FLAVONOIDS FROM Carduus nutans

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Continuing a study of the flavonoids of Carduus nutans L. [1, 2], we have extracted the total phenolic compounds of the leaves collected in the flowering period in the environs of Zaporozh'e by treating the air-dry raw material with 70% ethanol. Individual compounds were isolated by adsorption chromatography on a polyamide sorbent followed by elution with increasing concentrations of aqueous ethanol. Five substances of flavonoid nature were isolated.

The fractions containing 30% of ethanol yielded an individual compound consisting of a light yellow crystalline powder with the composition $C_{21}H_{26}O_9$, mp 205-210°C, (λ_{max} 352, 264 nm. The NMR spectrum of the silylated substance had the following signals)ppm): doublet at 7.80 (2 H, J = 4 Hz; H-2', 6'); doublet at 7.00 (2 H, J = 4 Hz; H-3', 5'); doublet at 6.5 (1 H, J = 2 Hz; H-8); doublet at 6.3 (1 H, J = 2 Hz; H-6); doublet at 5.20 at 5.20 (1 H, J = 4 Hz) — the signal of the glycosidic center of α-rhamnose; signals at 4.3-5.2, corresponding to rhamnose protons; doublet at 1.0 (3 H, J = 4 Hz) corresponding to the methyl residue of rhamnose. The UV spectra of the substance obtained with diagnostic additives showed that there were free hydroxy groups in positions 4' and 5 of the glycoside.

Hydrolysis with 10% sulfuric acid led to an aglycon with the composition $C_{14}H_{15}O_4$, mp 272-278°C, which was identified from the results of chromatography and its UV, IR and NMR spectra as kaempferol. L-Rhamnose was detected in the mother liquor.

A comparison of molecular rotations with the application of a correction factor showed that the sugar component in the glycoside under investigation had an α-glycosidic bond and a furanose ring.

The results obtained confirmed the identity of this compound with kaempferol 3-O-α-L-rhamnofuranoside.

On the basis of melting points, elementary compositions, physicochemical properties, chromatographic characteristics, and UV-, IR-, and NMR-spectral analyses [3, 4], the other four substances were identified as apigenin, tilianin, isorhamnetin, and rutin.

This the first time that rutin has been isolated from plants of the genus Carduus L.

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