

IR-Spectrophotometry of Laxatives Herbal Preparations Based on Bark of *Frangula alnus* Mill.

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ABSTRACT

In the present study there were developed the methodic of qualitative analysis of phytopharmaceuticals preparations: "Frangula syrup", "Frangula decoction" and "Frangula tablets" by means of Infrared spectrophotometry. As a result, more in-depth study of "Frangula syrup", "Frangula decoction" and "Frangula tablets" conducted by IR spectroscopy to compare and qualitative analysis of phytopharmaceuticals preparations.

Keywords: *Frangula alnus* Mill., bark, frangula syrup, frangula decoction, frangula tablets, anthracenderivatives, frangulin A, Infrared spectrophotometry.

INTRODUCTION

In recent decades, the world has been an increasing interest in practical medicine to medicines derived from plant material. This trend is not confined to countries traditionally and widely used medicinal plants (India, China, and others.), But also countries with highly developed chemical and pharmaceutical industry with great potential for large-scale works in the synthesis of drugs. To date, accumulated information on the biological activity of 12,000 chemical compounds isolated from medicinal plants with fully or partly fixed structure belonging to various classes of natural substances¹. As a result, a set of chemical reactions that take place in a plant cell in plants accumulate products of primary and secondary metabolism, which determine the multiple and harmonious nature of their actions on the human body². For this reason, herbal preparations, usually less allergenic than synthetic drugs, making them suitable for chronic diseases for a long time³. Very popular herbal drugs containing anthracenderivatives. This is due to the use of this group of plants for treatment of chronic constipation⁴. The first mention of the use of bark of *Frangula alnus* Mill. dates back to the tenth century, since this plant has become the most popular sources of laxatives in officinal medicine⁵⁻⁶. Pharmacopoeia type of raw material is bark of *Frangula alnus* Mill., which contains significant amounts of anthracenderivatives (8-10%), causing the main pharmacological effects of drugs⁷⁻⁸. On the territory of the Russian Federation is currently registered medicinal products derived from the bark of buckthorn are "Buckthorn extract coated tablets 0.2 g"¹¹.

During previous studies we isolated the active ingredients, set dominant components [6-O- α -L-

rhamnopyranoside of Frangula-emodin (frangulin A)] from bark of *Frangula alnus* Mill. and developed a technological procedure for preparing of "Frangula syrup"¹¹⁻¹². At present time there are no methods of qualitative analysis of these drugs on the basis of bark of *Frangula alnus* Mill. by IR spectrophotometry. Purpose of research - to develop methods of qualitative analysis of drugs on the basis of bark of *Frangula alnus* Mill.

MATERIALS AND METHODS

Materials: "Buckthorn extract coated tablets 0.2 g" (ZAO "VIFITEKH"); bark of *Frangula alnus* Mill. (OAO "Krasnogorleksredstva"). Electronic spectra were measured on the Infrared spectrophotometers "Nicolet iS5" (Thermo).

Production of syrup in the laboratory began to produce a decoction of the bark of *Frangula alnus* Mill. using ratios of "raw material - finished product" 1: 3. The volume of extractant to produce a given volume of the finished product was determined taking into account the water absorption coefficient, which is 2.2 ml/g. Most of decoctions prepared pharmacopoeial method: a known amount of a certain amount of raw material filled with purified water at room temperature, heated in a boiling water bath for 30 minutes, cooled for 10 min, filtered and adjusted if necessary until the desired amount of the resulting ratio "raw material - the finished product"⁷.

Water extract of bark of *Frangula alnus* Mill. was used instead of purified water to obtain sugar syrups by means of pharmacopoeia method. To 36 g of this aqueous extracts were mixed with 64 g of refined sugar, and the mixture was heated until complete dissolution of sugars was adjusted to boiling twice, each time with removing

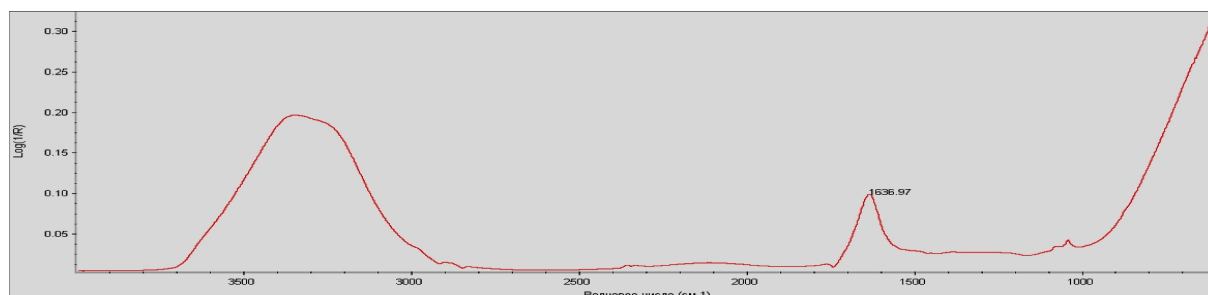


Figure.1. Infrared spectrum of frangula decoction

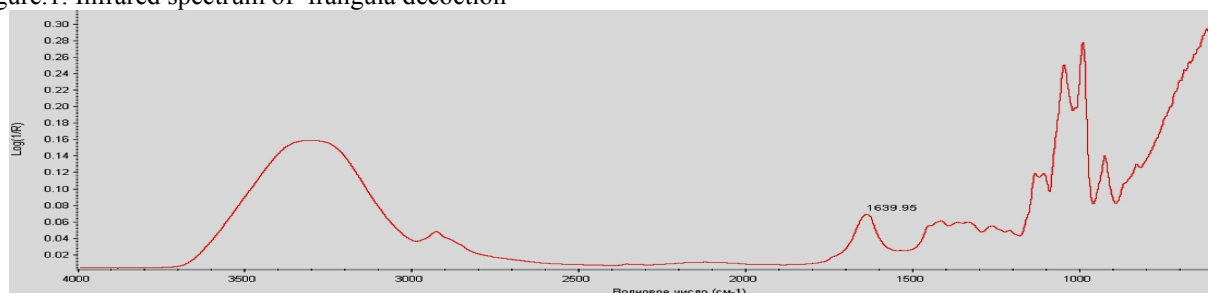


Figure.2. Infrared spectrum of frangula syrup

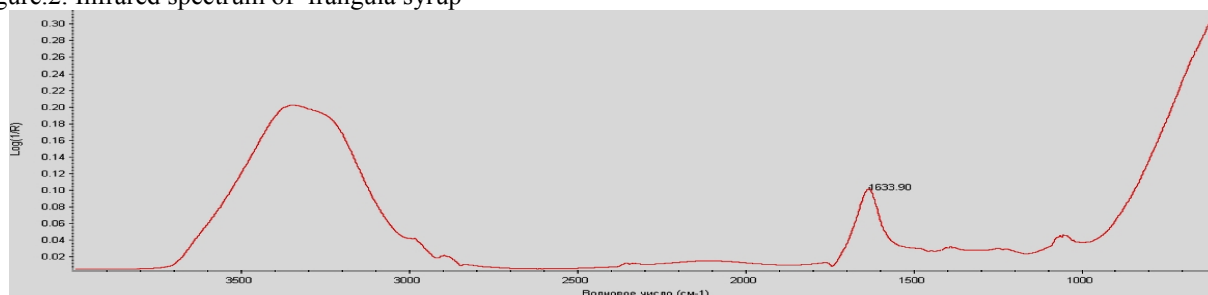


Figure.3. Infrared spectrum of frangula tablets

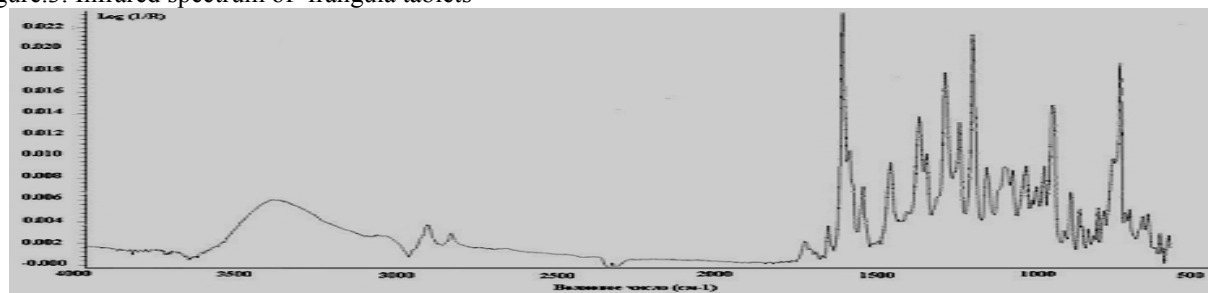


Figure.4. Infrared spectrum of working standard sample of frangulin A

the resulting foam. Syrups filtered through cheesecloth into a hot, and adjusted to the initial weight of purified water⁷.

RESULTS AND DISCUSSION

The IR spectra of anthracenderivative frangulin A structure in which there are two carbonyl groups ($C=O$), found two distinct intense absorption bands in the 1625-1620 cm^{-1} . (Fig. 1-4).

Intense absorption band in the IR spectra in the region of 3358 cm^{-1} . due to the stretching vibrations of OH groups of the carbohydrate, which confirms the glycoside nature of the substance (Fig. 1-4).

In the region 1400-1200 cm^{-1} IR spectra absorption bands were also observed, characteristic for phenolic compounds, including anthracenderivatives. In the region of 3100-3000 cm^{-1} IR spectra are also observed

absorption bands due to stretching vibrations of aromatic $CH=CH$ (Fig. 1-4).

A comparative study of compositional buckthorn bark brittle by IR spectrometry confirmed that in the case of alder buckthorn diagnostic significance have the anthraglycoside - frangulin A, which is the dominant component of the raw material of the plant. In our opinion, the results of IR spectroscopy can be used for the purposes of standardization drugs test plants (see "Qualitative reaction"). Anthracenderivatives dominant in the cortex of alder buckthorn is frangulin A, which can then be used as a standard substance, and on the substance must be based in the qualitative and quantitative analysis.

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