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Comparative analysis of meldonium by TLC in water-organic, aqueous micellar and cyclodextrin mobile phases

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Abstract

Meldonium belongs to the class of quaternary ammonium bases, which are products of the complete alkylation of ammonium salts. Possessing metabolic properties and a wide range of therapeutic action, meldonium is widely used in medicine. At present, modern analytical techniques are used to analyze meldonium in industrial and natural objects. However, most of them are quite expensive and require considerable time. Thin-layer chromatography (TLC), characterized by simplicity, availability of analysis, separation efficiency and cheapness, has gained much less use. In this connection, the purpose of this work was to reveal the analytical capabilities of water-organic, micellar and cyclodextrin mobile phases for meldonium analysis by means of TLC.

Initial meldonium solutions with a concentration of 20 mg/ml were prepared by diluting solutions for injections. Their chromatography was carried out by ascending thin-layer chromatography on plates of various polarities (Sorbfil, Plasmachrom, and RP-18) with a fixed sorbent layer. Aqueous solutions of surfactants (cetyltrimethylammonium bromide [CTAB], cetylpyridinium chloride [CPC], sodium dodecyl sulfate [SDDS], Triton X-100 [TX-100]), of cyclodextrins (β-cyclodextrin (β-CD), 2-hydroxypropyl-β-cyclodextrin (2-HP-β-CD), hydroxypropyl-γ-cyclodextrin (HP-γ-CD)) were used as mobile phases. Chromatographic zones were identified on a Sorbfil video-densitometer (Sorbopolymer, Krasnodar, Russian Federation).

Basic features of the behavior of meldonium were revealed. Based on the calculation of the number of theoretical plates and the height equivalent to a theoretical plate, it is shown that aqueous micellar and cyclodextrin mobile phases allow improving the efficiency of the chromatographic process and the shape of the chromatographic zones of meldonium as compared to water-organic eluents. Optimal chromatographic systems and conditions for their use in the thin-layer chromatography of drugs were selected and substantiated.

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