to the (–)-gallocatechin gallate of tea, which shows their steric analogy. On the basis of the results obtained, the 4-hydroxyflavane was identified as (±)-gallocatechin gallate.

By the paper densitometry method, the roots gathered in May and August were found to contain approximately the same amounts of gallocatechins: 0.035% of (–)-epigallocatechin, 0.017% of (+)-gallocatechin, and 0.010% of (±)-gallocatechin. The content of (±)-gallocatechin gallate was 0.039% in the spring and 0.016% in the autumn.

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Kirov Kazakh State University

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γ-TERPINENE IN THE TURPENTINES OF PINUS SILVESTRIS

I. I. Bardyshev, E. P. Dontsova, and A. L. Pertsovskii

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γ-Terpinene (1-methyl-4-isopropyl-1,4-cyclohexadiene) is a comparatively rare terpene hydrocarbon. It is generally obtained by the fractional distillation of various essential oils [1, 2].

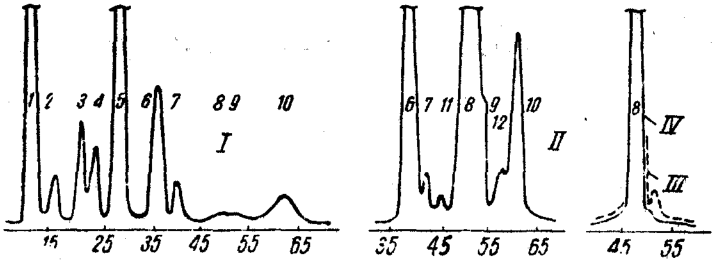

Fig. 1. Chromatograms. I) Pine resin turpentine; II) γ-terpinene fraction after third rectification; III) γ-terpinene fraction after fourth rectification; IV) γ-terpinene fraction after purification in a preparative chromatograph. 1) α-Pinene; 2) camphene 3) β-pinene; 4) mycrene; 5) 3-carene; 6) dipentene; 7) *l*-p-phellandrene; 8) γ-terpinene; 8) cymene; 10) terpinolene; 11, 12) substances of unknown structure.

In the chromatographic analysis of samples of Russian turpentines we found that the fractions containing p-cymene were contaminated with another component of the turpentine which, from its residence time in the column, corresponded to γ-terpinene [3]. We have found that this component is in fact γ-terpinene. Thus, it has been shown for the first time that γ-terpinene is present in the turpentines from Pincus silvestris (common pine).

The α-pinene fraction (60%) was distilled off from the pine resin turpentine (Fig. 1, I) of the Borisov Wood Chemical Factory. The residue from the distillation (6000 g) was rectified in a column with an efficiency of 50 theoretical plates in order to distil off the 3-carene fraction (80%). The second residue from the distillation (1150 g) was rectified in the same column and the γ-terpinene fraction obtained on redistillation (60 g, Fig. 1, II) was distilled yet again in a column with an efficiency of 100 theoretical plates. The γ-terpinene obtained (Fig. 1, III) had d_4^{20} 0.8495, n_D^{20} 1.4749. The γ-terpinene was further purified in a PAKhV-03 preparative gas-liquid chromatograph at 120° C on a

5000 × 8 mm column.

The solid support was deactivated Inza diatomite brick (grain size 0.3–0.5 mm), the liquid phase was poly (ethylene glycol adipate) (30% of the weight of the solid support), and the carrier gas was nitrogen. After purification the γ-terpinene had d_D^{20} 0.8483, n_D^{20} 1.4745, MR_D 45.17 (calc. for $C_{10}H_{16}F_2$ 45.24). Literature data d_4^{20} 0.8495, n_D^{20} 1.4747, MR_D 45.13 [4].

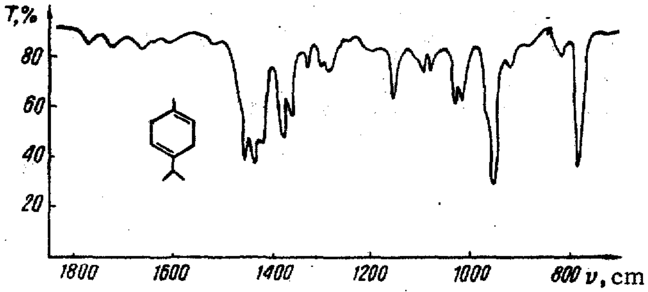

Fig. 2. IR spectra of a sample of γ-terpinene isolated from turpentine.

The melting points of the derivatives of the γ-terpinene were [2]: tetrabromide 128°–128.5° C; nitrosochloride 110.5°–111.0° C; nitrosate 116° C; and erythritol 234°–237° C. The IR spectrum of the sample of γ-terpinene (Fig. 2) was completely identical with the published IR spectrum of this substance [2].

By adding pure γ-terpinene in the GLC of industrial samples of turpentines from Pincus silvestris, we have shown that they all contain small amounts of γ-terpinene: resin turpentines, 0.2%; extraction turpentines, 0.5%; and dry-distillation turpentines, about 1%.

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Institute of Physical Organic
Chemistry, ASBSSR

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COMPOSITION OF THE ESSENTIAL OILS OF THE FRUITS OF BIOTA ORIENTALIS AND CUPRESSUS SEMPERVIRENS

E. Sakhatov and N. V. Belova

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We have studied the essential oils of the fruits of Biota orientalis Endl. (oriental arborvitae) and Cupressus sempervirens L., var. pyramidalis Targ-Tozz. (pyramidal cupressus) collected in October 1965 in the Botanical Gardens, Baku. The oils had the following constants: oriental arbovitae d_{20}^{20} 0.8861, n_D^{20} 1.4730, $[\alpha]_D^{20}$ + 20.5°, A. No. 0.38, E. No. 14.81, Sap. No. 15.19, yield 1.34%; pyramidal cupressus: d_{20}^{20} 0.8835, n_D^{20} 1.4740, $[\alpha]_D^{20}$ + 34.5°, A. No. 1.35, E. No. 25.04, Sap. No. 26.39, yield 1.07%.

Vacuum fractionation with subsequent percolation through active alumina separated the essential oils into hydrocarbon fractions, monoterpene and sesquiterpene fractions, and an oxygen-compound fraction. The yields of these