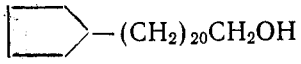
83, and 69). The presence of a peak with m/z 335 ($M^+ - 17 - 28$) (42.9%) stronger than a peak with m/z 293 ($M^+ - 17 - 70$) (23.0%) is characteristic for naphthenes with a five-membered ring. The substance was a primary alcohol [IR spectrum: ν_{max} 3580-3630 cm^{-1}; mass spectrum: peaks with m/z 380 ($M^+ - 17$) (9.6%); PMR spectrum: triplet at 3.53 ppm, J = 6 Hz, 2 H].

On the basis of what has been said, the most probable structure for substance (II) is the following



We are the first to have detected naphthenic derivatives in plants of the genus Ligularia.

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CARBOHYDRATES OF THE INFLORESCENCES OF Calendula officinalis

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UDC 547.917

The inflorescences of pot marigold Calendula contain a series of pharmacologically active substances relating to various classes of natural compounds [1, 2]. In the present communication we consider the results of an investigation of the polysaccharides of inflorescences of pot marigold Calendula isolated from raw material gathered in 1986.

Polysaccharides are attracting ever increasing attention at the present time as medicinal agents acting in various directions [3].

Fractions of carbohydrates from the raw material were isolated by the following scheme. The raw material was first defatted with chloroform, and then with carbohydrates were extracted: with 82% ethanol – the ethanol-soluble sugars (ESs); with water – the water-soluble polysaccharides (WSPSs); with a mixture of 0.5% solutions of oxalic acid and ammonium oxalic acid and ammonium oxalate – the pectin substances (PSs); and with 7 and 14% solutions of caustic potash – the hemicelluloses (HCs).

The ESs were freed from noncarbohydrate components with 10% lead acetate and sodium sulfate solutions. After filtration and concentration of the solution, the sugars were precipitated from a methanolic solution with acetone (1:3), and the precipitate was washed with anhydrous acetone and was dried with ether and over P_2O_5 in a vacuum desiccator. Free glucose, sucrose, and unidentified reducing oligosaccharides were detected in the ESs by paper chromatography in systems 1) butanol–pyridine–water (6:4:3), and 2) ethyl acetate–acetic acid–formic acid–water (18:3:1:4). The reducing sugars were revealed with aniline phthalate, and the nonreducing ones with Bonner's reagent [4].

The WSPSs and the PSs were freed from proteins by Sevag's method [5] and were precipitated with methanol (1:3). The HCs were neutralized with acetic acid and precipitated in the same way as the preceding fraction. The polysaccharides were determined by a gravi-

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Translated from Khimiya Prirodnykh Soedinenii, No. 4, pp. 585-586, July-August, 1988. Original article submitted September 8, 1987; revision submitted February 26, 1988.

0009-3130/88/2404-0499 $12.50

metric method. The amount of polysaccharides in the WSPSs was 14.75%, in the PSs 9.67%, and in the HCs 5.92%, calculated on the absolutely dry raw material.

The amount of reducing sugars in the WSPSs was 6.67%, in the PSs 1.45%, and in the HCs 2.53% [6]. The amount of acidic sugars in the WSPSs was 2.10%, in the PSs 2.63%, and in the HCs 0.05% [7].

The amount of polysaccharides in the fractions of the Calendula inflorescences that were investigated were different, but their greatest amount was found in the WSPS fraction, which served as a motive for its further investigation. The WSPS fraction was obtained by precipitation from an aqueous solution with methanol (1:3) and its moisture content, the amounts of ash, polysaccharides, acidic and reducing sugars, and proteins, and its monosaccharide composition were determined. The results of the analysis are given below (%):

PSs	Ash	Moisture	Acidic sugars	Reducing sugars	Proteins	Monosaccharide composition
84.58	29.25	9.25	25.77	31.25	4.92	Glc, Gal, Ara, Xyl, Rha, Gal, Ua

Thus, various fractions of carbohydrates have been isolated from inflorescences of pot marigold Calendula and have been characterized with respect to their monosaccharide composition and their amounts of reducing and acidic sugars.

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