INVESTIGATION OF THE ESSENTIAL OIL FROM THE FRUIT OF Eryngium octophyllum

M. T. Ikramov, M. I. Goryaev,
F. S. Sharipova, R. L. Khazanovich,
and Kh. Kh. Khalmatov

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In a study of some species of plants of the genus Eryngium L. growing in Uzbekistan, we found that the fruit of Eryngium octophyllum Eug. Kor. contained 4.4% of essential oil. The oil consists of a yellow-green liquid of viscous consistency with the following physicochemical constants: d_{20}^{20} 0.9109, n_D^{20} 1.5090, acid No. 1.18, ester No. 6.98.

To investigate the components of the essential oil, it was subjected to gas–liquid chromatographic study. By treatment successively with a 5% solution of $NaHCO_3$ and with KOH the free acids and phenols, respectively, were isolated from the essential oil. The oil freed from acids and phenols was separated in vacuum into two fractions – low-boiling and high-boiling.

The fractions isolated were analyzed on a "KhROM-2" instrument with a flame-ionization detector. The components detected were identified by comparing the retention times with those of known substances under similar conditions. The amounts of the substances detected (%) were determined by the method of internal standardization [1].

To determine the composition of the acid fraction, it was methylated with diazomethane and was then chromatographed. The following acids were found: acetic, propionic, butyric, valeric, caproic, enanthic, caprylic, pelargonic, and capric. The phenolic fraction was found to contain eugenol (1.45), thymol (1.41), and isoeugenol (2.85).

The low-boiling fraction was analyzed by using a copper column (165 × 0.4 cm) filled with Celite (60-80 mesh) upon which poly(ethylene sebacate) (20% of the weight of the solid support) had been deposited; the carrier gas was nitrogen at a rate of 21.6 ml/min, and the temperature was 106°C. The presence of the

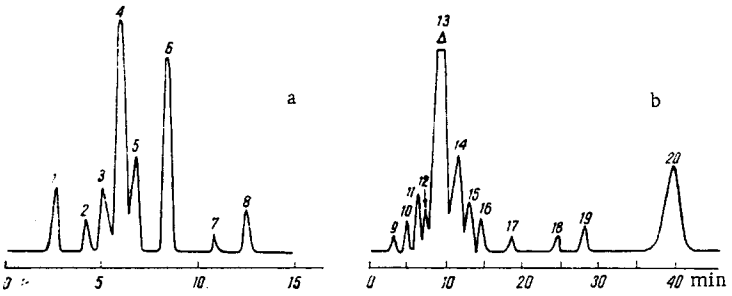

Fig. 1. Chromatograms of the low-boiling (a) and high-boiling (b) fractions of the essential oil of Eryngium octophyllum: 1) α-pinene; 2) camphene; 3) β-pinene; 4) sabinene; 5) myrcene; 6) limonene; 7) γ-terpinene; 8) p-cymene; 9) menthone; 10) menthol; 11) pulegone; 13) d*l*-piperitone; 14) piperitenone; 15) anethole; 17) anisaldehyde; 18) safranal; 20) β-betulenol; 12, 16, and 19) unidentified.

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following substances was established: α-pinene (0.24), camphene (0.15), β-pinene (0.33), sabinene (1.44), myrcene (0.63), limonene (1.29), α-terpinene (0.10), and p-cymene (0.82).

The high-boiling fraction, making up the bulk of the essential oil (80%), was analyzed in the same column as the low-boiling fraction but at 182°C with a rate of flow of gas of 24 ml/min. The following components were detected: menthone (0.23), menthol (0.39), pulegone (.254), dl-piperitone (29.38), piperitenone (7.36), anethole (2.09), anisaldehyde (2.00), safranal (2.00), and β-betulenol (28.27) (Fig. 1).

The main components of the essential oil were isolated preparatively on a UKh-2 instrument with a thermal conductivity detector and some of their constants were determined. These include dl-piperitone, piperitenone, and β-betulenol.

LITERATURE CITED

1. H. P. Burchfield and E. E. Storrs, Biochemical Applications of Gas Chromatography, Academic Press, New York (1962).