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Green Extraction Technologies of Flavonoids Containing Pharmaceuticals

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Abstract : Nowadays, there is an increasing demand for biologically active substances from vegetable, animal, and mineral resources. In terms of the use of natural compounds, pharmaceutical, cosmetic, and nutrition industry has big interest. The biggest drawback of conventional extraction methods is the need to use a large volume of organic extragents. The removal of the organic solvent is a multi-stage process. And their absolute removal cannot be achieved, and they still appear in the final product as impurities. A large amount of waste containing organic solvent damages not only human health but also has the harmful effects of the environment. Accordingly, researchers are focused on improving the extraction methods, which aims to minimize the use of organic solvents and energy sources, using alternate solvents and renewable raw materials. In this context, green extraction principles were formed. Green Extraction is a need of today's environment. Green Extraction is the concept, and it totally corresponds to the challenges of the 21st century. The extraction of biologically active compounds based on green extraction principles is vital from the view of preservation and maintaining biodiversity. Novel technologies of green extraction are known, such as "cold methods" because during the extraction process, the temperature is relatively lower, and it doesn't have a negative impact on the stability of plant compounds. Novel technologies provide great opportunities to reduce or replace the use of organic toxic solvents, the efficiency of the process, enhance excretion yield, and improve the quality of the final product. The objective of the research is the development of green technologies of flavonoids containing preparations. Methodology: At the first stage of the research, flavonoids containing preparations (Tincture Herba Leonuri, flamine, rutine) were prepared based on conventional extraction methods: maceration, bismaceration, percolation, repercolation. At the same time, the same preparations were prepared based on green technologies, microwave-assisted, UV extraction methods. Product quality characteristics were evaluated by pharmacopeia methods. At the next stage of the research technological - economic characteristics and cost efficiency of products prepared based on conventional and novel technologies were determined. For the extraction of flavonoids, water is used as extragent. Surface-active substances are used as co-solvent in order to reduce surface tension, which significantly increases the solubility of polyphenols in water. Different concentrations of water-glycerol mixture, cyclodextrin, ionic solvent were used for the extraction process. In vitro antioxidant activity will be studied by the spectrophotometric method, using DPPH (2,2-diphenyl-1- picrylhydrazyl) as an antioxidant assay. The advantage of green extraction methods is also the possibility of obtaining higher yield in case of low temperature, limitation extraction process of undesirable compounds. That is especially important for the extraction of thermosensitive compounds and maintaining their stability.

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