Chemical Investigation of Essential Oil of Abutilon Indicum

By Arvind Geda and A. K. Gupta
Department of Food Science
J. N. Krishi Vishwa Vidyalaya
Jabalpur-482004, India

The plant *Abutilon indicum* contains 0.15% of essential oil which mainly consists of α-pinene, caryophyllene, caryophyllene-oxide, endesmol, farnesol, borenol, geraniol, geranyl acetate, elemens and 1:8-cineole along with a number of other minor constituents.

Abutilon indicum,[1] an aromatic plant belonging to the family Malvaceae, is an annual herb commonly found in Madhya Pradesh, India.

The essential oil, for the present work obtained by steam distillation of the flowering top, yielded a reddish brown coloured oil. The physico-chemical characteristics of the oil were determined according to the methods recommended by Guenther.[2]

The average values are: $(\alpha)_D^{23}$ 3.5, d_4^{23} 1.1, acid value 1.5, ester value 80.4, viscosity 2.9.

The essential oil was studied on GLC/TLC with silica gel and silica gel impregnated with silver nitrate (15%),[3] using 2% vanilline-sulphuric acid solution as a spraying reagent for TLC. GLC was studied on Amil-fitted with SE-30 column and FID detector using N_2 as a carrier gas. The operation was conducted at programmed rate of 4/min from 70-210°. The compounds were identified by using reference sample for comparison and their percentages determined by triangulation method. The identified compounds are α-pinene (0.1%), 1:8-cineole (1%), caryophyllene (11.6%), borenol (0.6%), geraniol (13.0%), geraniol acetate (2%), caryophyllene-oxide (2%), elemens (0.5%), eudesmol (22.0%), and farnesol (2.8%).

The minor constituents of this oil were obtained by separating into acidic and neutral parts after washing with sodium hydroxide (5%). The neutral oil (10 gms) was chromatographed over neutral aluming grade II (1:30) and three major fractions were collected by eluting the column with pet-ether, benzene and solvent ether.

Pet ether fraction (10 g) was rechromatographed over active silica gel followed by silica gel impregnated with silver nitrate which gave two compounds 'A' and 'B' in pure form.

Compound 'A': bp 253.6/760 mm (bath, d_4^{20} 0.76, n_D^{26} 1.43, M^+ 198, analysed for $C_{14}H_{30}$ (found: C, 86.7 H, 13.33, $C_{14}H_{30}$ requires C, 85.6, H 14.2). Its IR spectrum showed bands at 2855, 1375, 790 and 722 cm^{-1} NMR ($CCl_4\delta$) 0.9δ(6H, s), 1.3δ)$CH_2)_n$s). On the basis of these spectral data this hydrocarbon could be tetradecane.[4,5]

Compound 'B': m.p. 50-60°C analysed for $C_{15}H_{24}O$ (M^+ 220). Its spot resolved on silica gel TLC plate gave a pink colour after spraying with vanilline-sulphuric acid and was identified as caryophyllene-oxide[6] by superimposable IR and NMR spectra with authentic sample.

The benzene fraction (5.5 g) referred to above, when chromatographed over silica gel (1:40), gave compound 'C'.

Compound 'C': b.p. 110-120°C/4 mm, d_4^{28} 0.930, n_D^{26} 1.4569 found C, 77.3; 4, 11.2, calculated $C_{10}H_{18}O_2$ C, 77.9 H, 11.7%). TLC on silica gel plate of this pure compound gave a characteristic green colour after spraying with vanilline-sulphuric acid.[7] So this compound may be 1:8-cineole.[8] Its IR absorption spectra is super-imposable with that of the reference sample.

Acknowledgement

We are grateful to Dr. C. K. Atal, Director, and Dr. K. L. Dhar, Scientist, R. R. L., Jammu-Tawi, for their valuable guidance and G.L.C. facilities during these investigations. Thanks are also due to CSIR New Delhi (A.G.) for the award of Pool Officership.

References

1. Bor and Hort George Taylor, The Grass of Burma, Ceylon, India and Pakistan, Pergamon Press, p. 208 (1960)
2. Guenther E., The Essential Oils. Vol. I, D. Van Nostrand & Co. N.Y. (1957)
3. Gupta, A. S. and Sukh Dev., J. Chromato., **12**, 190 (1963)
4. Kraft, F., B. **19** 2223 (1886)
5. Braun, J. V. and Sobecki, W. B., **44**, 1925 (1919)
6. Sinaonsen, J. and Barton, D. H. R., The Terpenes, The University Press, Oxford, **3**, 61 (1952)
7. Ekkert., Pharm Zentralhalle., 75, 145 (1934)
8. Wallach, Brass, Ann., 225, 291 (1884)

 0272-2666/83/0003-3901$04.00/00