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ANALYSIS OF NATURAL POLYPHENOLS BY A SPECTROPHOTOMETRIC METHOD

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An investigation of the properties of natural compounds containing phenol groups for antiradical activity will permit a purposeful search for substances possessing cancerolytic, antitumoral, radiosensitizing, and antioxidant activities.

We have studied the antiradical activity of the natural polyphenol quercetin and its acyl and dibromo derivatives by means of a reaction with the colored stable radical 2,2-diphenyl-1-picrylhydrazine (DPPH). The method is based on the change in the color of the stable radical on its interaction with the mobile hydrogen atoms of the hydroxy groups of phenols [1].

Quercetin (3,3′,4′,5,7-pentahydroxyflavone) and DPPH are industrial products. 3,3′,4′,5,7-Pentaacetoxyflavone and 6,8-dibromo-3,3′,4′,5,7-pentahydroxyflavone were synthesized by acetylating quercetin (with acetic anhydride) and brominating it (with bromine).

It was established that the activity of the compounds depended on their chemical structure and the choice of solvent. No reaction took place in DMSO, probably because of the formation of complex compounds with the solvent. The reaction proceeded more slowly in dioxane than in alcohol because of the formation of hydrogen bonds between the phenol and the solvent [2]. The method enables one to determine the number of reactive groups taking part in the reaction with DPPH. Thus, in ethanol all five hydroxy groups of quercetin interact with DPPH, and in dioxane only two. The replacement of the hydroxy groups of quercetin by ester (acetate) groups led to a loss of the antiradical properties of quercetin, which confirms the suggested mechanism of the interaction of phenols with DPPH. The introduction of bromine atoms into positions 6 and 8 of the quercetin molecule somewhat raised the rate of the reaction with DPPH without changing the number of reacting groups.

The procedure developed has been used for the quantitative analysis of quercetin in tablets. The amount of quercetin found was 0.022 $\pm$ 0.005 g, which corresponds to the prescription for the preparation of the tablets. The procedure developed is suitable for determining quercetin in other medicinal forms.

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