ESTERS OF THE ROOTS OF Ferula fedtschenkoana

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We have studied the roots of Ferula fedtschenkoana K. Pol., collected in the flowering period on the western shore of Lake Iskander-kul', Tadzhik SSR. From an acetone extract of the roots by chromatography on a column of KSK silica gel with chloroform elution we isolated two esters. The first of them had the composition $C_{22}H_{30}O_4$, mp 187-188.5°C (from ether), $[\alpha]_D^{20} - 86.1°C$ (c 1.0; ethanol), M^+ 358. On alkaline hydrolysis the compound formed p-hydroxybenzoic acid with mp 204-205°C and angrendiol with mp 134-135°C (from methanol) [1-3]. The substance gave no depression of the melting point with ferolin, and their NMR spectra also were identical. The second substance had the composition $C_{24}H_{32}O_5$, M^+ 400, mp 179-180°C (from ether), $[\alpha]_D^{20} - 90.9°$ (c 0.99; ethanol) and is new; we have called it federin. It forms colorless crystals readily soluble in ethanol and chloroform and insoluble in water.

The UV spectrum of federin has λ_{max} 260 nm (log ε 4.27) which shows the presence of an aromatic nucleus in the molecule.

The IR spectrum has absorption bands at (cm^{-1}) 1745 (carbonyl of an ester), 1610, 1590, 1525 (aromatic nucleus), and 3250-3350 (phenolic hydroxyl). On saponification with caustic soda, federin splits, forming p-hydroxybenzoic and acetic acids and angrendiol, which were identified by mixed melting points, IR spectra, and chromatography in a thin layer of silica gel. It follows from these facts that federin is a diester of angrendiol. This conclusion is confirmed by the NMR spectrum of federin which shows signals at 5.59 and 5.14 ppm (2H each) corresponding to two olefinic and geminal protons (the signals of the former and the latter are superposed on one another). In addition, in the NMR spectrum of federin there is a singlet at 1.78 ppm (3H) corresponding to the acetyl protons. To establish the position of the acid residues, we acetylated federin and ferolin. In both cases, we obtained the same (according to IR spectra) liquid substance with R_f 0.5 (chloroform system) consisting of the diester of the acetate of p-hydroxybenzoic and acetic acids and angrendiol. This shows that in federin the p-hydroxybenzoic acid occupies the same position as in ferolin, and the acetic acid is attached to the second hydroxyl of the angrendiol.

LITERATURE CITED

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