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Extraction of Active Compounds from Plants and Animals Using Deep Eutectic Solvents (DESS)

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Abstract

This section explores into the application of deep eutectic solvents (DESS) for isolating bioactive elements from both plants and animals, marking a fundamental transition towards greener and more efficient practices within the domain of green chemistry. Conventional extraction techniques frequently depend on solvents with significant environmental and health hazards due to their toxic and volatile nature. DESS stand out as a groundbreaking alternative, distinguished by their reduced melting points, harmlessness, and ability to decompose naturally, presenting a safer option compared to traditional solvents. The adaptability and effectiveness of DESS in isolating a wide range of bioactive substances are examined, as well as their potential to serve as a substitute for water in specific extraction scenarios. Additionally, the chapter addresses the obstacles tied to employing DESS, including viscosity and extraction specificity challenges, highlighting the necessity for

continued research to refine and expand the use of DES-based methods for broader industrial use. Upcoming directions and breakthroughs in this area are considered, emphasizing tailoring DES compositions, merging them with cutting-edge extraction methods, and leveraging automation to boost procedural efficacy. The eco-friendliness of DESs is thoroughly evaluated via extensive life cycle analyses, stressing the need for their adoption to be in harmony with the fundamental objectives of green chemistry and the principles of a circular economy. This chapter situates DESs at the confluence of creativity, environmental responsibility, and operational effectiveness in the extraction of bioactive elements, indicating a fertile path for the evolution of green chemistry initiatives. © The Author(s), under exclusive license to Springer Nature Singapore Pte Ltd. 2026.

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Bioactive compounds; Deep eutectic solvents; Green chemistry; Life cycle assessment; Sustainable extraction

Indexed keywords

Engineering controlled terms

Biohazards; Circular economy; Eutectics; Health hazards; Life cycle; Life cycle assessment; Solvent extraction; Solvents; Sustainable chemistry

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