

2.9565x10⁴ l/mol cm at 480 nm, highest sensitivity ever observed. In order to assess the possible analytical applications of the above coloured reaction, effects of a wide range of cations and anions which often accompany iron are investigated. An error of 2% in absorbance readings has been considered to be tolerable. The tolerance data are summarized in Table 2. The accuracy of the recommended procedure has been tested by applying the method for the analysis of iron content present in the pharmaceutical preparations and in mustard seeds. The procedural details are given in the experimental section. Data are presented in Table 1. The proposed micro spectrophotometric method with new developed conditions of colour reaction of iron(III) with thiocyanate has unusual highest sensitivity and stability among the methods proposed so far and stability. The result presented in Table 1 has been found to be entirely satisfactory with respect to the accuracy of the method. It is proved very effective for the determination of minute amounts of iron. The optimized procedural details are very simple without involving cumbersome extracting procedure. Further, the method has economy in using small amount of chemicals, improved safety and less time consuming with the minimum quantities of waste disposal.

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Essential oil Composition of *Coleus amboinicus* Lour

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The volatile constituents of the whole herb of *Coleus amboinicus* Lour (Labiatae) were analyzed by GC-MS following isolation by hydrodistillation. Ten compounds were identified among which carvacrol (50.7 %) γ -caryophyllene (13.1 %) and patchoulane (8.7%) were dominant.

Coleus amboinicus Lour (Labiatae), commonly called Indian borage or French thyme is a perennial herb found wild and cultivated throughout India. Its leaf juice is a powerful aro-

matic carminative, used in digestive disorders in children¹. The leaves are considered effective in asthma and chronic cough². Essential oil is reportedly antibacterial³ and weakly herbicidal⁴. Previous investigations of the herb oil reveal the presence of thymol^{5,6}. GC/MS analysis of essential oil of *Coleus amboinicus* of Indian origin has not been attempted earlier.

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The aromatic fresh herb was collected from our University Medicinal Farm, authenticated and a voucher specimen was deposited in the Herbarium, University Department of Pharmacognosy. The fresh herb (200 g), when subjected to hydrodistillation on a Clevenger-type apparatus for 3 h, yielded a highly viscous golden yellow coloured volatile oil (0.24%) with a pleasant thymol odour and a sharp pungent taste. It was dried by passing through anhydrous sodium sulphate and stored in an amber coloured bottle at 4-6° until further use. The oil is highly soluble in 80% alcohol and diethyl ether. Its physical parameters are, $[d]_{25}^{25}=0.934$, $[n]_{D}^{25}=1.522$, $[\alpha]_{D}^{25}=-4^{\circ}$. TLC (Silica gel G, E. Merck, Mumbai) of the oil on toluene:ethyl acetate (93:7) gave three major spots of R_f 0.62, 0.73 and 0.95, upon spraying and activation with vanillin sulphuric acid reagent.

GC-MS analysis was performed on a Model QP 5000 Shimadzu GC-MS system using 25 m \times 0.25 mm, ZB-5 fused silica capillary column, with poly diphenyl dimethyl siloxane as the bonded liquid phase of thickness 0.25 μ m. The oven temperature programme was as follows: 70° for 5 min and 70° to 260° at 5°/min. Carrier gas, helium flow rate was 1.3ml / min and 0.1 μ l of sample was injected using split mode (1:100). Components of the oil were identified by matching their 70 eV mass spectra with those recorded on Wiley MS data library

TABLE 1: GC-MS ANALYSIS OF COLEUS AMBOINICUS ESSENTIAL OIL

Compounds	Retention time (min)	Percentage*
carvacrol	6.6	50.7
diresorcinol sulphide	7.7	3.7
γ -caryophyllene	8.3	13.1
α -humulene	8.9	4.4
β -selinene	9.4	5.4
patchoulane	10.7	8.7
14-methyl-8-hexadecyn-1-ol	11	2.1
β -caryophyllene	11.8	2.1
cyclohexene, 6-(2-butenylidene)	12.3	2.7
dioctyl phthalate	20.1	1.9

* Relative percentage of the identified volatiles based on GC peaks.

and upon comparison with standard published data^{6,7}.

The compounds identified in the essential oil of *Coleus amboinicus* are listed in Table 1 in order of elution and the percentages were calculated by % peak calculations of GC analysis. This is the first report of the identification of 10 volatile compounds from Indian *Coleus amboinicus*. It may be noted that the identified compounds constitute 95% of the total peak area. carvacrol (50.7%) is the major constituent, whereas two earlier reports of the oil analysis, in Pakistan⁵ and Egypt³ indicate the preponderance of its isomer thymol (79.6% and 88% respectively). This difference might be explained by the existence of chemical races as is common with members of thyme⁸. Our analysis has identified for the first time the presence of patchoulane (8.7%), β -selinene (5.4%), α -humulene (4.4%), diresorcinol sulfide (3.7%), cyclohexene, 6-(2-butenylidene) (2.7%), 14-methyl-8-hexadecyn-1-ol (2%) and dioctyl phthalate (1.9%), apart from γ -caryophyllene (13.1%) and β -caryophyllene (2.1%) which have been reported earlier. However, p-cymene, verbenone, camphor, limonene, tert-butyl anisole and terpinen-4-ol reported earlier in the oil, could not be identified in the present investigation where approximately 5% of the total oil remains unidentified. The high phenol content of the essential oil may be held responsible for the antiseptic, antitussive and expectorant properties of the herb. Also the high carvacrol content makes the herb worthy of commercial exploitation.

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