

A CHEMICAL INVESTIGATION OF PHYTOLACCA AMERICANA

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The roots of Phytolacca americana L. (common pokeberry) contain a considerable amount of alkaloid phytolaccine essential oils, and saponins. The leaves and seeds are rich in vitamins of groups C, B, and PP [1].

This paper gives information on the chemical composition of the berries of this plant gathered in the Botanical Garden of AS KazSSR.

By paper chromatography and spectrophotometry we have established that the berries contain an anthocyanin (9.26%), fructose (1.42%), glucose (4.56%), alkaloids (2.2%), amino acids (0.8%), and a very small amount of a flavone glycoside.

An aqueous extract of berries was passed through KU-cation-exchange resin, after which elution with methanol gave glycoside I and elution with water gave the anthocyanin.

Glycoside I forms yellow crystals with mp 216-218° C, R_f 0.14 [butan-1-ol-acetic acid-water (4:1:5)] and 0.69 (15% acetic acid). UV spectrum: λ_{\max} 370 and 250 m μ ; $\lambda_{\max}^{\text{AlCl}_3}$ 410 and 290 m μ , $\lambda_{\max}^{\text{C}_2\text{H}_5\text{ONa}}$ 400 and 250 m μ , $\lambda_{\max}^{\text{CH}_3\text{COONa}}$ 370 and 250 m μ , $\lambda_{\max}^{\text{CH}_3\text{COONa}+\text{H}_3\text{BO}_3}$ 390 and 255 m μ . Consequently, in the glycoside the OH groups at C(5), C(4), and C(3) are free. Hydrolysis with 5% HCl (100° C, 2 hr) gave quercetin with mp 311-312° C. The hydrolysate was shown by paper chromatography to contain glucose and arabinose. Mild hydrolysis (boiling with 1% HCl for 30 min) formed arabinose and glycoside I' with R_f 0.32 in BAW (4:1:5), mp 242-244° C, λ_{\max} 372 and 357 m μ , $\lambda_{\max}^{\text{CH}_3\text{COONa}}$ 371 and 258 m μ . Quercetin and glucose were found in the products of hydrolysis of the substance (with 2% HCl). The information given shows that glycoside I' is quercimetrin. Thus, glycoside I can be characterized as quercetin 3-L-arabo-7-D-glycoside.

The anthocyanin formed a dark cherry-red crystalline precipitate, decomp. p. 280° C, R_f 0.04 [isoamyl alcohol-hydrochloric acid-water (5:1:1) system]; 0.38 [water-acetic acid-hydrochloric acid (82:15:3)]; 0.11 (2 N HCl). Stepwise hydrolysis showed that the substance is a diglycoside of cyanidin, which hydrolyzes first to chrysanthemine and then to cyanidin [2]. The absorption spectra of the anthocyanin and of cyanin isolated from the leaves of the red rose are identical (λ_{\max} 526 m μ).

REFERENCES

1. Atlas of Medicinal Plants of the USSR [in Russian], 278, 1952.
2. R. Willstätter, and I. Burdick, Liebigs Ann. Chem., 412, 149, 1916.

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