

Abstract

New extraction techniques are being developed in response to the growing interest in bioactive compounds found in nature. The goal of these novel procedures is to extract these chemicals from a range of biomasses and natural sources. In contrast to the conventional extraction methods that have been employed historically, these newer approaches are meant to be more ecologically friendly. On the other hand, phytochemicals, bioactive compounds derived from plant sources, have garnered extensive interest due to their diverse health benefits and industrial applications. The efficient extraction of these phytochemicals is a fundamental step in harnessing their potential. Emerging technologies, such as supercritical fluid extraction, microwave-assisted extraction, and ultrasound-assisted extraction, instant controlled pressure drop, pressurized liquid extraction and negative pressure cavitation have demonstrated improved yields, reduced solvent usage and enhanced sustainability. The integration of phytochemical extraction with biorefinery concepts further showcases the potential for circular economy approaches and zero-waste valorization of plant biomass. The review explores recent advancements in phytochemical extraction, highlighting their impact on human health, environmental sustainability, and industrial applications. It provides a critical analysis of current green extraction procedures in natural product chemistry, aimed at providing insights into strategies to improve both extraction efficiency and eco-sustainability, including innovative techniques, emerging solvents and sustainable approaches.