RUTIN OF Cerasus tianschanica

T. K. Chumbalov and Z. S. Dzhumagulova

UDC 547.972

It has been reported previously that the leaves of Cerasus tianschanica Pojark. contain rutin [1].

The results of an investigation of the substance that we isolated has shown that it is a combination of two isomeric forms. To separate the rutins into the isomers we used preparative paper chromatography in the n-butanol–acetic acid–water (40:12.5:29) system. The glycosides obtained were purified by chromatography on polyamide sorbent and by crystallization from aqueous methanol. Glycosides (I) and (II) consisted of yellow acicular crystals with mp 188-190°C, $[\alpha]_D^{20} -63.6°$ (dimethylformamide), $\lambda_{max}^{C_2H_5OH}$ 258, 265, and 360 nm, and mp 191-192°C, $[\alpha]_D^{20} -22.9°$ (dimethylformamide), $\lambda_{max}^{C_2H_5OH}$ 256, 260, and 360 nm, respectively. In the products of acid hydrolysis (2% hydrochloric acid, 3 h, 100°C) were found the aglycone quercetin, with mp 308-310°C (yield 50%) and, by paper chromatography, D-glucose and L-rhamnose.

The results of UV spectroscopy with ionizing and complex-forming reagents permitted the assumption that the sugar components in both biosides were present at the C_3 position of the molecule in the form of bioses [2]. The order of addition of sugars to the aglycone was determined by stepwise hydrolysis (0.1% hydrochloric acid).

Bioside (I) was cleaved with the formation as intermediate product of isoquercitrin with mp 218°C, while bioside (II) was hydrolyzed to the aglycone without the formation of an intermediate product under these conditions. The monoside from the bioside (II) was isolated by hydrolysis with 25% formic acid in cyclohexanol [3], and had mp 201-203°C. The acid hydrolysis of both monosides gave quercetin and glucose, which was attached to the aglycone in the C_3 position of the molecule. The glucose in the monoside of (I) had the pyranose form of the ring and in the monoside of (II) the furanose form, being attached to the aglycone by a β-linkage in both cases. The fermentation of the biosides (I) and (II) with rhamnodiastase indicated the linkage of the sugars in the biosides as 1→6. The bond between the glucose and the rhamnose in the biosides was determined by fermentations with emulsin and with maltase, and the form of the oxide ring of the rhamnose was determined by differential analyses of molecular optical rotation.

Thus, the investigations performed have identified the bioside (I) as isorutin – quercetin 3-O-[β-L-rhamnopyranosyl-(1→6)-O-β-D-glucopyranoside] –, and bioside (II) as rutin – quercetin 3-O-[α-L-rhamnopyranosyl-(1→6)-O-β-glucofuranoside]. Similar biosides of quercetin have been described in the literature [4].

LITERATURE CITED

1. T. K. Chumbalov and Z. S. Dzhumagulova, Khimiya i Khim. Tekhnologiya, Alma-Ata, No. 9, 146 (1969).
2. L. Jurd, The Chemistry of Flavonoid Compounds, New York (1962), p. 107.
3. D. W. Fox, S. H. Savage, and S. H. Wender, J. Amer. Chem. Soc., 275, 2504 (1963).
4. V. I. Litvinenko and T. P. Nadezhina, Rast. Res., 68, No. 4 (1968).

S. M. Kirov State University. Translated from Khimiya Prirodnykh Soedinenii, No. 5, p. 670, September-October, 1973. Original article submitted March 19, 1973.