Supporting Information

Viscosity-Responsive Styryl Benzoxazole Probes for Lipid Droplet Visualization

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≠Equal Authorship

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1. Characterization Details

(E)-4-(2-(benzo[d]oxazol-2-yl)vinyl)-N,N-dimethylaniline (R1)

^{1}H NMR (500 MHz, $CDCl_3$) δ 7.73 (d, *J* = 16.2 Hz, 1H), 7.67 (m, 1H), 7.49 (m, 3H), 7.29 (m, 2H), 6.85 (d, *J* = 16.2 Hz, 1H), 6.71 (d, *J* = 8.8 Hz, 2H), 3.03 (s, 6H). **^{13}C NMR (126 MHz, $CDCl_3$)** δ 164.15, 151.55, 150.49, 142.60, 140.12, 129.26 (2C), 124.58, 124.35, 123.24, 119.46, 112.14 (2C), 110.16, 108.66, 40.31 (2C). **HRMS** (ESI-TOF) *m/z* $[M+H]^+$ calculated for $C_{17}H_{17}N_2O^+$ 265.1335 ; found 265.1337.

(E)-2-(4-(pyrrolidin-1-yl)styryl)benzo[d]oxazole (R2)

^{1}H NMR (500 MHz, $CDCl_3$) δ 7.72 (d, *J* = 16.2 Hz, 1H), 7.65 (m, 1H), 7.48 (m, 3H), 7.28 (m, 2H), 6.81 (d, *J* = 16.2 Hz, 1H), 6.56 (d, *J* = 8.7 Hz, 2H), 3.35 (m, 4H), 2.03 (m, 4H). **^{13}C NMR (126 MHz, $CDCl_3$)** δ 164.22, 150.37, 148.99, 142.54, 140.32, 129.33 (2C), 124.36, 124.20, 122.42, 119.27, 111.78 (2C), 110.01, 107.77, 47.58 (2C), 25.48 (2C). **HRMS** (ESI-TOF) *m*/*z* $[M+H]^+$ calculated for $C_{19}H_{19}N_2O^+$ 291.1492 ; found 291.1493.

(E)-2-(4-(piperidin-1-yl)styryl)benzo[d]oxazole (R3)

^{1}H NMR (500 MHz, $CDCl_3$) δ 7.72 (d, *J* = 16.2 Hz, 1H), 7.68 (m, 1H), 7.49 (m, 1H), 7.48 (d, *J* = 8.8 Hz, 2H), 7.30 (m, 2H), 6.91 (d, *J* = 8.8 Hz, 2H), 6.87 (d, *J* = 16.2 Hz, 1H), 3.29 (t, J = 5.5 Hz, 4H), 1.67 (m, 6H). **^{13}C NMR (126 MHz, $CDCl_3$)** δ 163.94, 152.82, 150.50, 142.55, 139.81, 129.13 (2C), 125.09, 124.73, 124.41, 119.57, 115.30 (2C), 110.22, 109.68, 49.44 (2C), 25.62 (2C), 24.47. **HRMS** (ESI-TOF) *m*/*z* $[M+H]^+$ calculated for $C_{20}H_{21}N_2O^+$ 305.1648 ; found 305.1651.

(E)-2-(4-morpholinostyryl)benzo[d]oxazole (R4)

^{1}H NMR (500 MHz, $CDCl_3$) δ 7.72 (d, *J* = 16.3 Hz, 1H), 7.68 (m, 1H), 7.51 (m, 3H) 7.30 (m, 2H), 6.90 (m, 3H), 3.87 (t, *J* = 4.9 Hz, 4H), 3.25 (dd, *J* = 4.9 Hz, 4H). **^{13}C NMR (126 MHz, $CDCl_3$)** δ 163.67, 152.29, 150.50, 142.46, 139.47, 129.10 (2C), 126.48, 124.92, 124.50, 119.67, 115.08 (2C), 110.64, 110.28, 66.82 (2C), 48.39 (2C). **HRMS** (ESI-TOF) *m*/*z* $[M+H]^+$ calculated for $C_{19}H_{19}N_2O_2^+$ 307.1441 ; found 307.1461.

(E)-4-(2-(benzo[d]oxazol-2-yl)vinyl)-N,N-diphenylaniline (R5)

^{1}H NMR (500 MHz, $CDCl_3$) δ 7.73 (d, *J* = 16.3 Hz, 1H), 7.68 (m, 1H), 7.5 (m, 1H), 7.45 (d, *J* = 8.7 Hz, 2H), 7.3 (m, 6H), 7.14 (dd, *J* = 8.6, 1.2 Hz, 4H), 7.09 (t, 2H), 7.05 (d, *J* = 8.6 Hz, 2H), 6.93 (d, *J* = 16.3 Hz, 1H). **^{13}C NMR (126 MHz, $CDCl_3$)** δ 163.40, 150.42, 149.45, 147.03, 142.36, 139.10, 129.50, 128.67, 128.40, 125.31, 124.91, 124.43, 123.92, 122.09, 119.65, 111.32, 110.22. **HRMS** (ESI-TOF) *m*/*z* $[M+H]^+$ calculated for $C_{27}H_{21}N_2O^+$ 389.1648 ; found 389.1665.

(E)-2-(4-(9H-carbazol-9-yl)styryl)benzo[d]oxazole (R6)

^{1}H NMR (500 MHz, $CDCl_3$) δ 8.16 (d, *J* = 7.7 Hz, 2H), 7.90 (d, *J* = 16.4 Hz, 1H), 7.83 (d, *J* = 8.1 Hz, 2H), 7.76 (m, 1H), 7.65 (d, *J* = 8.4 Hz, 2H), 7.57 (m, 1H), 7.49 (d, *J* = 8.2 Hz, 2H), 7.44 (m, 2H), 7.37 (m, 2H), 7.32 (m, 2H), 7.17 (d, J = 16.4 Hz, 1H). **^{13}C NMR (126 MHz, $CDCl_3$)** δ 162.76, 150.61, 142.34, 140.62, 139.09, 138.41, 134.17, 129.11 (2C), 127.36 (2C),

126.23 (2C), 125.53, 124.77, 123.77, 120.53 (2C), 120.44 (2C), 120.11, 114.70, 110.53, 109.93 (2C). **HRMS** (ESI-TOF) *m/z* $[M+H]^+$ calculated for $C_{27}H_{19}N_2O^+$ 387.1492 ; found 387.1513.

(E)-2-(2-(9-ethyl-9H-carbazol-2-yl)vinyl)benzo[d]oxazole)(R7)

^{1}H NMR (500 MHz, $CDCl_3$) δ 8.31 (d, *J* = 1.6 Hz, 1H), 8.14 (d, *J* = 7.7 Hz, 1H), 8.00 (d, *J* = 16.2 Hz, 1H), 7.75 (dd, *J* = 8.5, 1.8 Hz, 1H), 7.72 (m, 1H), 7.53 (m, 1H), 7.51 (ddd, *J* = 8.3, 7.0, 1.2 Hz, 1H), 7.43 (dd, *J* = 8.5, 1.6 Hz, 2H), 7.32 (m, 2H), 7.29 (ddd, *J* = 7.9, 7.0, 1.2 Hz, 1H), 7.10 (d, *J* = 16.2 Hz, 1H), 4.37 (q, *J* = 7.3 Hz, 2H), 1.45 (t, *J* = 7.3 Hz, 3H). **^{13}C NMR (126 MHz, $CDCl_3$)** δ 163.66, 150.44, 142.43, 140.94, 140.82, 140.47, 126.30, 126.28, 125.22, 124.77, 124.37, 123.46, 122.87, 120.64, 120.60, 119.58, 110.71, 110.20, 108.97, 108.87, 37.78, 13.87. **HRMS** (ESI-TOF) *m/z* $[M+H]^+$ calculated for $C_{23}H_{19}N_2O^+$ 339.1492 ; found 339.1498.

4-((1E,3E)-4-(benzo[d]oxazol-2-yl)buta-1,3-dien-1-yl)-N,N-dimethylaniline (R8)

^{1}H NMR (500 MHz, $CDCl_3$) δ 7.67 (m, 1H), 7.57 (ddd, *J* = 15.5, 7.5, 2.8 Hz, 1H), 7.48 (m, 1H), 7.40 (d, *J* = 8.9 Hz, 2H), 7.29 (m, 2H), (6.83 (m, 2H), 6.69 (d, *J* = 8.9 Hz, 2H), 6.51 (d, *J* = 15.5 Hz, 1H), 3.00 (s, 6H). **^{13}C NMR (126 MHz, $CDCl_3$)** δ 163.65, 150.94, 150.50, 142.57, 141.10, 139.65, 128.66 (2C), 124.79, 124.54, 124.42, 122.93, 119.58, 114.05, 112.23 (2C), 110.21, 40.36 (2C). **HRMS** (ESI-TOF) *m/z* $[M+H]^+$ calculated for $C_{19}H_{19}N_2O^+$ 291.1492 ; found 291.1493.

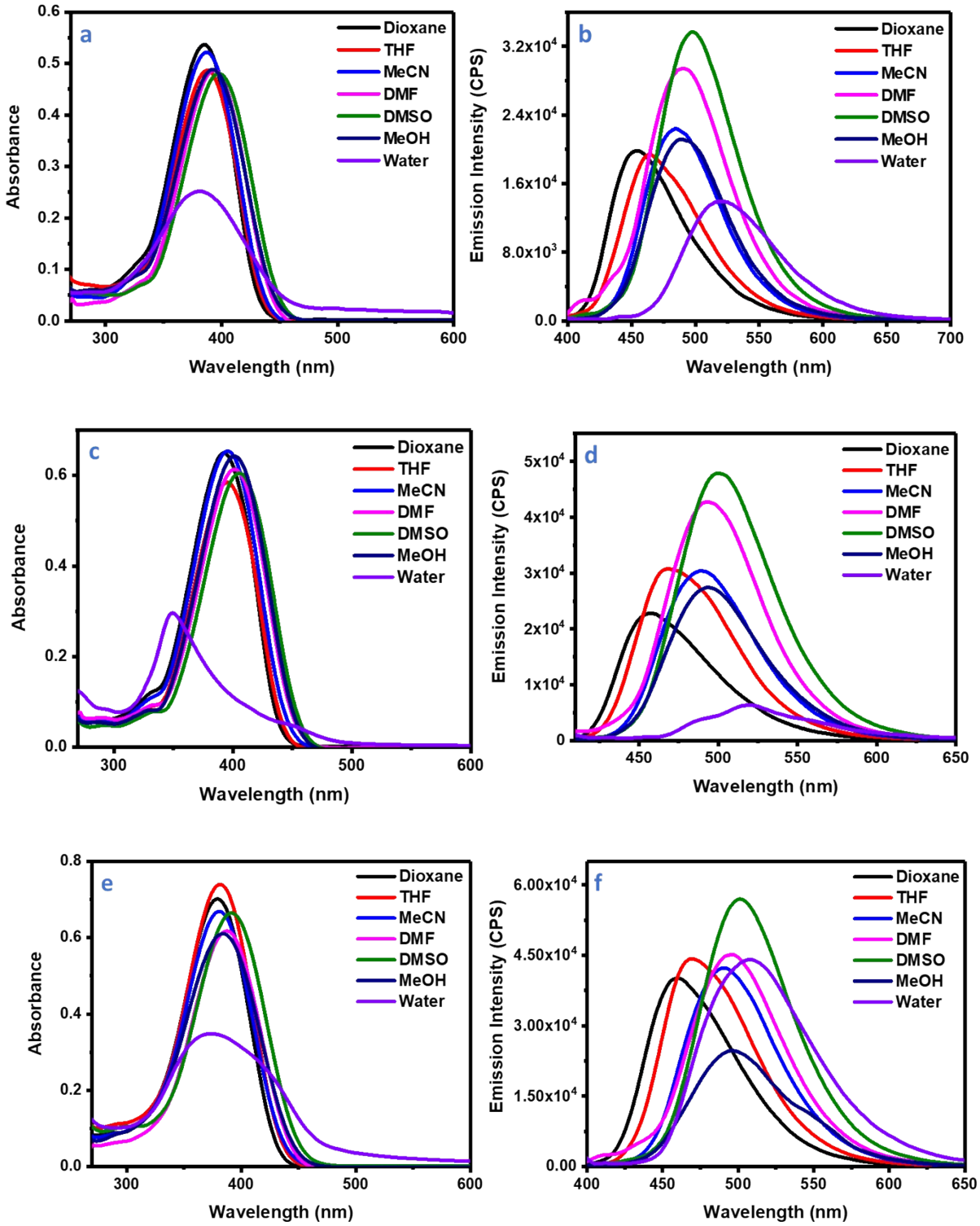


Figure S1a: Absorption and emission of the synthesized compounds **R1** (a,b) -**R2** (c,d) **R3** (e,f), respectively in various solvents. [Concentration= 10 μM]

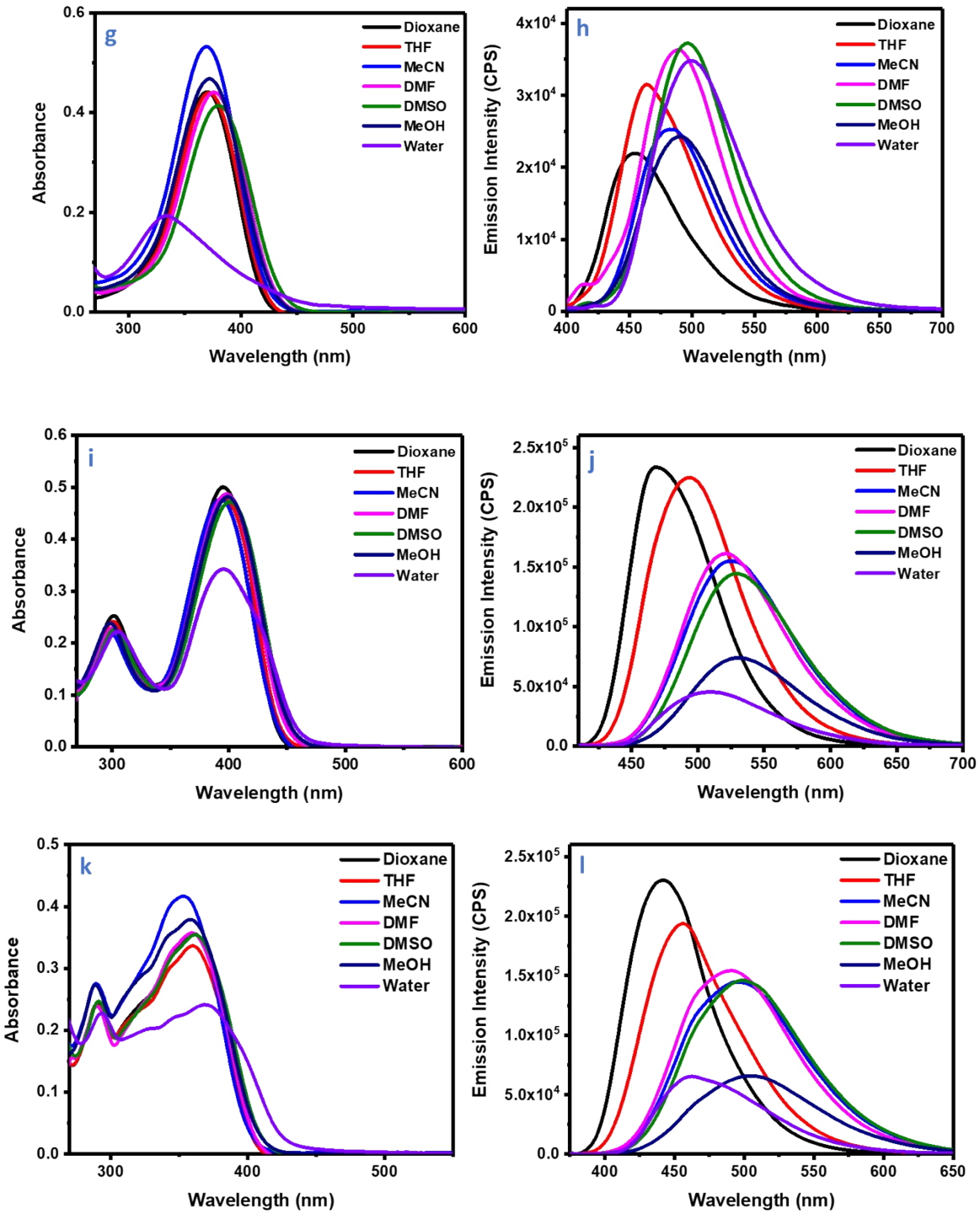


Figure S1b: Absorption and emission of the synthesized compounds **R4** (g,h), **R5** (i,j), **R6** (k, l) in different solvents of varying polarity, [Concentration= 10 μM]

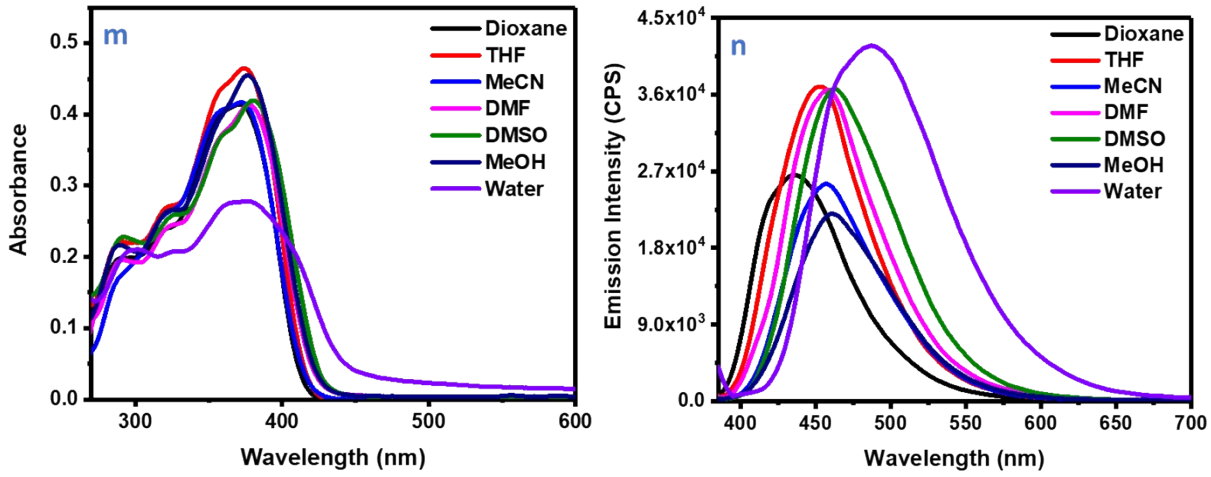


Fig S1c Absorption and emission of the synthesized compounds **R7** (m, n) in solvents of varying polarity, [Concentration= 10 µM]

DLS Spectra

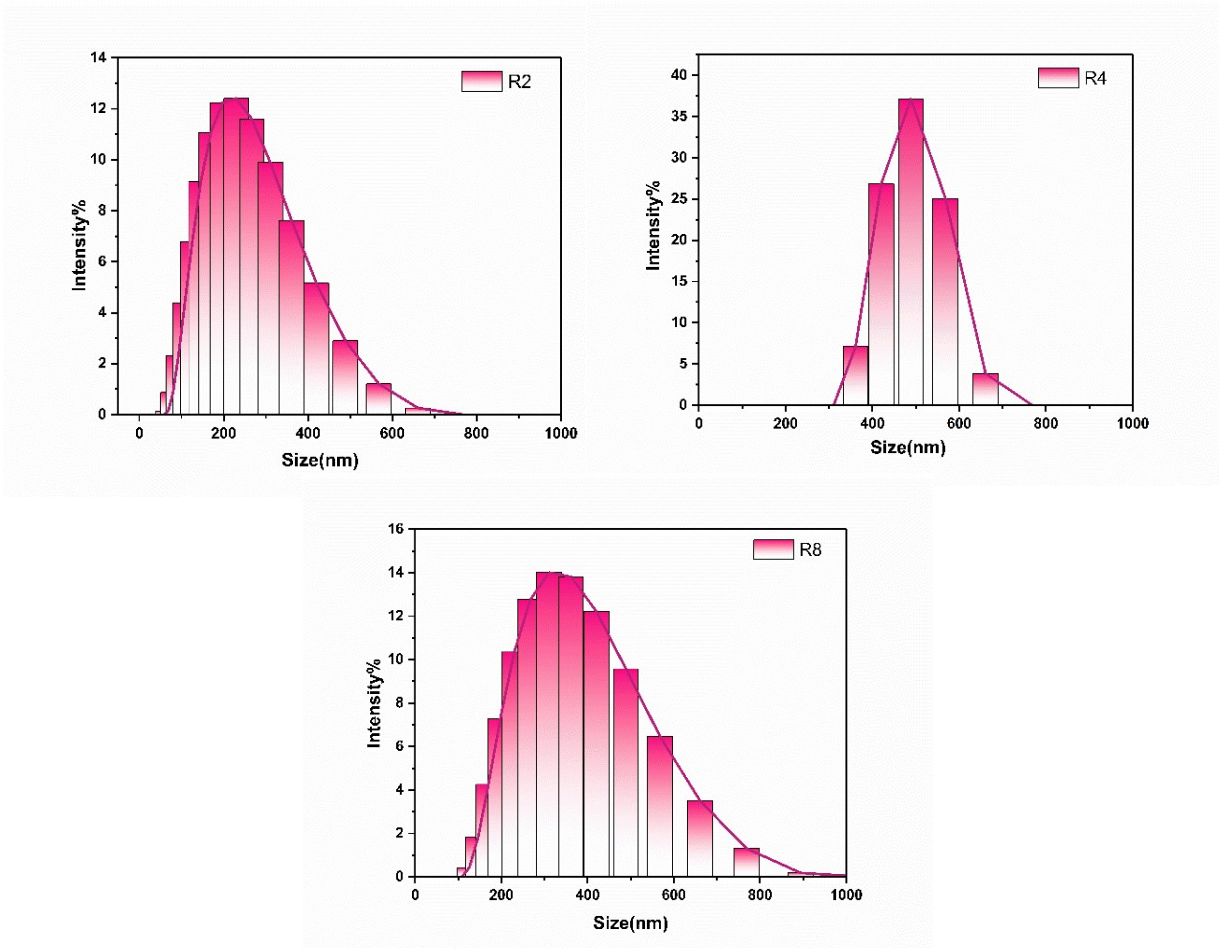


Fig S3: Dynamic Light Scattering Spectra of **R2**, **R4** & **R8**

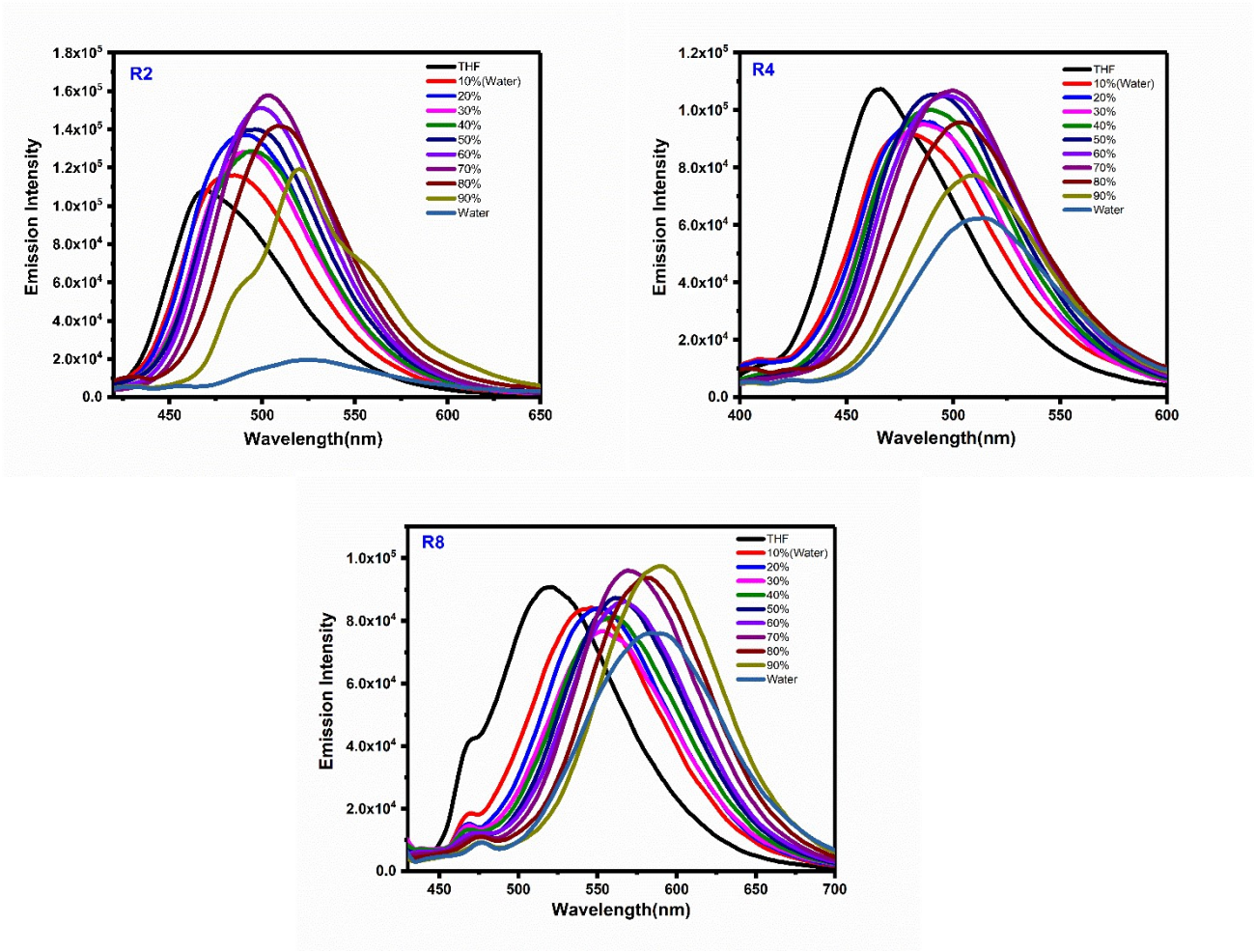


Fig S3: Emission intensity of compounds **R2**, **R4** and **R8** in THF: water binary mixtures with increasing water fraction.

Cytotoxicity assay

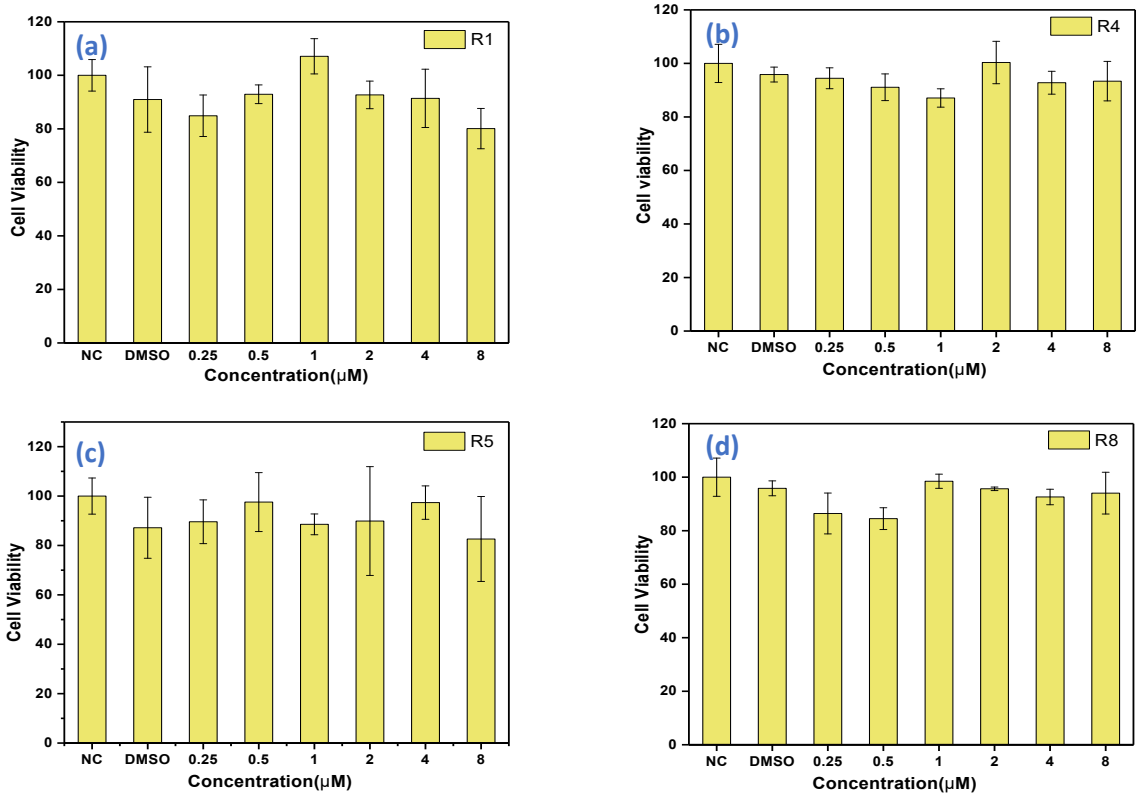


Fig S4: Cytotoxicity assay for **R1**,**R4**, **R5** and **R8** at various concentrations**.**

Live Cell Imaging

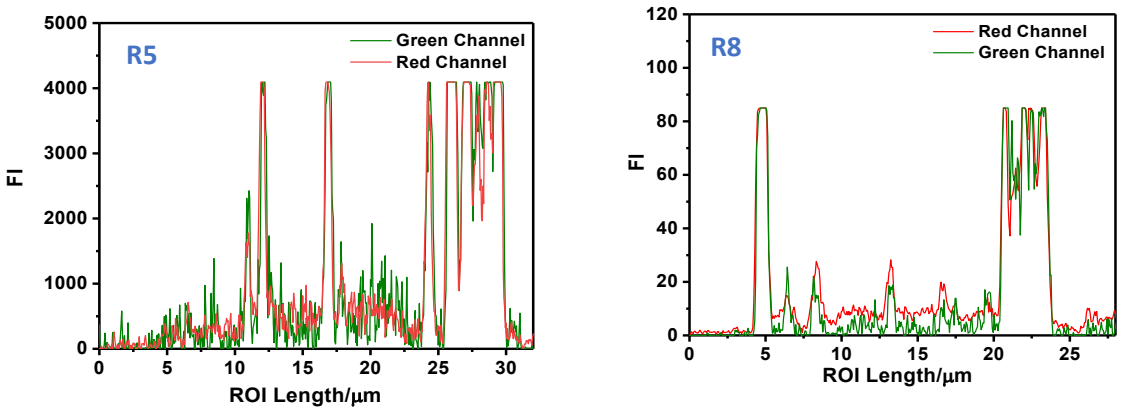


Fig S5: Line profile for **R5** and **R8** showing the extent of localization

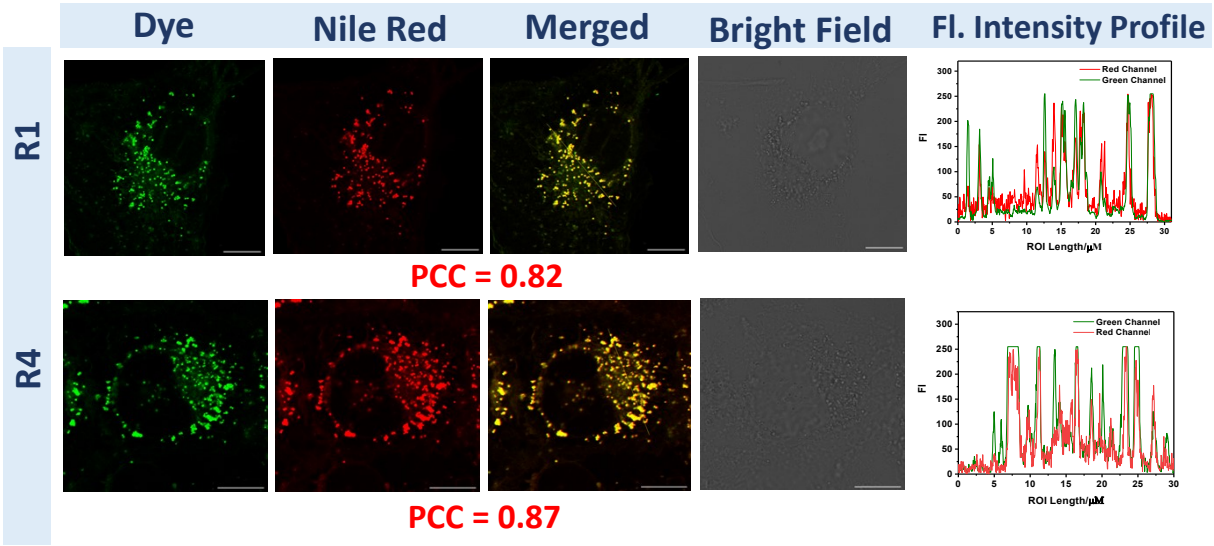


Fig S6: Colocalization of **R1** and **R4** in COS-7 cells. CLSM image of **R1** (Row-1) and **R4** (Row-2) with Nile Red. [Concentration= 2 μM]

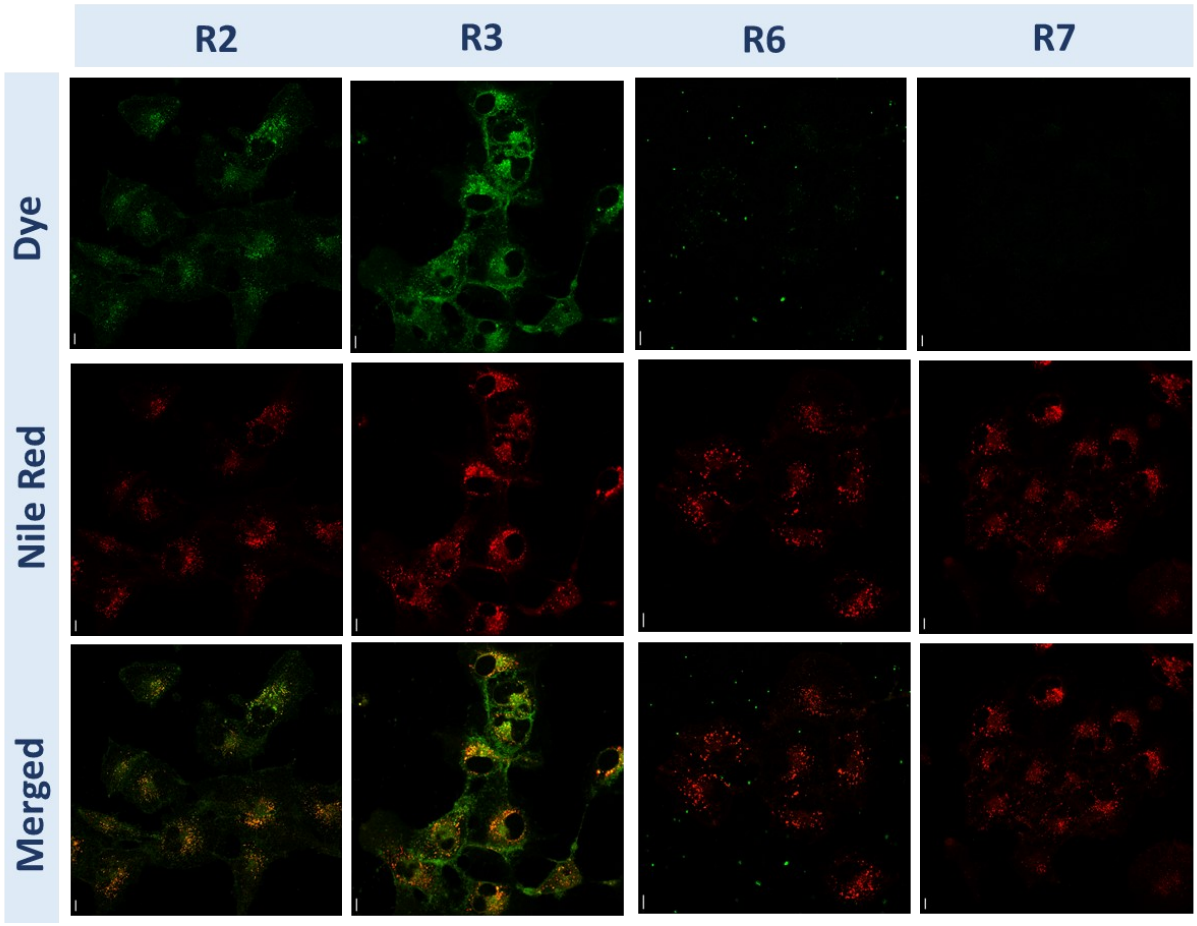


Figure S7: Colocalization of **R2**, **R3**, **R6** and **R7** in COS-7 cells. CLSM image of R2 (Column-1), R3 (Column-2), R6 (Column-3) and R7 (Column-4) with Nile Red [Concentration= 2 μM]

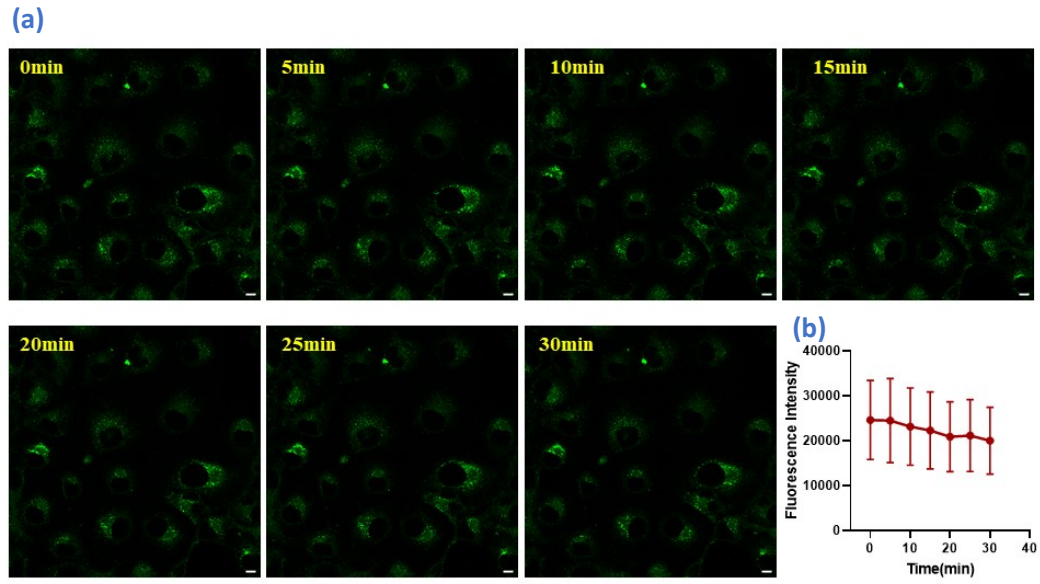
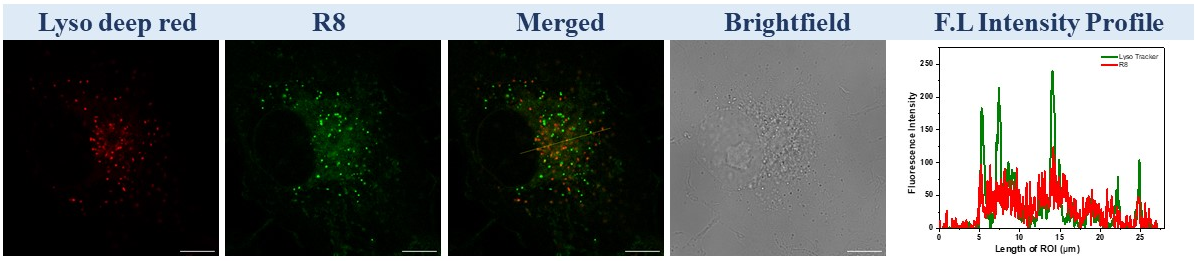
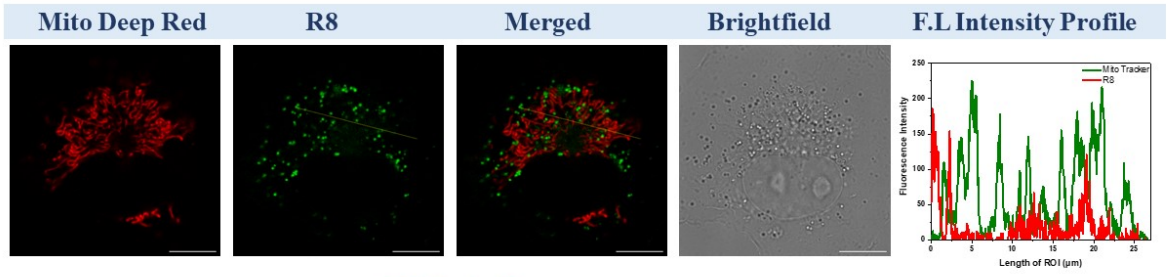


Fig S8: Photo stability Experiment: (a) CLSM images of **R8** upon continuous exposure to 405 nm laser for 30-minute duration. (b) Fluorescence intensity vs time plot at different time intervals. (Scale Bar: 10 µm)



PCC: 0.27

Fig S9: CLSM image of Colocalization of **R8** with lyso deep Red in COS-7 cells. [Concentration= 1 µM] (Scale Bar 10 µm)



PCC: 0.18

Fig S10: CLSM image of Colocalization of **R8** with Mito deep Red in COS-7 cells. [Concentration= 1 µM] (Scale Bar 10 µm)

pH Study

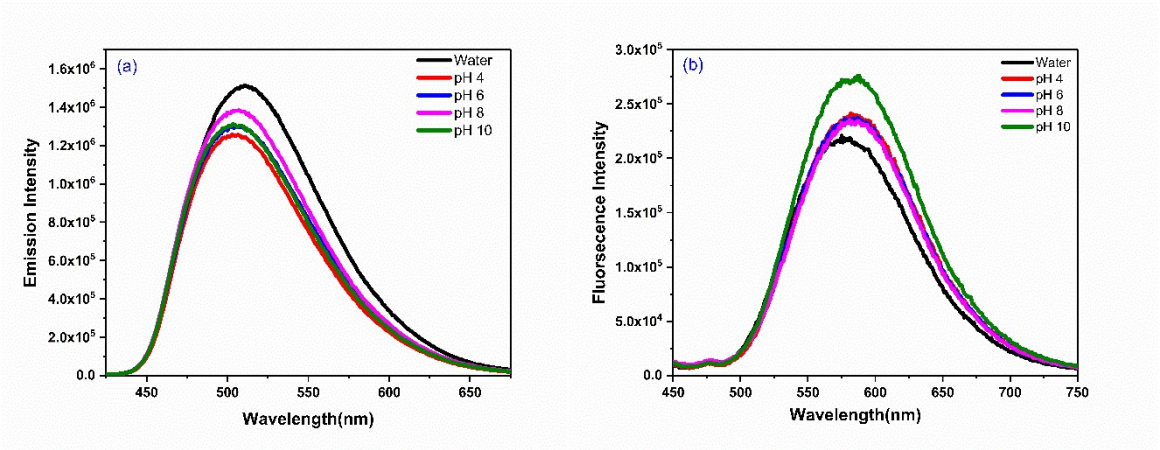


Fig S11: Emission intensity spectra of (a) **R5** & (b) **R8** (10 µM) in water across different pH values.

Analyte Titration

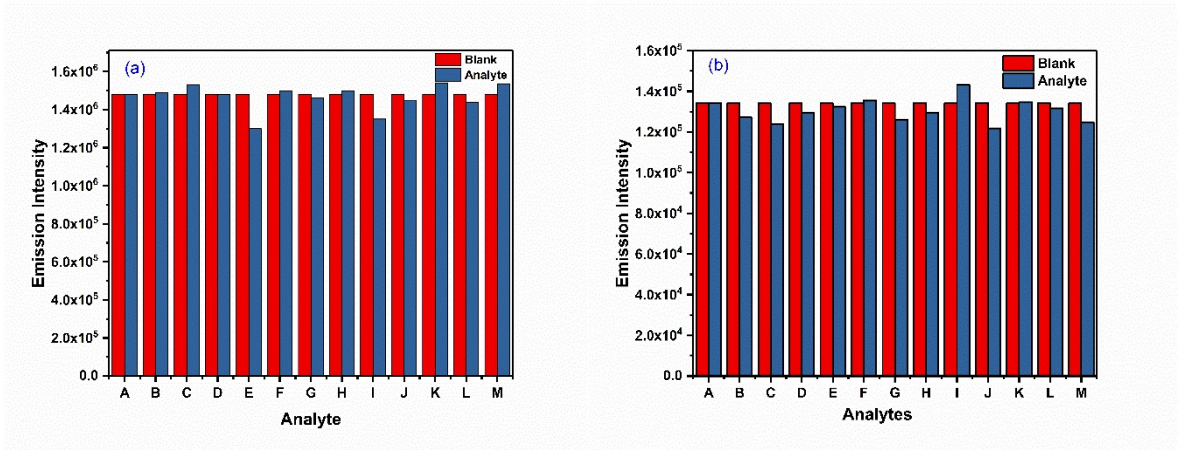


Fig S12: Emission intensity changes for (a) **R5** & (b) **R8** (10 µM) with Fe^{2+} different analytes [A to M = None, Mg^{2+}, Na^{+}, Glutathione, Fe^{3+}, K^{+}, PO_4^{3-}, Ca^{2+}, Al^{3+}, Bisuphite, Cystine, S^{2-} ,H_2O_2]

Viscosity dependence in Glycerol-water binary mixture

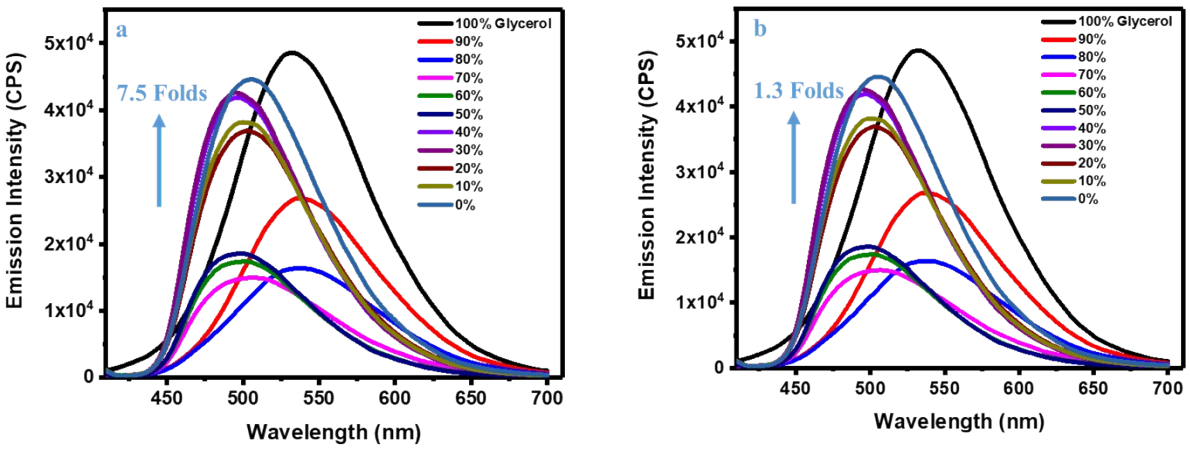


Fig S13: Effect of viscosity on the emission of **R4** and **R5** with gradual addition of glycerol. [Concentration= 10 μM]

Förster Hoffman Plots

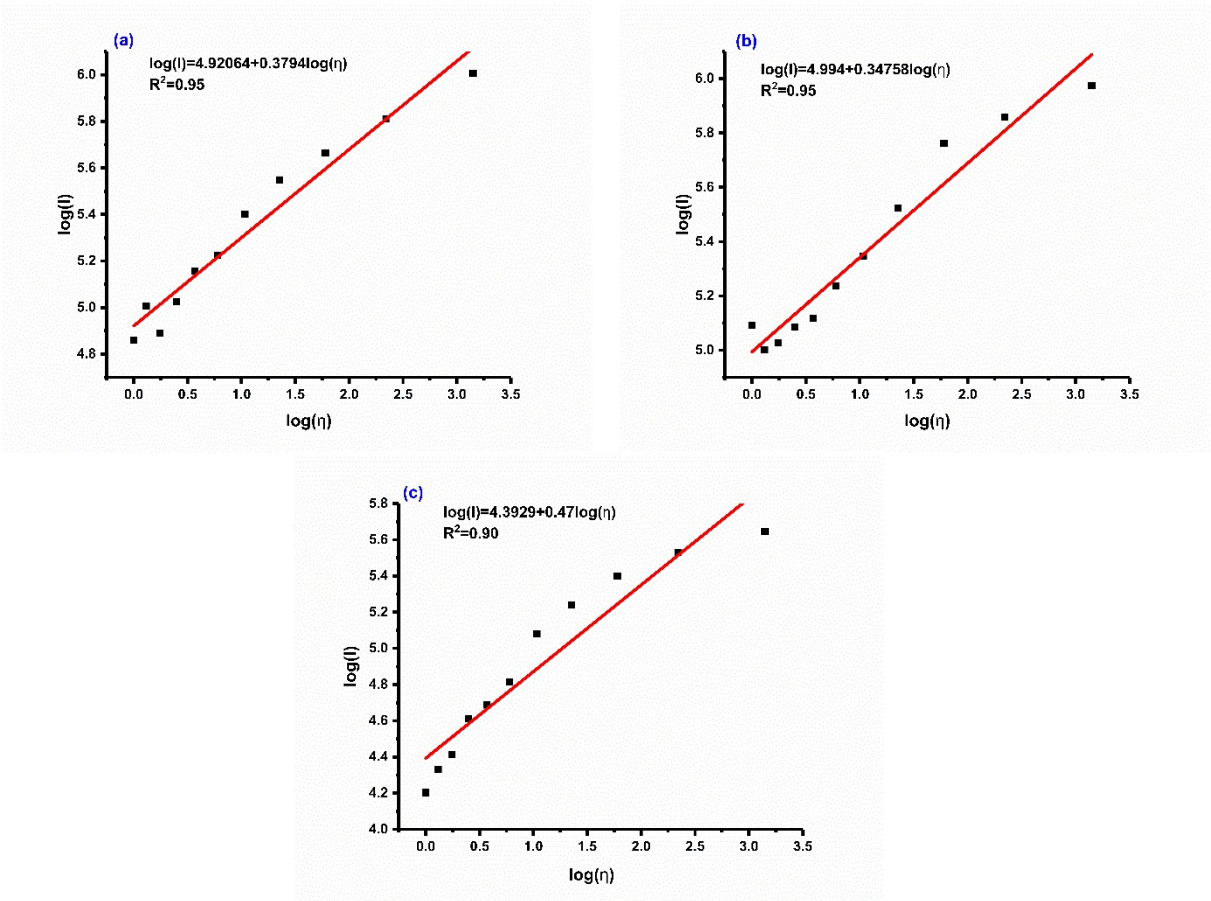
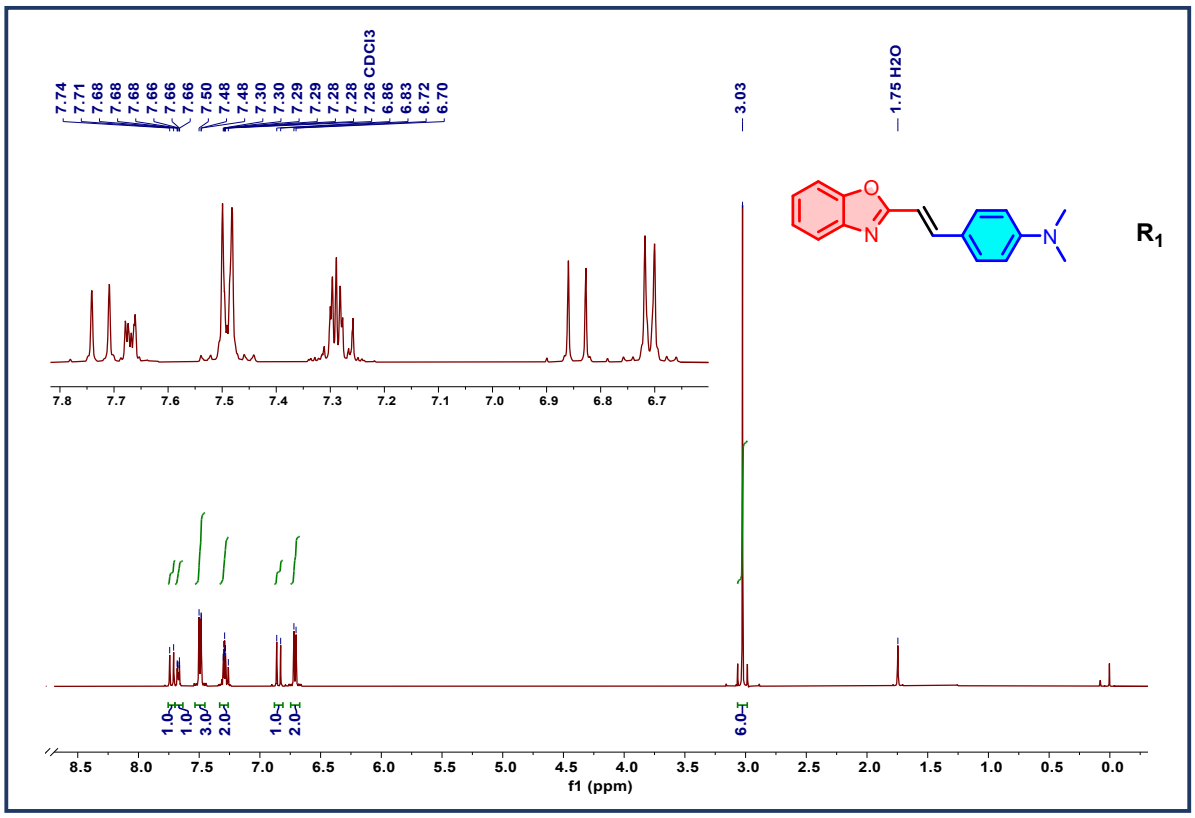


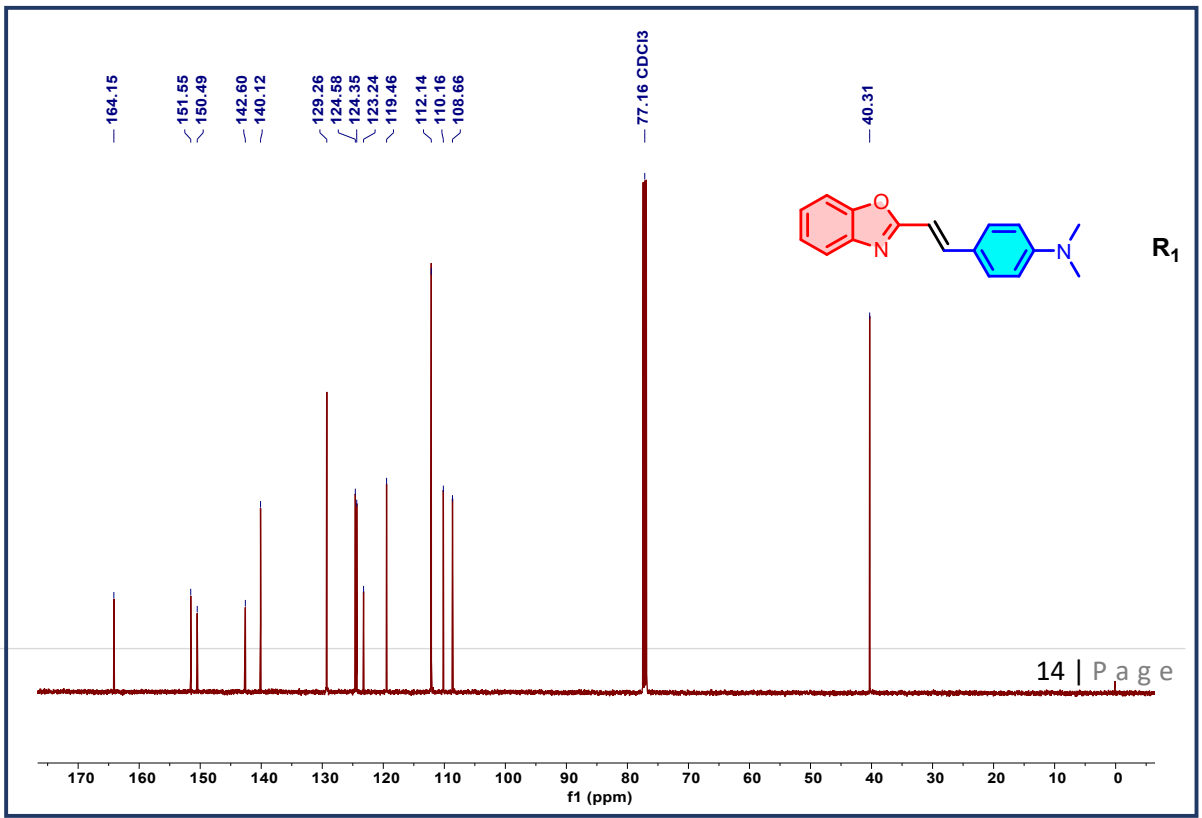
Fig S14: Plot of a logarithm of Emission intensity and logarithm of viscosity values obtained from the water-glycerol mixture for compound **R1 (a), R4 (b), & R8 (c)**

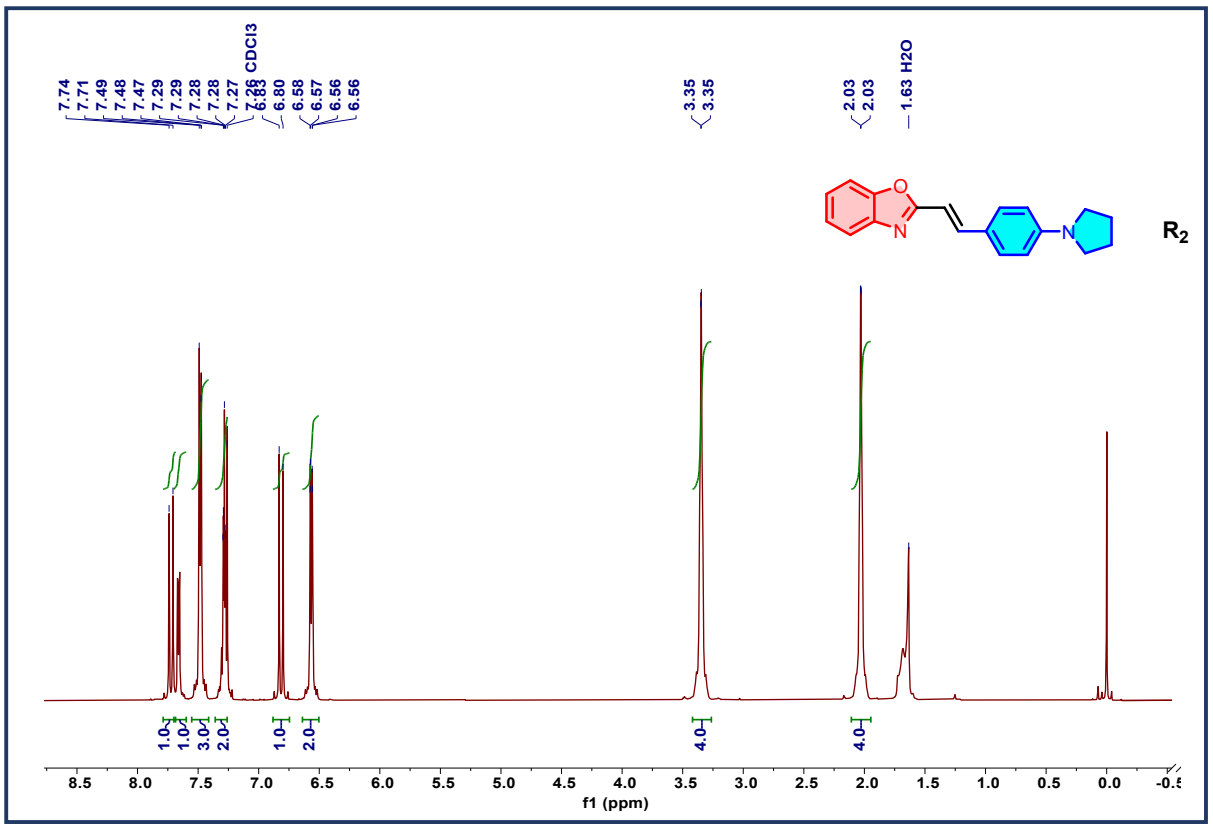
Characterization Spectral Details



$^{1}H/^{13}C$ NMR Spectra of R1

$^{1}H/^{13}C$ NMR Spectra of R2

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7.27
CDCl3
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6.80
6.58
6.57
6.56
6.56
3.35
3.35
2.03
2.03
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R2
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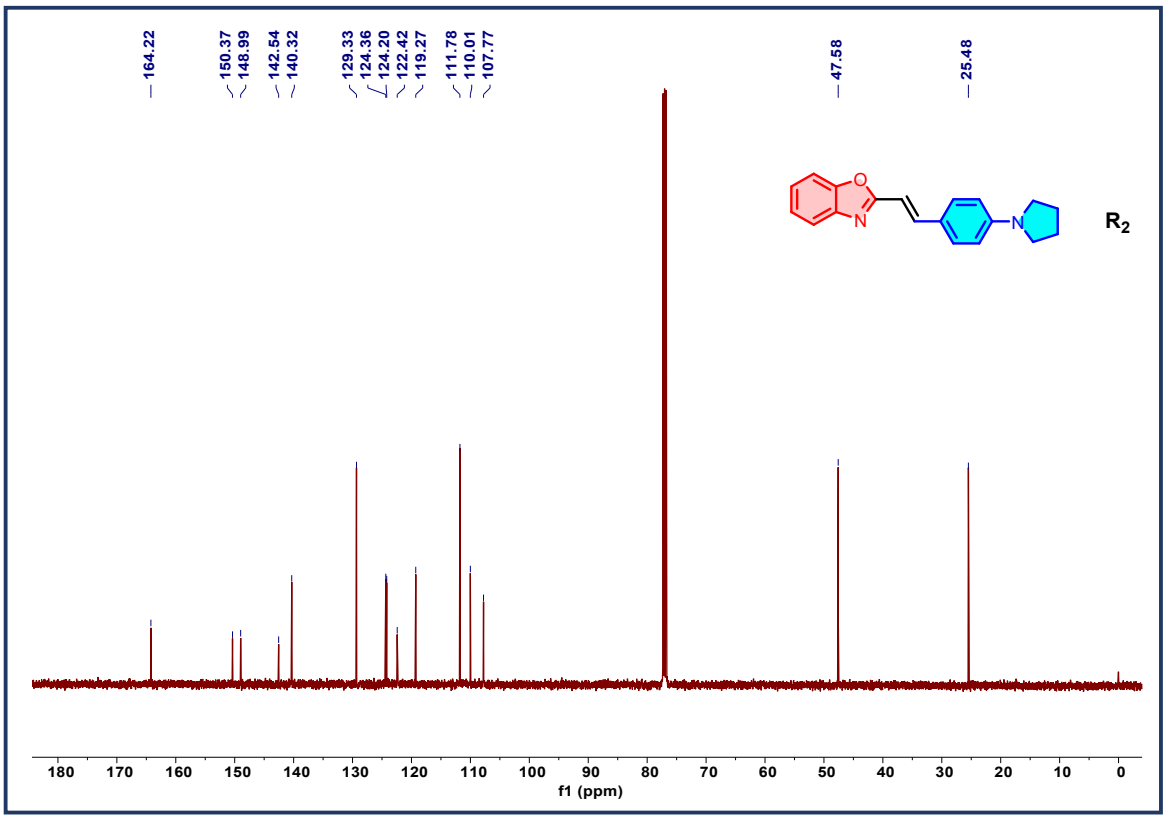
4.0
f1 (ppm)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142.54
140.32
129.33
124.36
124.20
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119.27
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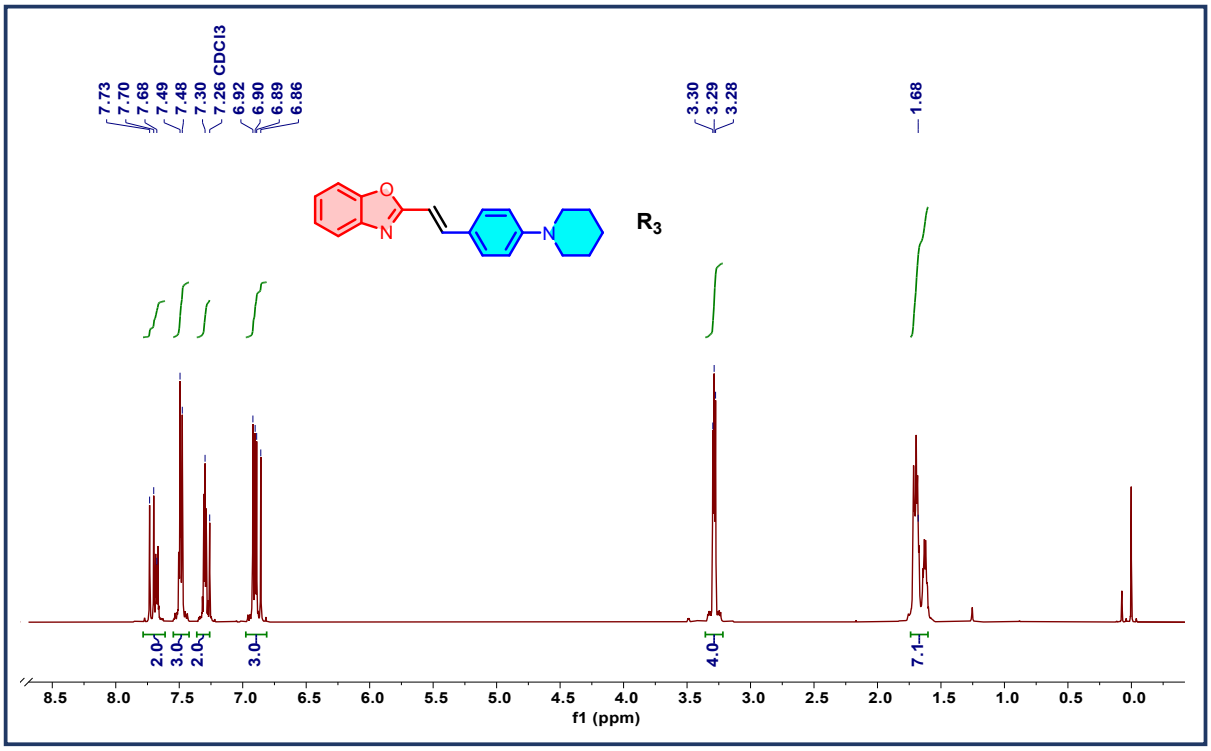
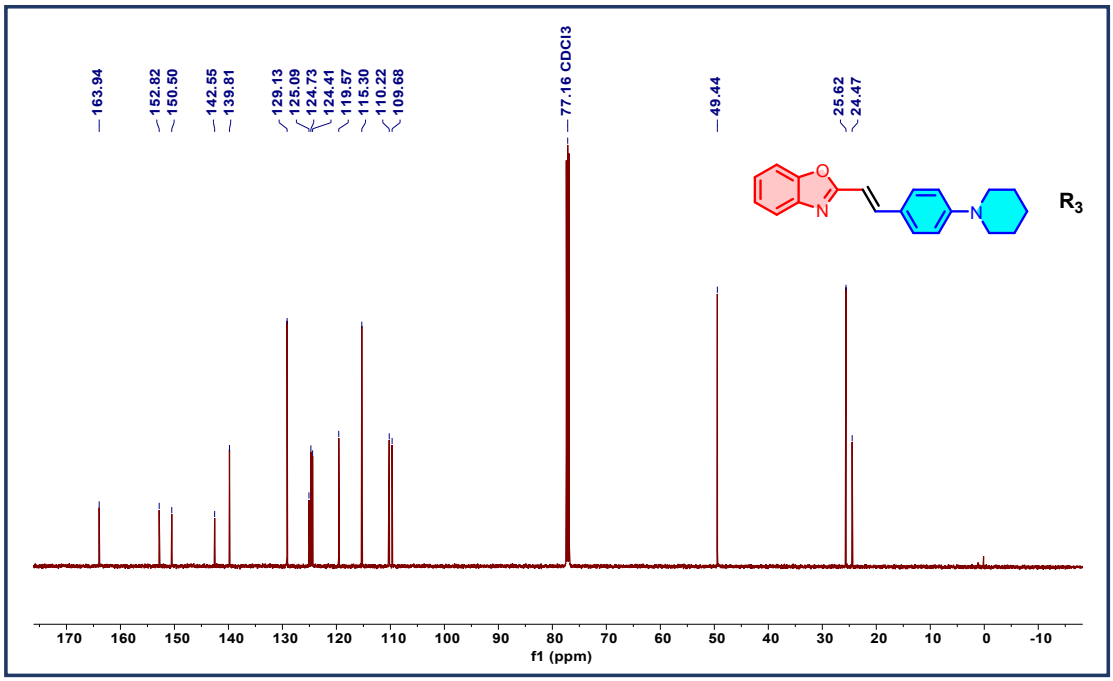
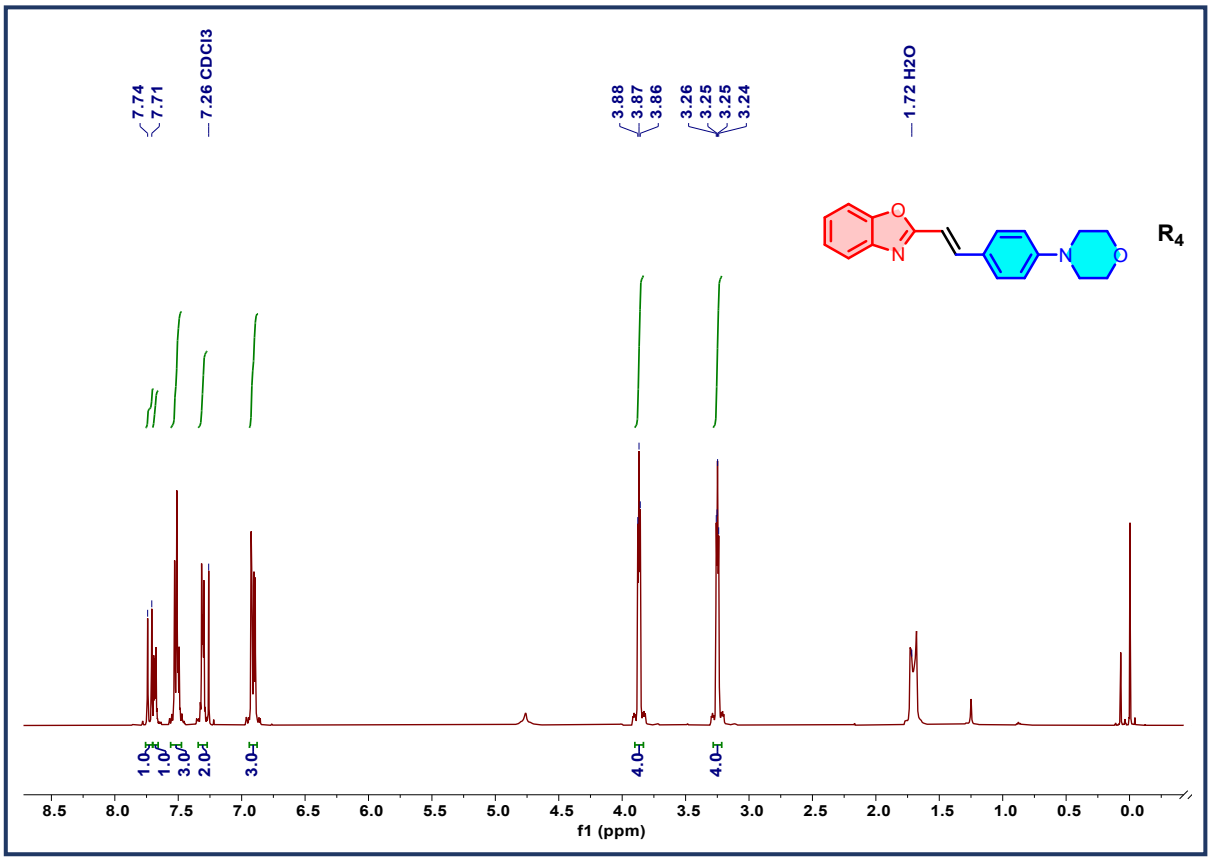
107.77
47.58
25.48
R2
f1 (ppm)

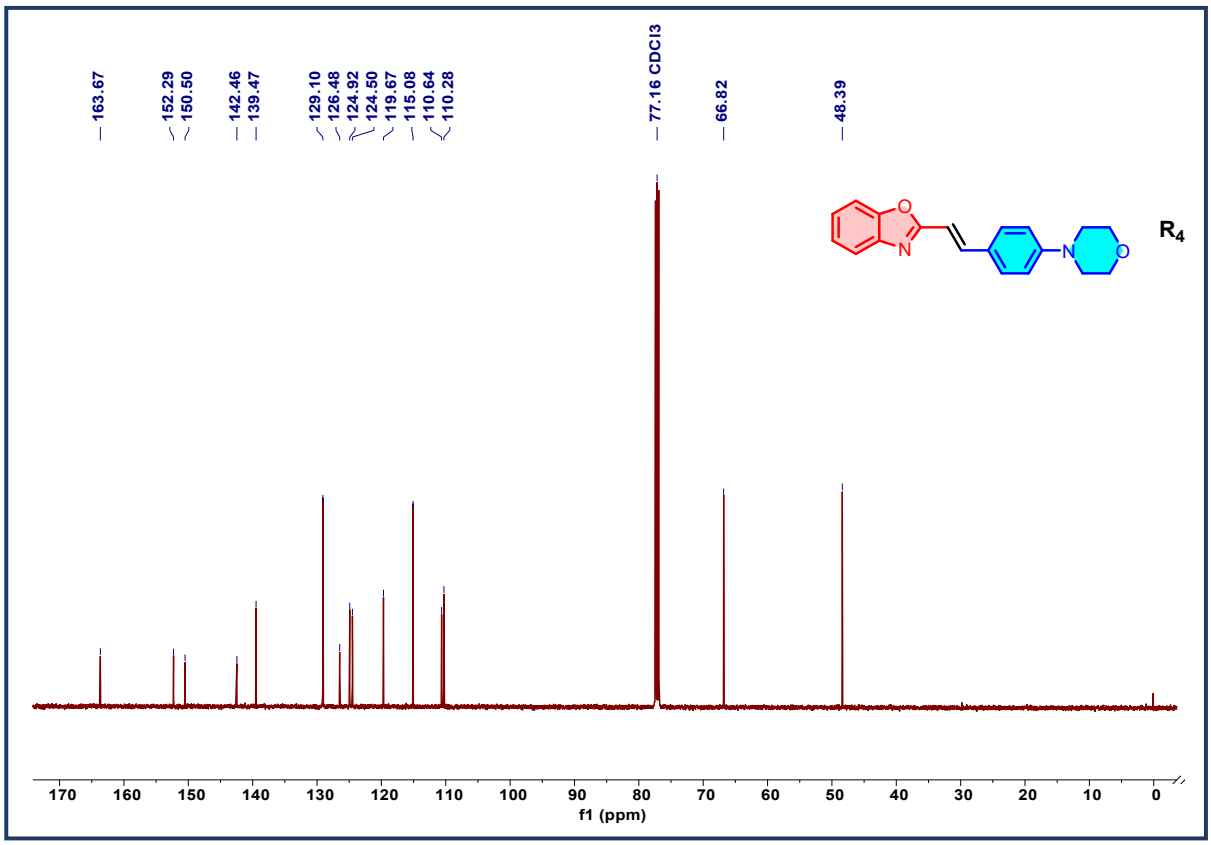
$^{1}H/^{13}C$ NMR Spectra of R3

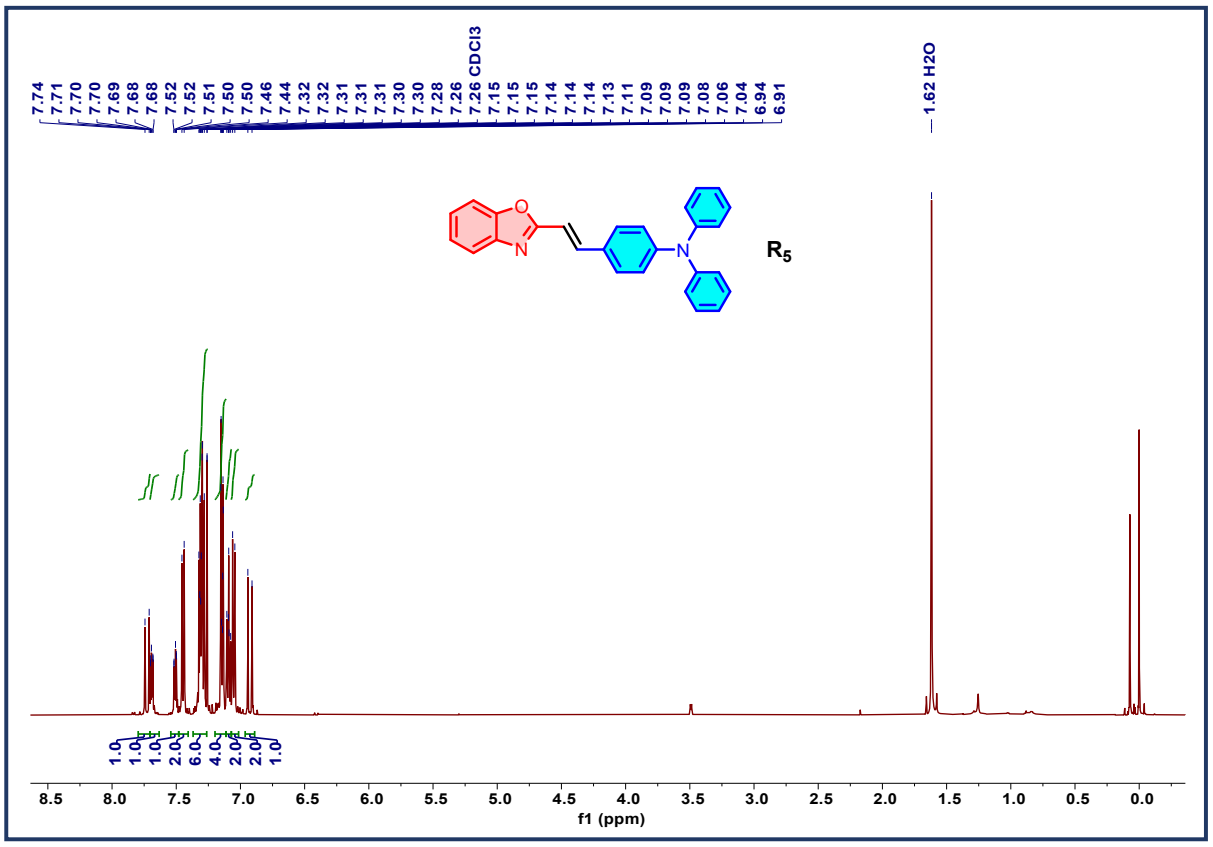




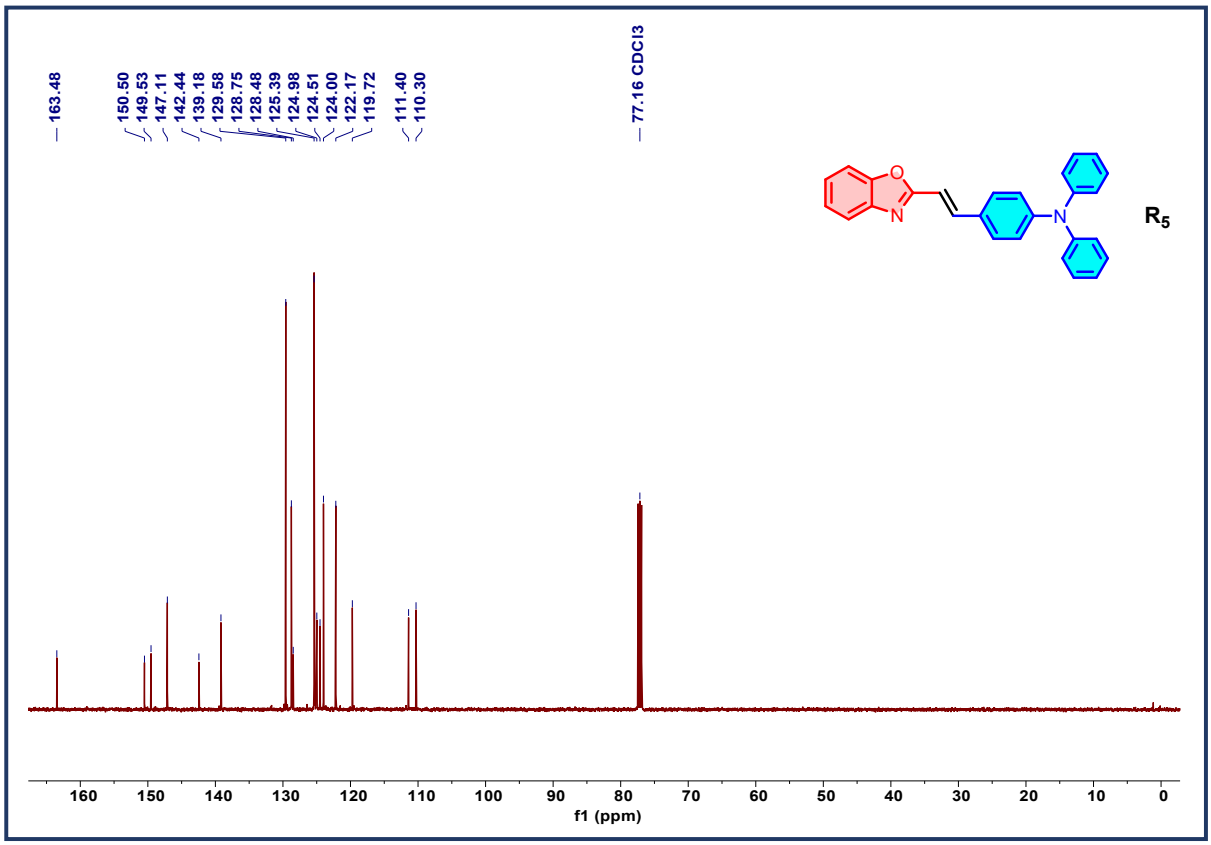
$^{1}H/^{13}C$ NMR Spectra of R4



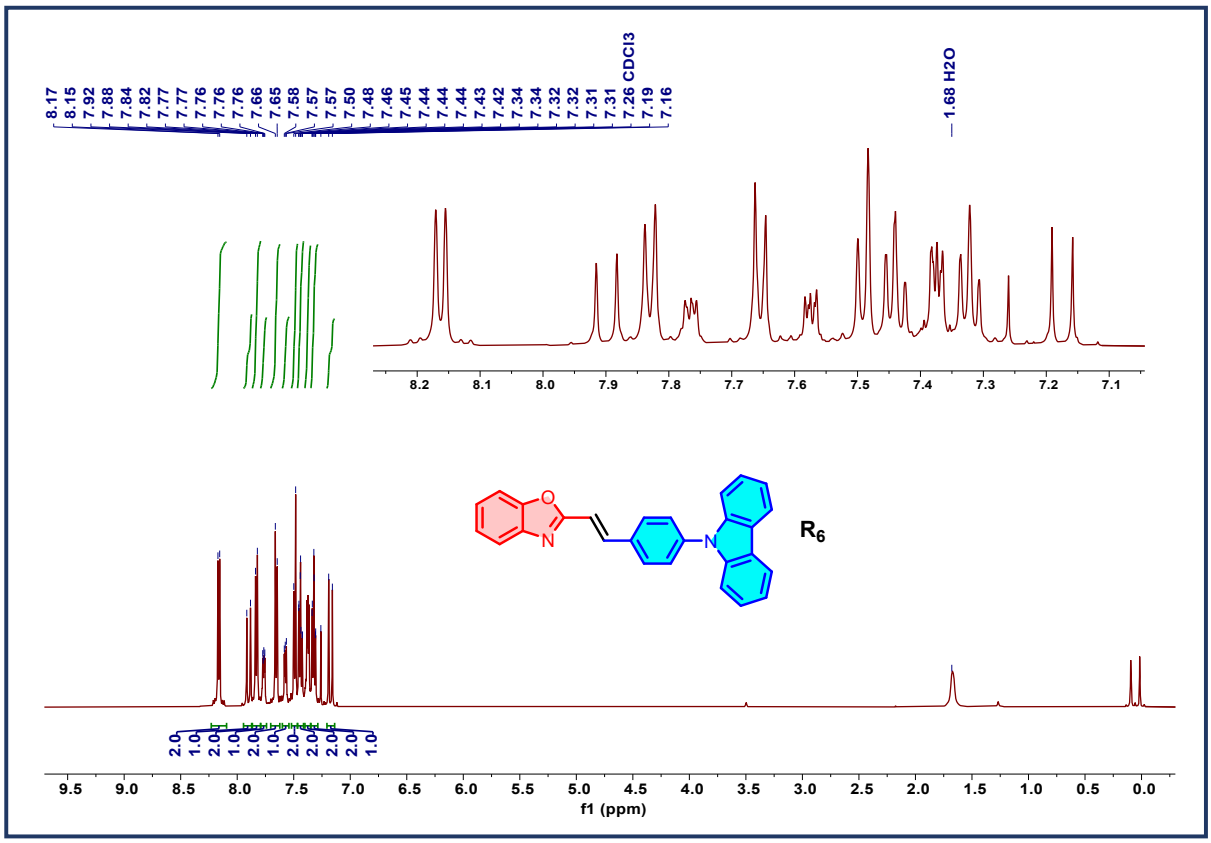


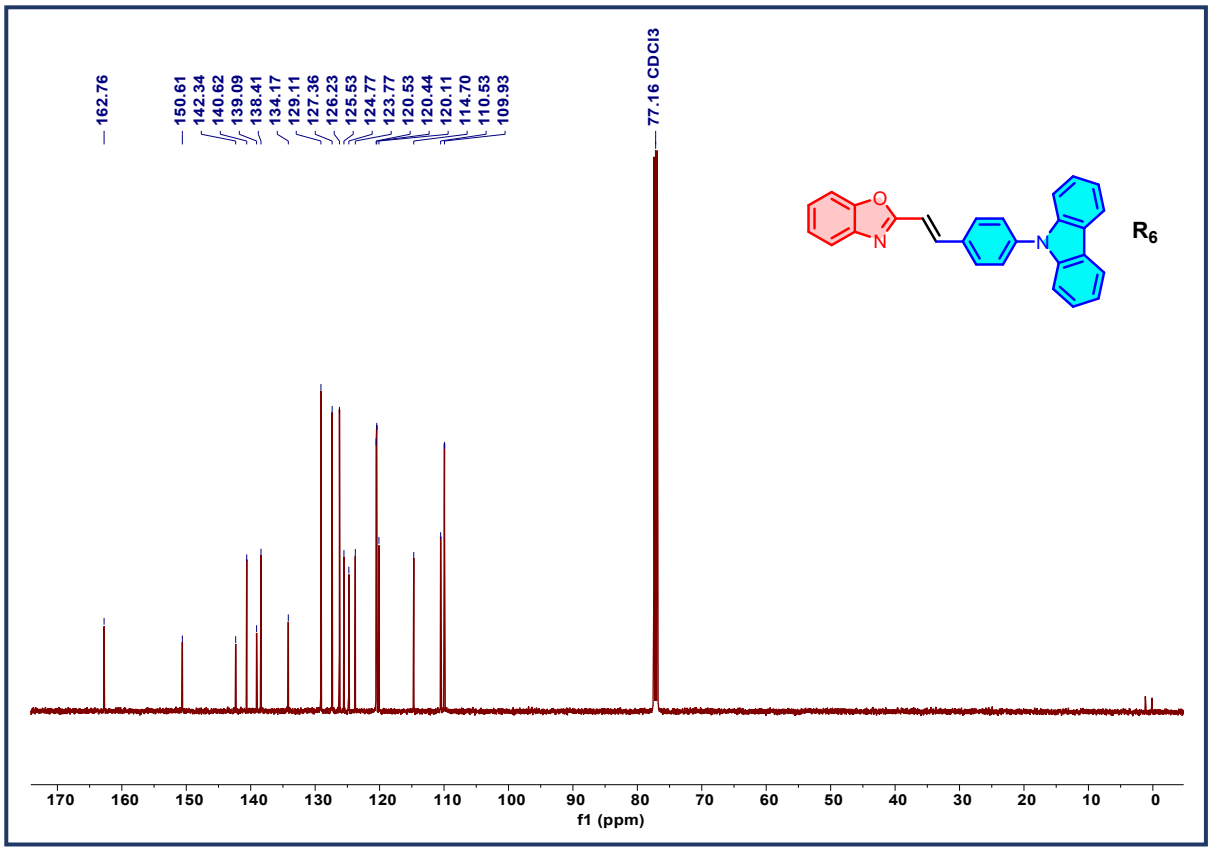


$^{1}H/^{13}C$ NMR Spectra of R5

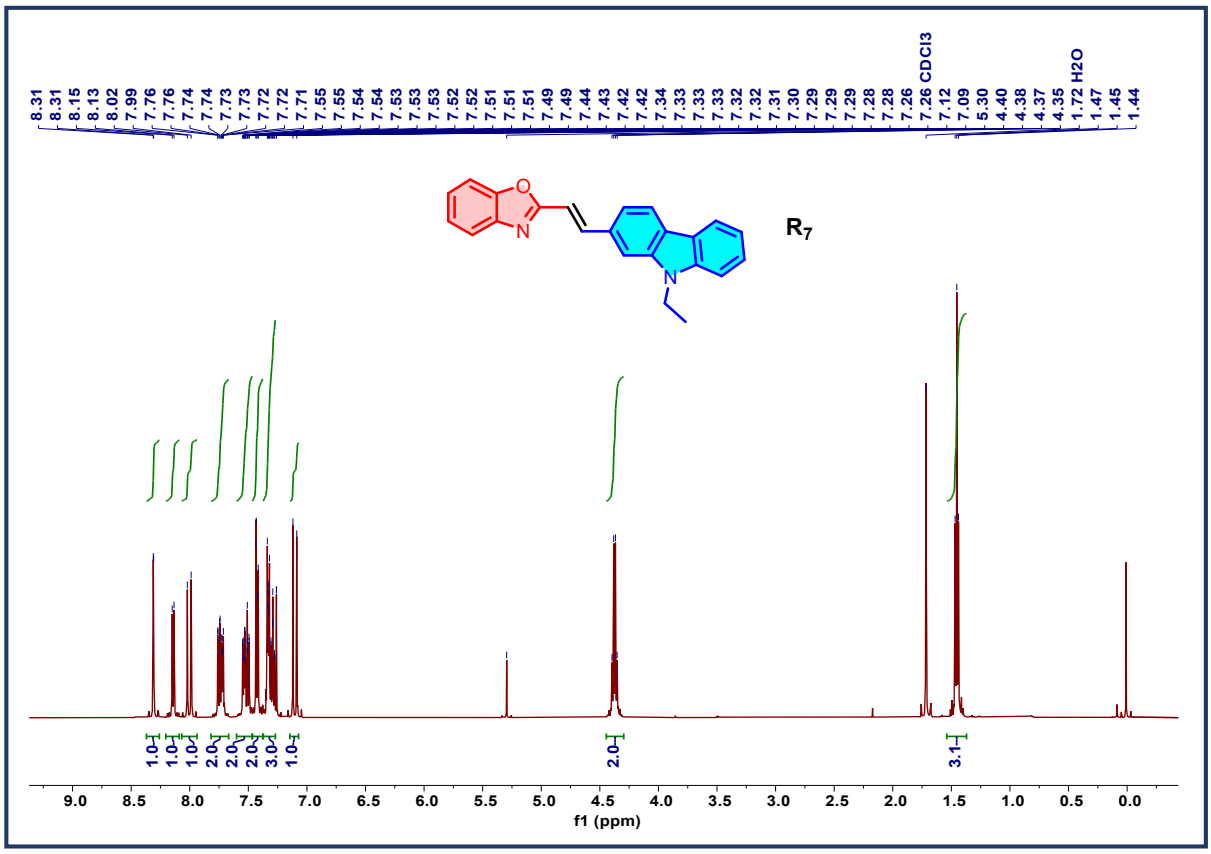


$^{1}H/^{13}C$ NMR Spectra of R6





^{1}H/^{13}C NMR Spectra of R7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R7
1.0 1.0 1.0 2.0 2.0 3.0 1.0 2.0 3.1
9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
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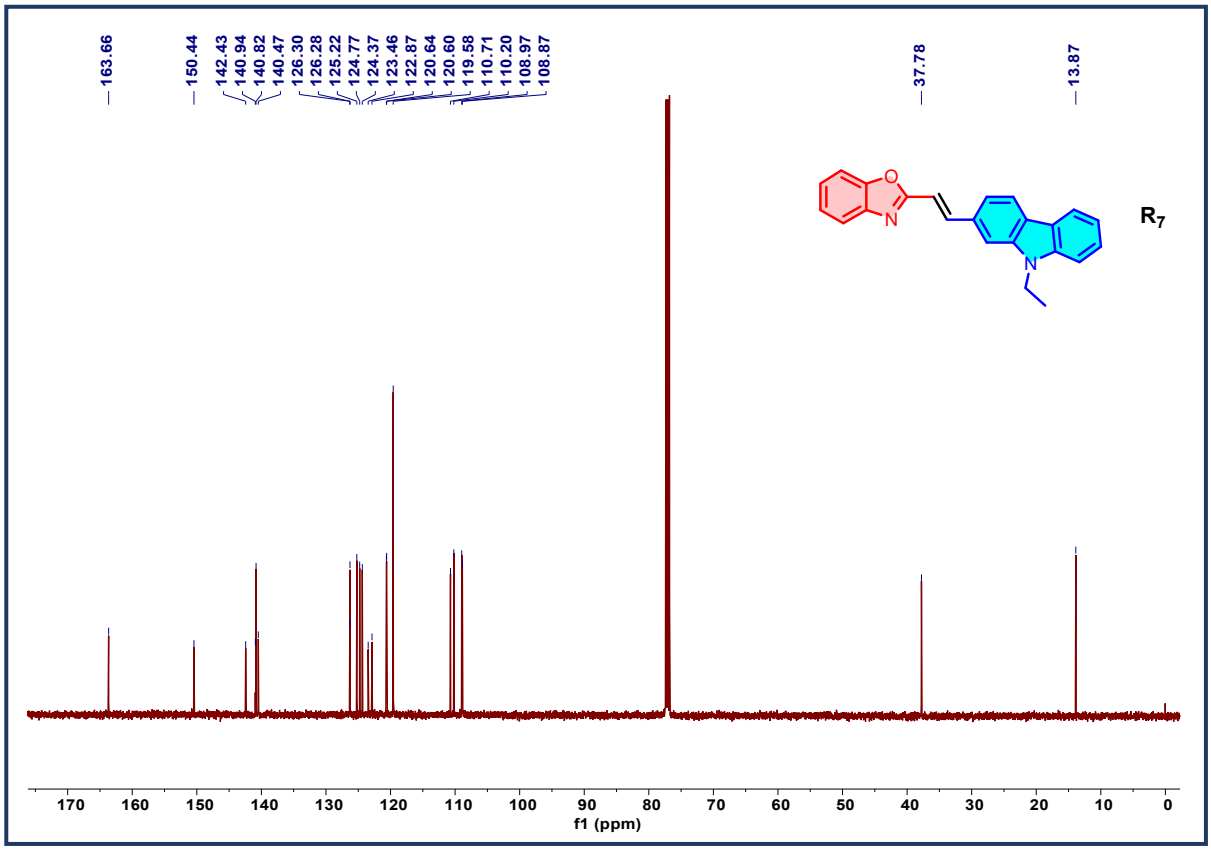
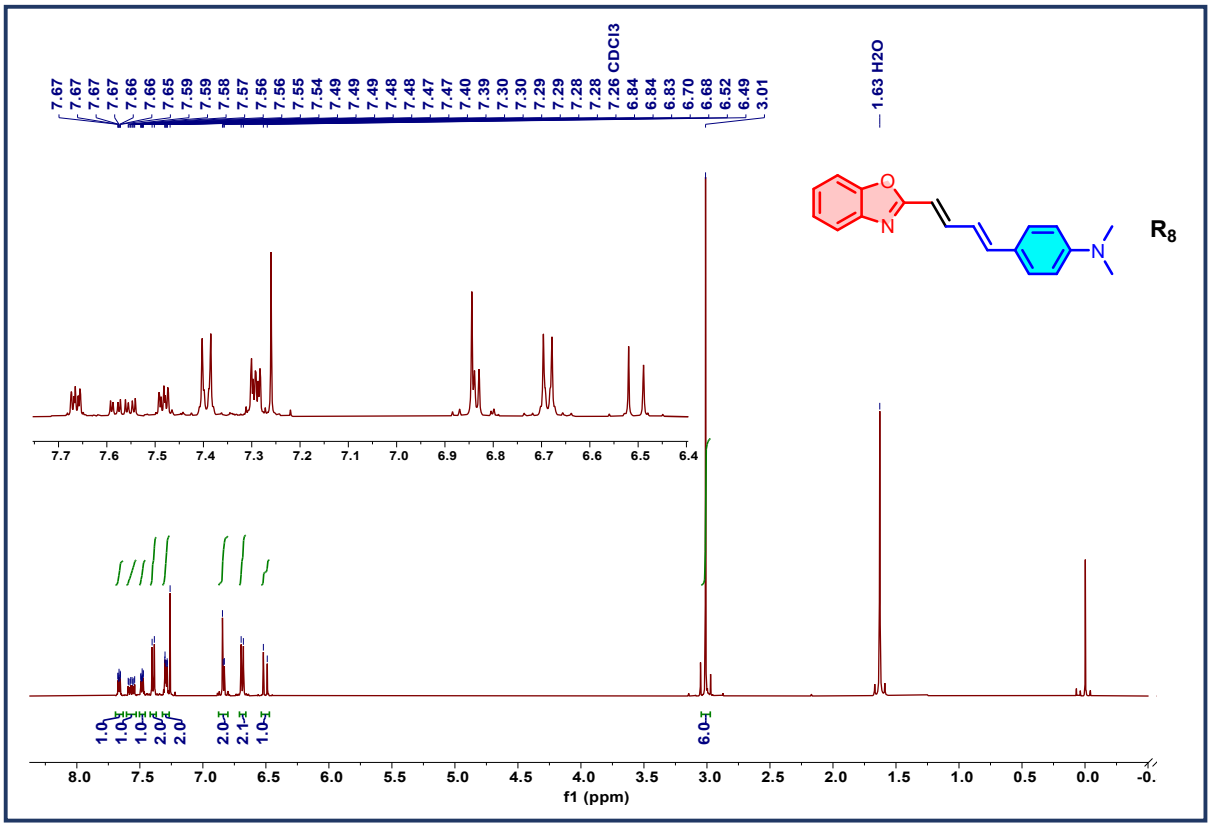
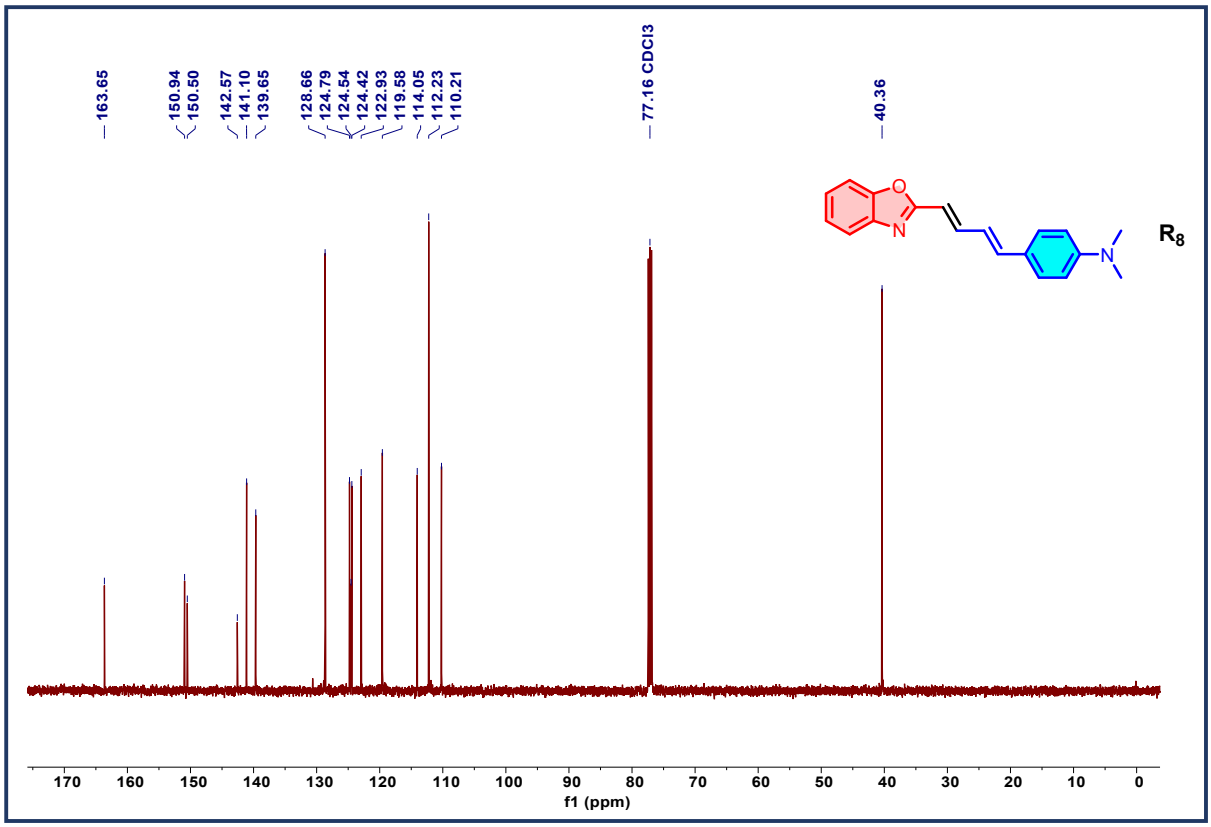
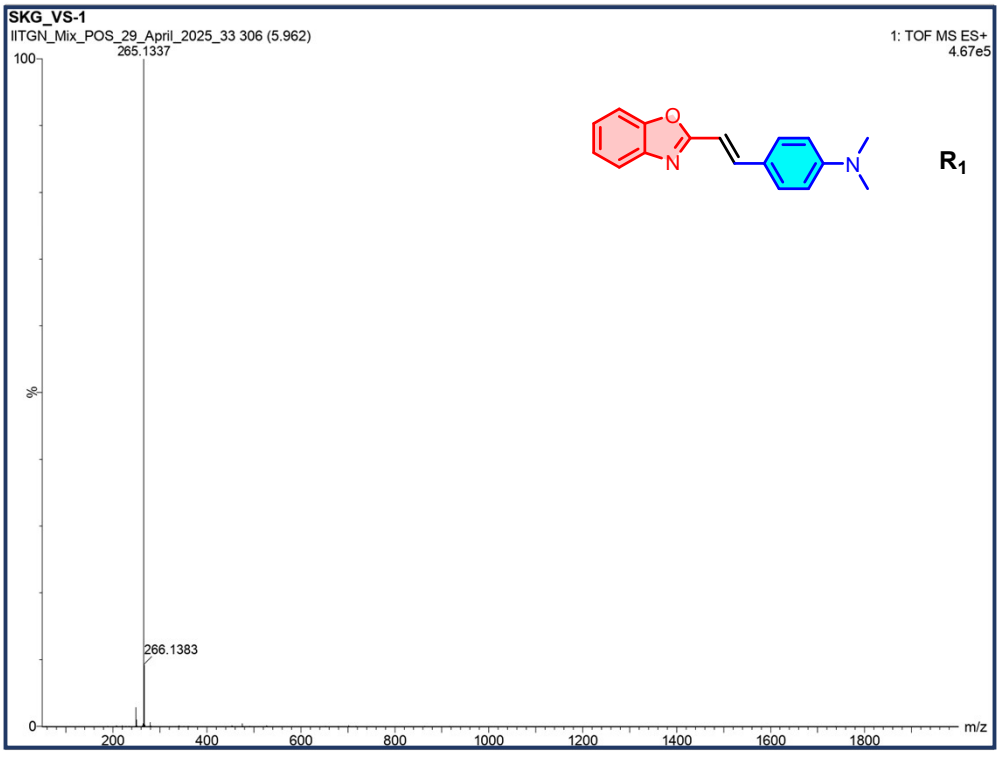

163.66 150.44 142.43 140.94 140.82 140.47 126.30 126.28 125.22 124.77 124.37 123.46 122.87 120.64 120.60 119.58 110.71 110.20 108.97 108.87 37.78 13.87
R7
170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
f1 (ppm)

$^{1}H/^{13}C$ NMR Spectra of R8



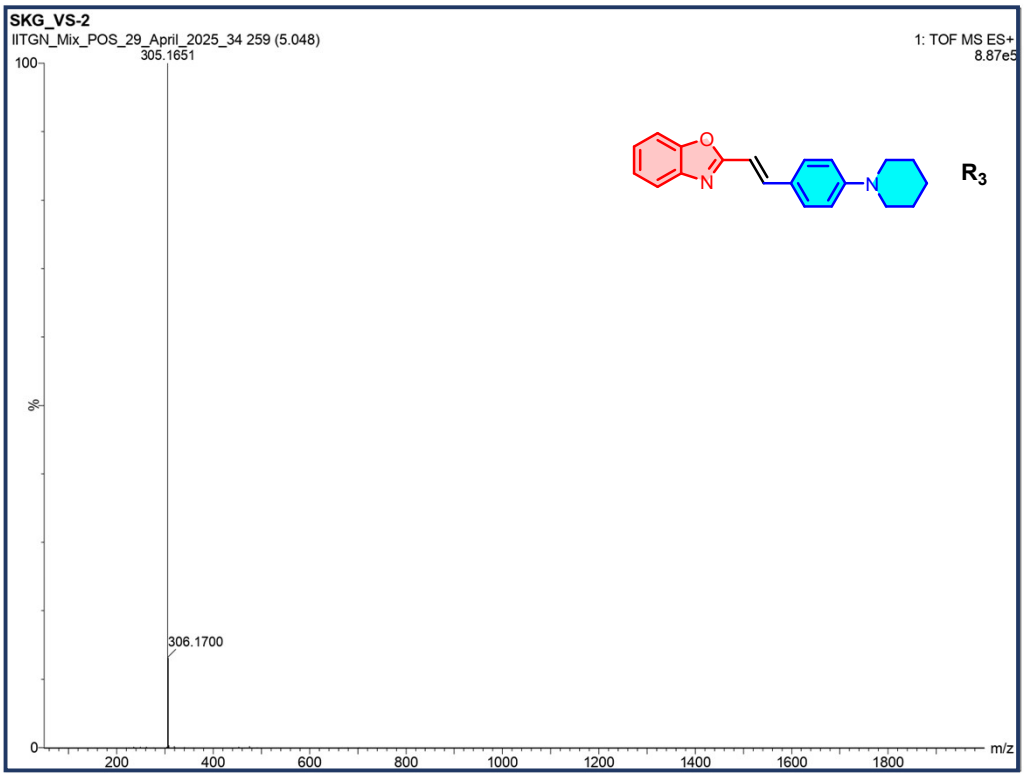


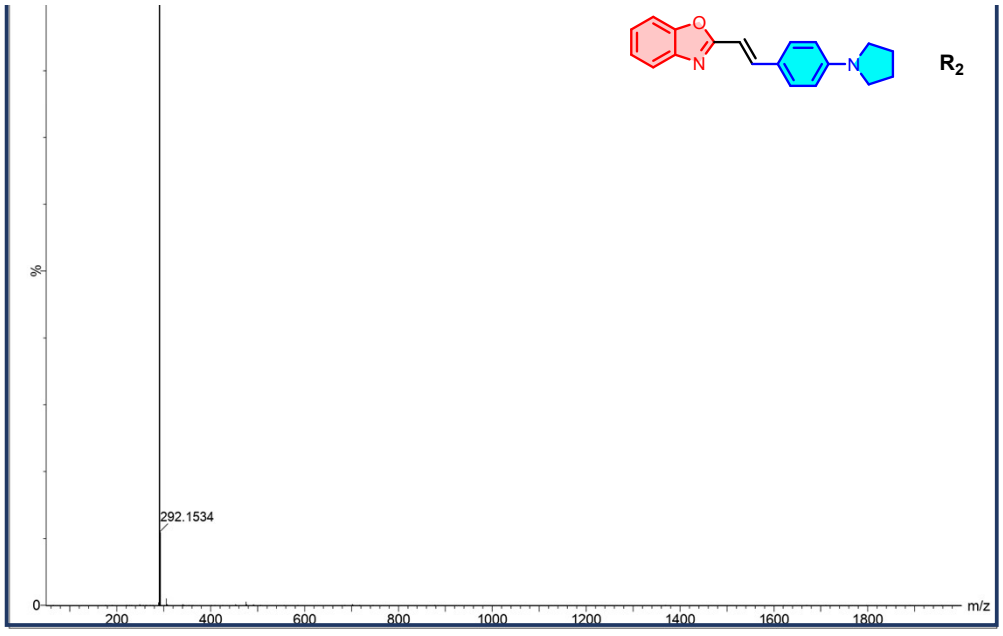
Mass Spectra



Mass Spectra of R1

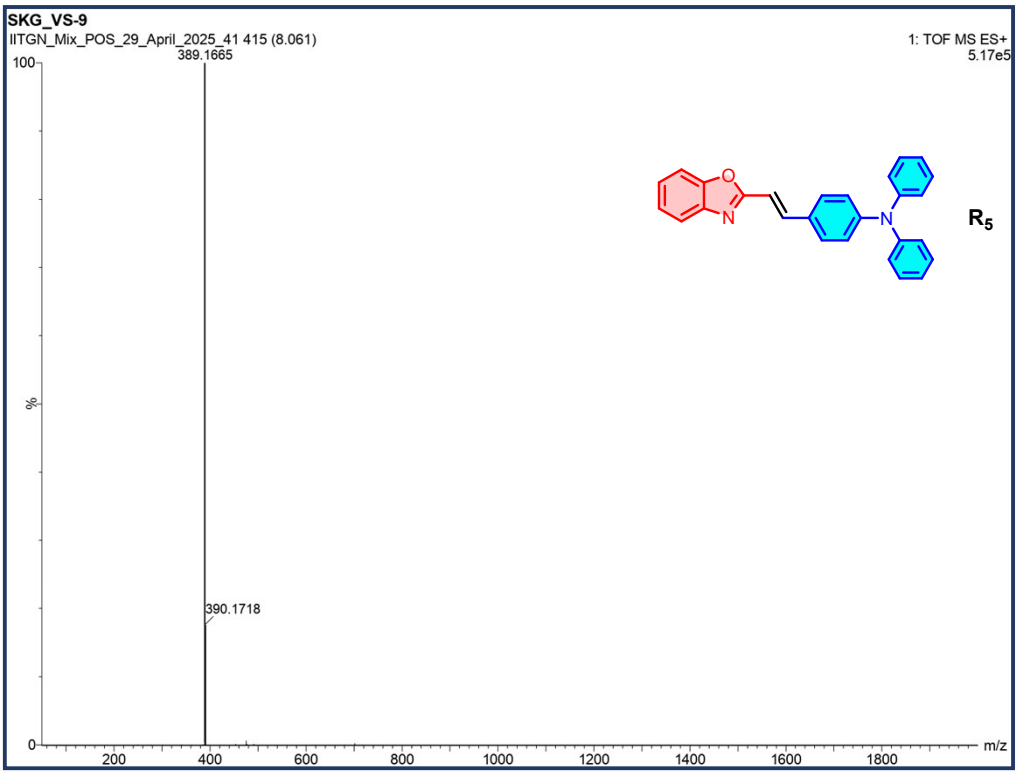
Mass Spectra of R2

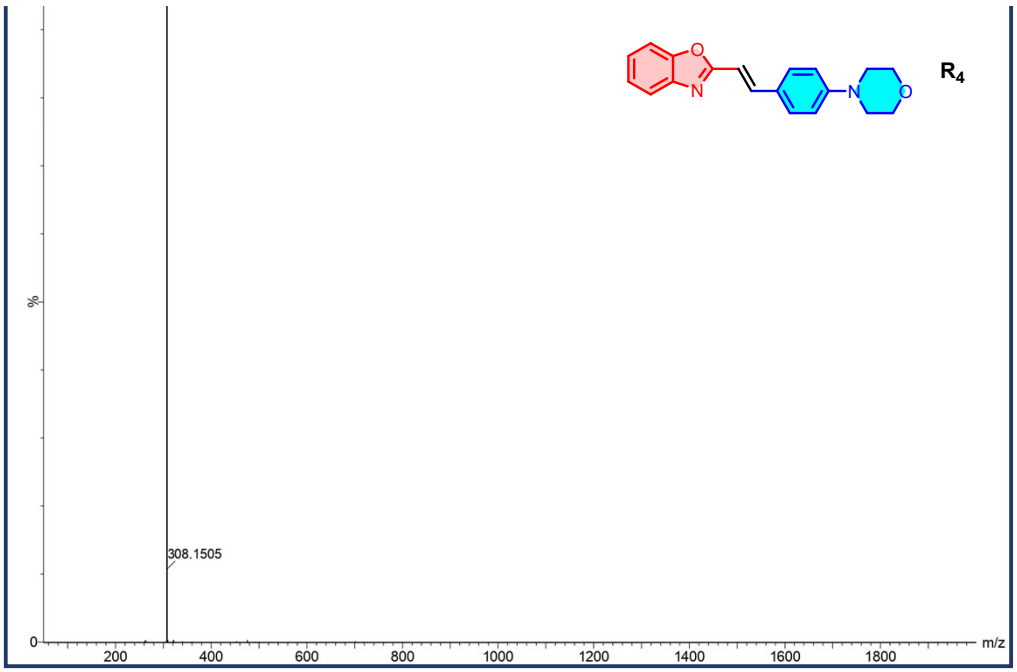




Mass Spectra of R3

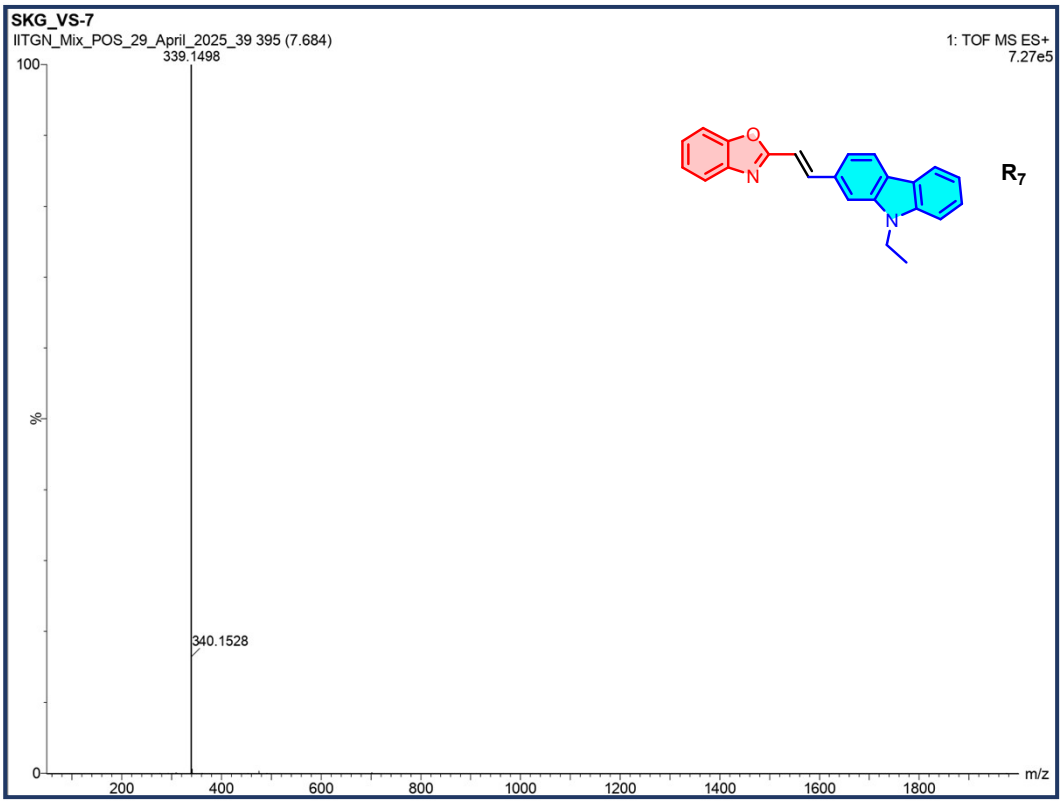
Mass Spectra of R4

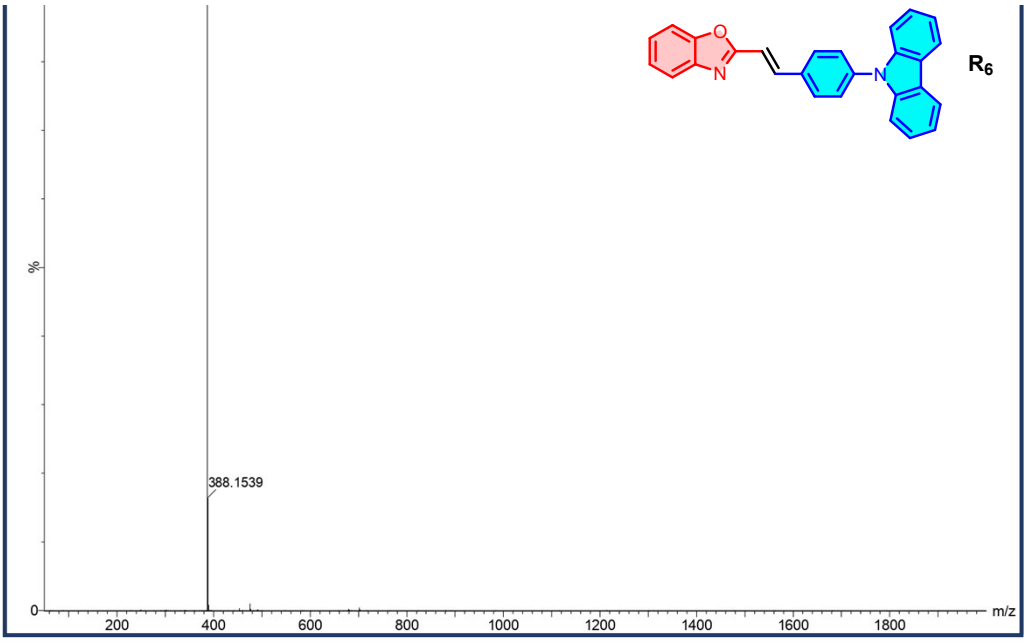




Mass Spectra of R5

Mass Spectra of R6





Mass Spectra of R7

Mass Spectra of R8