

## EXTRACTION OF ELEUTHEROCOCCUS BY APROTIC SOLVENTS

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In the extraction of eleutherococcus, mixtures of water and alcohol and methyl and ethyl alcohols are used as solvents. The methanolic extracts are used only in scientific investigations. Aqueous ethanolic extracts are contraindicated under the conditions of the fight against alcoholism and in the treatment of young patients. The main disadvantage of aqueous alcoholic solutions consists in their instability, since their most physiologically active constituents - eleutherosides - are cleaved in the presence of water under the influence of enzymes present in the plant. Aqueous alcoholic mixtures cannot therefore be recommended for obtaining eleutherococcus extracts [1]. The production of nonalcoholic preparations is possible by two methods: by eliminating the alcohol from the finished product and by replacing the alcohol by another solvent at the extraction stage.

We have tested the aprotic solvents acetone, methyl and ethyl acetates, and ethyl formates for the extraction of eleutherococcus. This choice was based on the conditions of the existence of moderate polarity and a low boiling point (since the eleutherosides are polar and heat-labile substances), low cost, and low toxicity.

Air-dry raw material from the roots and stems of eleutherococcus ground and freed from lipophilic substances by exhaustive extraction with diethyl ether was investigated. Extraction was carried out in a Soxhlet apparatus for 7 h. The extracts obtained were evaporated in vacuum; the amounts of eleutheroside B, B<sub>1</sub>, and D + E in the dry residues were determined as described in [2]. The figures are given in Table 1. As can be seen from the Table, the rates of extraction correlate with the polarity parameters of the solvents [3]. For the aprotic media tested the values of these magnitudes were lower than for water and alcohols. The relative amounts of eleutherosides in the acetone and ether extracts were higher than in the aqueous and alcoholic extracts. However, the high boiling points and the presence of water in the latter are unfavorable in working with labile solutions of eleutherosides. The aprotic solvents investigated, possessing low boiling points and low heats of evaporation, permit extraction to be performed under mild conditions and alcohol-free preparations with high eleutheroside contents and high physiological activity to be obtained, since they suppress the hydrolytic cleavage of the eleutherosides during the preparation of the extracts.

TABLE 1. Yields of Extractive Substances and Eleutherosides on the Seven-Hour Extraction of Eleutherococcus with Various Solvents (P = 0.95; n = 2)

Solvent	Polarity, (kJ/mole)	Yield of dry extract on the mass of eleutherococcus, %	Amount of eleutherosides B, B <sub>1</sub> and D+E in the extract, %
Ethyl acetate	159.2	0.80±0.15	50
Methyl acetate	—	0.83±0.16	50
Ethyl formate	—	1.09±0.24	65
Acetone	176.4	1.03±0.18	65
Ethanol	216.9	2.46±0.23	48
Methanol	232.0	3.30±0.28	43
Water	263.8	5.50±0.31	25

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