

acid, which has local anesthetic effect and it is commonly used as a topical pain reliever associated with minor burns, sunburn, scrapes and insect bites or minor skin irritations or in cough drops.

**The aim.** Evaluation of methods of analysis of benzocaine.

**Materials and Methods.** The study and analysis of the existing methods of analysis of benzocaine from 150 bibliographical sources. Electronic databases: Medline, Cochrane, Embase and Springer were accessed using “benzocaine”, “identification of benzocaine” and “assay of benzocaine”.

**Research results.** 46% of the analyzed bibliographic sources presented chemical methods of analysis of benzocaine. Thus, for the identification of benzocaine as a drug substance, the reactions for primary, aromatic amine group are exposed: formation of azo dye, formation of Schiff base, formation of bromine derivatives and also the reactions for esteric group are used: formation of iron (III) or copper (II) hydroxamates and reactions of acidic or alkaline hydrolysis. The quantitative determination of benzocaine is presented by the volumetric methods of analysis: nitritometry or bromatometry. 54% of the analyzed bibliographic sources presented physico-chemical methods: IR spectroscopy and UV-VIS spectrophotometry for identification, determination of purity and assay of benzocaine in dosage forms. Also, for the determination of chemically related impurities of benzocaine, thin layer chromatography method is presented (17%).

**Conclusions.** The literature presents both chemical and physico-chemical methods of analysis of benzocaine.

## STUDY OF THE TOTAL CONTENT OF HYDROQUINONE DERIVATIVES IN DIETARY SUPPLEMENTS WITH LINGONBERRY

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**Introduction.** Nowadays at the pharmaceutical market of Ukraine one can find a number of dietary supplements for treating urological diseases. The first reason is 10% of the Ukrainian population has signs of chronic diseases of the genitourinary system. The second reason is a high consumer interest in purchasing dietary supplements. The dietary supplement is an important problem of pharmacy in Ukraine as according to the Law of Ukraine dietary supplements are not subjected to the qualitative and quantitative analysis, as a result, the quality of these products are casted doubt.

**The aim.** Determine the total content of hydroquinone derivatives in dietary supplements with lingonberry

**Material and methods.** The object of our study were dietary supplements with lingonberry: «Extract of lingonberry» («MEDAGROPROM», Dnipro) contains extract of lingonberry fruits, dosage form is drops (30 mL); «Lingonberry» («Danikafarm», Kharkiv) contains leaves and shoots of lingonberry, the dosage form is tablets (100 pcs); «Lingonberry nano» («LSS SYSTEM», Kharkiv) contains leaves and fruits of lingonberry, intercellular and intracellular liquid of lingonberry leaves and fruits, the dosage form is tablets (100 pcs). 3.2 g (accurate weight) of «Lingonberry» (Danikafarm) and “Lingonberry nano” (LSS SYSTEM) was dissolved in 96% ethanol and filtrated in a 50.0 mL measuring flask. 5.0 mL of “Extract of lingonberry” (MEDAGROPROM) was dissolved in a 25.0

mL measuring flask and diluted to the volume with 96% ethanol. 20.00 mL of the aliquot of the each solutions obtained were evaporated to dryness on a water bath at 80 °C. The residue was dissolved in 20.00 mL of water, filtered through a paper filter, transferred into a separating funnel, than mixed with 1 mL of 2% 4-amino-2,3-dimethyl-1-phenylpyrazolin-5-one solution, 0.5 mL of 3.3% ammonia solution, 1 mL of 8% potassium ferricyanide and extracted twice with 20.00 mL of chloroform for 10 min. The absorbance was measured at wavelength of 455 nm in 30 min after extraction. The compensation liquid was chloroform. The total content of hydroquinone derivatives in «Lingonberry» (Danikafarm) and «Lingonberry nano» (LSS SYSTEM) dietary supplements in 1 tablet was calculated by the equation and expressed with reference to arbutin:

$$X(\%) = \frac{A \times K_{dil} \times m_{aver\ tab} \times 100 \times 100}{A_{st} \times m_s \times (100 - W)},$$

where A – is the absorbance of the test solution;

$A_{st}$  – is the absorbance of the standard solution of arbutin;

$m_s$  – is the sample weight, g;

$m_{aver\ tab}$  – is the average mass of a tablet, g;

$K_{dil}$  – is the coefficient of dilution;

W – is the percentage of moisture, %.

The total content of hydroquinone derivatives in «Extract of lingonberry» (MEDAGROPROM, Dnipro) dietary supplement in the total volume of drops was calculated by the equation and expressed with reference to arbutin:

$$X(\%) = \frac{A \times K_{dil} \times V_{drops} \times 100}{A_{st} \times V_{al}},$$

where A – is the absorbance of the test solution;

$A_{st}$  – is the absorbance of the standard solution of arbutin;

$V_{al}$  – is the volume of an aliquot, mL;

$V_{drops}$  – is the total volume of drops, mL;

$K_{dil}$  – is the coefficient of dilution.

**Research results.** The total content of hydroquinone derivatives were 0.040±0.005% or 0.16±0.01 mg/tab, 0.030±0.005% or 0.11±0.01 mg/tab and 1.01±0.05% or 10.1±0.05 mg/mL. Results are shown in Table 1. The highest amount of hydroquinone derivatives was in the dietary supplement «Extract lingonberry», (MEDAGROPROM, Dnipro).

Table 1. The total content of hydroquinone derivatives in the dietary supplements in a dosage form

Dietary supplement	Total hydroquinone derivatives	
	%	X
«Lingonberry», (Danikafarm)	0.040±0.005	0.16±0.01 mg/tab
«Lingonberry nano», (LSS system)	0.030±0.005	0.11±0.01 mg/tab
«Extract lingonberry», (MEDAGROPROM)	1.01±0.05	10.1±0.05 mg/mL

**Conclusions.** Based on the study, it can be concluded that only dietary supplement «Extract lingonberry» (MEDAGROPROM) has the high quality and can be recommended for use.