover, this green extraction technique contributes to waste valorisation by converting plant byproducts into value-added extracts with potential applications in the food, pharmaceutical, and cosmetic industries. This review highlights the advantages of SFE, including its efficiency, eco-friendliness, and production of residue-free extracts, while discussing potential challenges and future prospects for the utilisation of SFE in obtaining biologically active substances from plant byproducts.

Keywords

Author Keywords

supercritical extractionbioactive compoundscarbon dioxidegreen extraction techniquebyproducts

Keywords Plus

BLACK-CURRANTCO2

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2-A comprehensive review of ultrasonic assisted extraction (UAE) for bioactive components: Principles, advantages, equipment, and combined technologies

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Abstract

The increasing focus on health and well-being has sparked a rising interest in bioactive components in the food, pharmaceutical, and nutraceutical industries. These components are gaining popularity due to their potential benefits for overall health. The growing interest has resulted in a continuous rise in demand for bioactive components, leading to the exploration of both edible and non-edible sources to obtain these valuable sub-stances. Traditional extraction methods like solvent extraction, distillation, and pressing have certain drawbacks, including lower extraction efficiency, reduced yield, and the use of significant amounts of solvents or resources. Furthermore, certain extraction methods necessitate high temperatures, which can adversely affect certain bioactive components. Consequently, researchers are exploring non-thermal technologies to develop environ-mentally friendly and efficient extraction methods.Ultrasonic-assisted extraction (UAE) is recognized as an environmentally friendly and highly efficient extraction technology. The UAE has the potential to minimize or eliminate the need for organic solvents, thereby reducing its impact on the environment. Additionally, UAE has been found to significantly enhance the pro-duction of target bioactive components, making it an attractive method in the industry. The emergence of ul-trasonic assisted extraction equipment (UAEE) has presented novel opportunities for research in chemistry, biology, pharmaceuticals, food, and other related fields. However, there is still a need for further investigation into the main components and working modes of UAEE, as current understanding in this area remains limited. Therefore, additional research and exploration are necessary to enhance our knowledge and optimize the application of UAEE. The core aim of this review is to gain a comprehensive understanding of the principles, benefits and impact on bioactive components of UAE, explore the different types of equipment used in this technique, examine the various working modes and control parameters employed in UAE, and provide a detailed overview of the blending of UAE with other emerging extraction technologies. In conclusion, the future devel-opment of UAEE is envisioned to focus on achieving increased efficiency, reduced costs, enhanced safety, and improved reliability. These key areas of advancement aim to optimize the performance and practicality of UAEE, making it a more efficient, cost-effective, and reliable extraction technology.

Keywords

Author Keywords

Ultrasonic assisted extractionExtractBioactive componentsEquipmentCombined technologies

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Keywords Plus

FREQUENCY ULTRASOUNDPHENOLIC-COMPOUNDSGREEN EXTRACTIONPOWER ULTRASOUNDANTIOXIDANT ACTIVITIESENZYMATIC EXTRACTIONACOUSTIC CAVITATIONSWEEP FREQUENCYESSENTIAL OILSSEED OIL