Chemistry of Natural Compounds, Vol. 30, No. 4, 1994

METHOD FOR THE QUANTITATIVE DETERMINATION OF LYCORINE IN THE LEAVES OF *Ungernia severtsowii*

A. U. Makhkamova and É. V. Safonova

UDC 547.94:543.422

Lycorine hydrochloride, obtained from the leaves of *Ungernia severtsowii* (Regel) B. Fedtsch, fam. Amaryllidaceae, is used in medicine as an expectorant, and also in acute forms of bronchitis and bronchial asthma [1, 2].

According to the VFS [Provisional Pharmaceutical Standard] [3], the lycorine in *Ungernia sewertsovii* leaves is determined by the following method: an analytical sample of the raw material is comminuted and extracted with chloroform in a Soxhlet apparatus. The chloroform extract is purified and evaporated. The resulting dry mixture of alkaloids is dissolved in alcohol, deposited on a non-fixed layer of alumina, and chromatographed. An alcoholic solution of standard lycorine [4] is used as reference material. The spots are revealed with a solution of iodine. The lycorine zone is removed and eluted with alcohol, with standing for 12 hours and with shaking for 3 h. The optical densities of the elutes are measured at a wavelength of 293 nm.

This method is laborious and time-consuming. Other disadvantages are the poor solubility of the mixture of alkaloids in ethyl alcohol (on heating), and the facts that the separation of alkaloids on the chromatogram is insufficiently sharp and that the use of a non-fixed layer of alumina as sorbent and of a solution of iodine as revealing agent does not make it possible to determine the size of the lycorine spot accurately, all of which in combination creates difficulties in the large-scale analysis of supplies of *U. sewertsowii* raw material.

We have developed and tested the following modifications to this method. The purified total alkaloids (from a 10 g sample of the raw material) are dissolved in 5 ml of methyl alcohol. On the starting line of a Silufol (UV-254) plate with dimensions of 20 × 20 cm are deposited 0.2-ml portions (as bands) of a solution of the total alkaloids under investigation and of a freshly prepared 0.2% solution of RSO [standard] lycorine hydrochloride in methyl alcohol. The plate is dried in the air and is placed in a chamber with the solvent system chloroform–ethyl alcohol–ammonia (25%) (90:10:1). When the solvent front has migrated about 18 cm, the plate is removed and dried in the air for 20-30 min.

The chromatogram is viewed in UV light. The lycorine spots shown are eluted by shaking with a 0.1 N solution of hydrochloric acid for 3 h. The optical densities of the eluates are determined in a spectrophotometer at a wavelength of 292 nm (λ_{max} of a hydrochloric acid solution of lycorine). The eluate from the control band is used as comparison solution.

The percentage content of lycorine calculated on the absolutely dry raw material is determined from the formula

$$X = \frac{D_1 \cdot a_0 \cdot 100 \cdot 100}{D_0 \cdot a_1 \cdot (100 - W) \cdot 5},$$

where D_1 is the optical density of the solution being analyzed;

D_0 is the optical density of the solution of standard lycorine hydrochloride;

a_0 is the weight of standard lycorine hydrochloride, g;

a_1 is the weight of raw material, g; and

W is the loss in weight on the drying of the raw material, %.

The metrological characteristics of this method of analyzing *U. sewertsovii* leaves (1988 harvest in the "Darmina" sovkhoz [communal farm]) are given below. Results of analyses in percentages on the air-dry weight of the raw material: 1) 0.101; 2) 0.103; 3) 0.100; 4) 0.102; 5) 0.104; 6) 0.101.

Institute of the Chemistry of Plant Substances, Academy of Sciences of the Republic of Uzbekistan, Tashkent, FAX (3712) 89 14 75. Translated from Khimiya Prirodnykh Soedinenii, No. 4, pp. 571-572, July-August, 1994. Original article submitted November 15, 1993.

0009-3130/94/3004-0529$12.50

n	f	$\bar{X}$	S	t	P	ΔX	Σ
6	5	0.102	$1.79 \cdot 10^{-3}$	2.57	96	$4.54 \cdot 10^{-3}$	4.5

The proposed changes to the method permit the time of analysis to be shortened and also enable the analysis to be improved qualitatively because: lycorine dissolves in methyl alcohol better than in ethyl alcohol; a good separation of the mixture of alkaloids is achieved on the Silufol plate; inspection in UV light gives sharp boundaries to the spots; and elution with 0.1 N hydrochloric acid is more effective (100% desorption).

REFERENCES

1. I. D. Kalashnikov and M. V. Savicheva, Farmatsiya, **19,** 26 (1970).
2. Pharmacology of the Alkaloids [in Russian], Tashkent (1965), p. 232.
3. Provisional Pharmaceutical Specification 42-1257-82 [in Russian].
4. Pharmacological Specification 42-1340-79 [in Russian].