CHAPTER - V

EXPERIMENTAL
7.0.0 Procurement of Plant Material:

30 kgms of the fresh bulbs of Iris kashmiriana were procured from the Tangmarg area, about 35 km north-west of the capital Srinagar, of the J&K State, in the month of August. A specimen of the plant material is preserved at SMPU, RRIUM, University of Kashmir, Hazratbal, Srinagar under voucher No: UD/1986-413.

V.1.0 Extraction of Plant Material:

The plant material was chopped into small pieces, subjected to partial drying in shade for 5 days and extracted with hot methanol and dried under reduced pressure. The methanolic extract was extracted again with hot petroleum ether (b.p 60°-80°) to remove the lipid portion. Subsequently the residue was triturated with ethylacetate. The ethylacetate insoluble portion was redissolved in methanol, filtered and the filtrate concentrated.

V.2.0 Isolation of the Compounds:

The isolation of the compounds was restricted to the ethylacetate soluble fraction. These two fractions were worked out independantly. The fractions were subjected to column chromatography over silica gel, using purified dry gradient solvent systems of pet ether (b.p. 60°-80°), benzene ethylacetate and methanol. The column chromatography
was monitored by tlc on silica gel G, using an appropriate solvent system, depending upon the $R_f$ values of each component. The identical fractions usually mixtures were pooled together before subjecting to further chromatography. Preparative tlc was carried out on silica gel G plates. Wherever, the resolution of the mixtures by column chromatography and preparative tlc failed, centrifugal disc thin layer chromatography on chromatotron was used for their separation.

V.3.0 Isolation of the compounds from Ethylacetate Soluble Fraction:

50 g of the ethylacetate soluble fraction was subjected to column chromatography over silica gel (1.5 kg). The fractions were recovered from benzene-ethylacetate graded solvent systems and 25 ml fractions were collected. The tlc identical fractions were pooled together. This gave four major fractions numbered fraction A to fraction D. The fraction A (7 g) was obtained with 70% benzene in ethylacetate; the fraction B (9.3 g) was obtained with 50% benzene in ethylacetate; fraction C (12.53 g) was recovered with 30% benzene in ethylacetate and fraction D was recovered with pure ethylacetate.

The thin layer chromatography showed that all the four fractions A to D were mixtures of three, five, four and five compounds respectively.
Isolation of the Compounds from fraction A:

The fraction A (1 g) was subjected to further column chromatography on silica gel and the column was developed with benzene-ethylacetate graded solvent systems, starting from pure benzene. This gave two main fractions A-I (4 g) with benzene-ethylacetate (7:3) consisting of two compounds with close $R_f$ values and fraction A-II (2.2 g) consisting of three compounds.

Further column chromatography of the fraction A-I proved futile. The attempts to resolve this fraction by preparative tlc on 1 mm thick silica gel plates using benzene-ethylacetate (19:1 v/v) eluants partially resolved the fraction to afford (0.05 g) of the compound 1. The fraction was, therefore, subjected to further purification using disc-chromatography.

V.3.1 Disc-Chromatography of fraction A-I:

The centrifugal disc chromatography of the fraction was carried out on chromatotron using 3mm thick silica gel discs. The best solvent system for resolution was found to be benzene-chloroform (6:4 v/v). The separation of 2g mixture of the fraction A-I was carried out in two stages. 15 ml fractions were collected and monitored by tlc using benzene-ethylacetate (19:1 v/v) as solvent systems. Identical fractions were pooled
together. The fractions containing the mixtures of the compounds were discarded. This process afforded 0.823 g of the compound 1 and 1.021 g of the compound 4. The compound 1 and 4 were recrystalised from chloroform - pet. ether.

V.3.3 Separation of the fraction A-II:

On rechromatography of this fraction on silica gel, using graded solvent systems of benzene-ethylacetate and collecting 20 ml fractions, the first fraction containing the compound was recovered with benzene-ethylacetate (19:1 v/v). This was found to be a binary mixture having \( R_f \) values identical to that of the compounds in fraction A-I. This fraction was not, therefore, worked further.

The second fraction, recovered with benzene-ethylacetate (7:3 v/v) was found to be a mixture of three compounds with only one compound having \( R_f \) value different to the compounds obtained with 75% benzene in ethylacetate. This fraction was numbered as A.II.a. Further development of the column with benzene-ethylacetate (1:1 v/v) afforded another fraction containing two compounds. This fraction numbered as A.II.b was found to contain one compound resembling to that of fraction A.II.a.
V.3.4 Separation of the fraction A.II.a:

This fraction (0.705 g) was subjected to preparative tlc using 0.5 mm thick plates and using benzene-chloroform (1:1 v/v) as the solvent system. The plates were observed after developing with iodine. Iodine was evaporated using hot air. The bands were cut and compounds extracted with dry ethylacetate. The compound with lower $R_f$ value was recovered, discarding the mixture with higher $R_f$ value. The compound was purified by percolating through silica gel micro-column and subsequently crystalised from chloroform-benzene to give the compound 9.

Separation of the fraction A.II.b:

This fraction was subjected to column chromatography over silica gel. The development of the column with benzene-ethylacetate (19:1 v/v) afforded first the compound 3, then a mixture of two compounds. The mixture was resolved by preparative tlc using benzene-ethylacetate (8:2 v/v). The compound with lower $R_f$ value was isolated by extraction with ethylacetate and crystalised to give compound 34.

V.3.5 Separation of fraction H:

The fraction B, recovered from the crude column with benzene-ethylacetate (1:1 v/v) was found to
be a mixture of five compounds by tlc using benzene-
ethylacetate (6:3 v/v) as eluant. The mixture was
chromatographed over silica gel columns, using benzene-
ethylacetate graded solvent systems as develop-
ment. After monitoring by tlc and combining the identical fractions,
four fractions B-I to B-IV, consisting of two, three,
three and two compounds, respectively, were recovered.

V.3.6 Separation of the fraction B-I:

The fraction B-I, on comparison with the
previously isolated products was found to contain the
compound 9 and another product with close Rf value. The
separation of this fraction was attempted by argentine
column chromatography using 1% AgNO3 and elution with
benzene. The mixture could not be resolved. The separation
of the mixture was therefore, attempted on chromatotron,
using Chloroform-ethylacetate (95:5 v/v) solvent system.
by repeated chromatography over chromatotron few fractions
containing one compound only were collected. This compound
6 was crystallised from benzene as rhombic crystals.

V.3.7 Separation of the fraction B-II:

This fraction also showed the presence of the
compound 9 in addition to two well resolved compounds on
tlc, using Chloroform-ethylacetate (19:1 v/v) solvent
system.
The fraction was, therefore, subjected to preparative tlc, this time using the solvent system 85% chloroform in ethylacetate. The bands were observed after exposing the sides of the 24 x 24 inch plates to iodine vapours. After cutting the lower two bands, the compounds were recovered with ethylacetate; subjected to column chromatography over silica gel and crystallisations from chloroform pet.ether to yield the compound \( \text{I} \). The fraction containing the compound \( \text{I} \) was not worked out.

V.3.8 Separation of the fraction B-III:

Tlc on silica gel revealed that it was a mixture of three compounds with the major concentration of the compound \( \text{II} \) and an extracom pound. The mixture was subjected to column chromatography when initial development with benzene-ethylacetate (8:2 V/v) afforded a mixture of \( \text{I} \) and \( \text{II} \). Further development of the column with 70% benzene in ethylacetate gave a mixture of two compounds, one of which had the \( R_f \) value identical to that of \( \text{II} \). This mixture was subjected to further column chromatography when benzene-ethylacetate (7:3 v/v) eluted the compound \( \text{II} \). The last fractions collected with the same solvent system afforded tlc homogeneous compound \( \text{I} \).

V.3.9 Separation of the mixture B-IV:

This fraction was found to be a mixture of two compounds with close \( R_f \) values, on tlc using the solvent
system benzene-ethylacetate (19:1 V/V). The mixture could not be effectively resolved with column chromatography. It was, however, resolved on thin preparative tlc (0.1 mm thick) plates. The bands bearing compound with lower $R_f$ value alone, were alone cut and the compound extracted with chloroform. The purification of the compound was accomplished by column chromatography using percolation technique and benzene as solvent system. The compound was crystalised from chloroform-pet.ether to obtain pure needles of the compound 30.

V.3.10 Separation of the fraction C:

On development of the crude column with 30% benzene in ethylacetate a fraction containing four compounds was recovered. As usual its separation was attempted by further column chromatography, monitored with tlc, using benzene-ethylacetate (1:1 v/v) solvent systems and combining the tlc identical fractions. Three fractions containing two, three and two compounds were recovered whose separation into individual compounds was effected by combined column and preparative tlc. These fractions were numbered as C-I to C-III.

V.3.11 Separation of the fraction C-I:

The fraction C-I was subjected to column chromatography over silica gel column. The development of
the column with benzene-ethylacetate (19:1 V/v) initially afforded a mixture of compounds, found to be oily on evaporation of the solvent. On changing the solvent to benzene-ethylacetate (7:3 V/v) a crystalline compound 30 was first obtained. Few fractions containing the mixture of two compounds were, subsequently, obtained. The latter fractions gave a compound which had the tlc behaviour similar to compound 4.

V.3.12 **Separation of the fraction C-II:**

Like fraction C-I, this fraction was also subjected to column chromatography. This afforded two compounds identical to 30 and 4, on tlc plate. The fractions recovered with benzene-ethylacetate (6:4 V/v) gave a compound similar to II. The fractions were not worked further.

V.3.13 **Separation of the fraction C-III:**

This being a mixture of only two compounds, was subjected to preparative tlc on silica gel G using benzene-ethylacetate (6:4 V/v) as eluant. The band with higher R_f value was cut, processed in the usual way and finally the compound was recovered by crystallisation from Chloroform-pet.ether to give compound 26. The compound with lower R_f value was identical to the compound II by tlc.
V.3.14 Separation of the fraction D:

The fraction D recovered from the crude column with pure ethylacetate was found to be a mixture of five compounds. The fraction was, therefore, rechromatographed over silica gel column, using benzene-ethylacetate graded solvent systems and recovering 25 ml fractions. The tlc identical fractions were combined together. This led to the recovery of five fractions numbered D-1 to D-5.

V.3.15 Separation of the fraction D₁:

This fraction on tlc over silica gel G using benzene-ethylacetate (6:4 v/v) showed three compounds with close Rf values. The mixture could not be resolved by column chromatography. The attempts to resolve the mixture by preparative tlc also failed.

The mixture was subjected to centrifugal disc chromatography over 0.5 mm thick discs, using chloroform-ethylacetate (8:2 v/v). 15 ml fractions were collected, monitored by tlc and combining the identical fractions. On repeated centrifugal disc chromatography of the mixtures obtained during each chromatographic process, three compounds were obtained. The compounds were crystallised from chloroform-methanol. One of these compounds was found identical to that of the compound α, which had earlier been obtained from the fraction B. The other two
compounds were 21 and 31.

V.3.16 Separation of the fraction D-2:

The mixture contained two compounds similar in tlc to the compounds 21 and 31. The mixture was not worked out further.

V.3.17 Separation of the fraction D-3:

The tlc showed that the fraction was a mixture of two compounds, one of which resembled the compound 31. The fraction was subjected to preparative tlc using chloroform-ethylacetate (7:3 v/v). The band with higher R_f value was cut and processed, as usual. The compound was crystallised from chloroform-benzene to afford the compound 26.

V.3.18 Separation of the fraction D_4:

This fraction was found to be a mixture of three compounds two of which showed tlc behaviour identical to 26 and 31. The other compound had R_f value close to that of 31. The mixture was subjected to column chromatography and developed as usual with graded solvent systems. The mixture of two compounds containing the compound 31 and another compound was subjected to centrifugal disc chromatography over silica gel G, Using
the solvent system benzene-ethylacetate (7:3 v/v). To resolve this mixture, the centrifugal chromatography had to be repeated thrice to recover the compound 19. The compound was crystallised from chloroform-pet. ether.

V.3.19 Separation of the fraction D₄:

Since tlc showed that the components of the mixture showed were identical to that of 26 and 19 present in the fraction D₄, no attempt was made to resolve this fraction.

V.4.0 Separation of the compounds from methanolic fraction:

On evaporating the solvent, the residue did not form a clear solution in methanol. The mixture dissolved in hot DMSO; adsorbed on silica gel and evaporated to total dryness in a thin-film evaporator. The adsorbed material was subjected to column chromatography over 2 kgs of silica gel. The development of the column was started with benzene and subsequently with graded solvent systems of benzene, ethylacetate and methanol. Following the usual procedure, three main fractions were recovered with benzene-ethylacetate (1:1 and 3:7 v/v), and ethylacetate. The column was finally eluted with methanol. The methanol fraction has not been worked out further. The three fractions were designated as M-1, M-2 and M-3.
V.4.1 Separation of the fraction M-1:

This fraction, recovered from benzene-ethylacetate (1:1 v/v) was found to be a mixture of three compounds by tlc, using solvent system benzene-ethylacetate (7:3). The mixture contained two compounds which showed overlapped spots on tlc. The mixture was subjected to rechromatography over silica gel column. By the usual procedure two combined fractions were recovered with benzene-ethylacetate (6:4) and benzene-ethylacetate (1:1) solvent systems. The latter fraction was found to be a mixture of two compounds, whereas the former contained tlc homogenous fraction. The compound \( \text{I}_6 \) from this fraction was crystallised from ethylacetate-benzene.

The second fraction was again chromatographed on silica gel column without getting desired resolution. The mixture was partially resolved on neutral alumina and latter by centrifugal disc chromatography using chloroform-ethylacetate (7:3 v/v) as the solvent system. The tlc homogeneous fractions were pooled together. From the fractions containing only single constituents two compounds were recovered and rest of the fractions were discarded. One of these compounds was found identical to the compound \( \text{II} \) by its tlc and mp. The other compound \( \text{III} \) was crystallised from ethylacetate-pet. ether.
V.4.2 Separation of the fraction M-2:

This fraction was recovered with benzene-ethylacetate (1:1 v/v) and was found to contain compound 16 with two additional compounds. Following three repeated column chromatographic procedures over silica gel and development of the columns with graded benzene-ethylacetate solvent systems, the compound 16 was completely eliminated from this fraction. The other two compounds 12 and 24 were separated by preparative tlc using chloroform-methanol (75:25 v/v) as solvent systems. Both the compounds were crystalised from methanol-pet.ether.

V.4.3 Separation of the fraction M-3:

This fraction was collected from benzene-ethylacetate (3:7 v/v) and found to be a mixture of three compounds, two of which resembled to the compounds of the fraction M-2. The mixture was subjected to column-chromatography which eliminated the compound 16 from the mixture. The left out fractions containing two compounds were further chromatographed over silica gel columns and finally separated by preparative tlc, using chloroform-ethylacetate (1:1 v/v) as the solvent system. The compound 27 thus obtained was crystalised from methanol-benzene.

V.5.0 Identification of the Compounds:

Following the isolation and purification of
compounds, the structural elucidation of each compound was attempted by spectral analysis and chemical transformations. Since, most of the compounds carried a hydroxyl, they were subjected to acetylation and methylation. At one instance, where the compound was found to contain an aldehyde function, reduction with lithium-aluminium hydride was attempted. The general procedures employed for acetylation and methylation are given below:

V.5.1 General Procedure for acetylation:

The compound in the range of 15 to 20 mgm. was dissolved in pyridine and 2 to 3 ml acetic anhydride added. The mixture was left to room temp. for 24 to 35 hrs, and monitored by tlc. In case the tlc showed complete transformation the product was worked out, otherwise left for 24 hr, more at room temp. wherever the reaction did not proceed to completion the mixture was heated on waterbath for 24 to 48 hr. The cooled mixture was poured on ice-cold water, and filtered. The ppts were washed with acidulated water thrice, dried, extracted with ethylacetate and purified by column chromatography on silica gel followed by crystallisation. Crystalisations were generally effected from benzene-methanol.

V.5.2 General Procedure for Methylation:

10-20 mg compound was dissolved in dry methanol or acetone and to this was added anhyd. \( \text{K}_2\text{CO}_3 \). Then 2-4 ml
of MeI was added dropwise with constant shaking. The mixture was left at room temp. and monitored by tlc. The mixtures usually showed incomplete reactions and therefore the mixture was refluxed on water bath till the reactions were complete. The mixtures were cooled filtered and freed from the solvent by distillation on water bath. The products were purified by passing through silica gel micro columns and latter by crystallisation from chloroform-methanol.

V.5.3 General Procedure for Lithium Aluminum Hydride Reduction:

20 mgm compound was dissolved in dry methanol and 0.5 g LAH was added in four equivalent amounts to the solution. The mixture was left at room temp. Using a CaCl$_2$ guard tube for 36 hr., monitored by tlc. Excessive LAH was destroyed with ethylacetate. The solution was filtered, and condensed to 1/3rd volume. Water was added and the compound isolated with ethylacetate dried over anhyd. Na$_2$SO$_4$, filtered and distilled. The compound was purified by passing through silica gel microcolumn and development of the column with benzene-ethylacetate (3:7 v/v) before crystallisation from ethylacetate-pet.ether.

V.5.4 Oxidative Degradation of the Compounds:

Two compounds 3 and 21 were dissolved in acetone and 1N KMnO$_4$ was added. The mixtures were left
at room temp. for 48 hrs till decolourisation was achieved. The products were isolated with acetone and after usual work up the acids were recovered and crystallised.

Characterisation of Compounds

V.6.1 Identification of Compound 1

UV: $\lambda_{\text{max}}^{\text{MeOH}}$ 266, 232 (inflection)

IR: $\nu_{\text{KBr}}^{\text{max}}$ 3320, 1660, 1620, 1590, 1460, 1320, 1240, 940.

$^1$HNMR: Refer Table No. IV.1

MS Frag.: Refer to Fig No.1.

V.6.2 Identification of Compound 2

UV: $\lambda_{\text{max}}^{\text{MeOH}}$ 235, 270

IR: $\nu_{\text{KBr}}^{\text{max}}$ 1730, 1650, 1615, 1580, 1450, 1310, 1230, 940.

$^1$HNMR: Refer Table No. IV.2

MS Frag.: Refer Fig No.2.

V.6.3 Identification of Compound 3

UV: $\lambda_{\text{max}}^{\text{MeOH}}$ 268, 328

IR: $\nu_{\text{KBr}}^{\text{max}}$ 1640, 1630, 1590, 1490, 1320, 940.

$^1$HNMR: Refer Table No. IV.3

MS Frag.: Refer Fig No.3
V.6.4 Identification of Compound 4

UV
\[ \lambda \text{max} = 264 \text{ (band II) 325 (sharp band I)} \]

IR
\[ \nu \text{max} = 3250, 1560, 1610, 1430, 1380, 1220, 940 \]

$^1$HNMR : Refer Table No. IV.4

MS Frag. : Refer Fig No.4

V.6.5 Identification of Compound 5

UV
\[ \lambda \text{max} = 251, 324 \text{ (Inflection)} \]

IR
\[ \nu \text{max} = 1760, 1640, 1620, 1580, 1510, 1450, 1320, 940 \]

$^1$HNMR : Refer Table No. IV.5

MS Frag. : Refer Fig. No.5.

V.6.6 Identification of Compound 6

UV
\[ \lambda \text{max} = 266, 319 \]

IR
\[ \nu \text{max} = 3250, 1640, 1624, 1601, 1520, 1515 \]

$^1$HNMR : Refer to Table No. IV.6

MS Frag. : Refer to Fig Nos. 6 and 7

V.6.7 Identification of Compound 7

UV
\[ \lambda \text{max} = 256, 320 \]

IR
\[ \nu \text{max} = 1730, 1620, 1585, 1430, 1380, 1245 \]

$^1$HNMR : Refer Table No. IV.7

MS Frag. : Refer Fig. 8
V.6.8 Identification of Compound 8

UV
\[ \lambda_{\text{max}} = 273, 333 \]

IR
\[ \nu_{\text{max}} = 1615, 1590, 1490, 1320, 1245 \]

$^1$HNMR : Refer Table No. IV.8

MS Frag. : Refer Fig. No. 9

V.6.9 Identification of Compound 9

UV
\[ \lambda_{\text{max}} = 285, 328 \text{ (Inflection)} \]

IR
\[ \nu_{\text{max}} = 3340, 1660, 1610, 1580, 1490, 1460, 1310, 1220, 940 \]

$^1$HNMR : Refer Table No. IV.9

MS Frag. : Refer Fig. No. 10.

V.6.10 Identification of Compound 10

UV
\[ \lambda_{\text{max}} = 270, 320 \]

IR
\[ \nu_{\text{max}} = 1730, 1620, 1590, 1450, 1320, 1245, 1120, 1050, 940 \]

$^1$HNMR : Refer Table No. IV.10

MS Frag. : Refer Fig. No. 11

V.6.11 Identification of Compound 11

UV
\[ \lambda_{\text{max}} = 252, 328 \text{ (Inflection)} \]

IR
\[ \nu_{\text{max}} = 1650, 1610, 1590, 1430, 1380, 1240, 940 \]

$^1$HNMR : Refer Table No. IV.11

MS Frag. : Refer Fig. No. 12
Identification of Compound 12

UV: λ 273, 285, 345 (Inflection)

IR: ν 3320, 2719, 1650, 1510, 1585, 1450, 1310, 1230

^1H NMR: Refer Table No. IV.12

MS Frag.: Refer Fig No. 13

Identification of Compound 13

UV: λ 265, 325 (Inflection)

IR: ν 2715, 1620, 1580, 1490, 1320, 1240

^1H NMR: Refer Table No. IV.13

MS Frag.: Refer Fig No. 14

Identification of Compound 14

UV: λ 260, 280, 335 (Inflection)

IR: ν 2710, 1765, 1760, 1610, 1590, 1450, 1220

^1H NMR: Refer Table No. IV.14

MS Frag.: Refer Fig No. 15

Identification of Compound 15

UV: λ 270, 340

IR: ν 3320, 1515, 1595, 1460, 1230

^1H NMR: Refer Table No. IV.15

MS Frag.: Refer Fig No. 16
Identification of Compound 16

UV: \( \lambda_{\text{max}} 270, 350 \) (Inflection)
IR: 3445, 3450, 1645, 1525, 1570, 1450, 1300, 1220, 930.

\(^1\text{HNMR}\): Refer Table No. IV.16
MS Frag.: Refer Fig No. 17

Identification of Compound 17

UV: \( \lambda_{\text{max}} 290 \) (Inflection)
IR: 1780, 1748, 1650, 1590, 1460, 1370, 1310, 1245, 940.

\(^1\text{HNMR}\): Refer Table No. IV.17
MS Frag.: Refer Fig No. 18

Identification of Compound 18

UV: \( \lambda_{\text{max}} 271, 329 \)
IR: 1620, 1585, 1490, 1380, 1220, 935

\(^1\text{HNMR}\): Refer Table No. IV.18
MS Frag.: Refer Fig No. 19

Identification of Compound 19

UV: \( \lambda_{\text{max}} 260, 330 \) (Inflection)
IR: 3440, 1750, 1650, 1420, 1320, 1240, 930

\(^1\text{HNMR}\): Refer Table No. IV.19
MS Frag.: Refer Fig No. 20
Identification of Compound 20

UV: λ 250, 315
IR: ν 1785, 1748, 1645, 1590, 1460, 1370, 1310, 1245, 940

\(^1\)HNMR: Refer Table No. IV.21

MS Frag.: Refer Fig No. 18

Identification of Compound 21

UV: λ 270, 329 (Sharp)
IR: ν 3350, 1650, 1510, 1585, 1490, 1320, 1245, 1220, 1120.

\(^1\)HNMR: Table No. IV.22

MS Frag.: Fig. No 21

Identification of Compound 22

UV: λ 258, 313
IR: ν 1760, 1640, 1615, 1580, 1480, 1240

\(^1\)HNMR: Refer Table No. IV.23

MS Frag.: Refer Fig No. 22

Identification of Compound 23

UV: λ 272 (Sharp) 329 (Inflection)
IR: ν 1650, 1610, 1500, 1360, 1170, 1150, 1050, 1040, 1020, 980

\(^1\)HNMR: Refer Table No. IV.24

MS Frag.: Refer Fig No. 25
Identification of Compound 24

UV : \( \lambda \) 250, 275, 335 (Inflection)

IR : \( \nu \) 3340 (broad hump) 1600, 1625, 1580, 1490, 1460, 1380, 1240, 1145, 1025

\(^1\text{HNM}R\) : Refer Table No. IV.25

MS Frag. : Refer Fig No. 23

Identification of Compound 25

UV : \( \lambda \) 240, 264, 323 (Inflection)

IR : \( \nu \) 1760, 1750, 1660, 1610, 1590, 1480, 1410, 1360, 1230, 1140, 1020

\(^1\text{HNM}R\) : Refer Table No IV.26

MS Frag. : Refer Fig No. 24

Identification of Compound 26

UV : \( \lambda \) 270 (Sharp) 330 (Inflection)

IR : \( \nu \) 1650, 1610, 1500, 1360, 1170, 1150, 1050, 1040, 1020, 980

\(^1\text{HNM}R\) : Table No IV.27

MS Frag. : Refer Fig No. 25

Identification of Compound 27

UV : \( \lambda \) 270 (Sharp) 332 (Inflection)

IR : \( \nu \) 3580, 1665, 1620, 1610, 1590, 1450, 1400, 1320, 1190, 1020, 840

\(^1\text{HNM}R\) : Refer Table No. IV.28

MS Frag. : Refer Fig No. 26
Identification of Compound 28

UV: λ 245, 313 (Inflection)

IR: ν 1760, 1755, 1660, 1600, 1585, 1490,
    1410, 1380, 1310, 1240, 1200, 1150,
    1090

³HNMR: Refer Table No. IV.29

MS Frag.: Refer Fig. No. 27

Identification of Compound 29

UV: λ 265, 335

IR: ν 1640, 1620, 1590, 1510, 1495, 1440,
    1380, 1260, 1220, 1185, 1105, 1050

³HNMR: Refer Table No. IV.30

MS Frag.: Refer Fig. No. 28

Identification of Compound 30

UV: λ 266, 320 (Inflection)

IR: ν 1655, 1620, 1585, 1525, 1490, 1480,
    1024, 940

³HNMR: Refer Table No. IV.31

MS Frag.: Refer Fig. No. 29

Identification of Compound 31

UV: λ 268, 340

IR: ν 3370, 1550, 1575, 1450, 1365, 1150, 1065,
    1015

³HNMR: Refer Table No. IV.32

MS Frag.: Refer Fig. No. 30
V.6.32 Identification of Compound 32

UV: λ 240, 325 (Inflection)
IR: ν 1770, 1640, 1610, 1580, 1490, 1380, 1230, 1190, 1080

1H NMR: Refer Table No. IV.33
MS Frag.: Refer Fig No. 31

V.6.33 Identification of Compound 33

UV: λ 271, 332 (Inflection)
IR: ν 1655, 1615, 1590, 1485, 1390, 1245, 1160, 1100, 1050

1H NMR: Refer Table No. IV.34
MS Frag.: Refer Fig No. 32

V.6.34 Identification of Compound 34

UV: λ 265, 330 (Inflection)
IR: ν 3240, 1640, 1610, 1590, 1480, 1420, 1365, 1280, 1030, 940

1H NMR: Refer Table No. IV.35
MS Frag.: Refer Fig No. 33

V.6.35 Identification of Compound 35

UV: λ 243, 217 (Inflection)
IR: ν 1765, 1645, 1615, 1535, 1490, 1410, 1380, 1320, 1240, 1180, 1055, 935

1H NMR: Refer Table No. IV.36
MS Frag.: Refer Fig No. 34
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7. List of Publications :
   ii) Two Isoflavonoids from Iris kashmiriana (1990) Phytochemistry (under print).
   iv) Isocladrastin and Kashmigenin - Two New Isoflavonoids from Iris Kashmiriana (1990) J. of Natural Products (Communicated).
   v) Further Isoflavonoids from Iris Planta Medica (communicated).