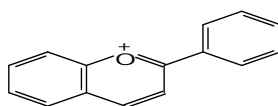


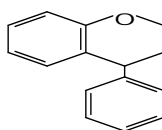
3-Results and Discussion

3.1- Identification of compound I

Compound I was isolated from ethyl acetate fraction of *Geigeria alata*. The IR spectrum of compound I (Fig. 3) did reveal a carbonyl stretching indicating absence of catechins and anthocyanins. It gave ν (KBr): 3411.84 (OH) , 2864.90 (C-H ,alkane) , 1691.46 (C = O), 1579.59 , 1452.30 (C = C , aromatic) , 1051.13 (C-O , phenolic), 1112.85 (C – O , ether) and 1398.30 (C-H ,bending)



Anthocanin



Catechin

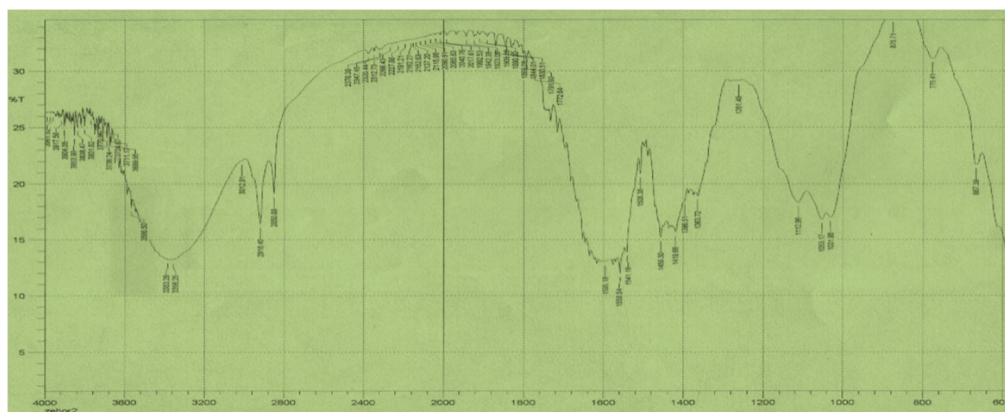
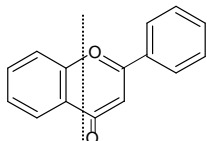


Fig. 3: IR spectrum of compound I

The UV spectra of most flavonoids consist of two major absorption maxima, one of which occurs in the range 220-285 nm (band II) and the other in the range 300-400 nm (band I). The appearance of both band I and II in the UV spectrum demonstrates conjugation between the two chromophoric systems: benzoyl and cinnamoyl systems.



Benzoyl System Cinnamoyl System

In its UV spectrum compound I (Fig. 4) showed λ_{max} (MeOH) 224 nm. Such absorption is characteristic of flavanones, dihydroflavonols and isoflavones.

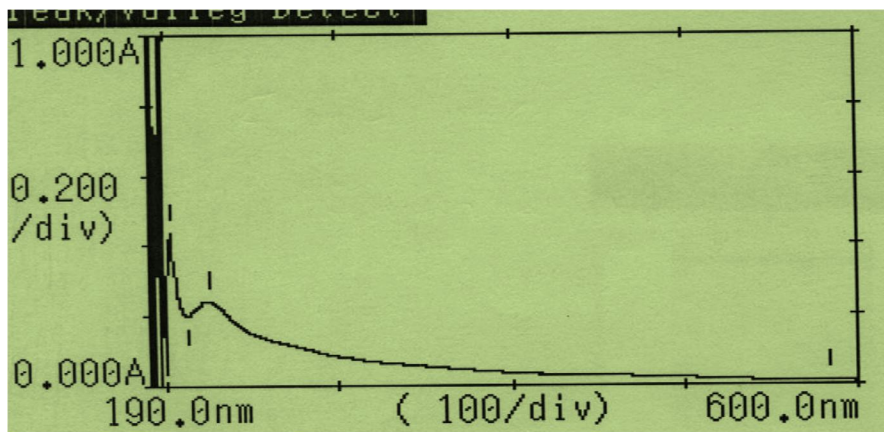
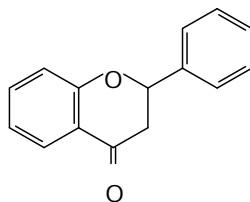


Fig. 4: UV spectrum of compound I

The spectrum did not reveal any shoulder in the range: 300-340 nm which is characteristic of isoflavones¹⁰. The shift reagent, sodium methoxide is a strong base and it is used as a diagnostic reagent for the detection of 3-OH and 4'-OH. In both cases it gives bathochromic shifts, but with decrease in intensity in case of a 3-OH function.

The sodium methoxide spectrum of compound I (Fig 5) did not reveal a bathochromic shift indicative of 3- or 4'-OH functions¹⁰. The 3-OH function is characteristic of dihydroflavonols. This argument suggests a flavanone.



Flavanone

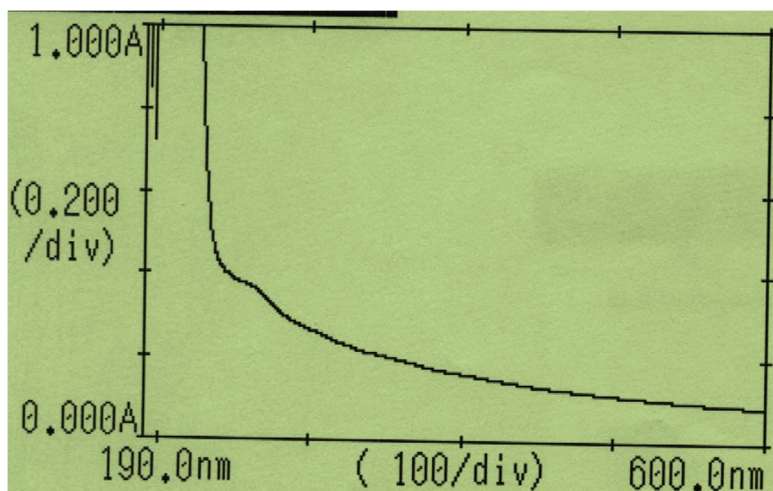


Fig. 5: Sodium methoxide spectrum of compound I

Some UV shift reagents (sodium acetate, aluminium chloride, boric acid) can provide significant structural features. They afford bathochromic shift a of a specific hydroxylation pattern.

The weak base, sodium acetate is a useful shift reagent for the specific detection of a 7-OH function where a 5-20nm bathochromic shift is observed.

The sodium acetate spectrum of compound I (Fig 6) revealed a bathochromic shift in band II indicating a free OH function in position 7.

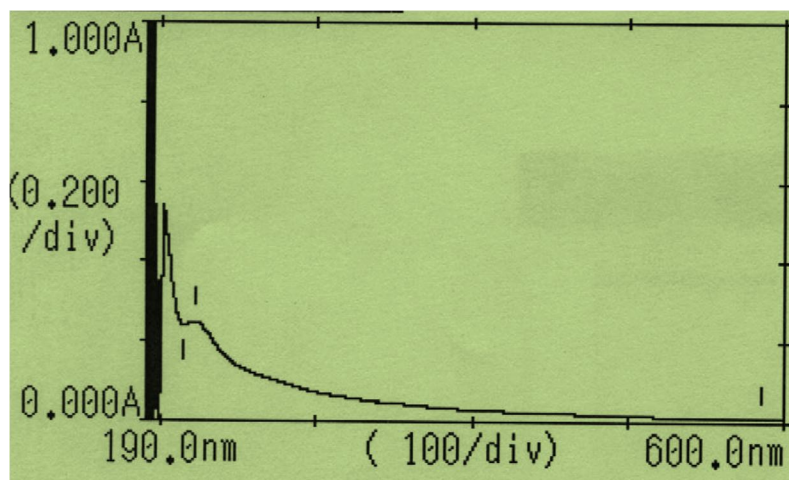
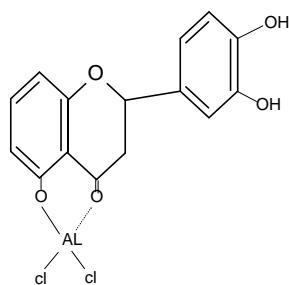
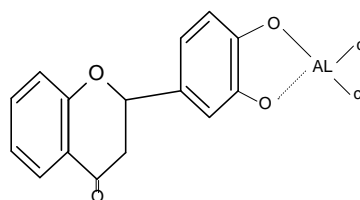


Fig. 6: Sodium acetate spectrum of compound I

Aluminum chloride (AlCl_3) is useful complexing agent for the detection of 3-, 5-OH or dihydroxyl systems. The complexes formed by (AlCl_3) and flavonoid with 3-, 5-OH group or catechol systems are shown below:

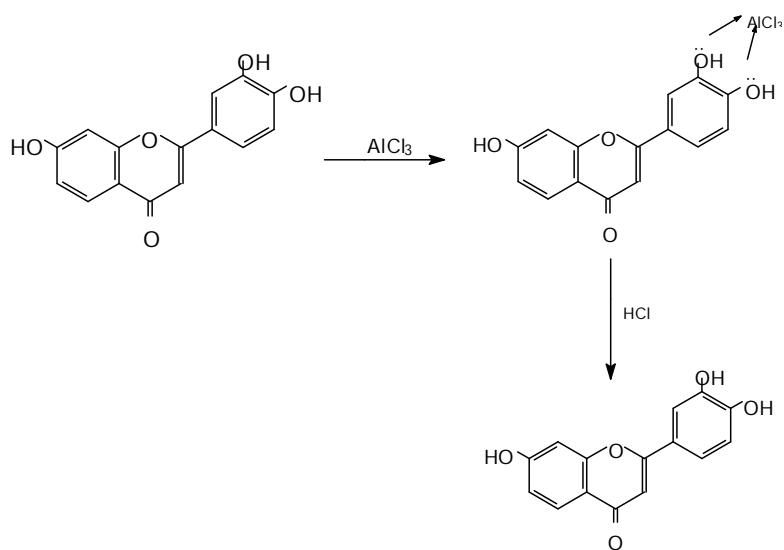


5,4- complex



4',5'- complex

These complexes could be distinguished by the addition of (HCL), where the catechol complexes are unstable in the presence of (HCL)



The aluminium chloride spectrum of compound I (Fig.7) did not reveal a bathochromic shift. Indicating absence of 3-, 5-OH as well as catechol moieties.

On the other hand, boric acid can detect catechol systems, where it afford a bathochromic shift. The boric acid spectrum of compound did not afford a bathochromic shift indicating absence of catechol systems (Fig.8).

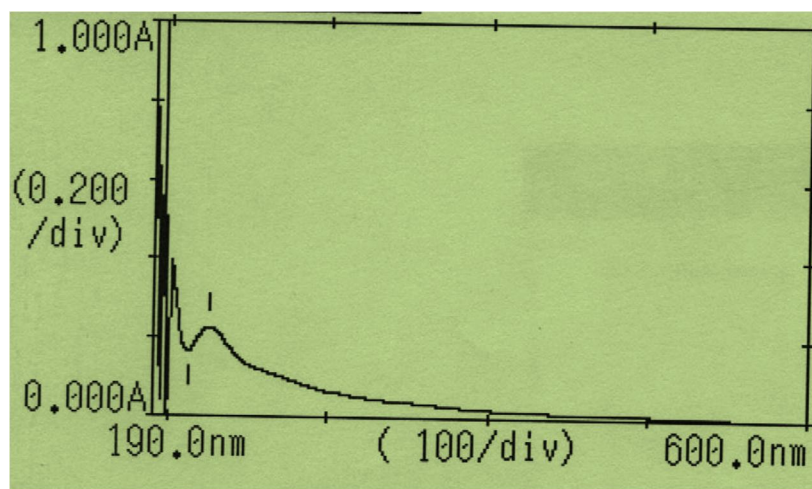


Fig. 7: Aluminium chloride spectrum of compound I

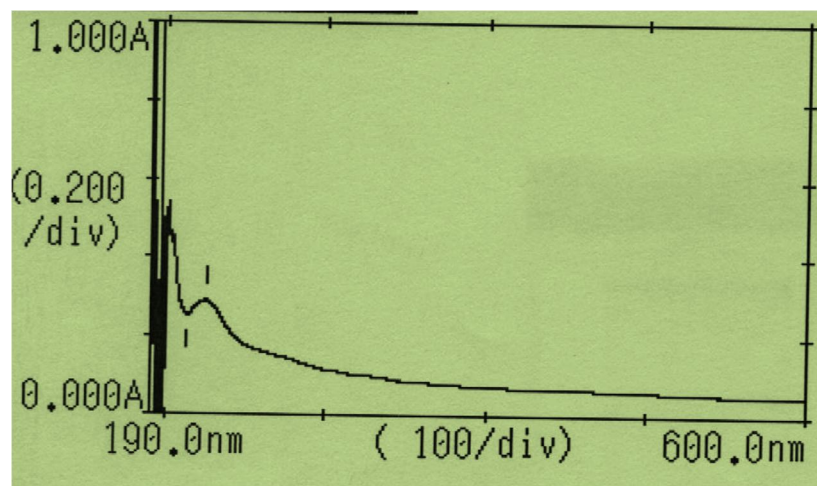


Fig. 8: Boric acid spectrum of compound I

The ^1H NMR spectrum (Fig.9) gave signals at δ 0.85 (3H) assigned for a methyl group. The resonances at δ 1.14 (3H) and δ 1.78 (2H) account an ethyl group. The signal at δ 3.46 (6H) ppm indicates two methoxyl functions. The resonance at δ 8.30 account for the aromatic protons. The EI mass spectrum (Fig.10) gave m/z 342 for the molecular ion.

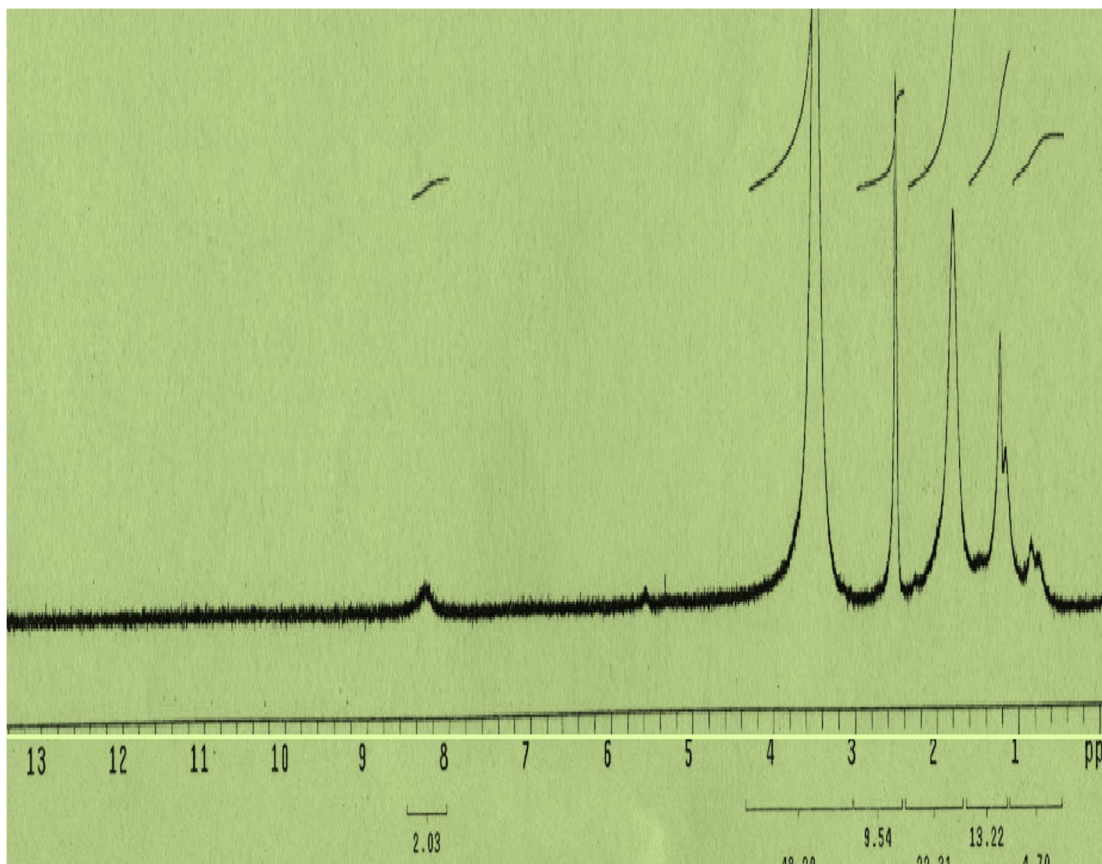


Fig. 9: ¹H NMR spectrum of compound I

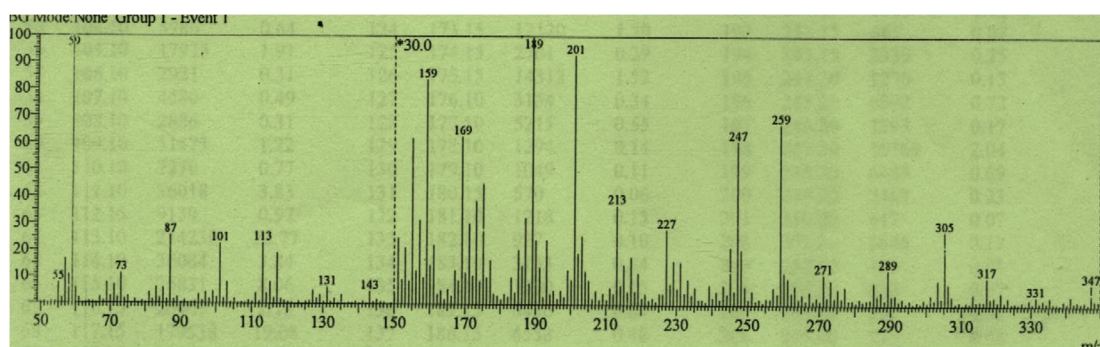
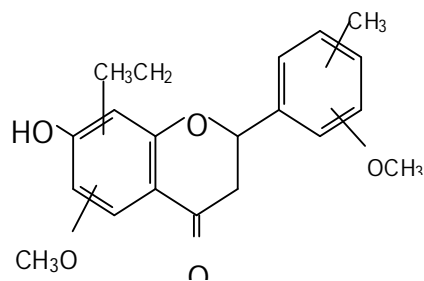


Fig. 10: Mass spectrum of compound I

On the basis of the above spectral data, the following tentative structure was proposed for compound I:



3.2-Identification of compound II

Compound II was isolated from ethyl acetate fraction. The IR spectrum of compound II (Fig.11) revealed ν (KBr): 997(C-H, Ar.bending), 1033(CO), 1458, 1591(C=C,Ar.),1743(C=O),2920(C-H, alkanes) and 3446 cm^{-1} (OH).

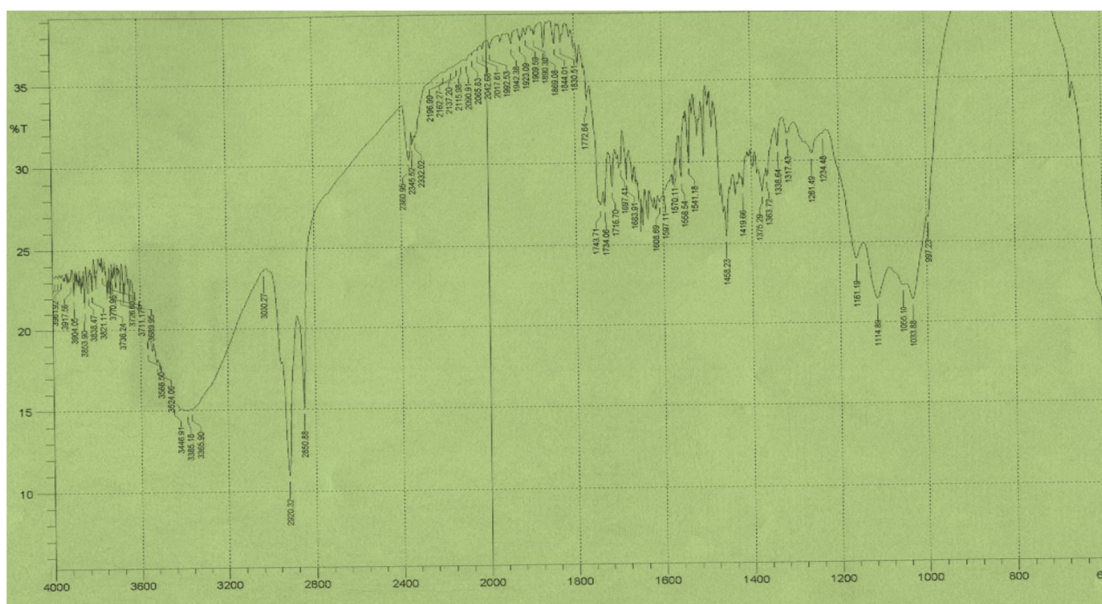


Fig. 11: IR spectrum of compound II

In the UV, this compound absorbs (Fig.12) at λ_{max} 276,336nm. Such absorption is characteristic of flavones¹⁰.

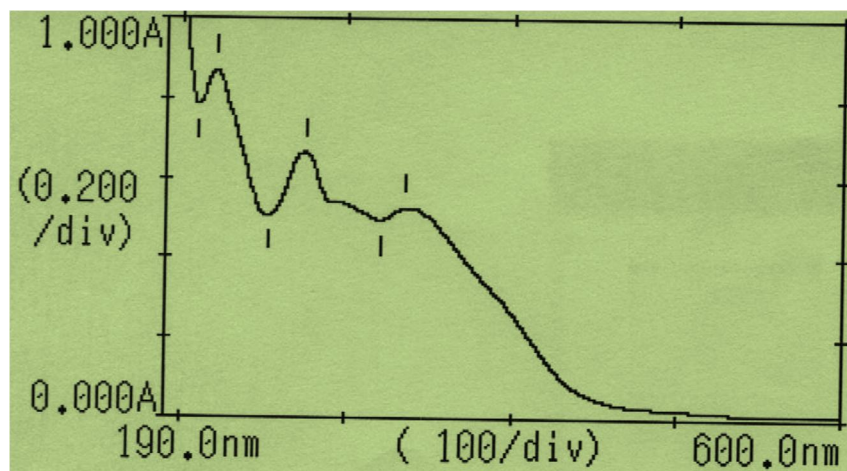


Fig. 12: UV spectrum of compound II

The sodium methoxide spectrum (Fig.13) gave a bathochromic shift with decrease in intensity which is diagnostic of a 4'-OH function. Furthermore, the sodium acetate spectrum (Fig.14) gave a

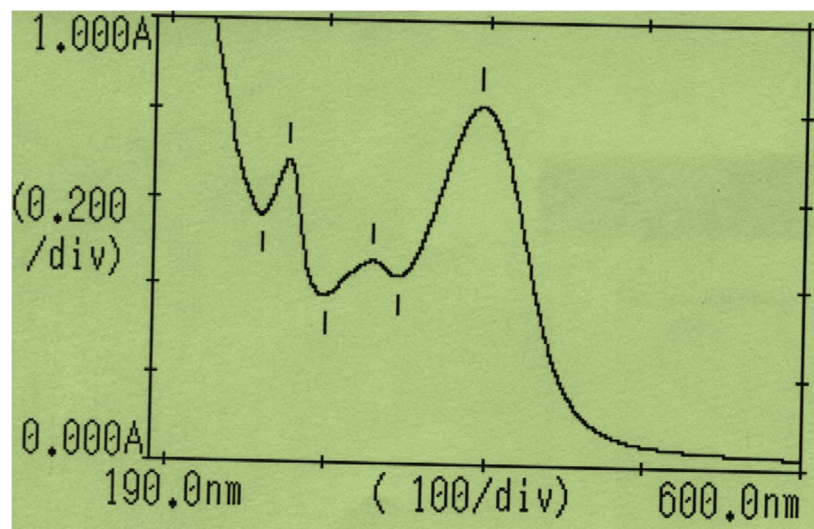


Fig. 13: Sodium methoxide spectrum of compound II

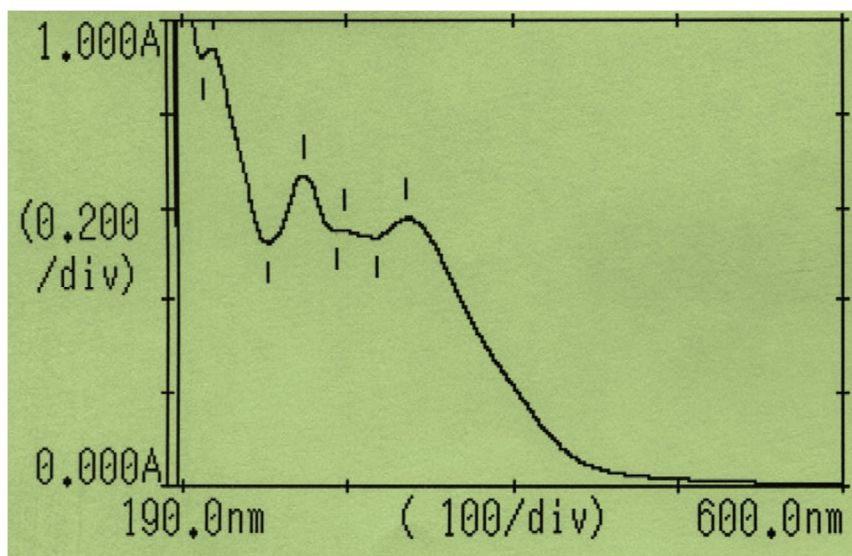


Fig. 14: Sodium acetate spectrum of compound II

Bathochromic shift indicative of a 7-OH function¹⁰. No bathochromic shifts were observed in the aluminium chloride spectrum (Fig. 15). This suggests absence of catechol systems as well as 3- and 5- hydroxyl groups. The boric acid spectrum also did not reveal any bathochromic shift indicating absence of catechol moieties(Fig.16).

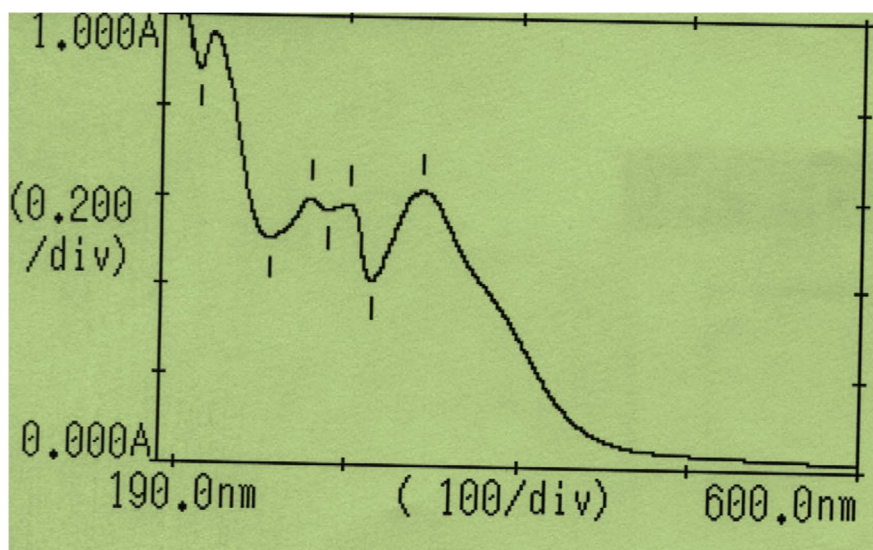


Fig. 15: Aluminium chloride spectrum of compound II

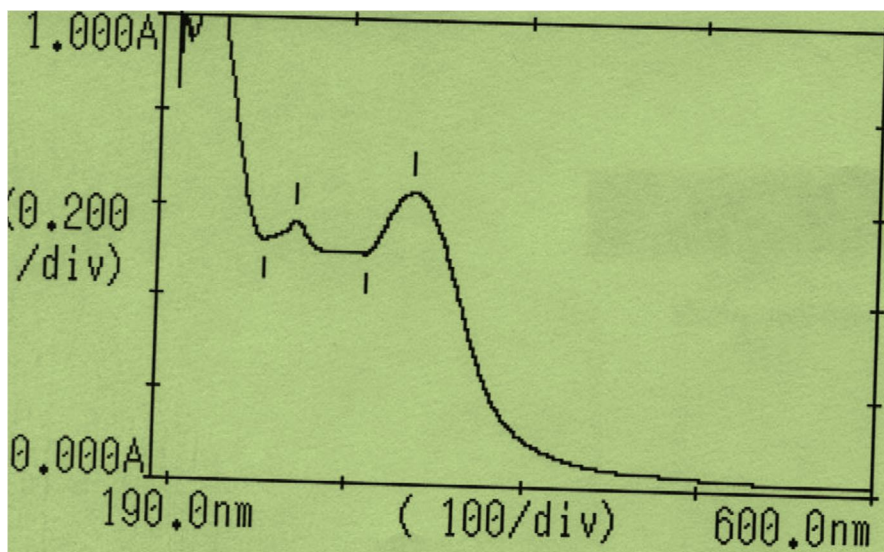


Fig. 16: Boric acid spectrum of compound II

The ^1H NMR spectrum (Fig.17) showed: δ 1.23 (6H) assigned for two methyl functions. The resonance at 3.75 (3H) accounts for a methoxyl function. The signals at 6.77(1H) and 6.95(1H) were attributed for C_6 – and C_8 - protons respectively. The latter proton usually resonates at lower field relative to the former due to the deshielding influence of the oxygen atom at position one. The EI mass spectrum (Fig.18) gave m/z 311 for the molecular ion.

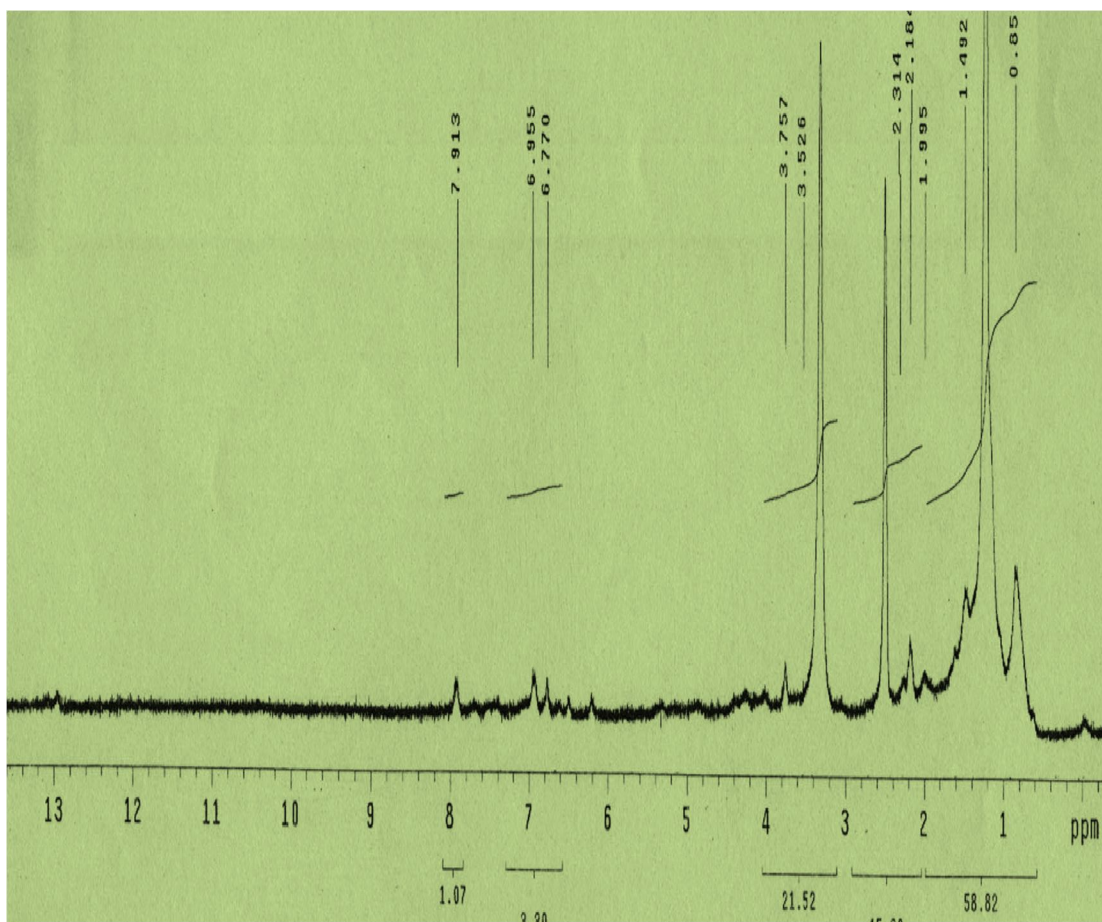


Fig. 17: ¹H NMR spectrum of compound II

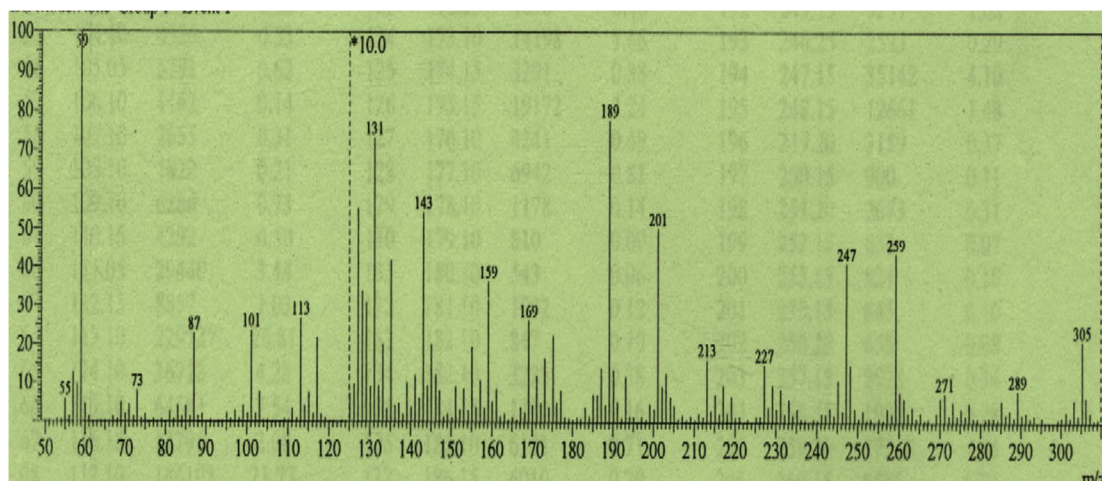
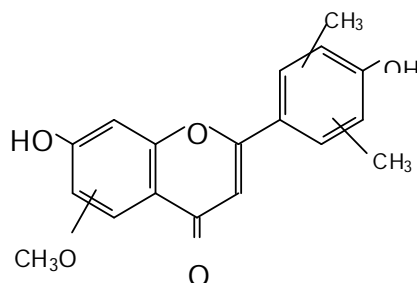


Fig. 18: Mass spectrum of compound II

On the basis of the above argument, the following tentative structure was suggested for compound II:



3.3-Identification of compound III

Compound III was isolated from n-butanol fraction of *Geigeria alata*. The IR spectrum of compound III revealed (Fig.19) ν (KBr): 613,719(CH,Ar.bending),1114(CO),1419,1448(C=C,Ar.),1743(C=O),2922(C-H, alkanes) and 3346 cm^{-1} (OH).

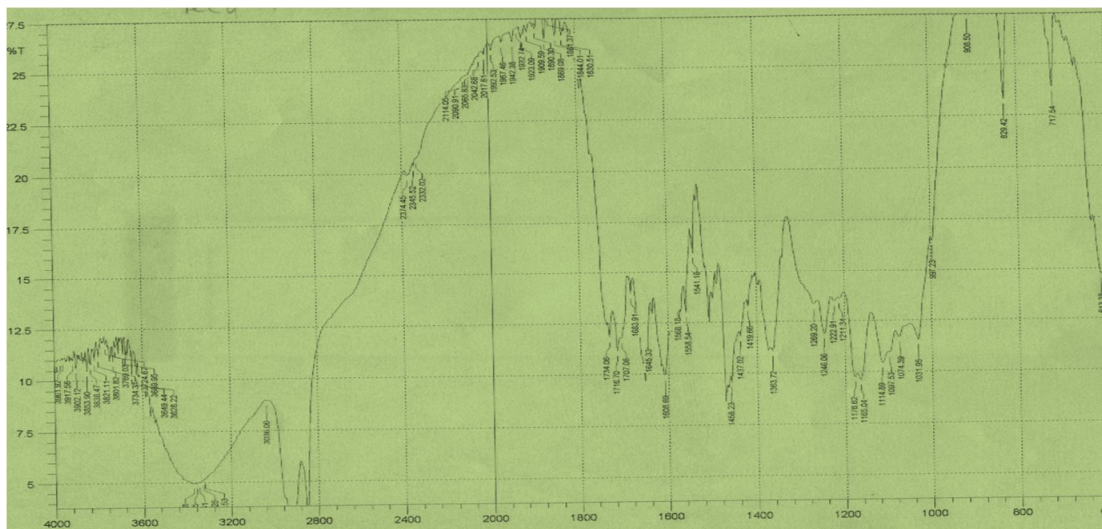


Fig. 19: IR spectrum of compound III

In the UV, this compound absorbs (Fig.20) at λ_{max} 269,337nm. Such absorption is characteristic of flavones¹⁰.

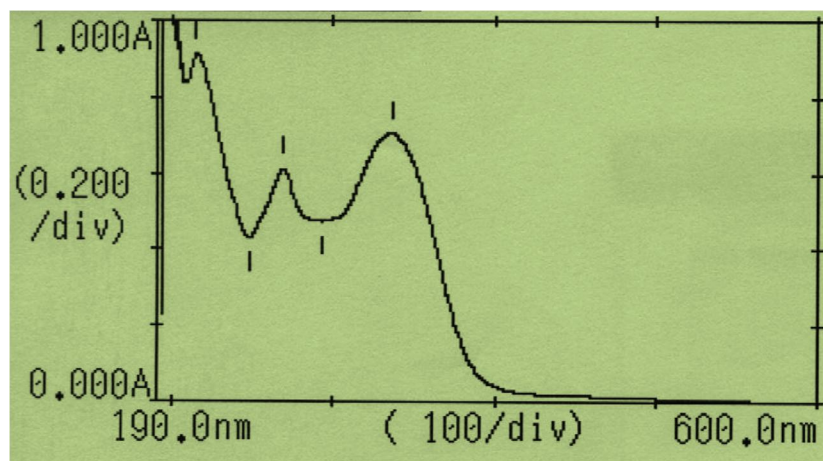


Fig. 20: UV spectrum of compound III

The sodium methoxide spectrum (Fig.21) gave a bathochromic shift (61nm) with decrease in intensity which is diagnostic of a 4'-OH function. The sodium acetate spectrum (Fig.22) did not give any bathochromic shift indicating absence of a 7-OH function¹⁰.

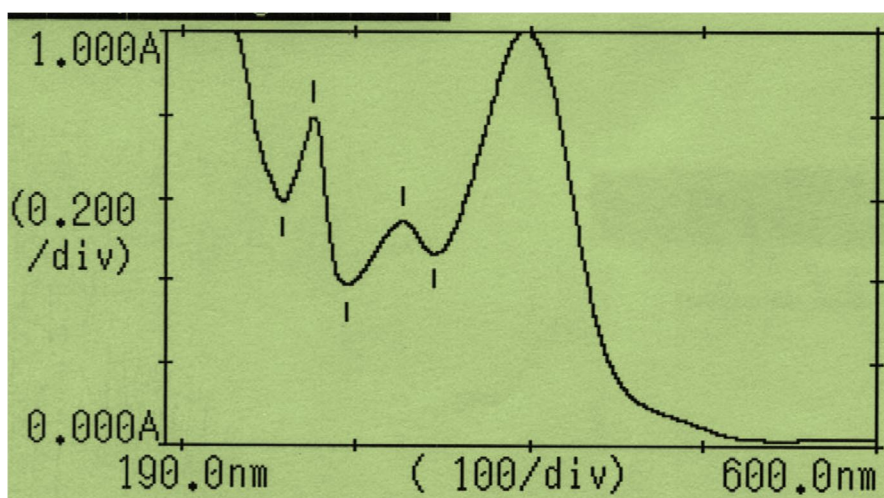


Fig. 21: Sodium methoxide spectrum of compound III

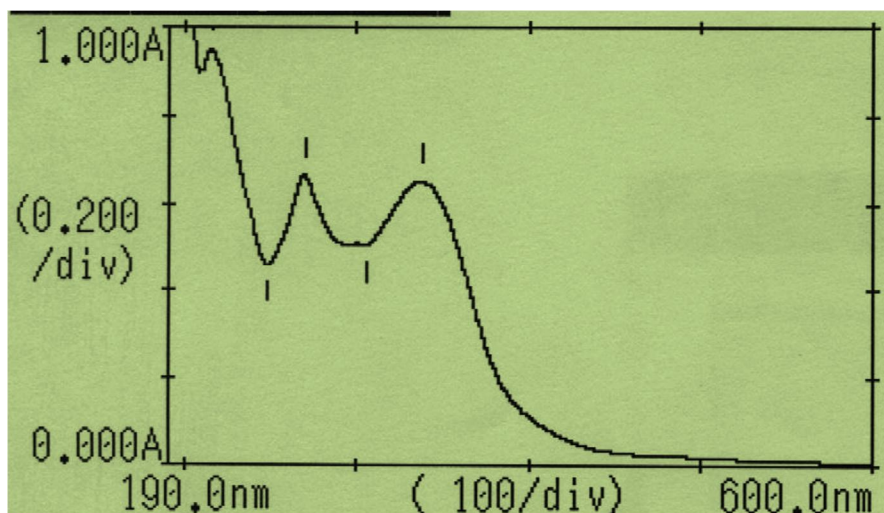


Fig. 22: Sodium acetate spectrum of compound III

A bathochromic shift was observed in the aluminium chloride spectrum (Fig.23). The spectrum was acid-stable (Fig.24) suggesting a 5-OH function. The boric acid spectrum (Fig.25) did not reveal any bathochromic shift indicating absence of catechol moieties.

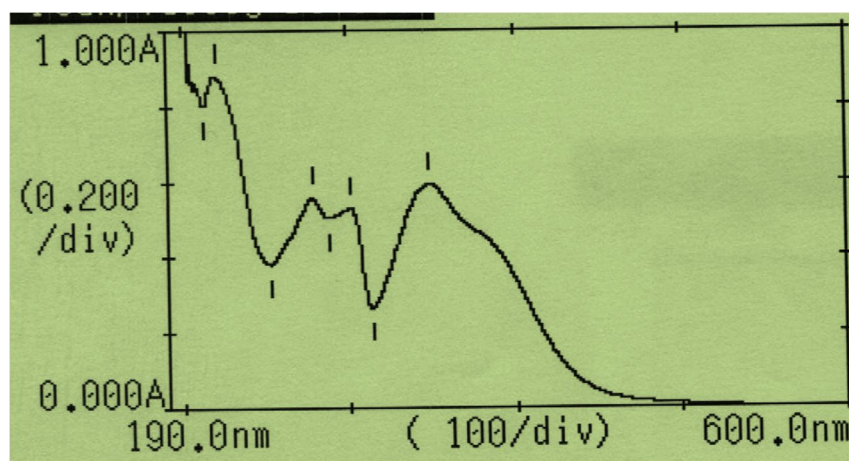


Fig. 23: Aluminium chloride spectrum of compound III

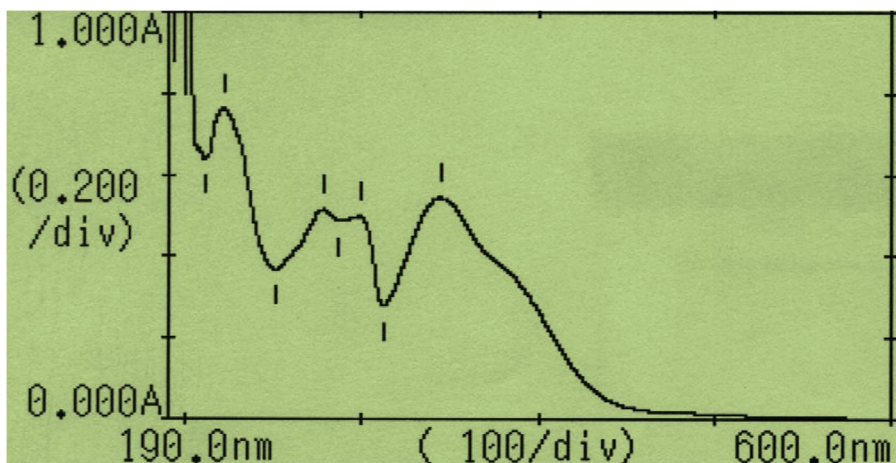


Fig. 24: Aluminium chloride/ HCl spectrum of compound III

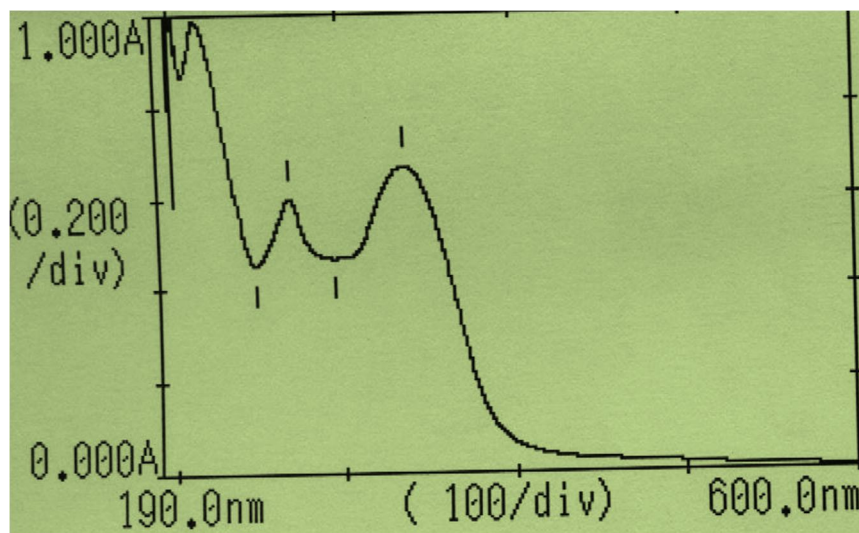


Fig. 25: Boric acid spectrum of compound III

The ^1H NMR spectrum (Fig.26) showed: δ 1.23 (6H) assigned for two methyl functions. The resonance at δ 3.75 (3H) accounts for a methoxyl function. The signals at δ 6.19(1H) and δ 6.48(1H) were attributed for C_6 – and C_8 -protons respectively. The resonances at δ 6.76, 6.91 and were assigned for A ring protons. The B ring protons, which usually resonate at lower field

appeared at δ 7.93ppm. The EI mass spectrum (Fig.27) gave m/z 281 for the molecular ion.

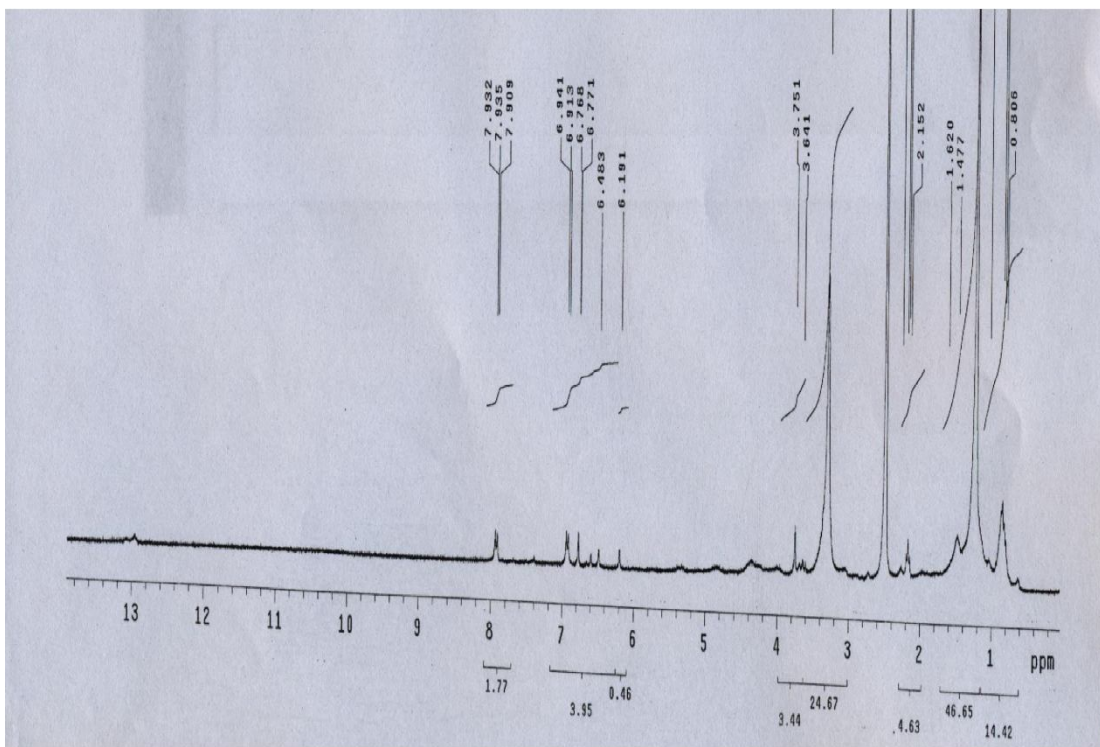


Fig. 26: ¹H NMR spectrum of compound III

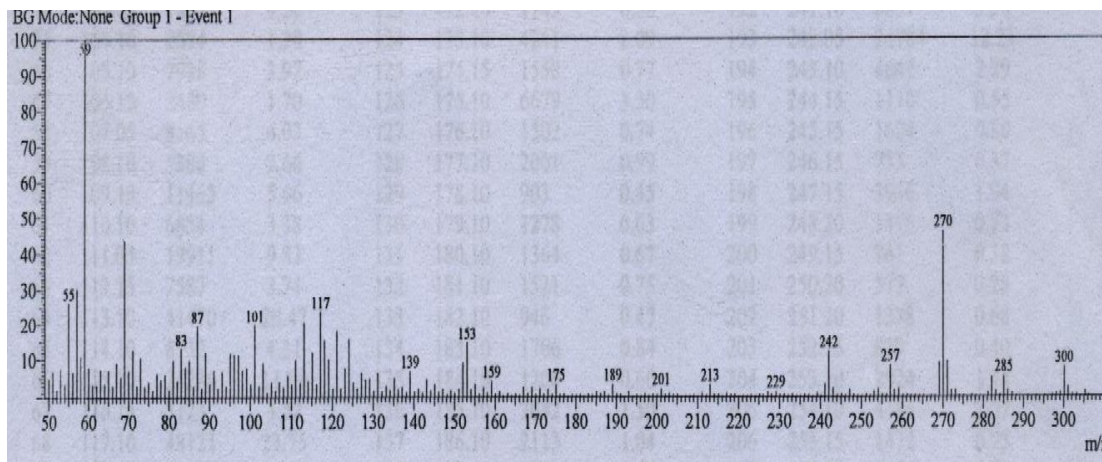
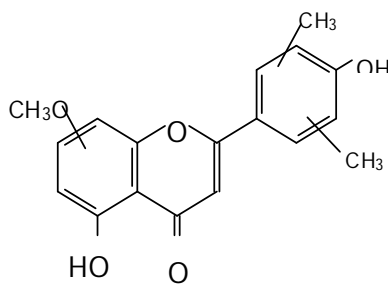


Fig. 27: Mass spectrum of compound III

On the basis of the above argument, the following tentative structure was suggested for compound III:



Recommendations

Gegeiria alata (DC) is a rich source of various phytochemicals such as favonoids alkaloids, tannin and In Sudanese traditional medicine *G.alata* is being used against various ailments such as epilepsy as an antispasmodic or to treat cough and intestinal complain. In recent study *G.alata* showed strong immunomodulation inhibitory activity and cell oxidative burst response. *G.alata* root is frequently used for the managements of diabetes in Sudan. Hence the plant should be further study.