Supporting Information
Design, Synthesis and DNA-Cleaving Efficiency of Photoswitchable Dimeric Azobenzene Based Enediynes

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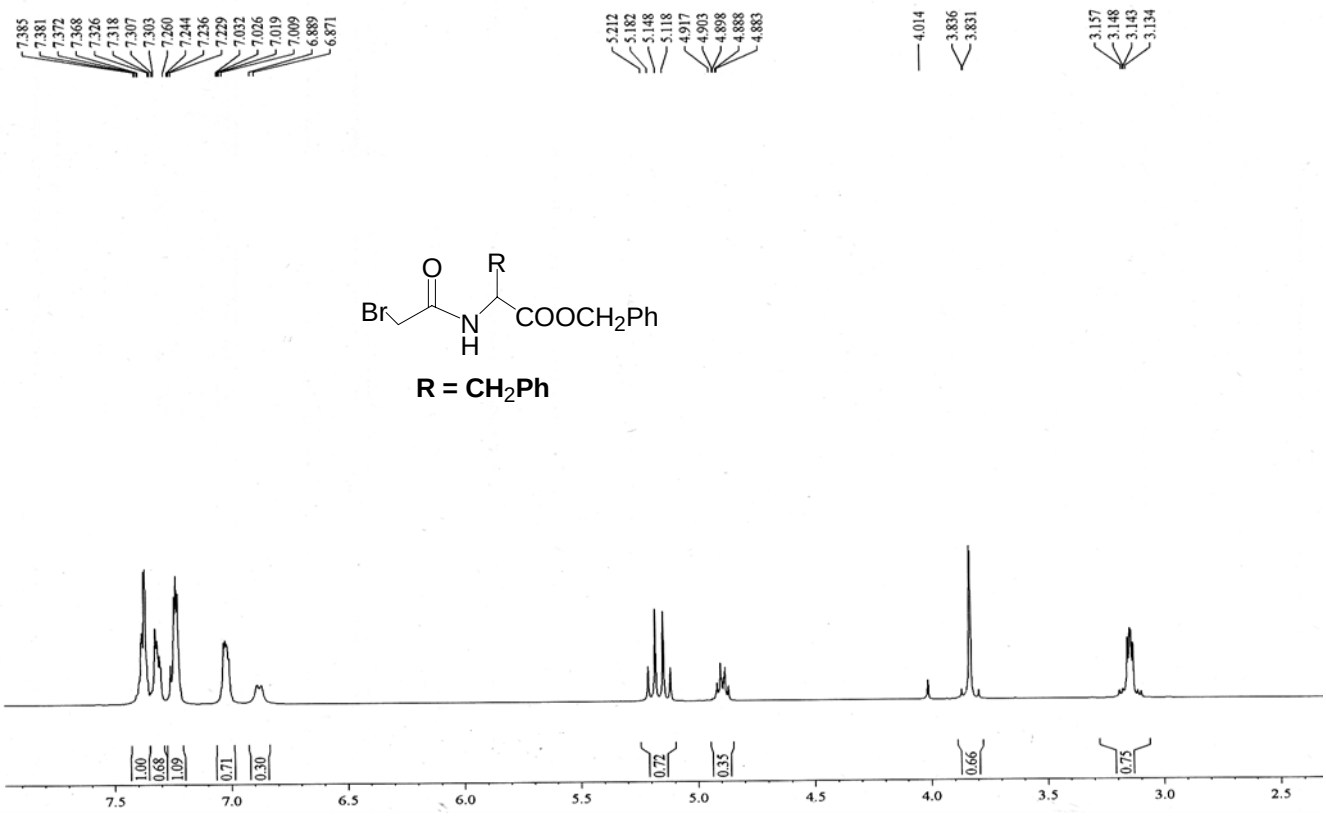
Figures S1



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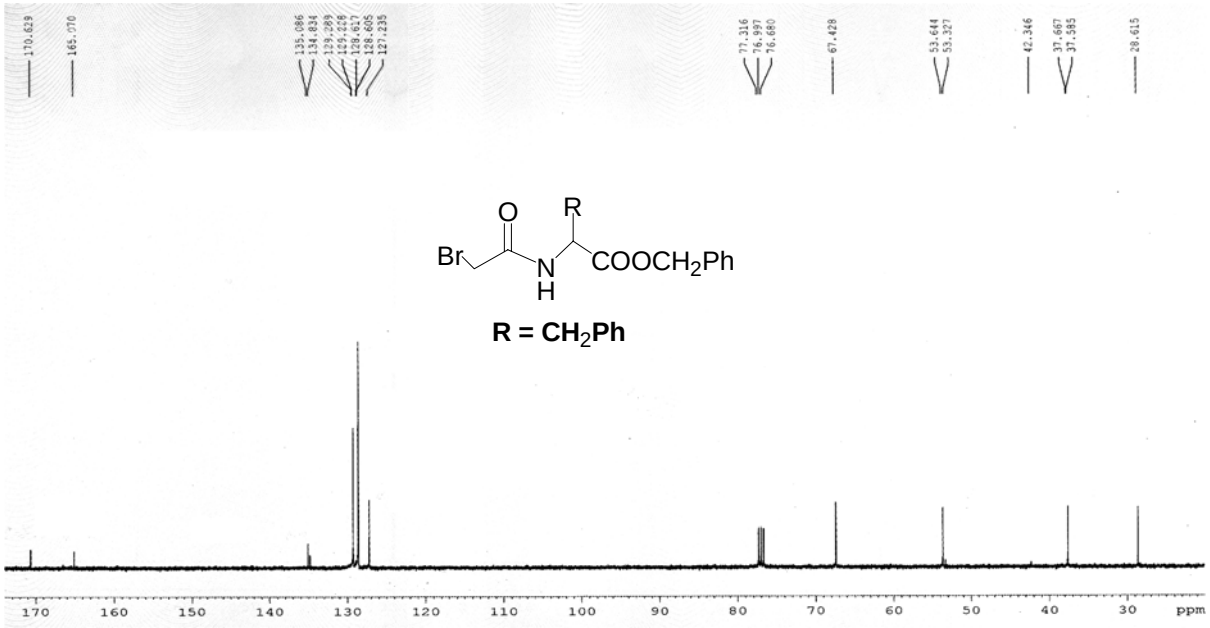

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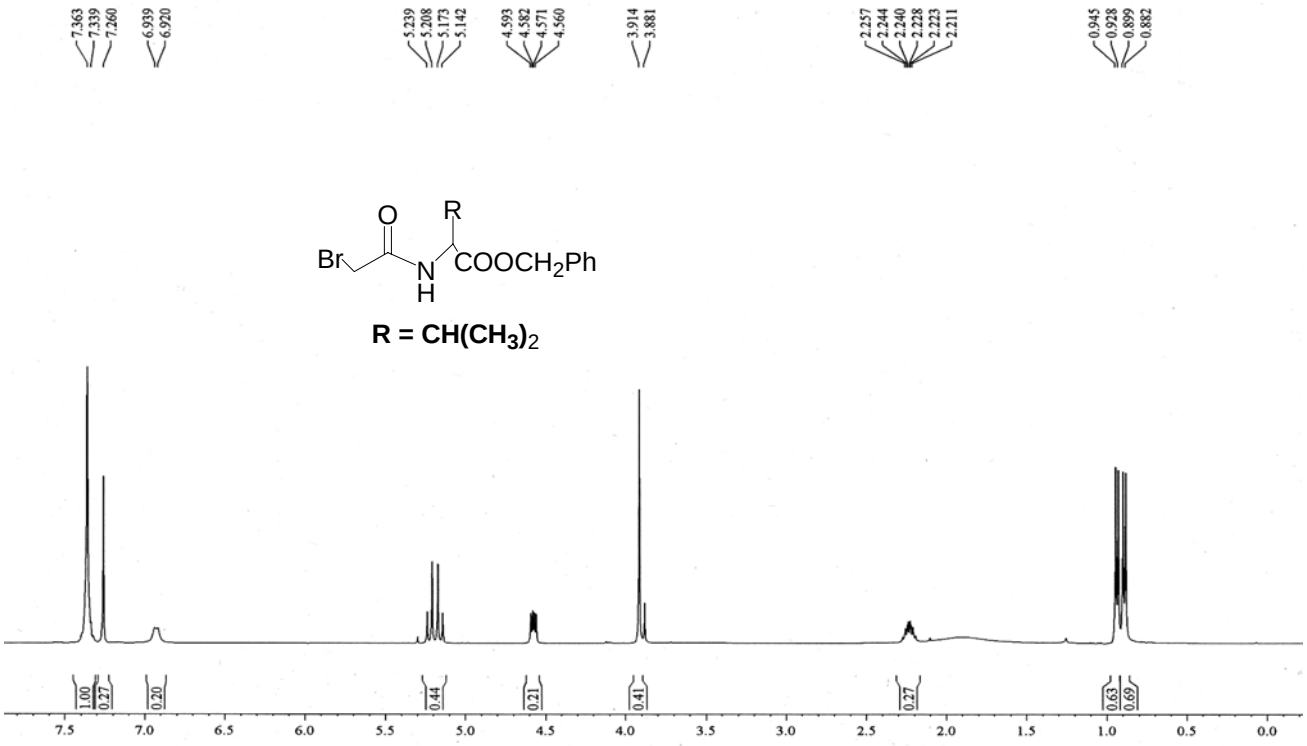

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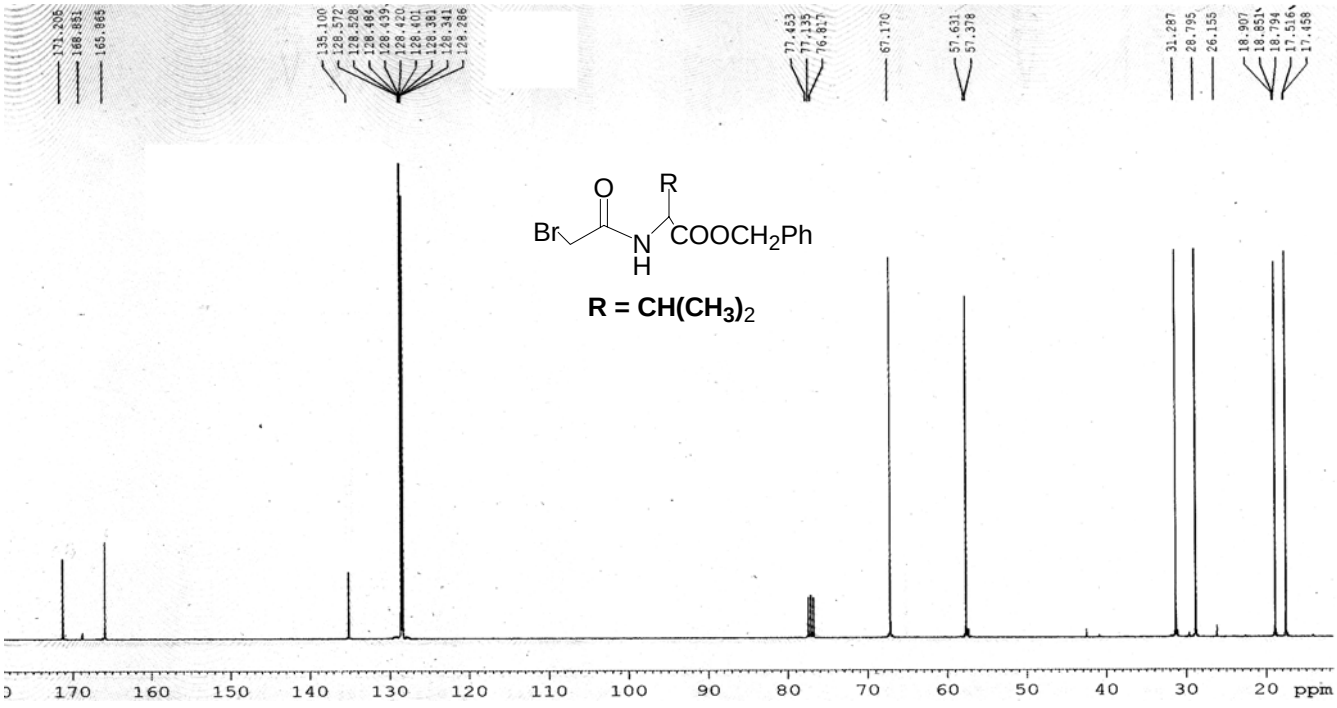

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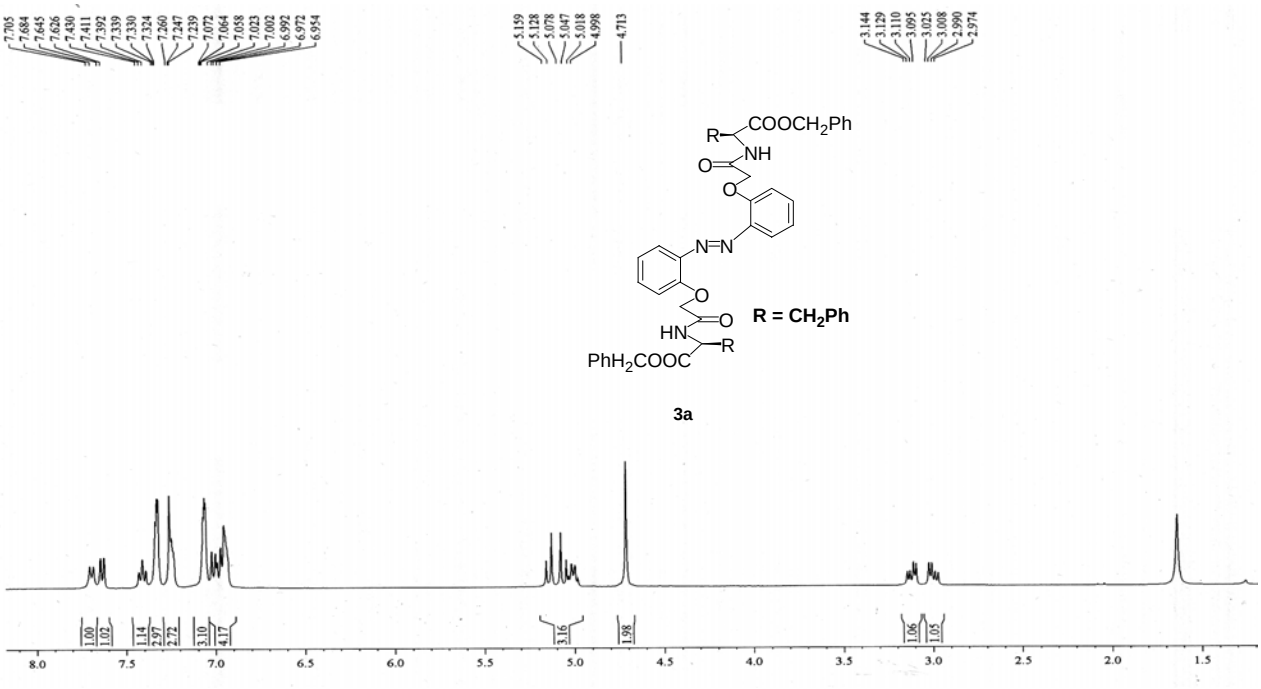

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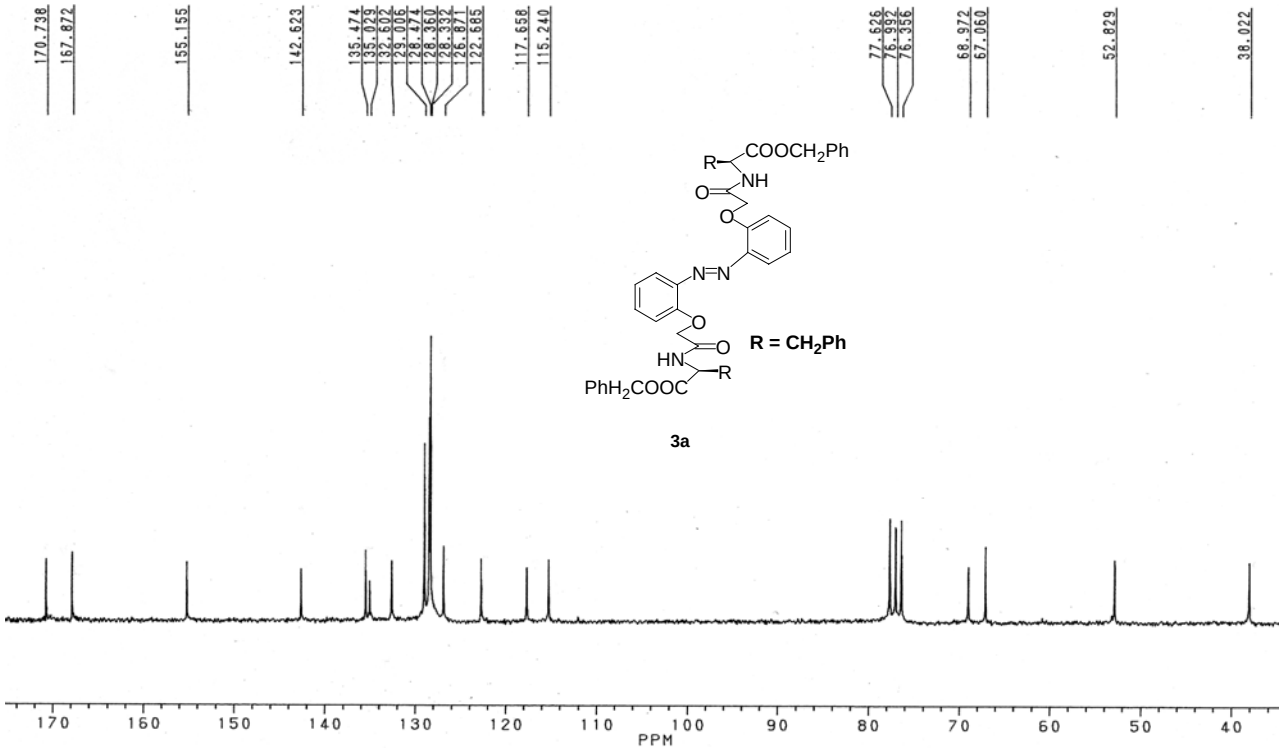

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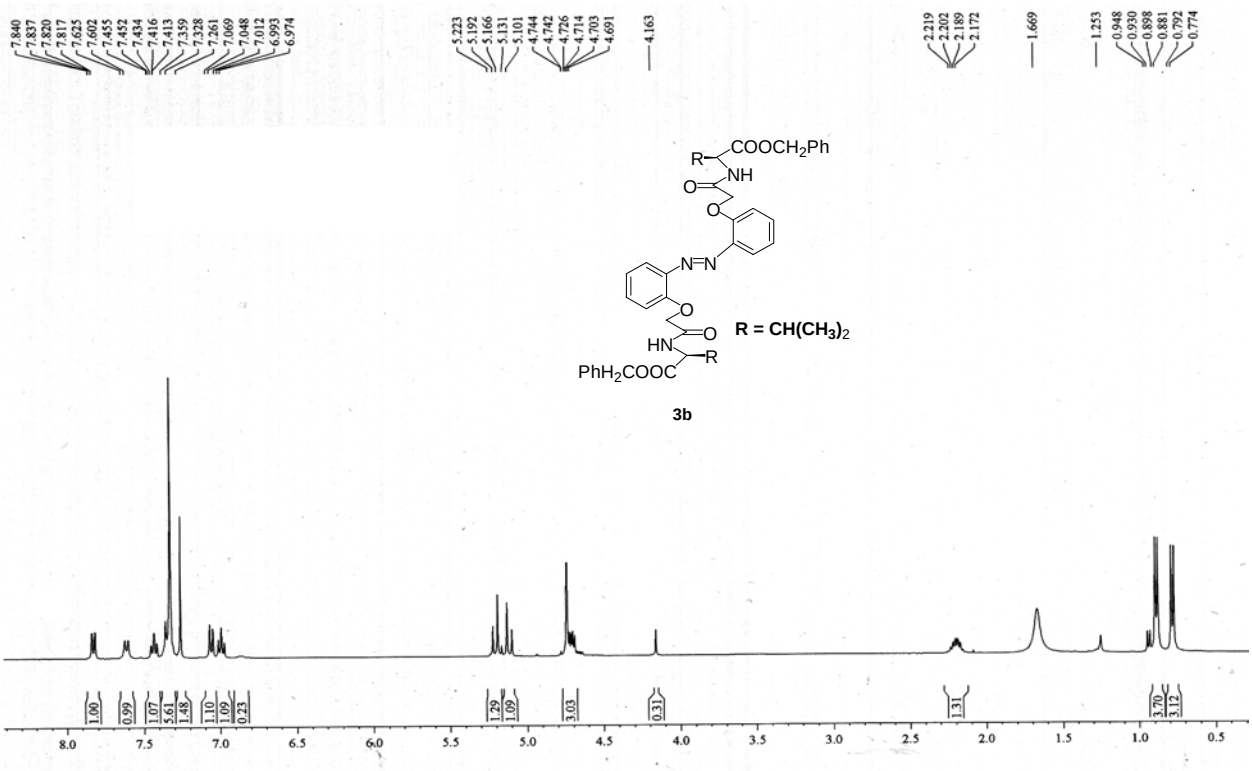

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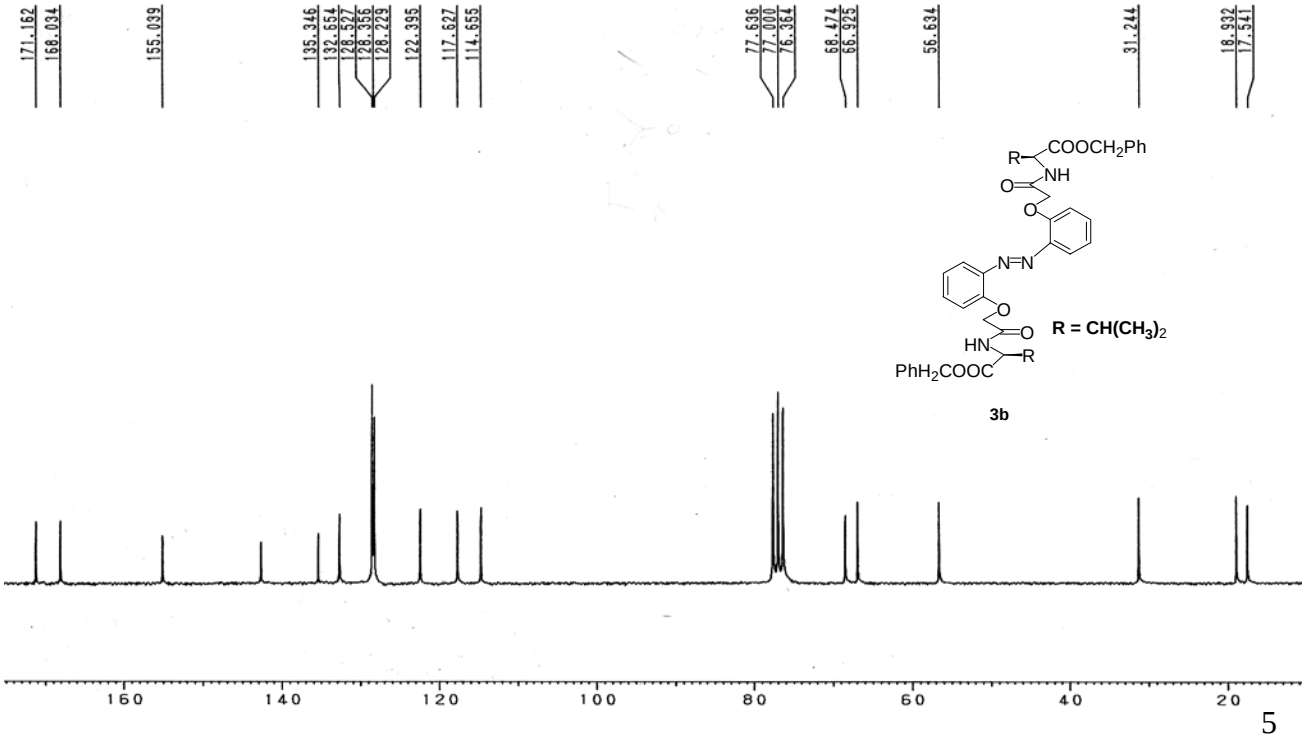

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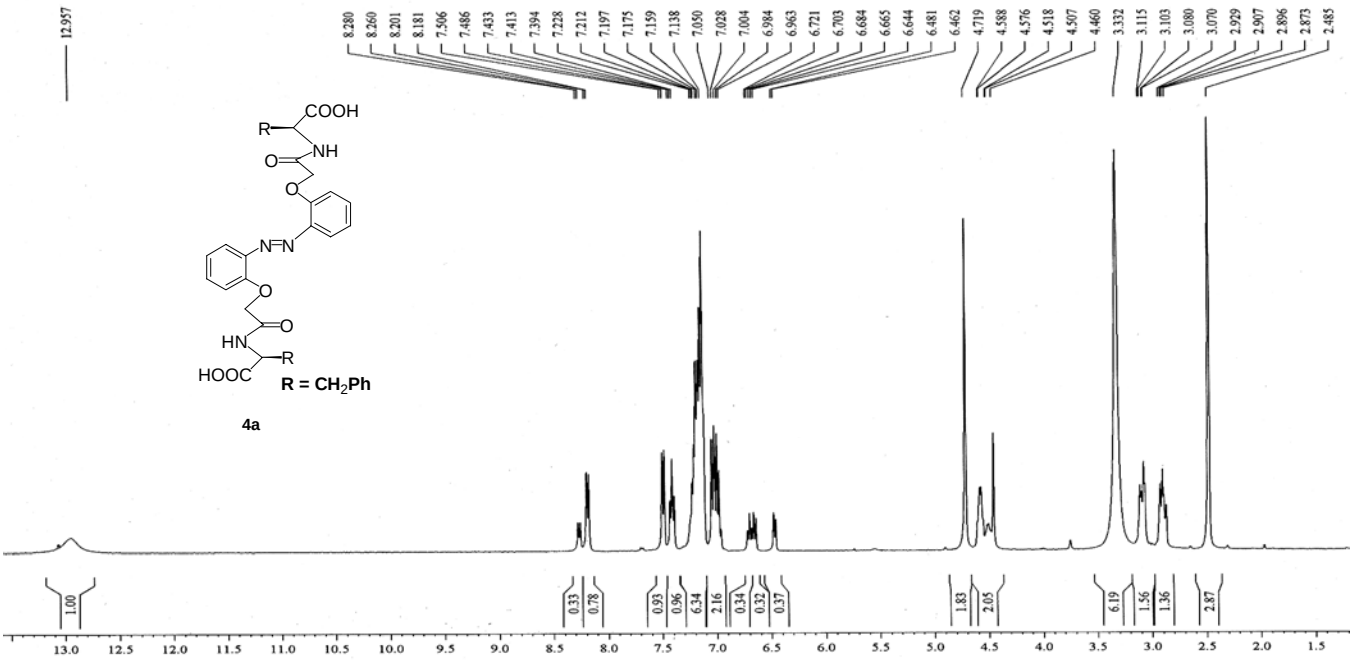

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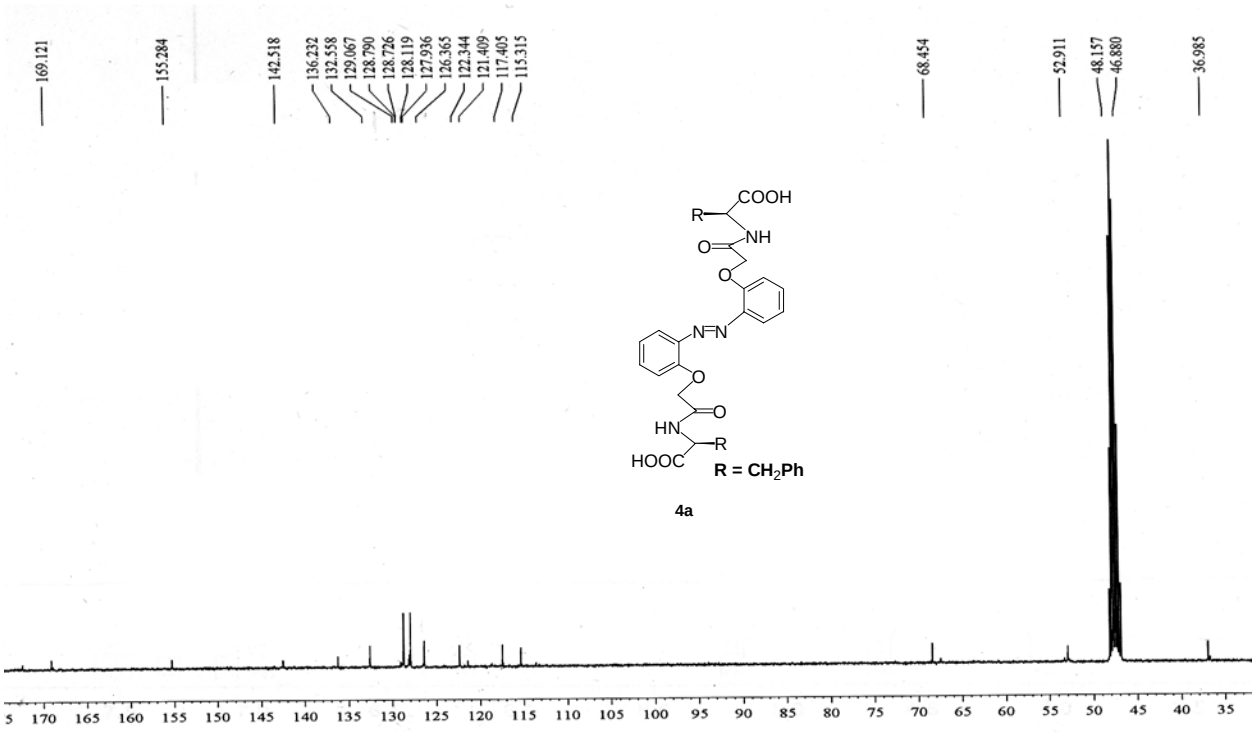

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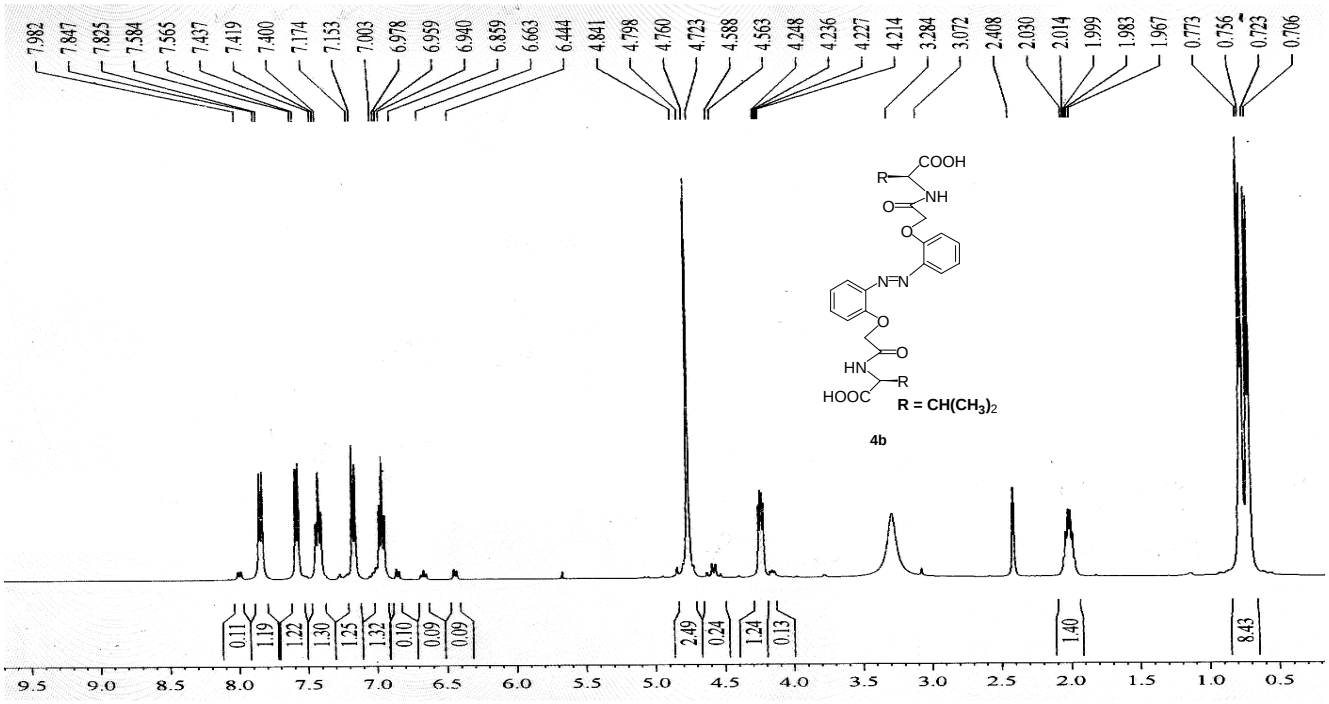

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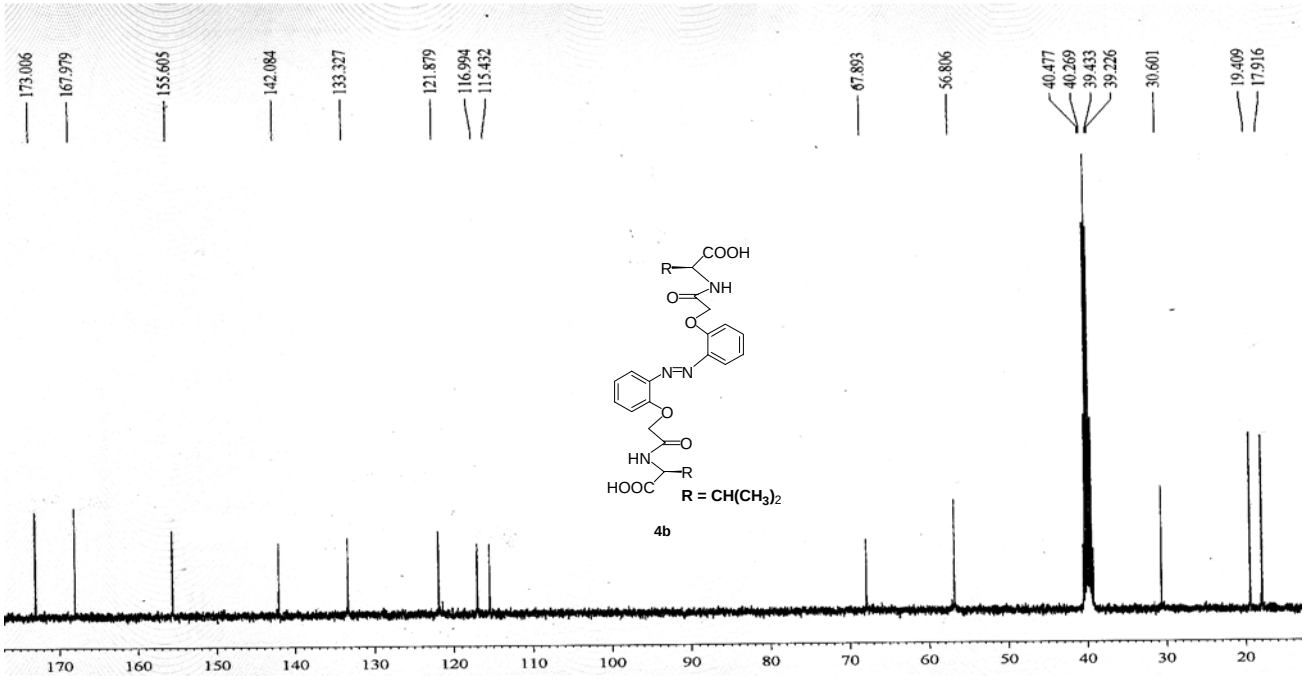

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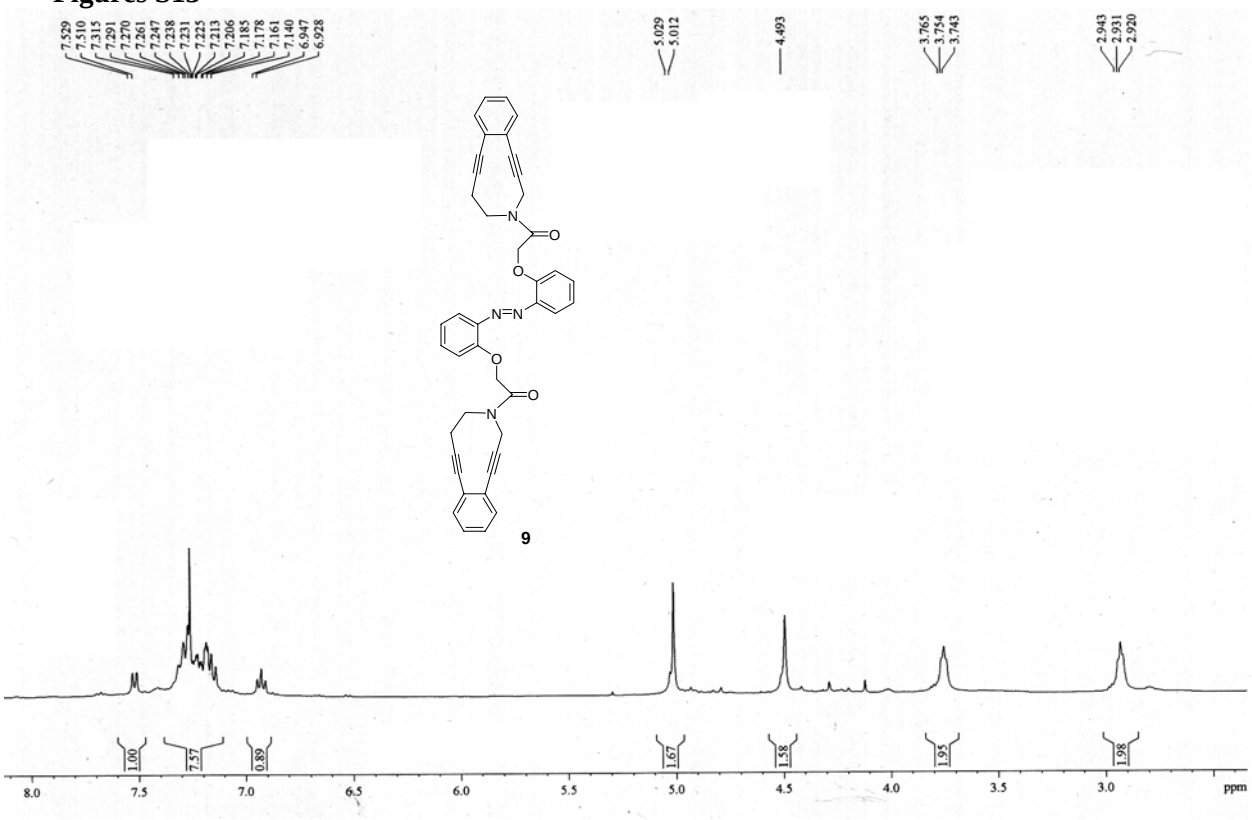

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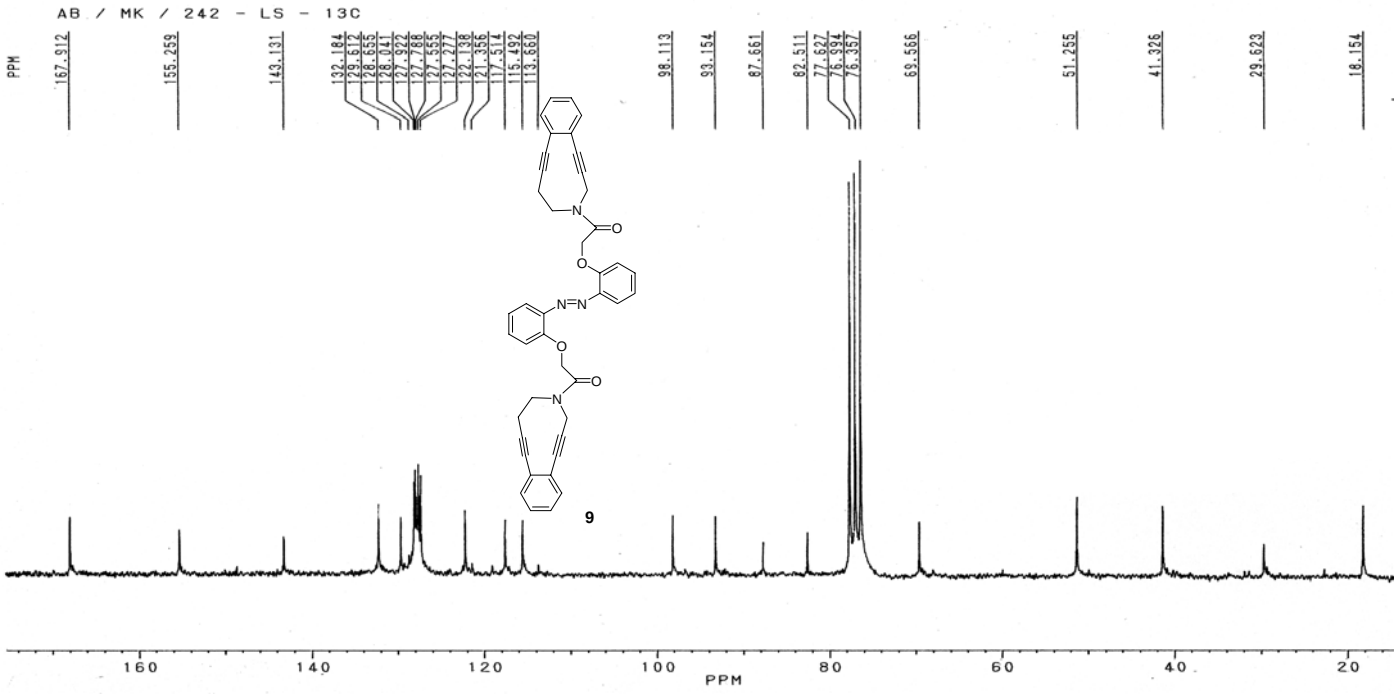

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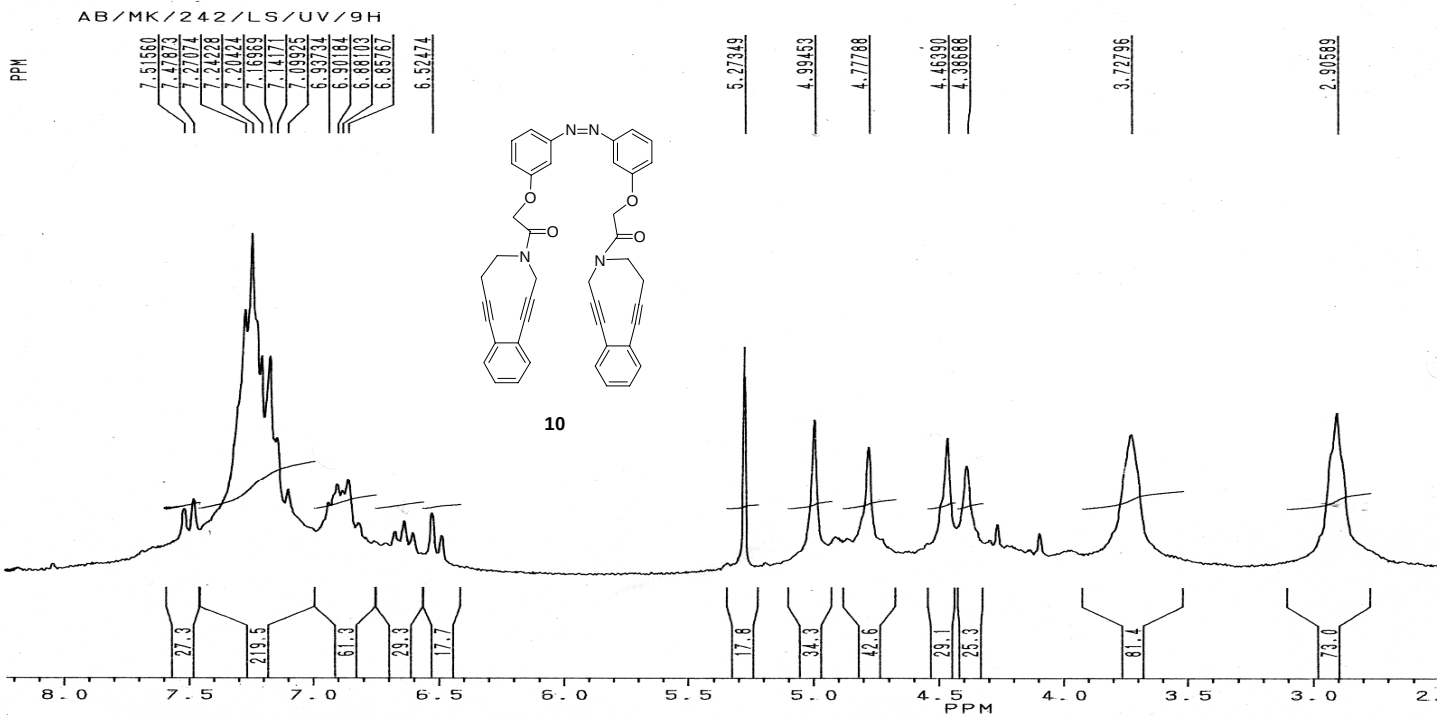

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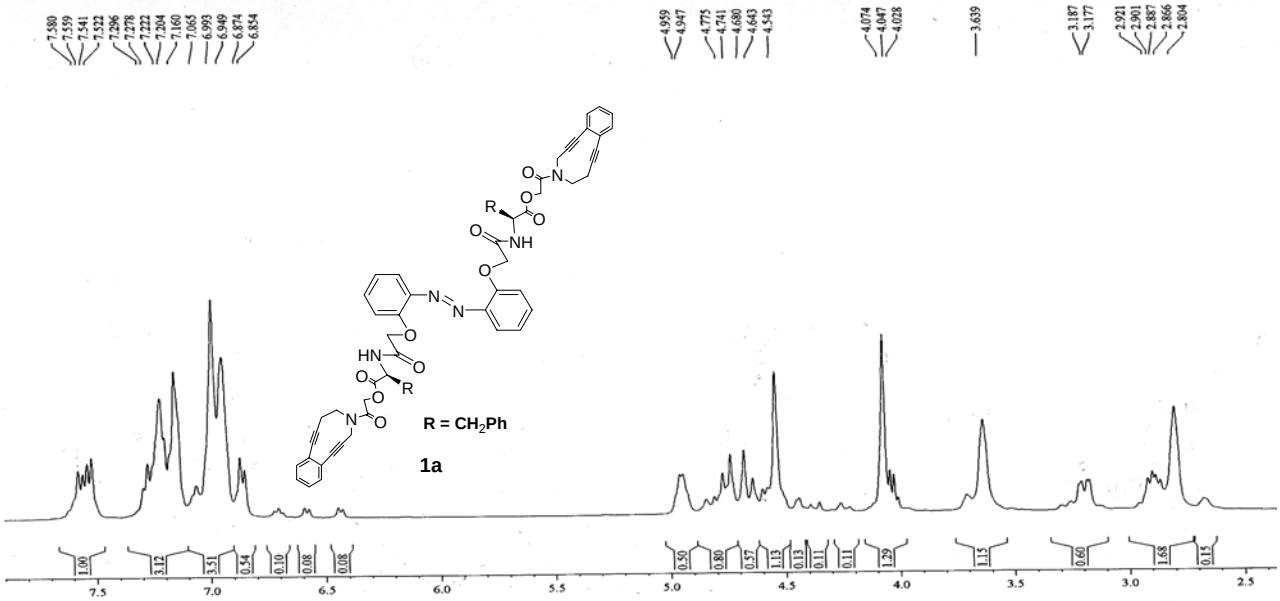

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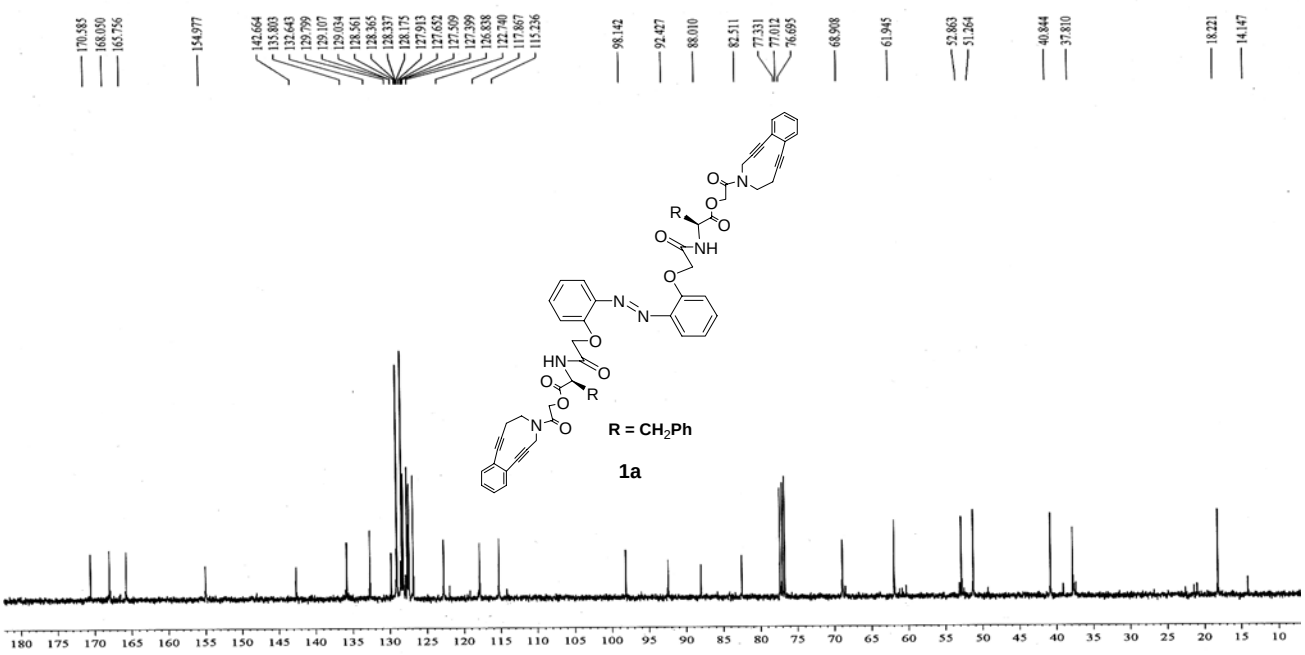

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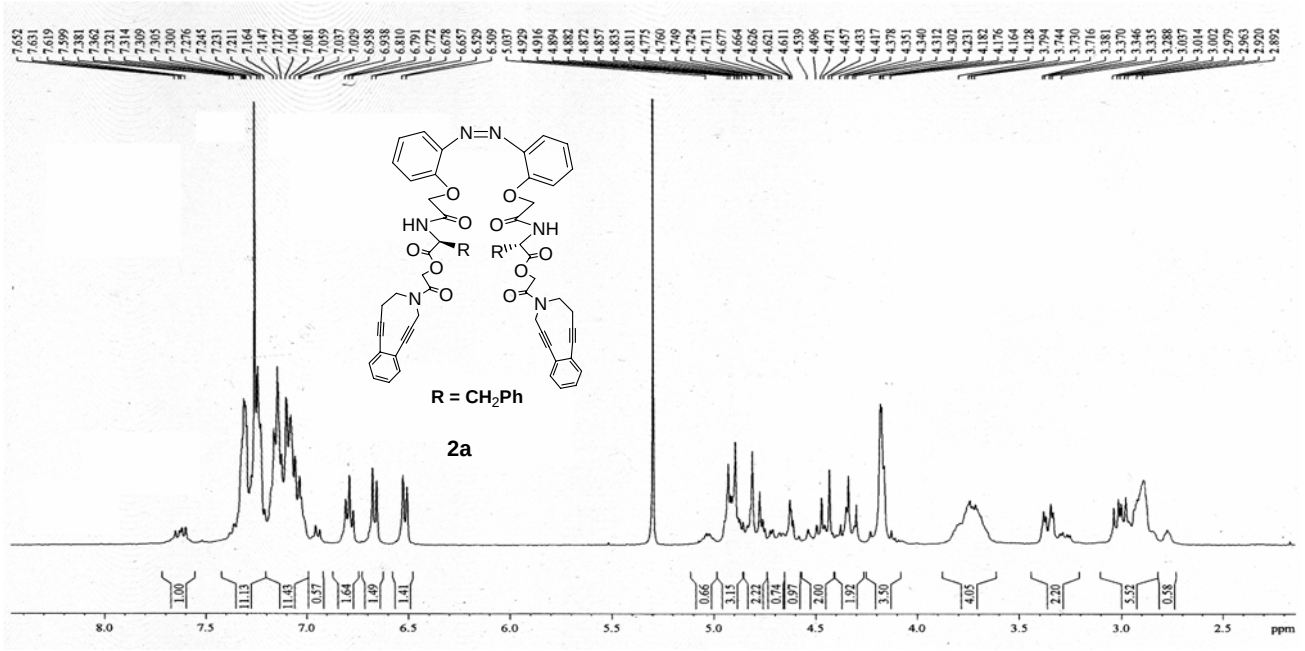

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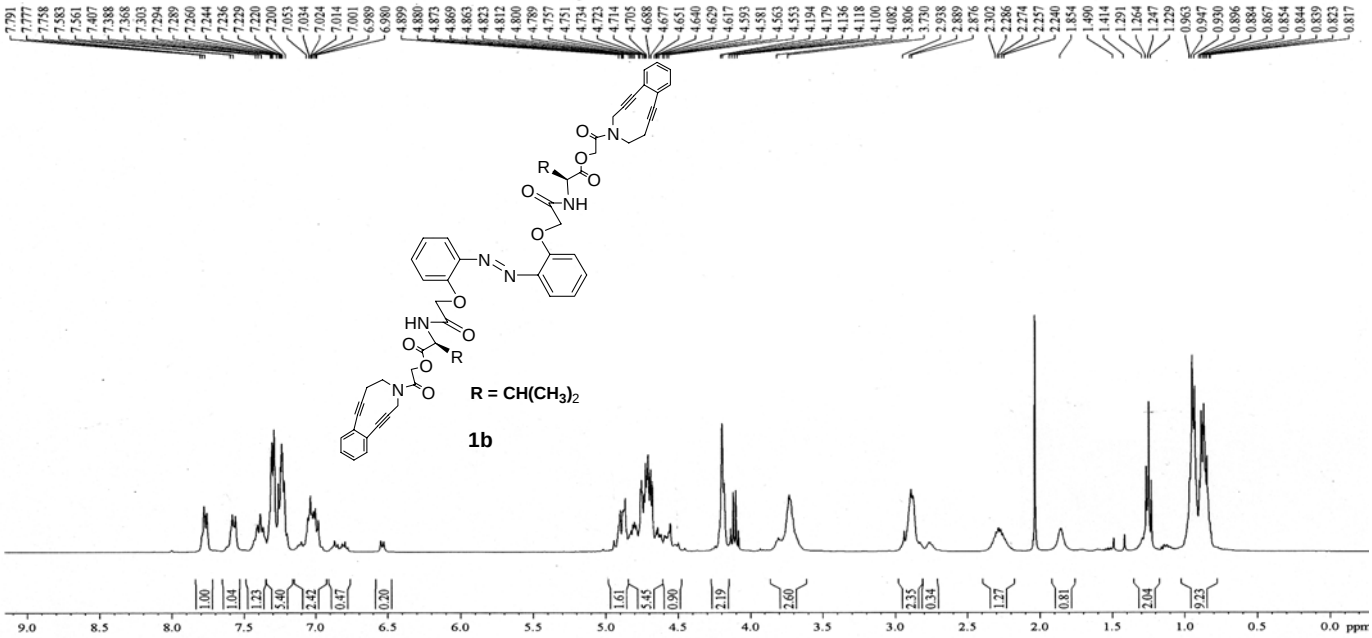

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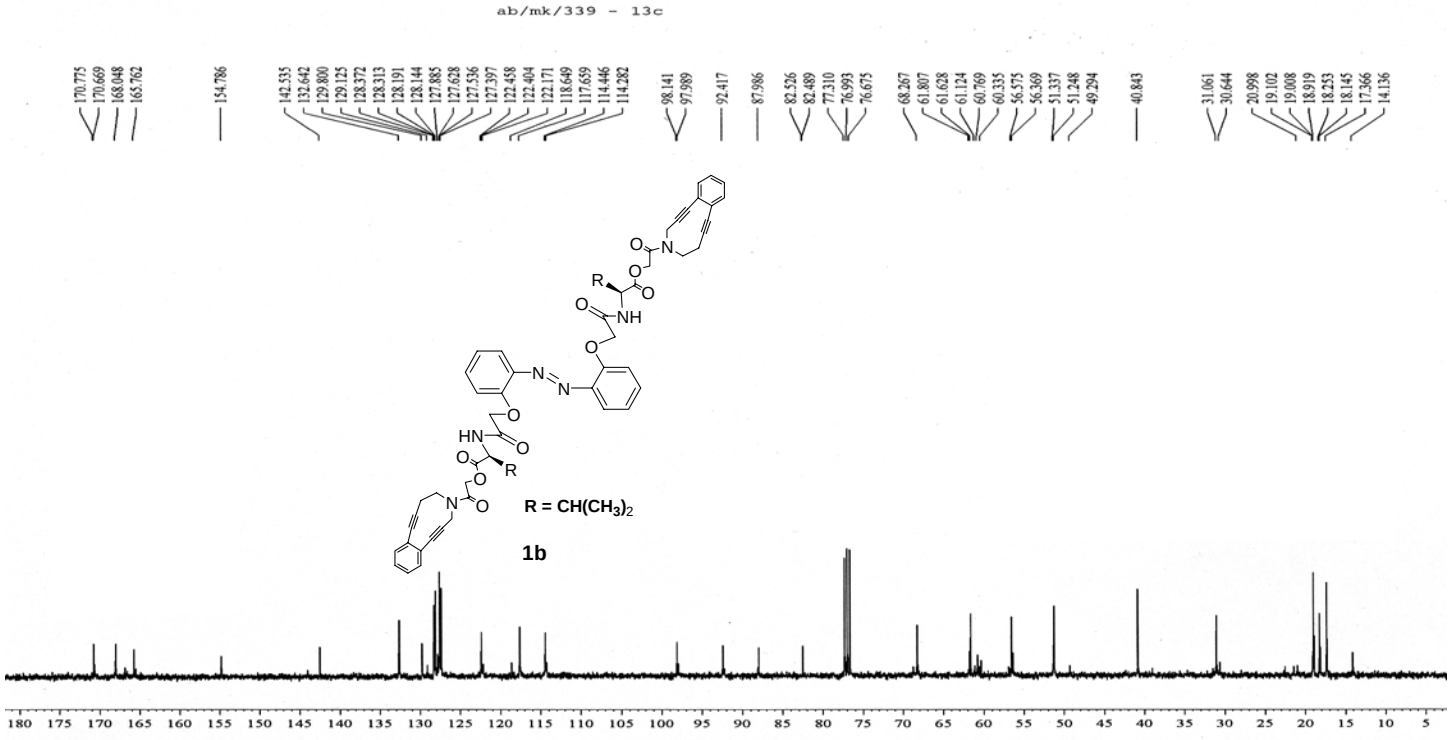

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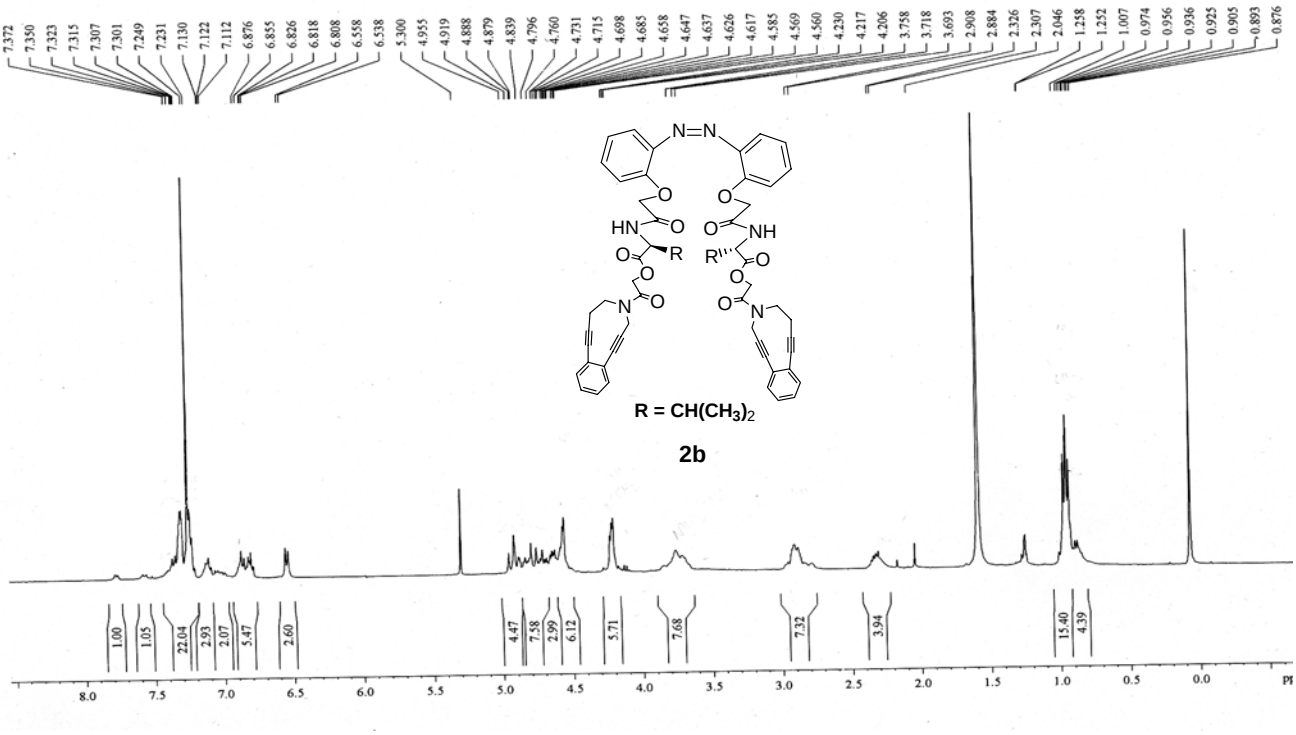

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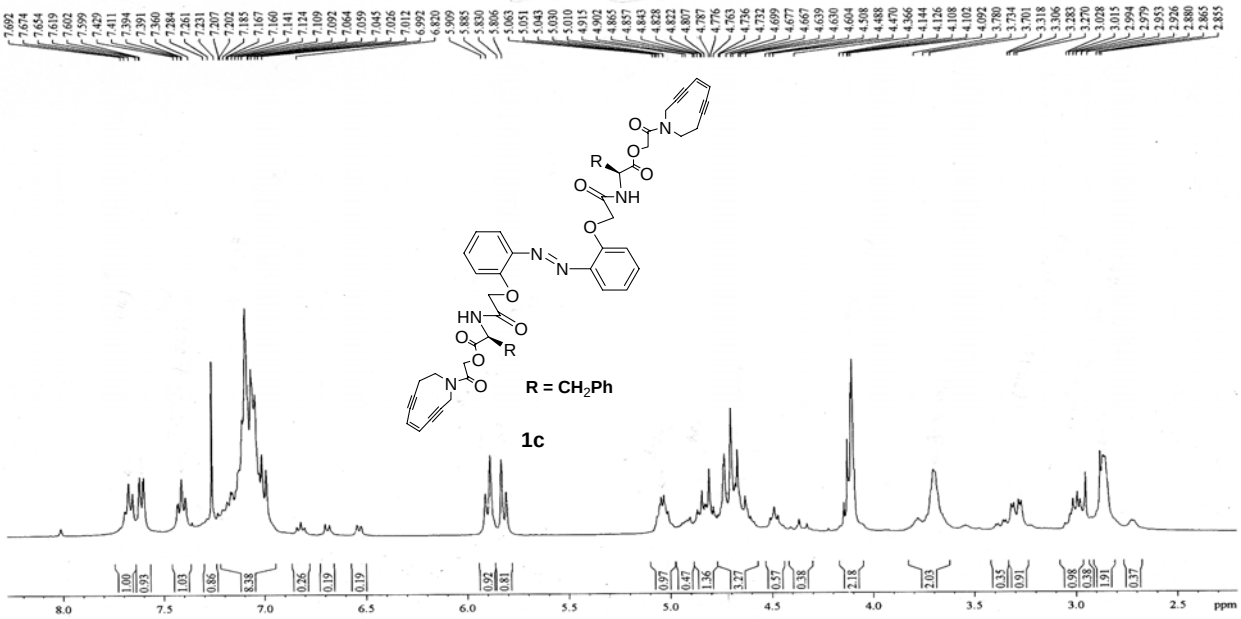

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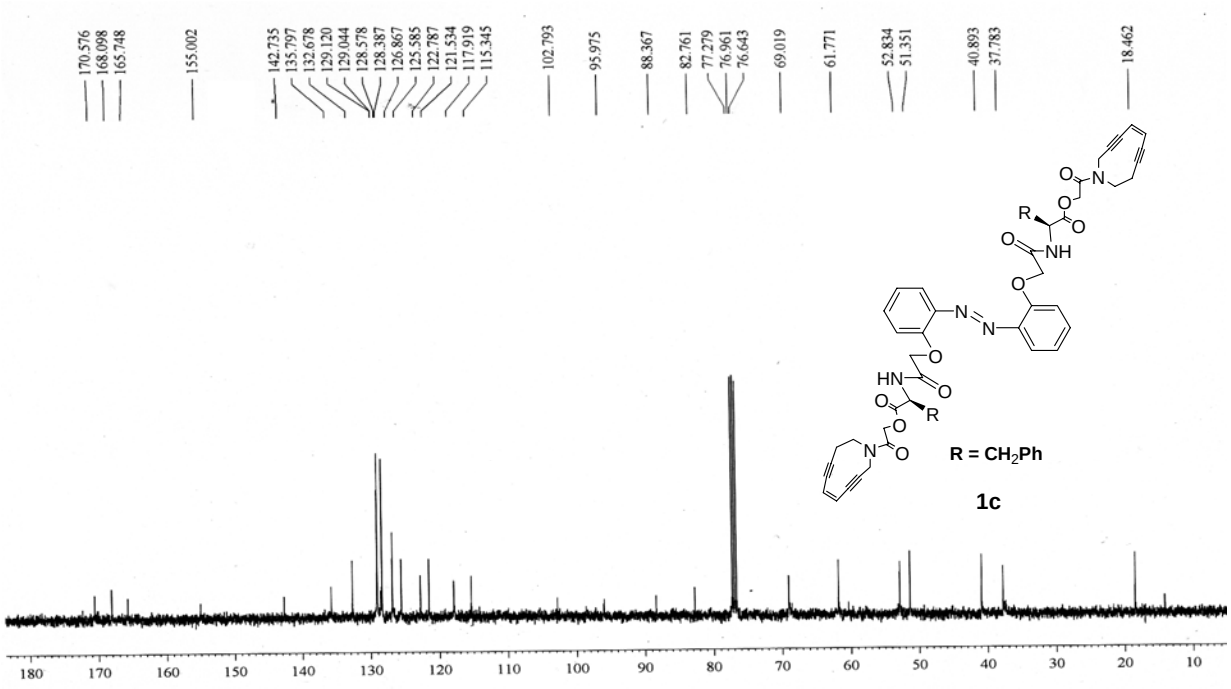

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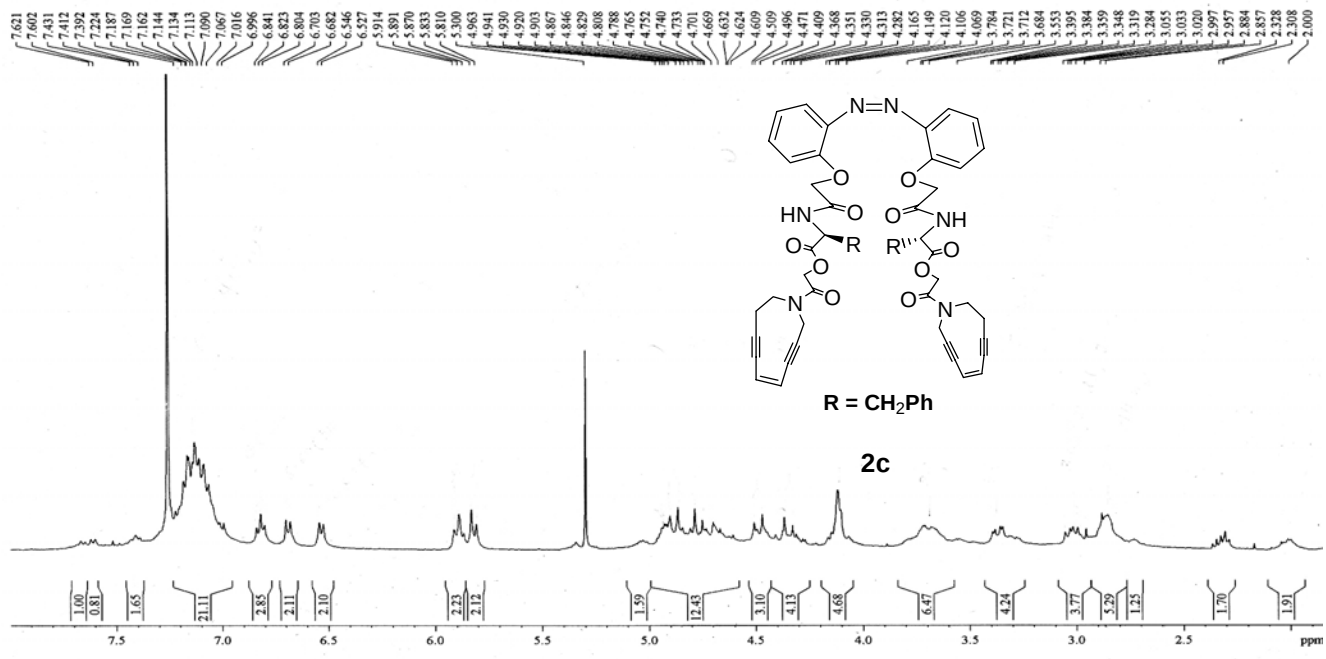

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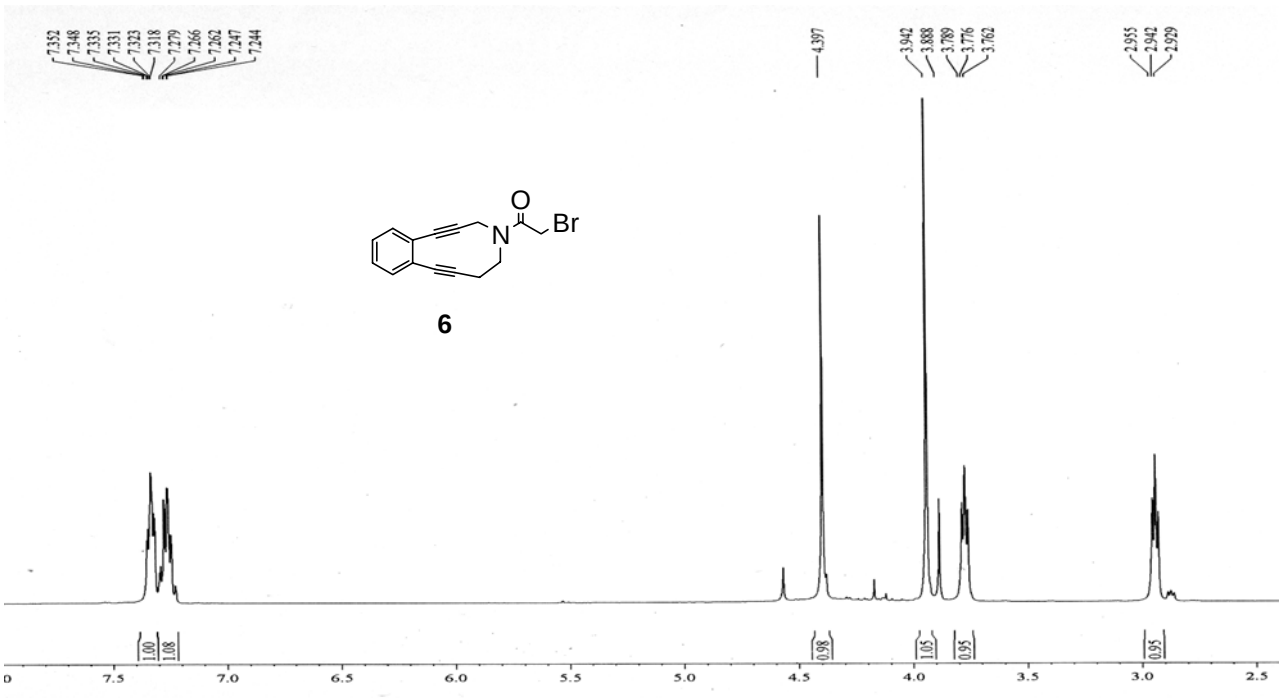

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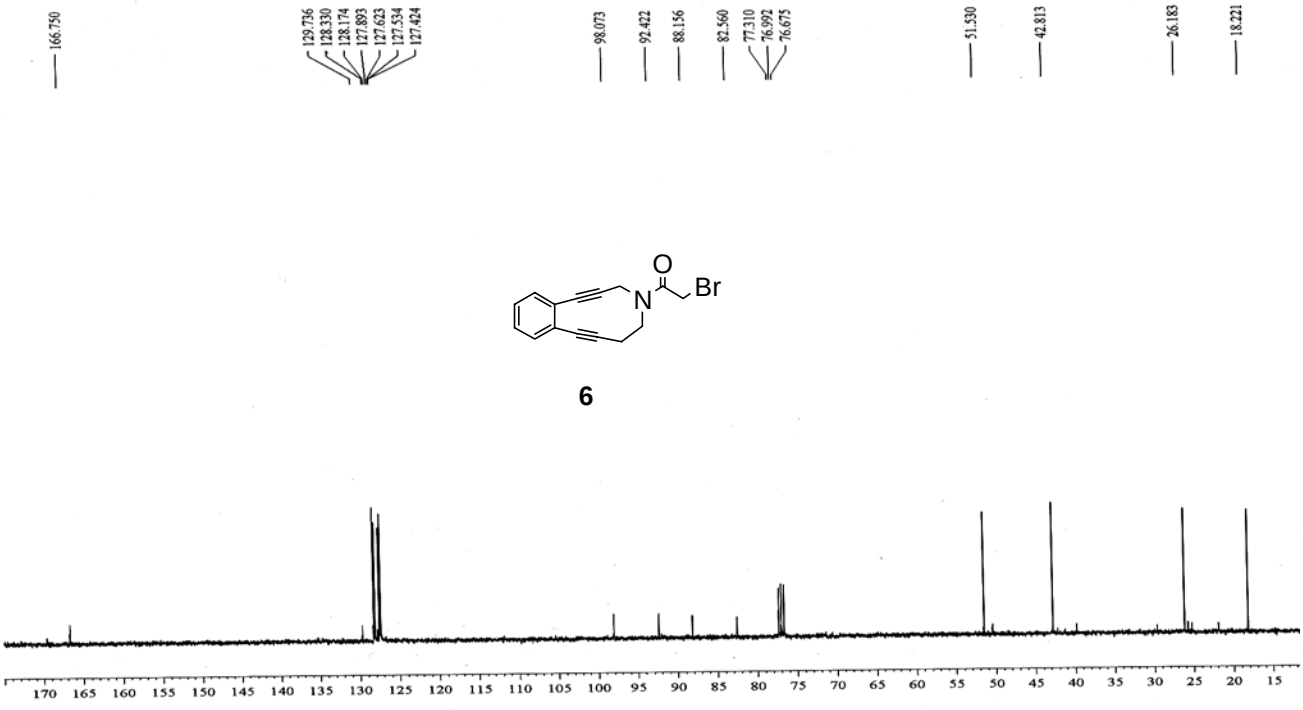

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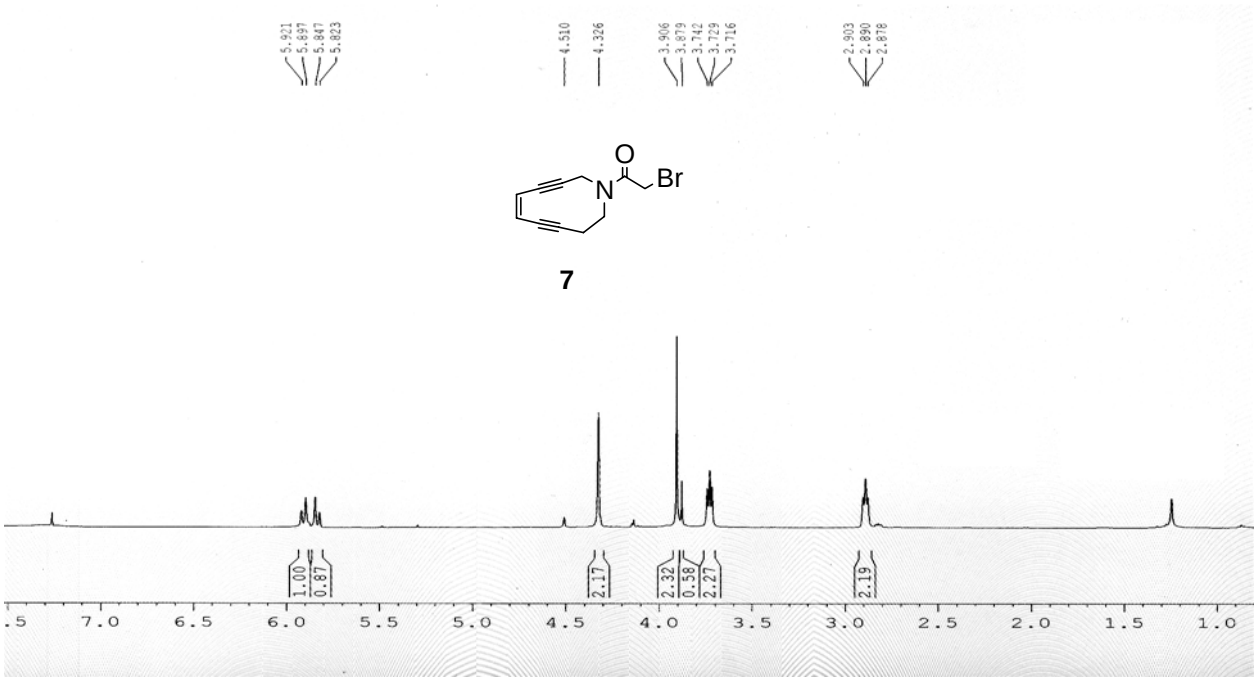

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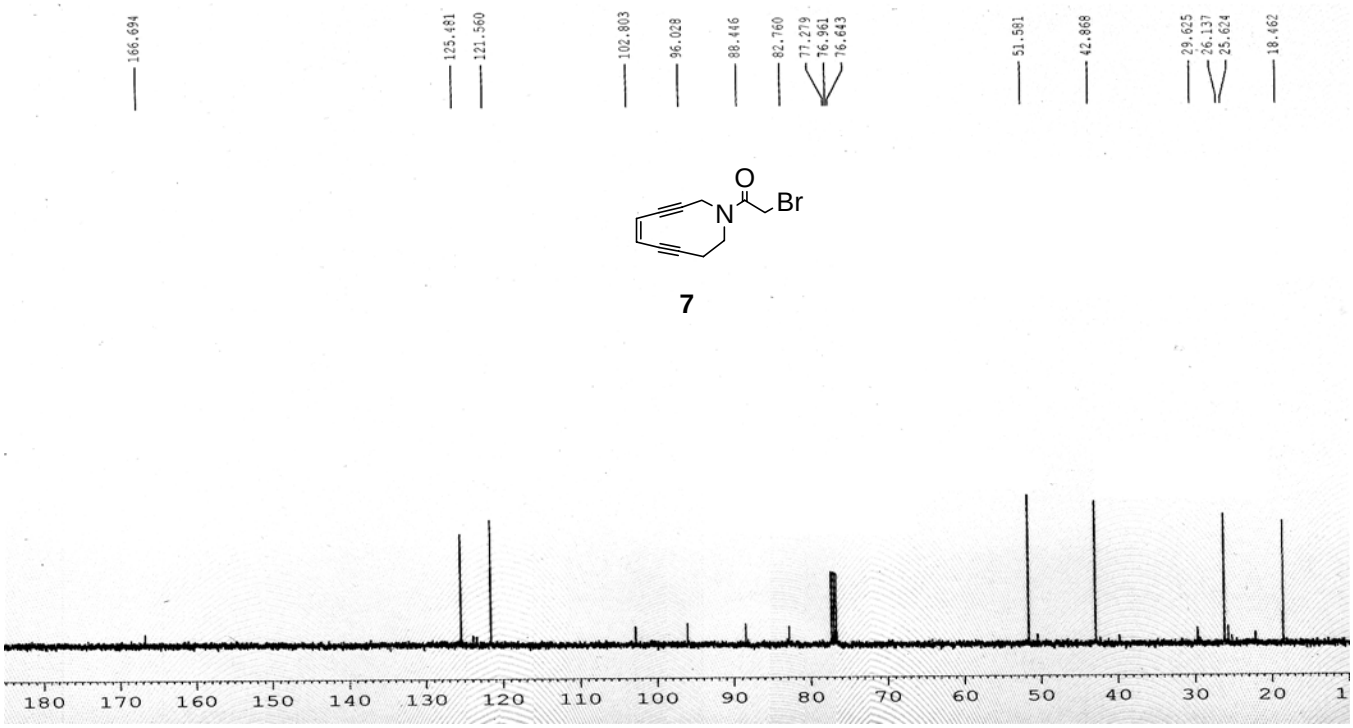

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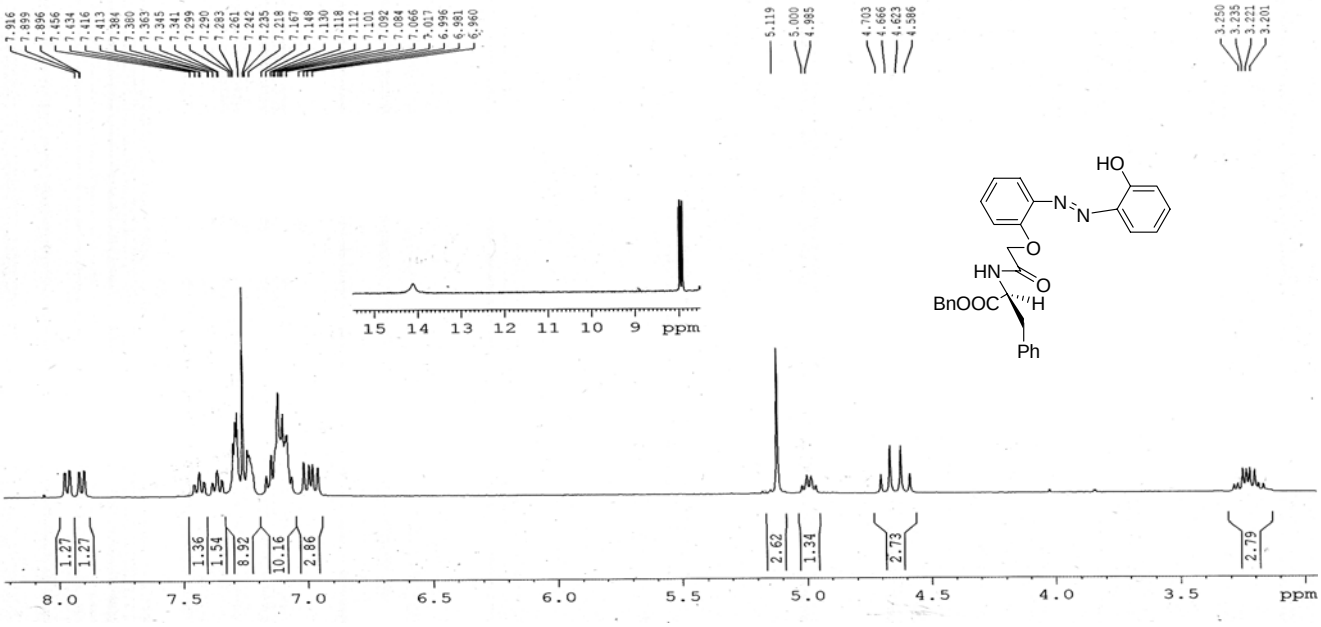

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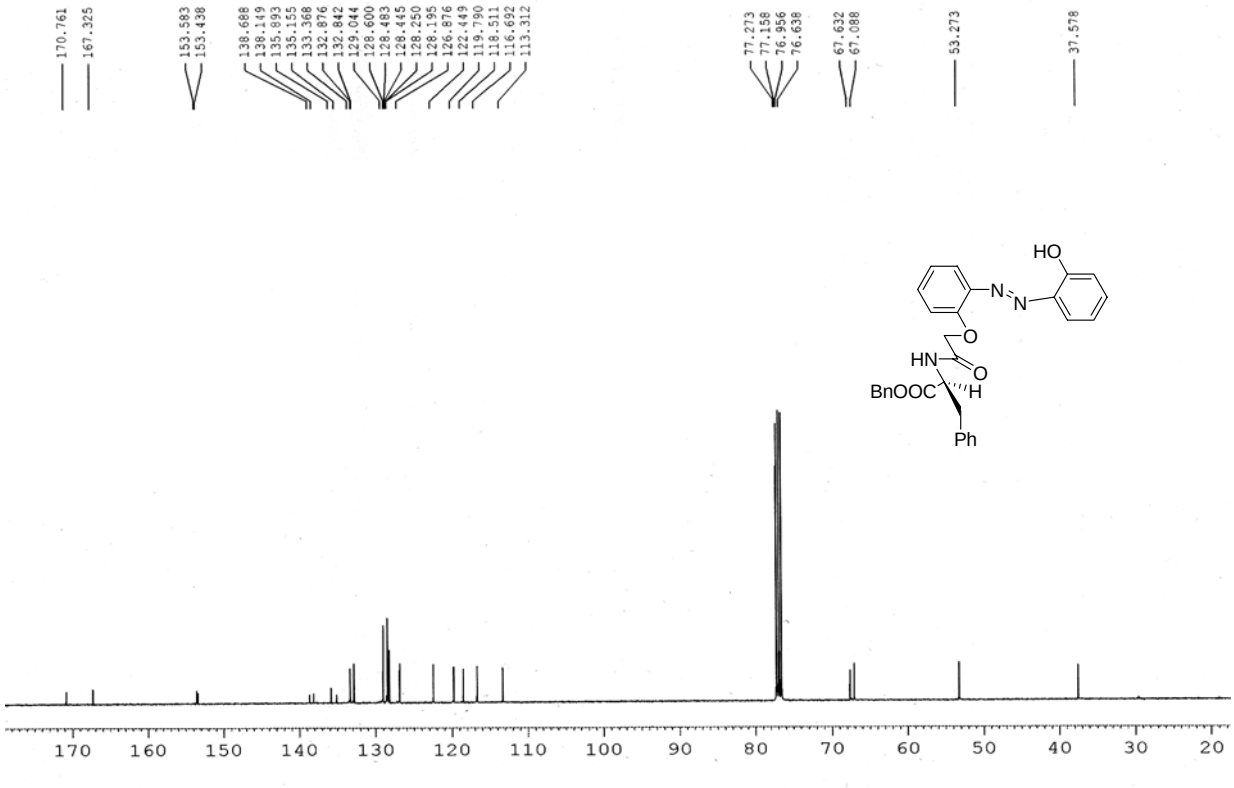

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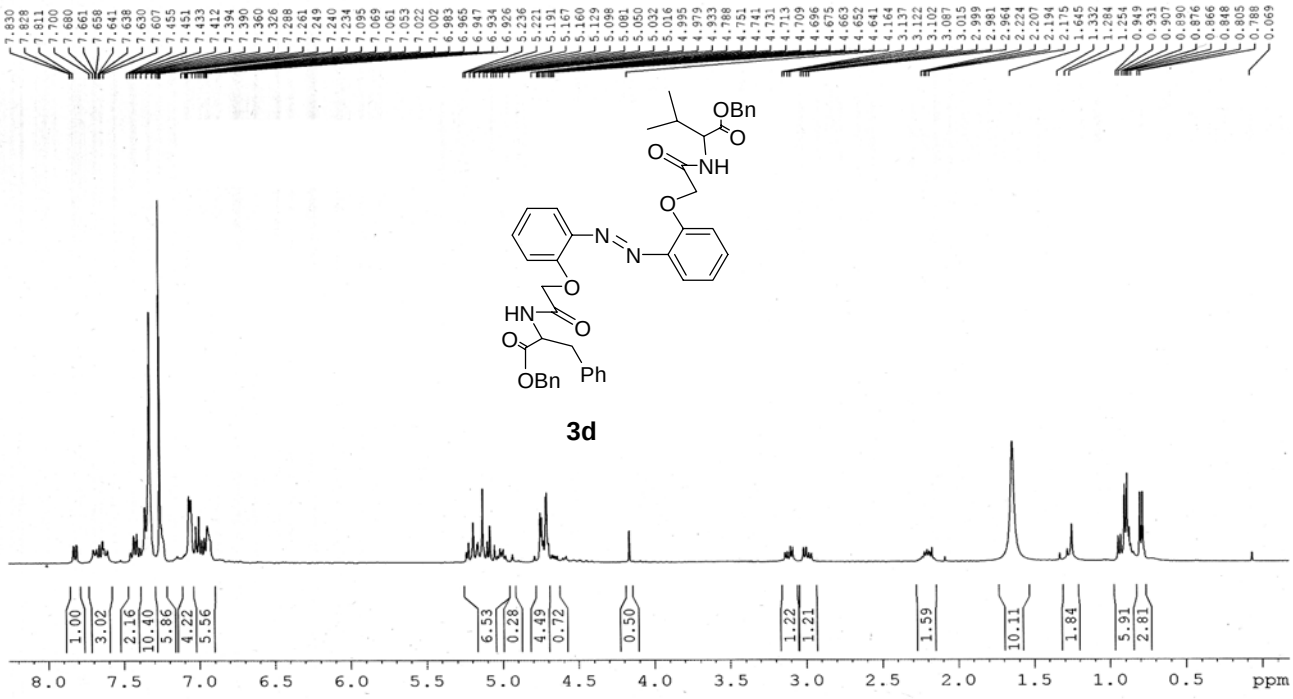

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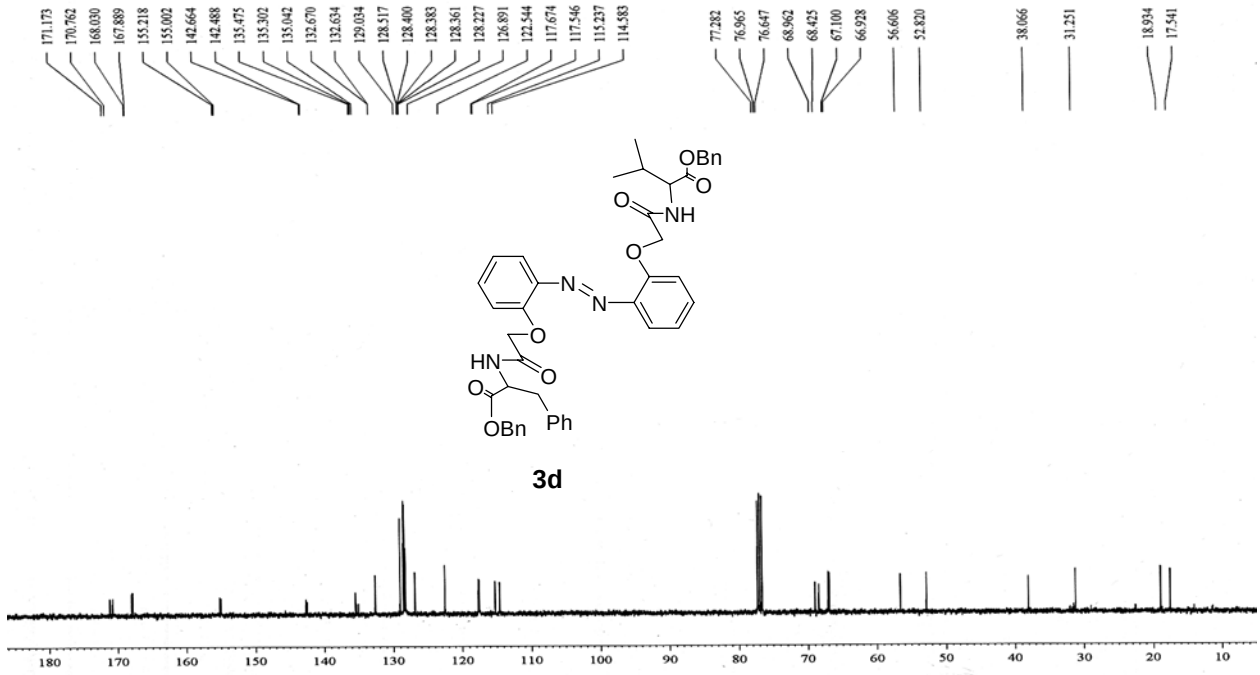

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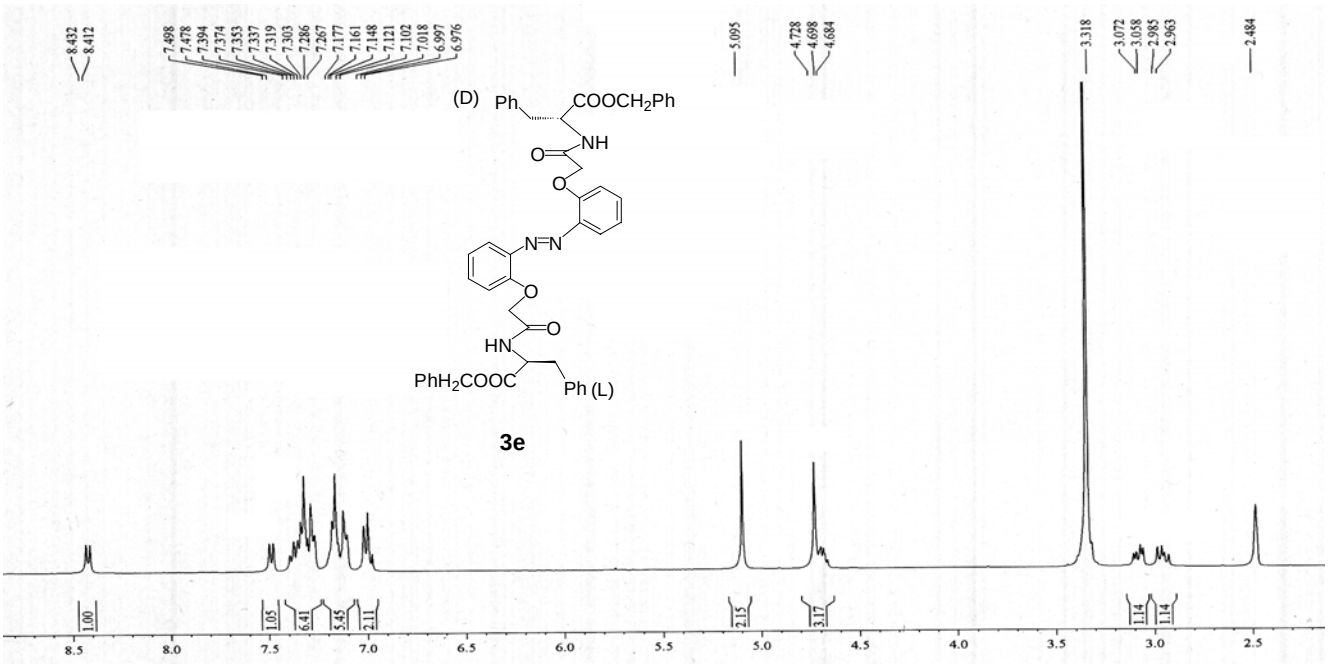

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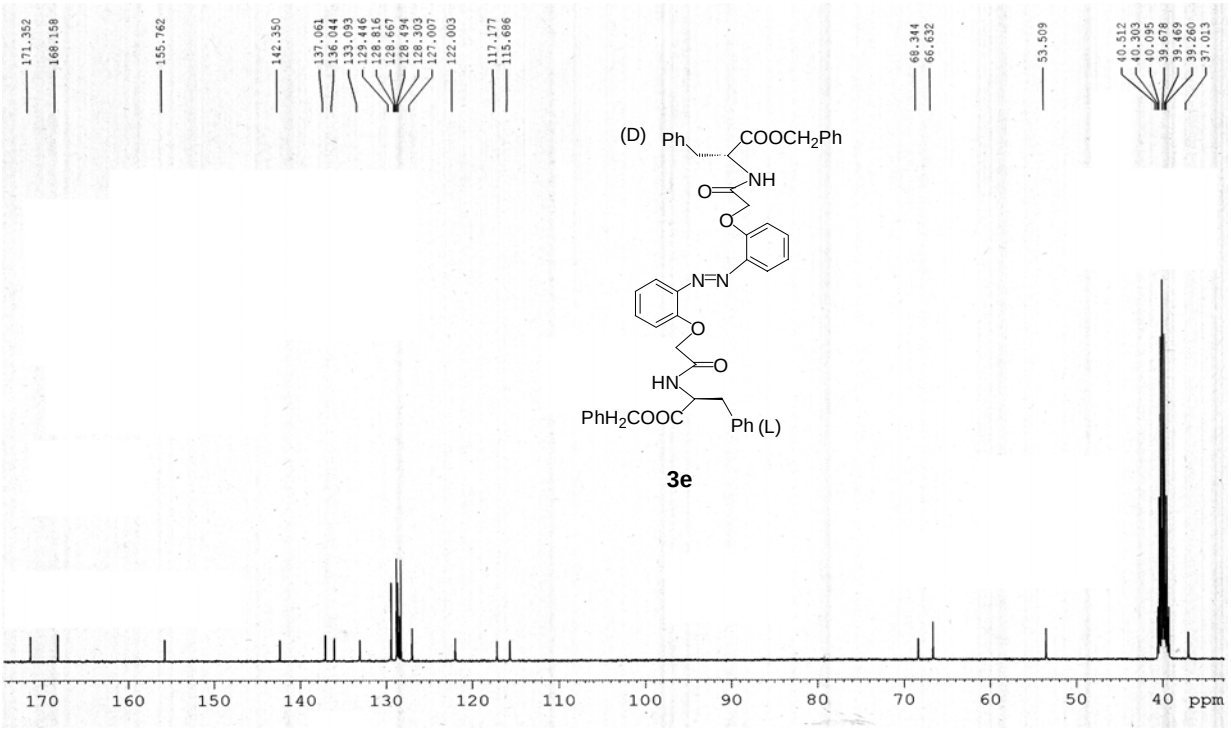

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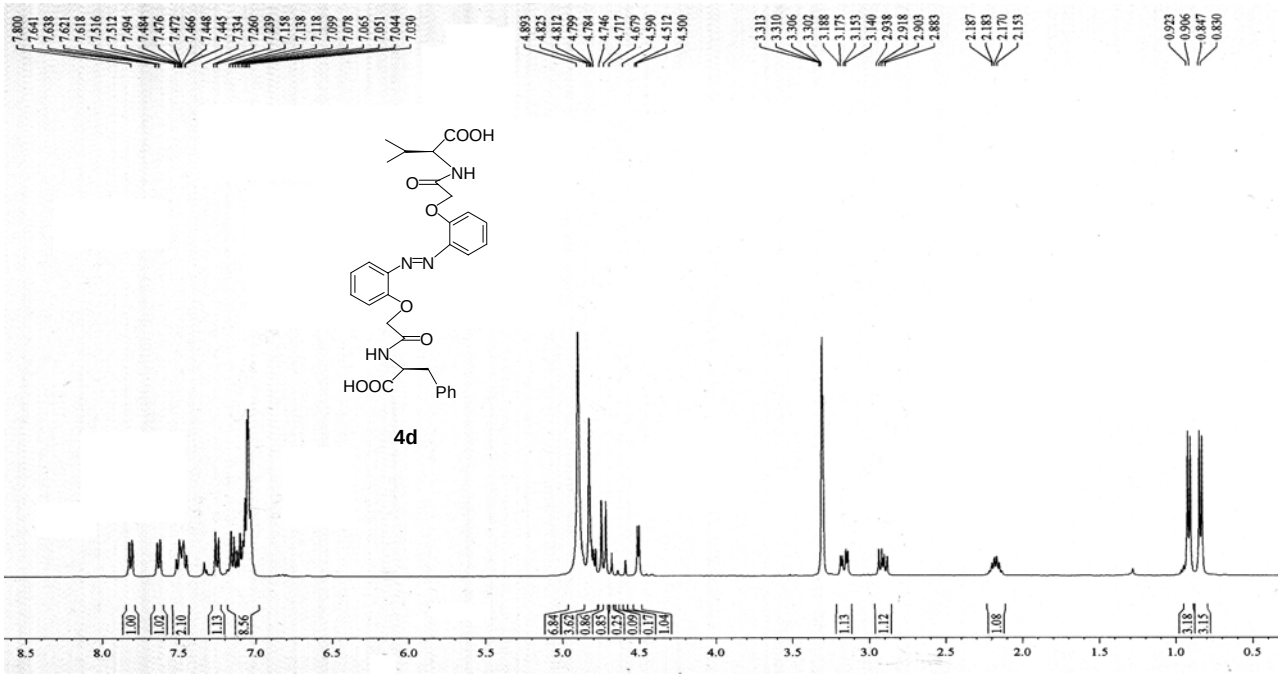

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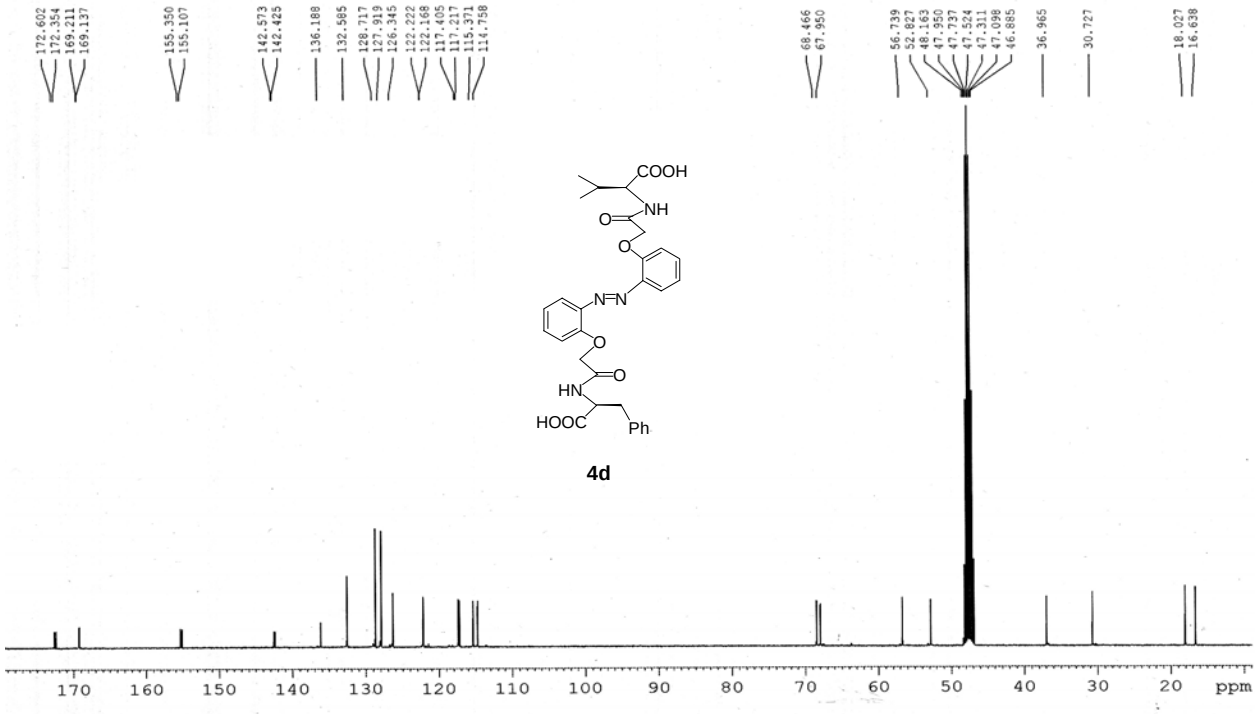

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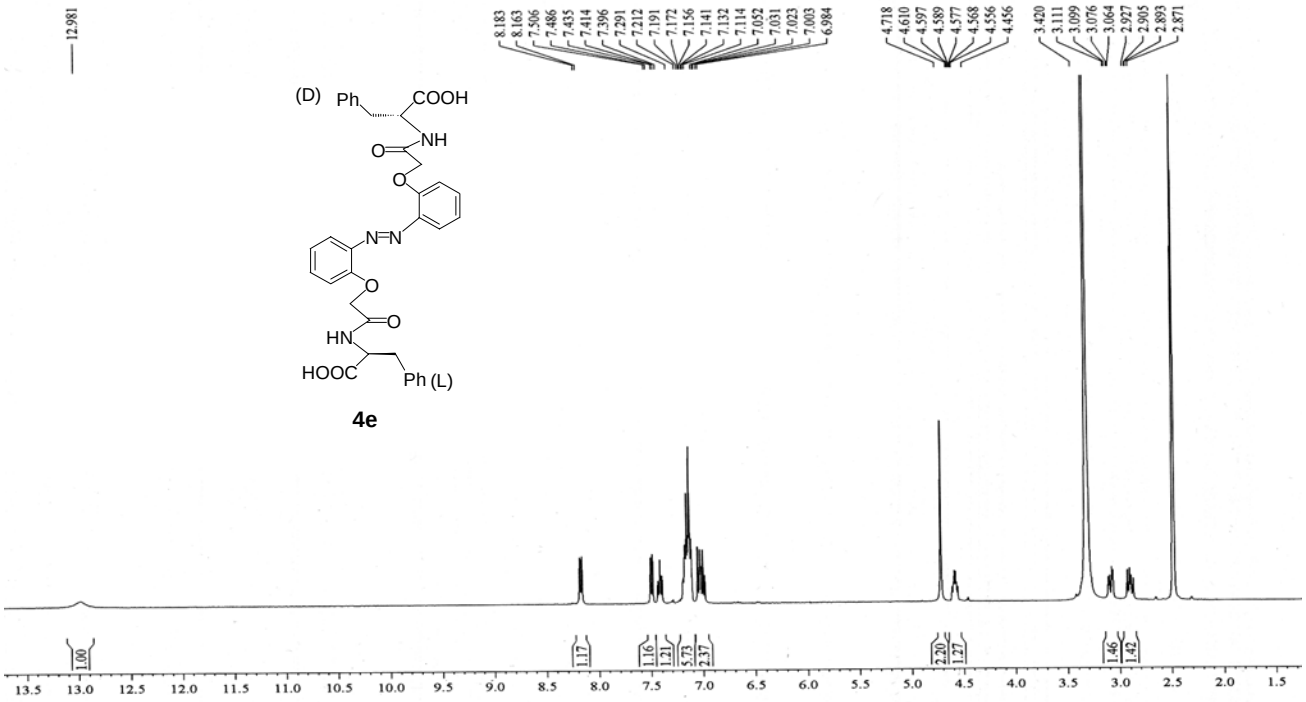

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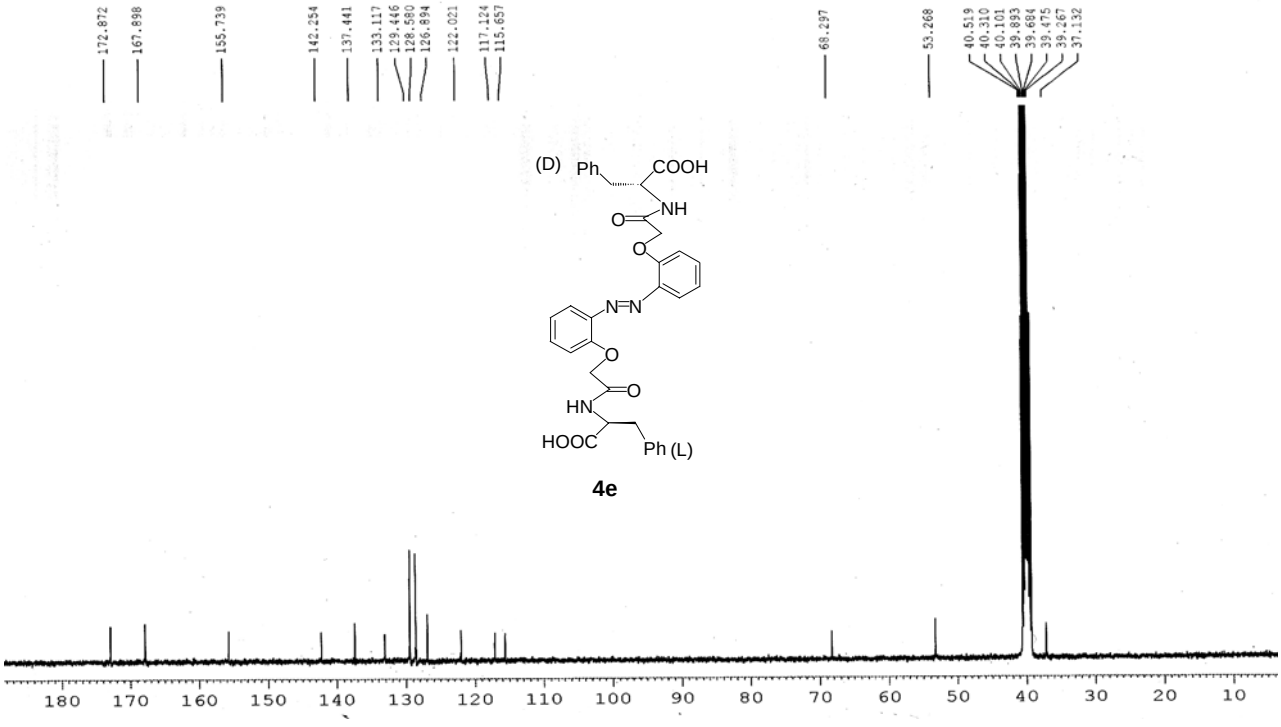

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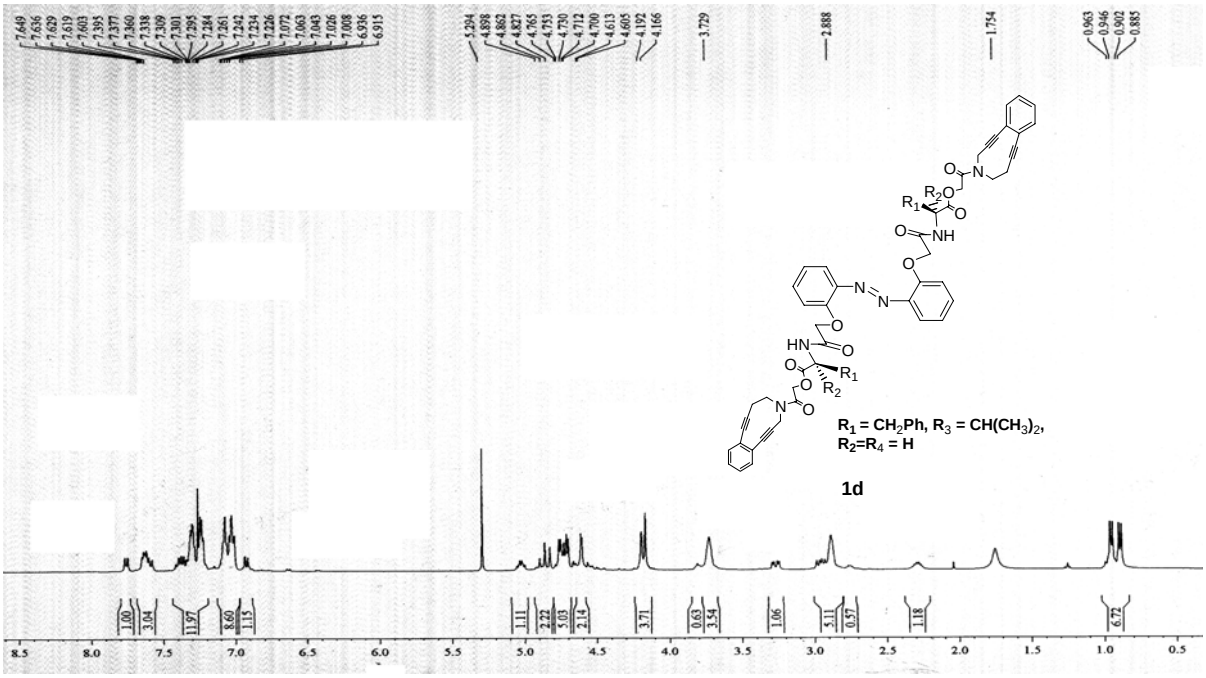

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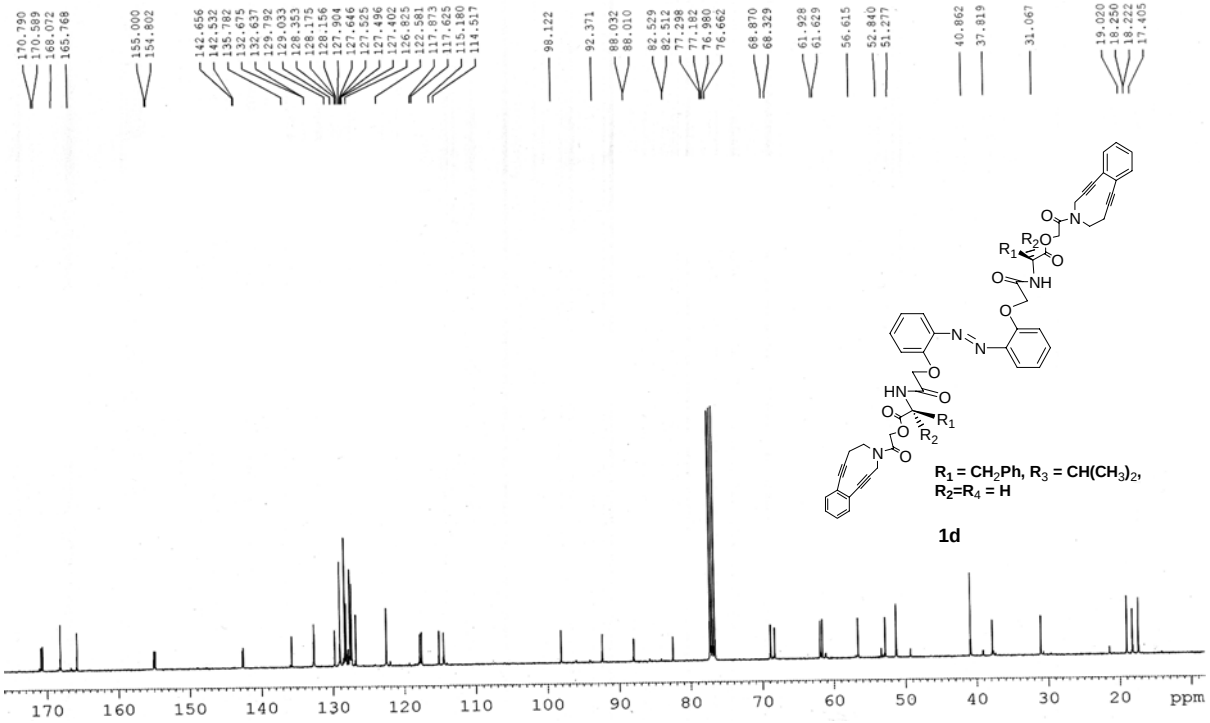

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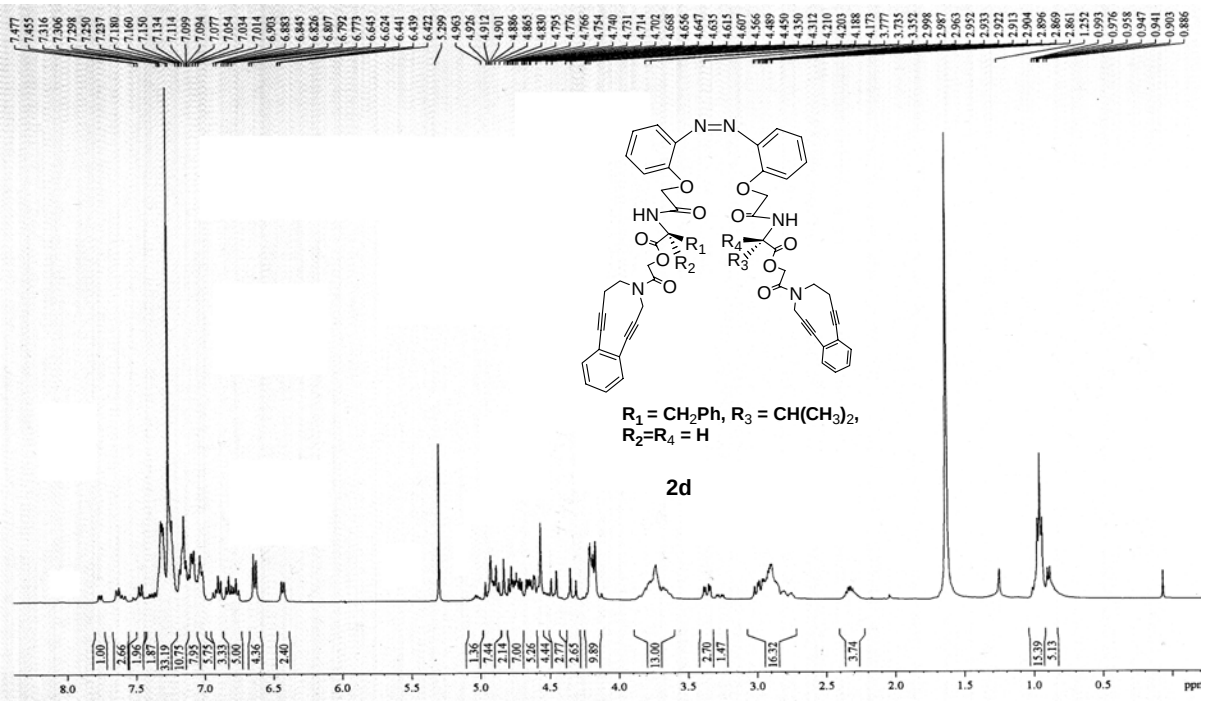

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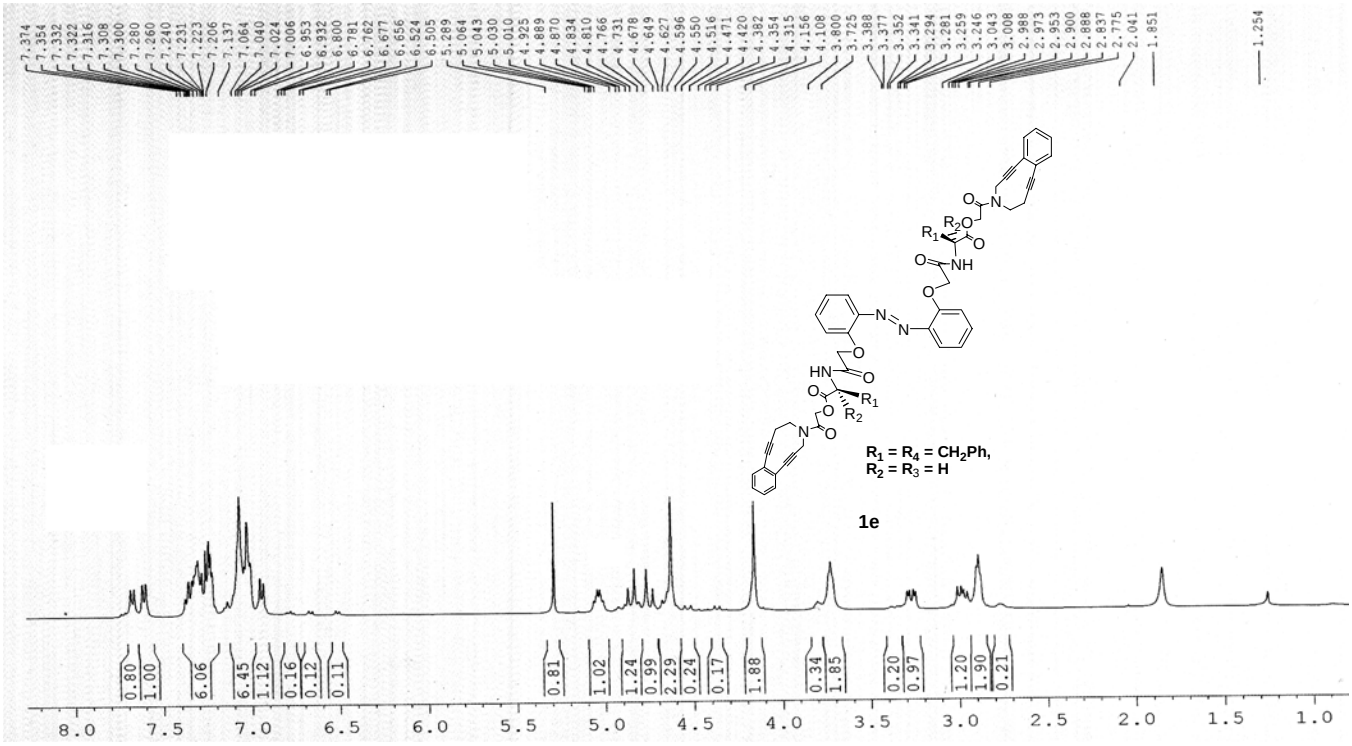

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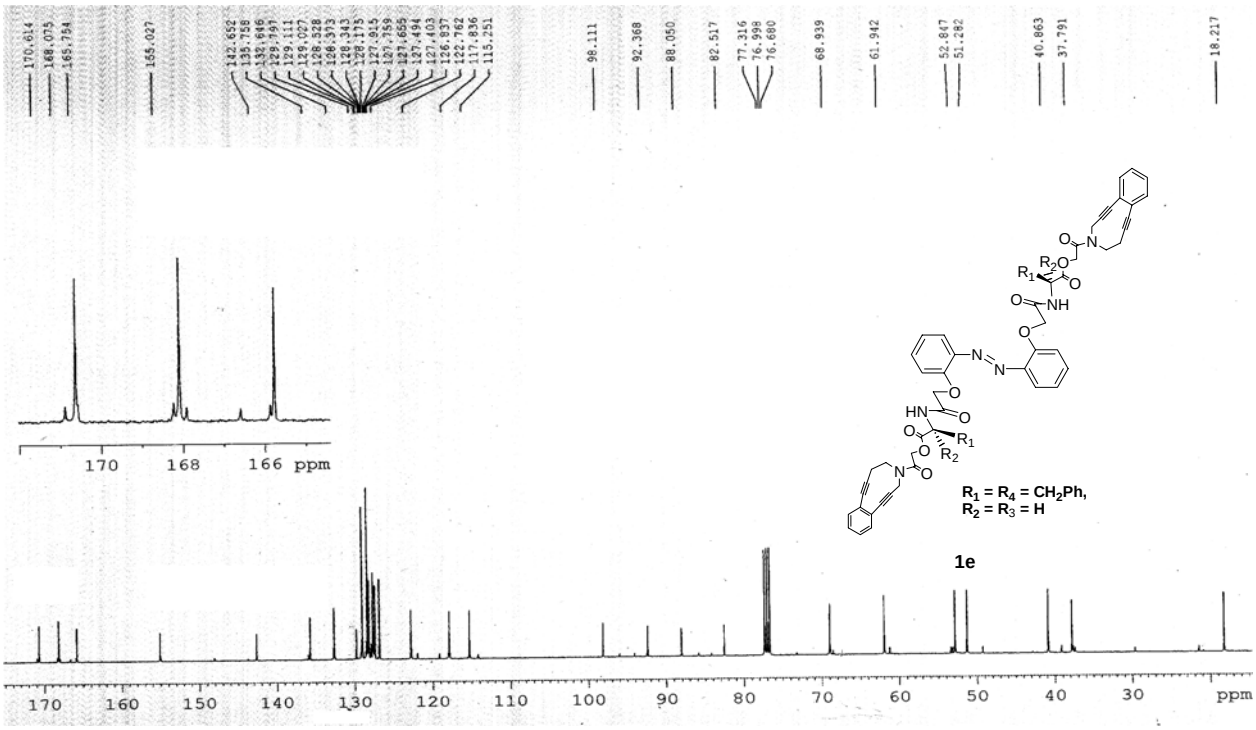
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77.316
76.998
76.680
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61.942
52.847
51.282
40.863
37.791
18.217
170
168
166 ppm
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
ppm
R1 = R4 = CH2Ph,
R2 = R3 = H
1e

Thermal Isomerization Kinetics of 10 at 20 ^{o}C

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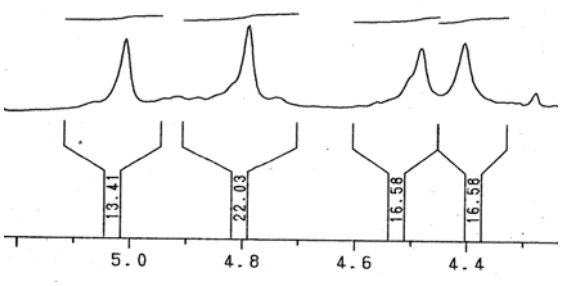

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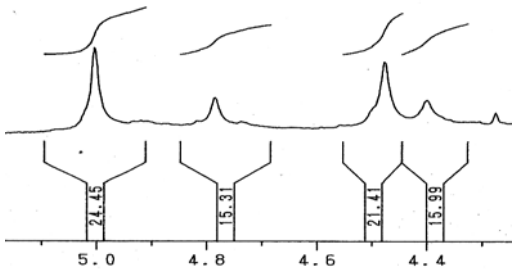

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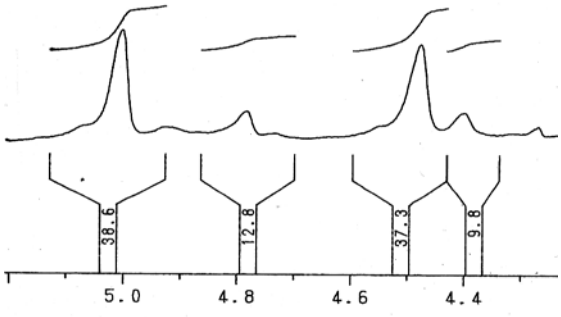

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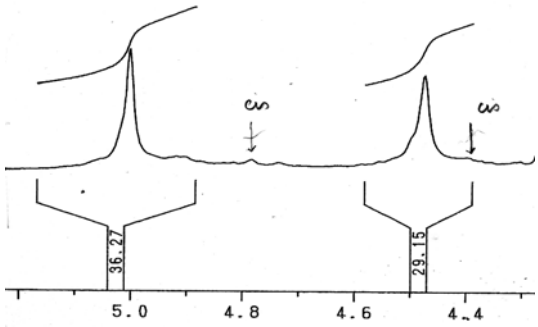

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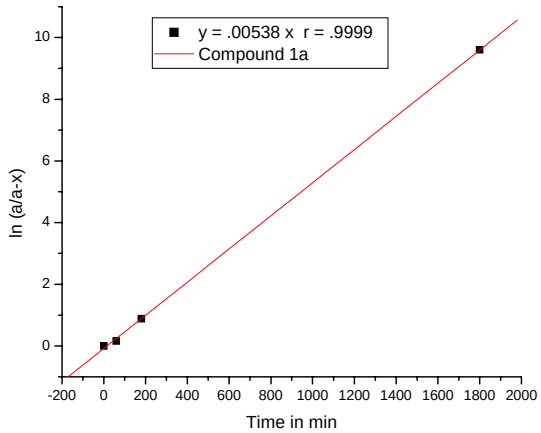

Figure S47a

Thermal Isomerization Kinetics of 2a at 20 ^{o}C

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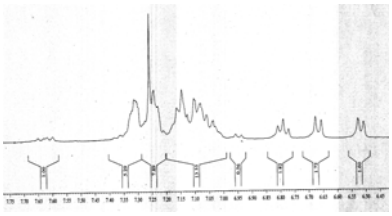

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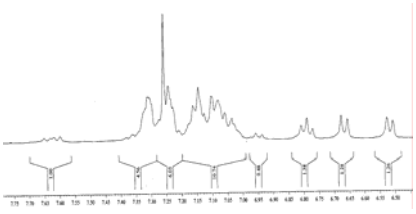

Figures S49

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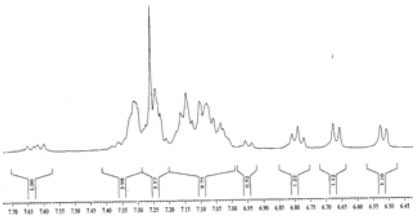

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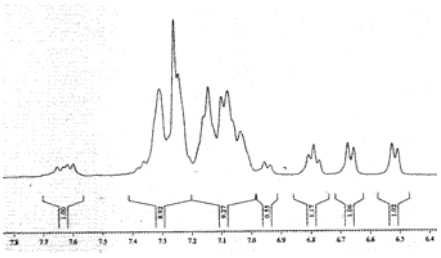

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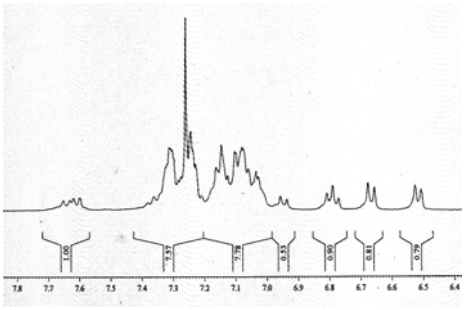

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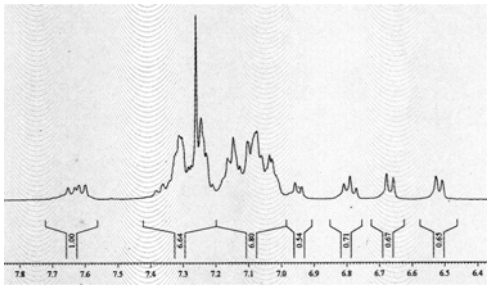

Figures S53

Thermal Isomerization Kinetics of 2b at 20 °C

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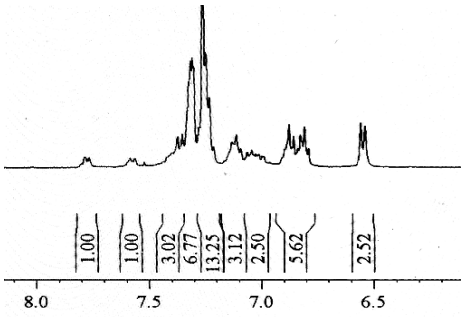

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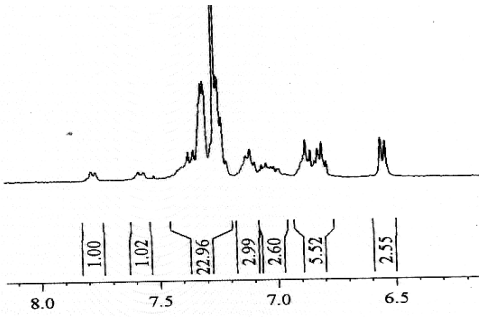
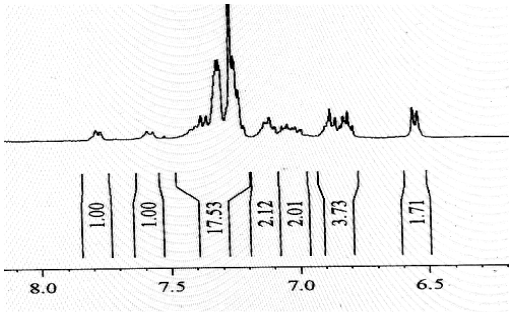
T = 50 min



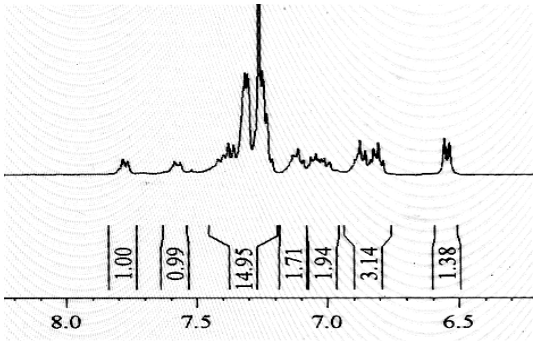
Figures S55

T = 180 min



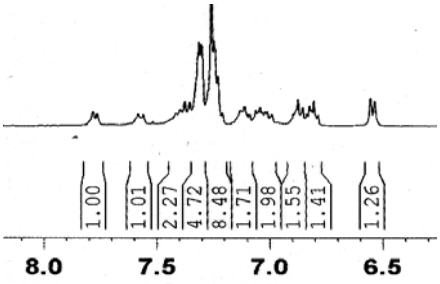
Figures S56

T = 300 min



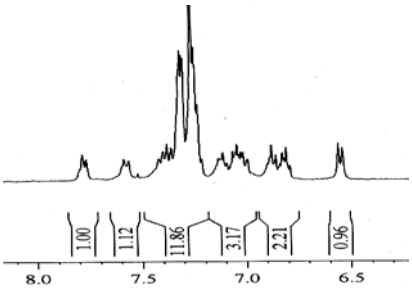
Figures S57

T = 450 min



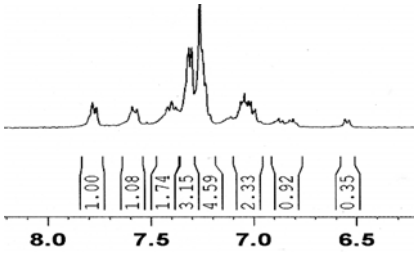
Figures S58

T = 550 min

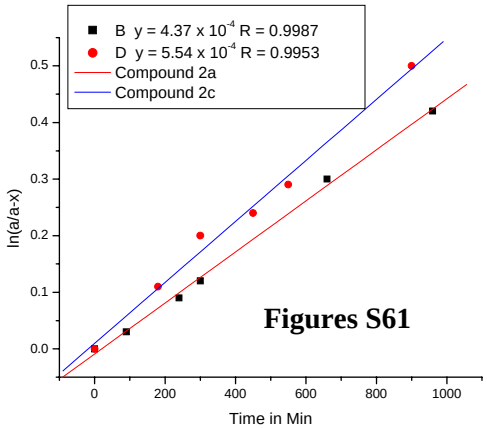


Figures S59

T = 900 min



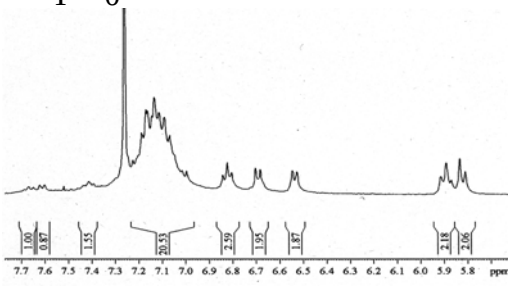
Figures S60



Figures S61

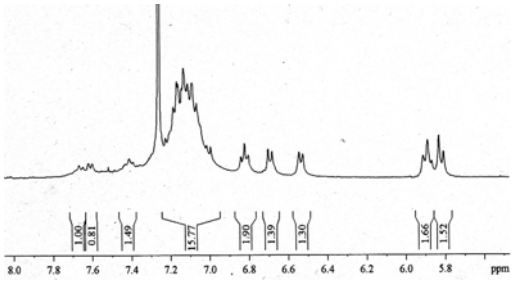
Thermal Isomerization Kinetics of 2c at 20 °C

T = 0



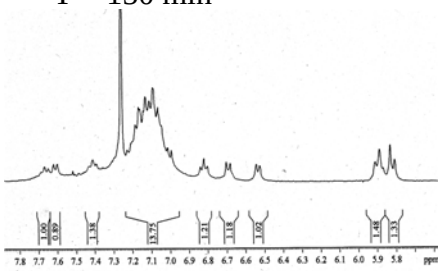
Figures S62

T = 45 min



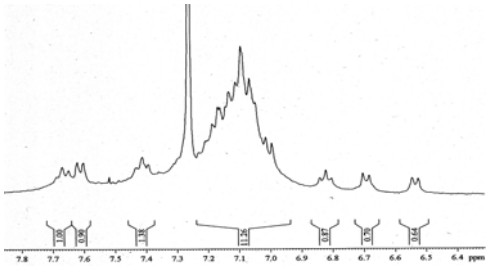
Figures S63

T = 150 min



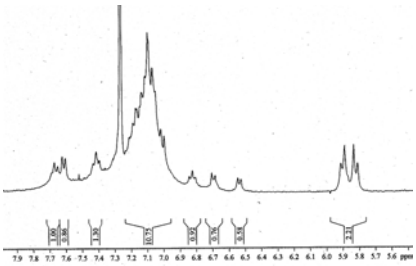
Figures S64

T = 290 min



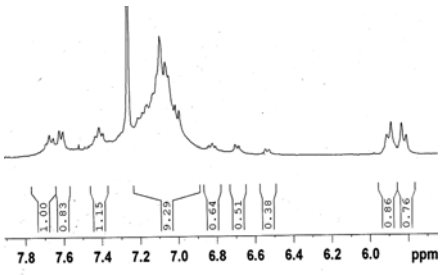
Figures S65

T = 350 min

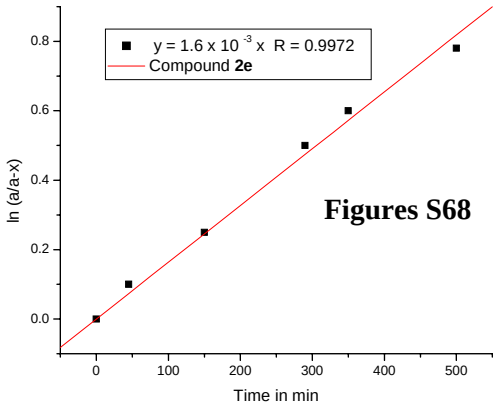


Figures S66

T = 500 min

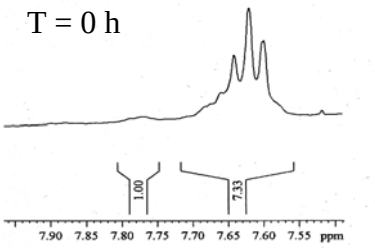


Figures S67

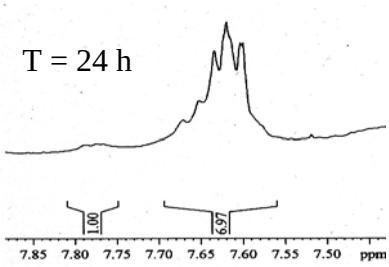


Figures S68

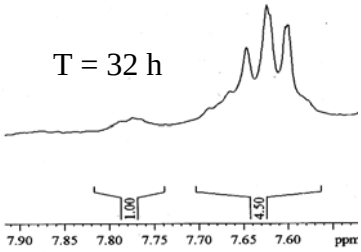
Bergman Cyclization Kinetics of 1a at 45 °C



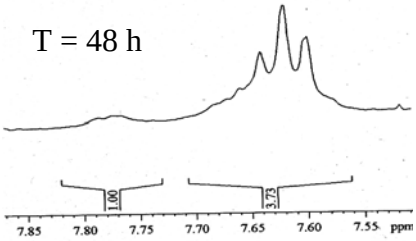
Figures S69



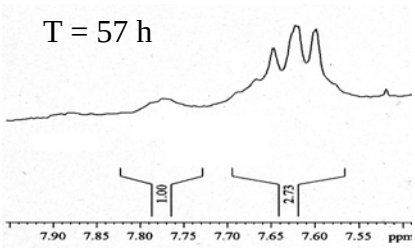
Figures S70



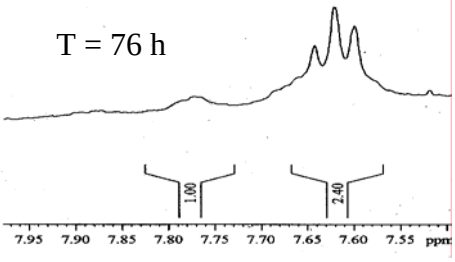
Figures S71



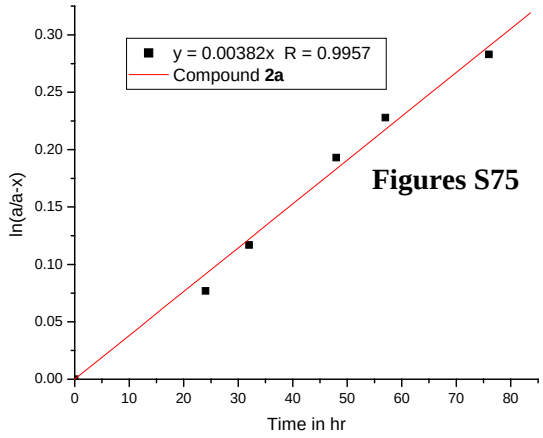
Figures S72



Figures S73



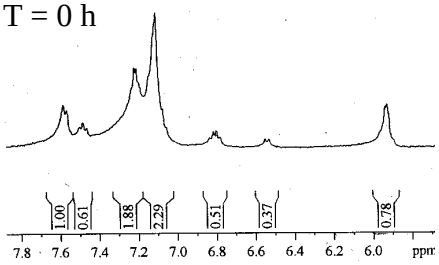
Figures S74



Figures S75

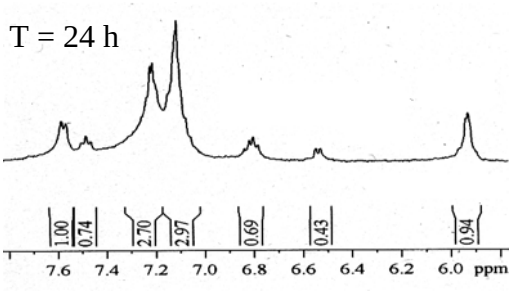
Bergman Cyclization Kinetics of aliphatic 1c at 30 °C

T = 0 h



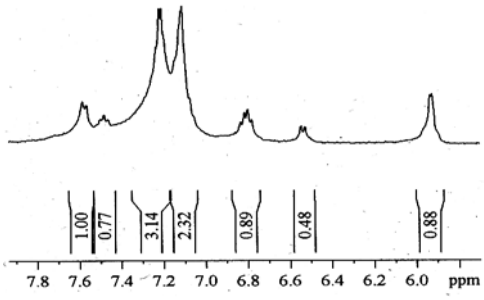
Figures S76

T = 24 h



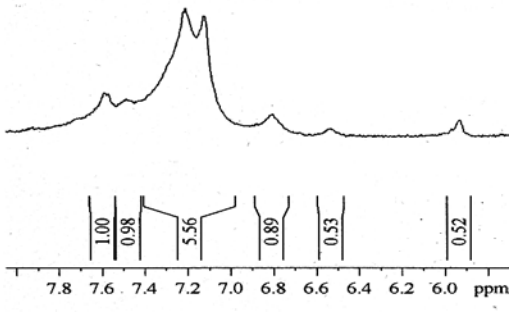
Figures S77

T = 30.5 h



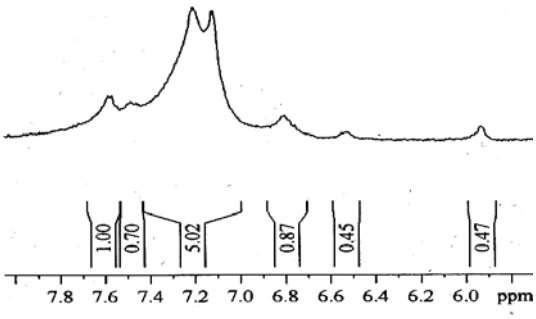
Figures S78

T = 34 h

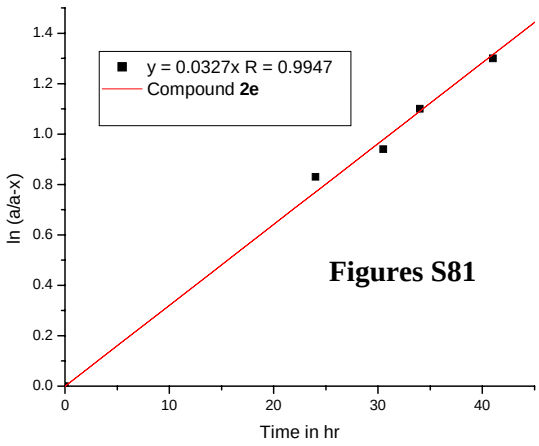


Figures S79

T = 41 h

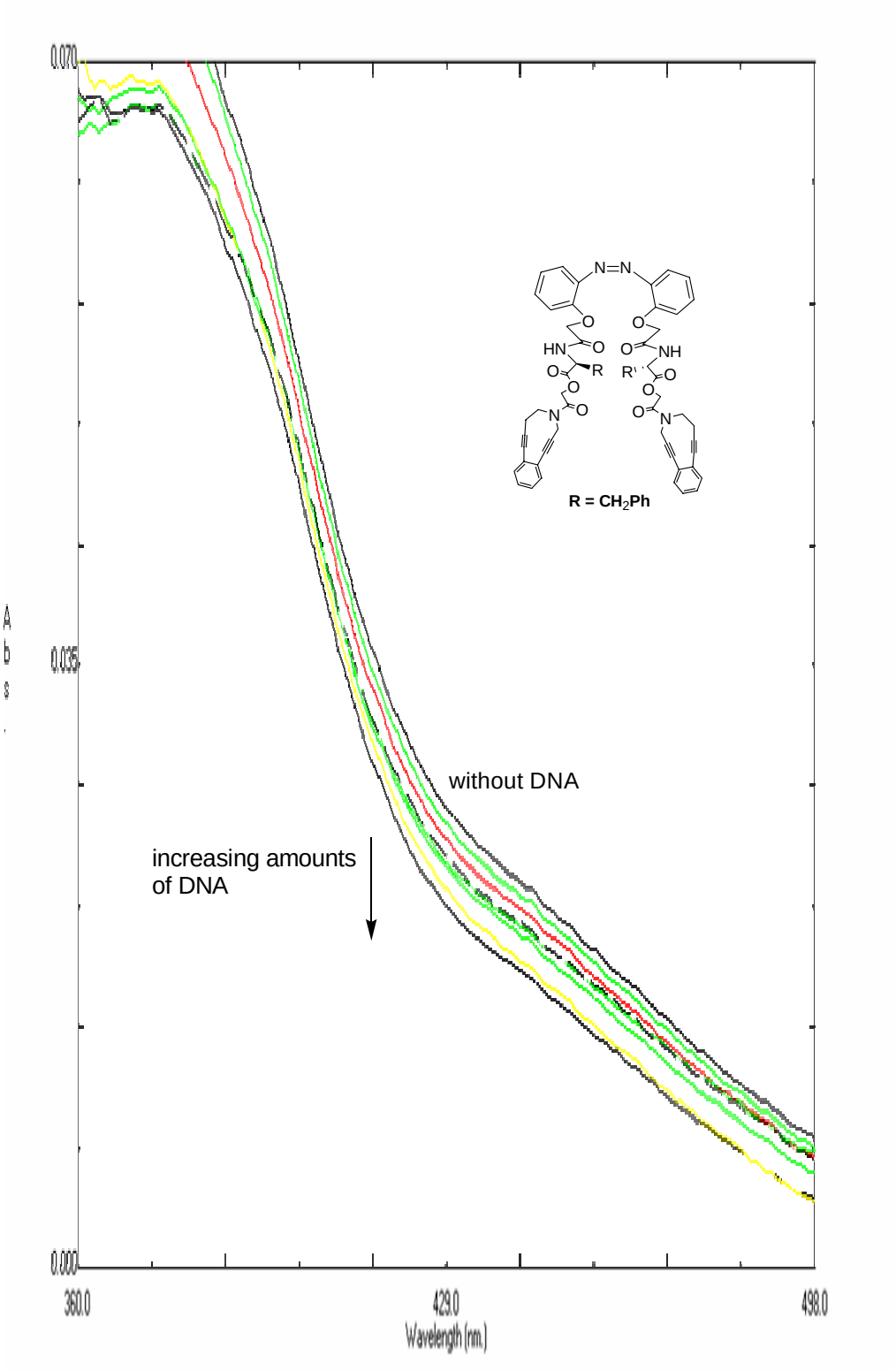


Figures S80



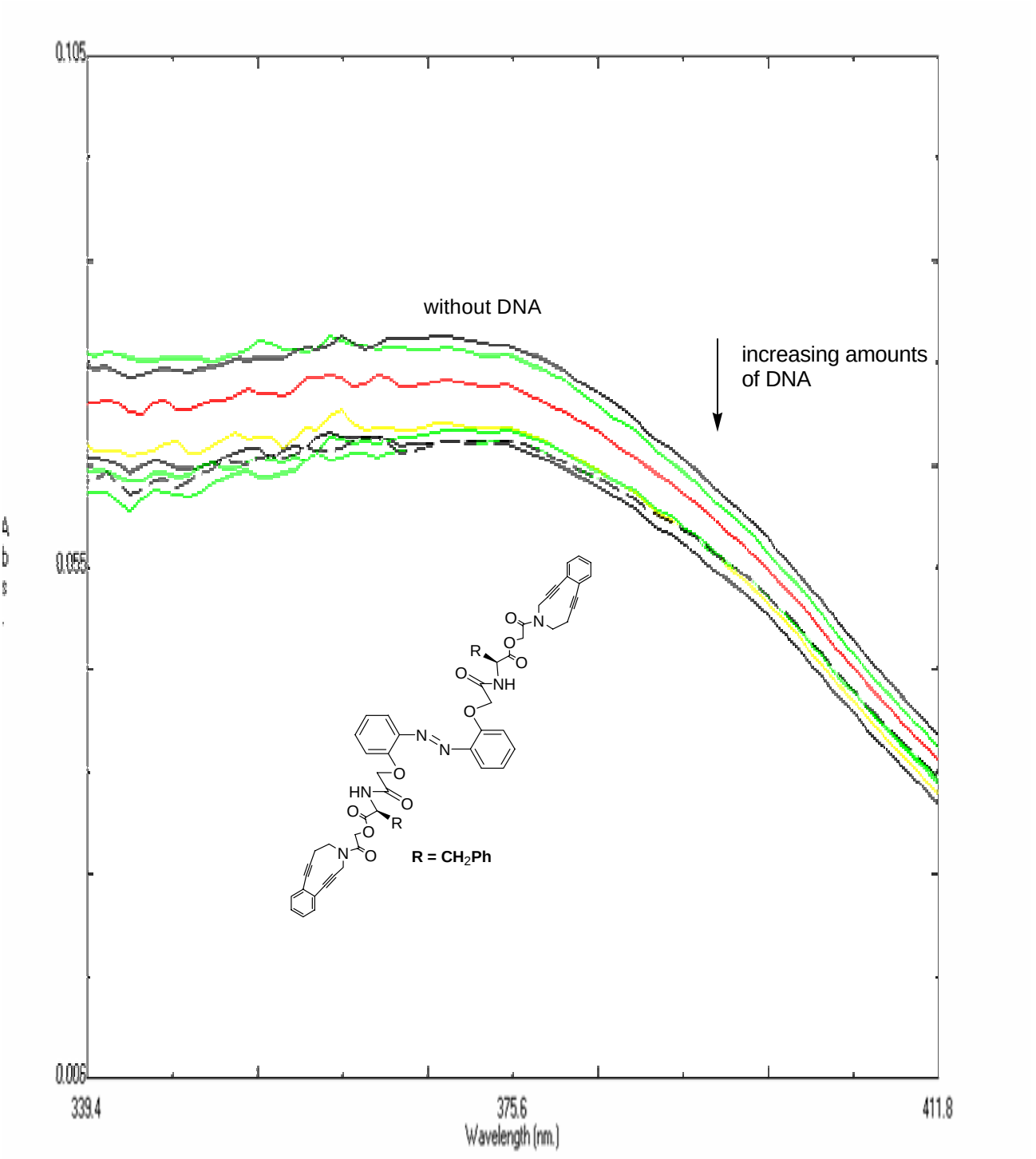
Figures S81

DNA binding study of compound 2a by UV



Figures S82

DNA binding study of compound 1a by UV



Figures 83

DNA-Binding Plots

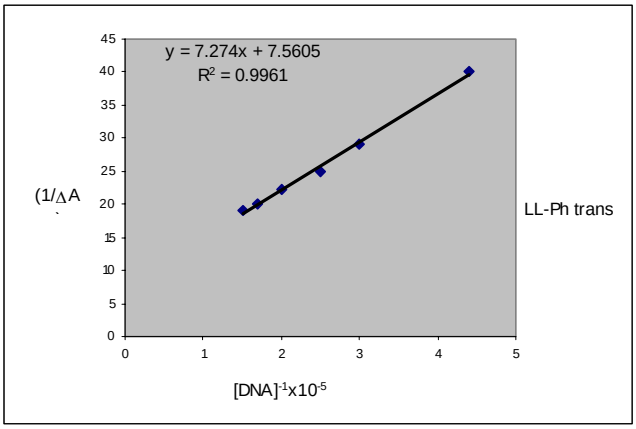


Figure S84: For 1a

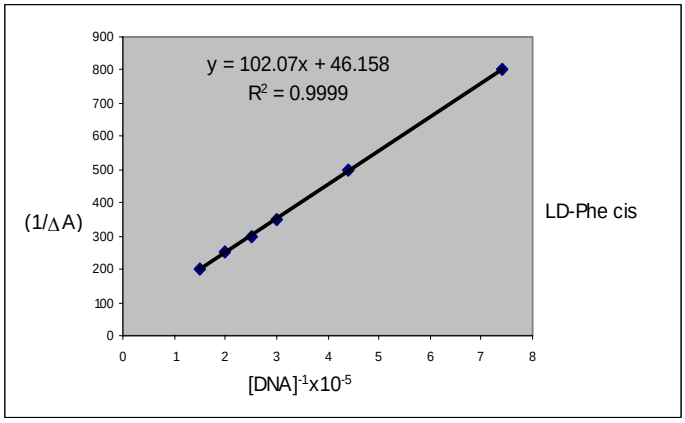


Figure S85: For 2a

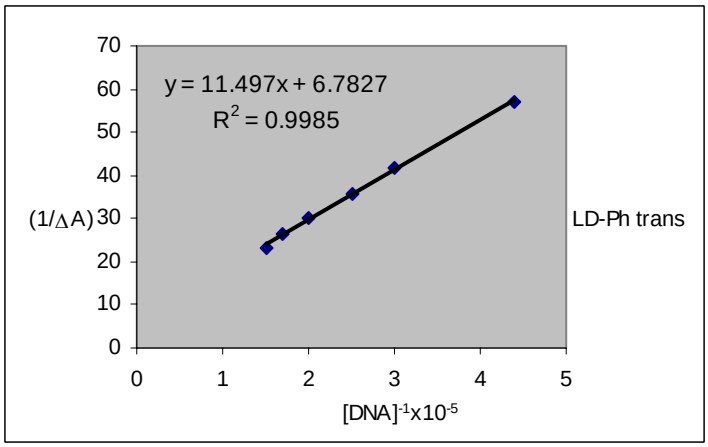


Figure S86:For 1e

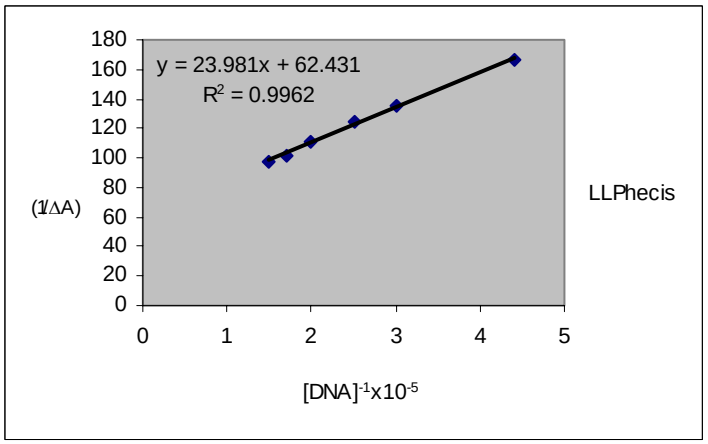


Figure S87: For 2e

DSC of enediynes 1a, 1b, 1c and 1e respectively

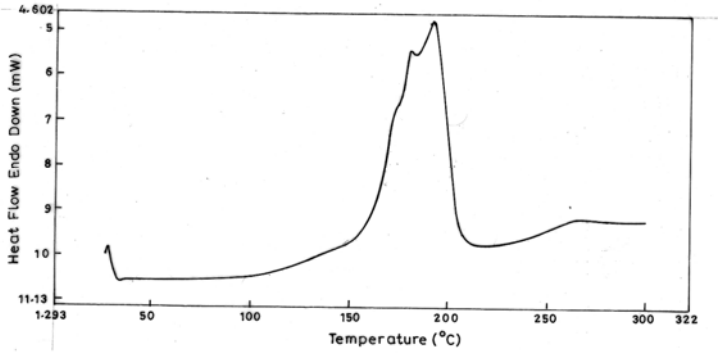


Figure S88

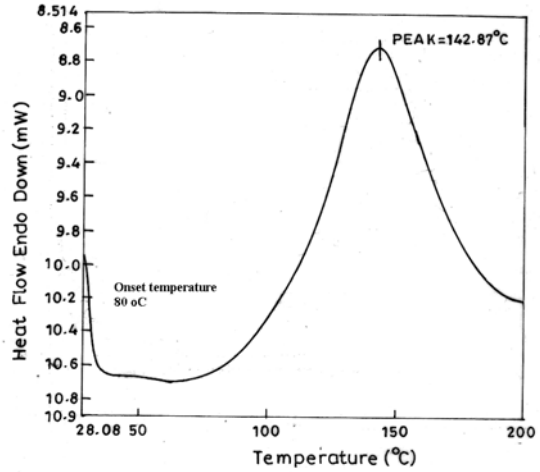


Figure S89

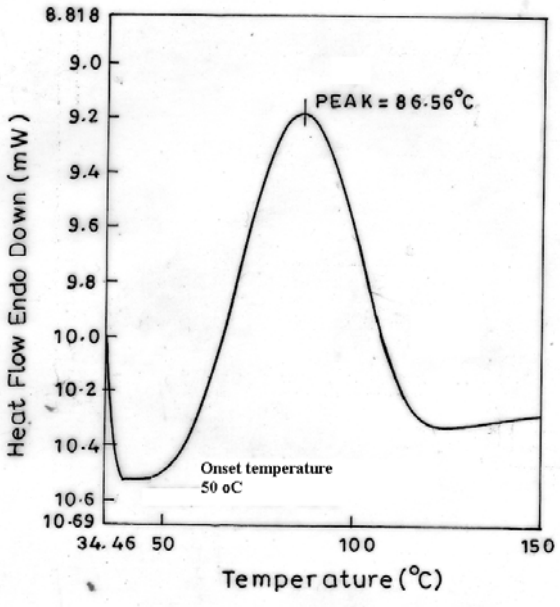


Figure S90

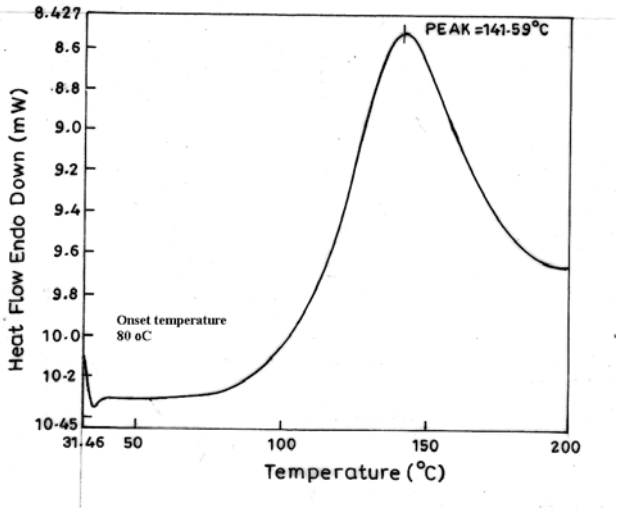
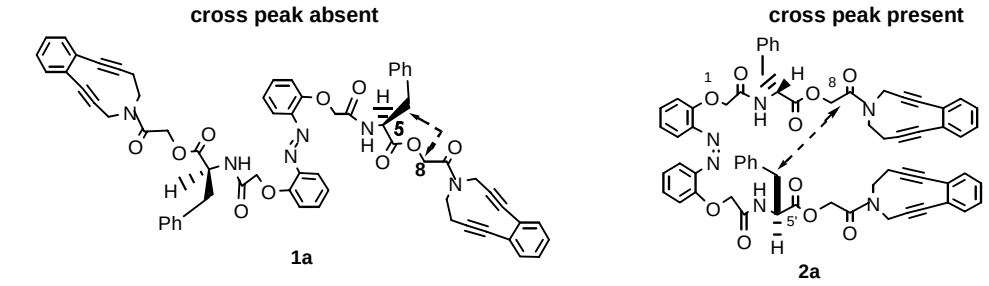


Figure S91



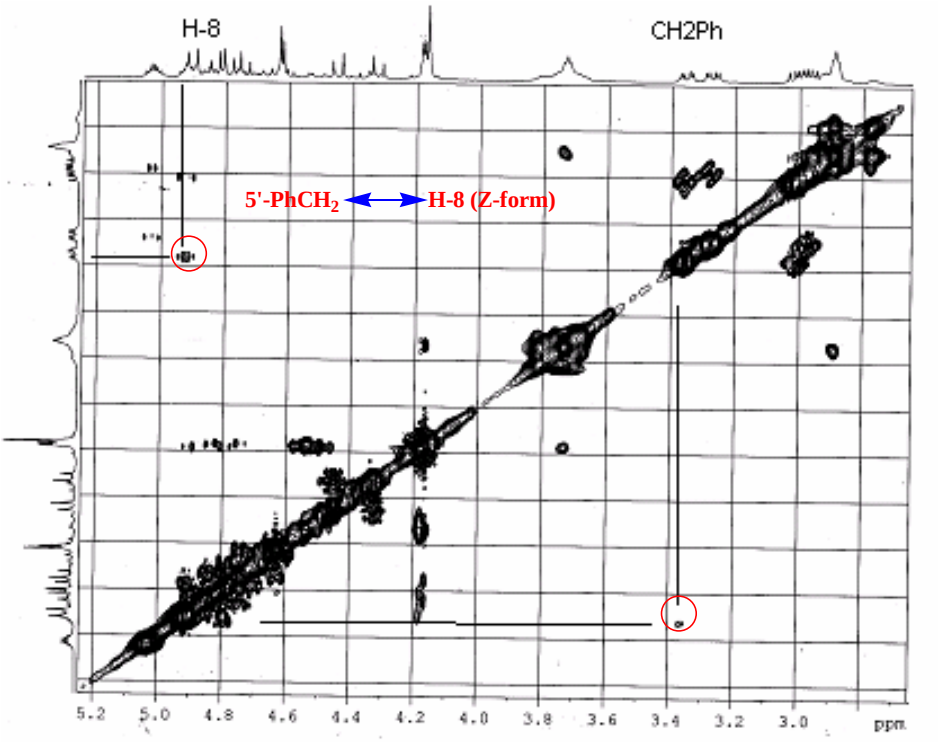


Figure S92: NOESY spectrum of enediynes **1a**/**2a**

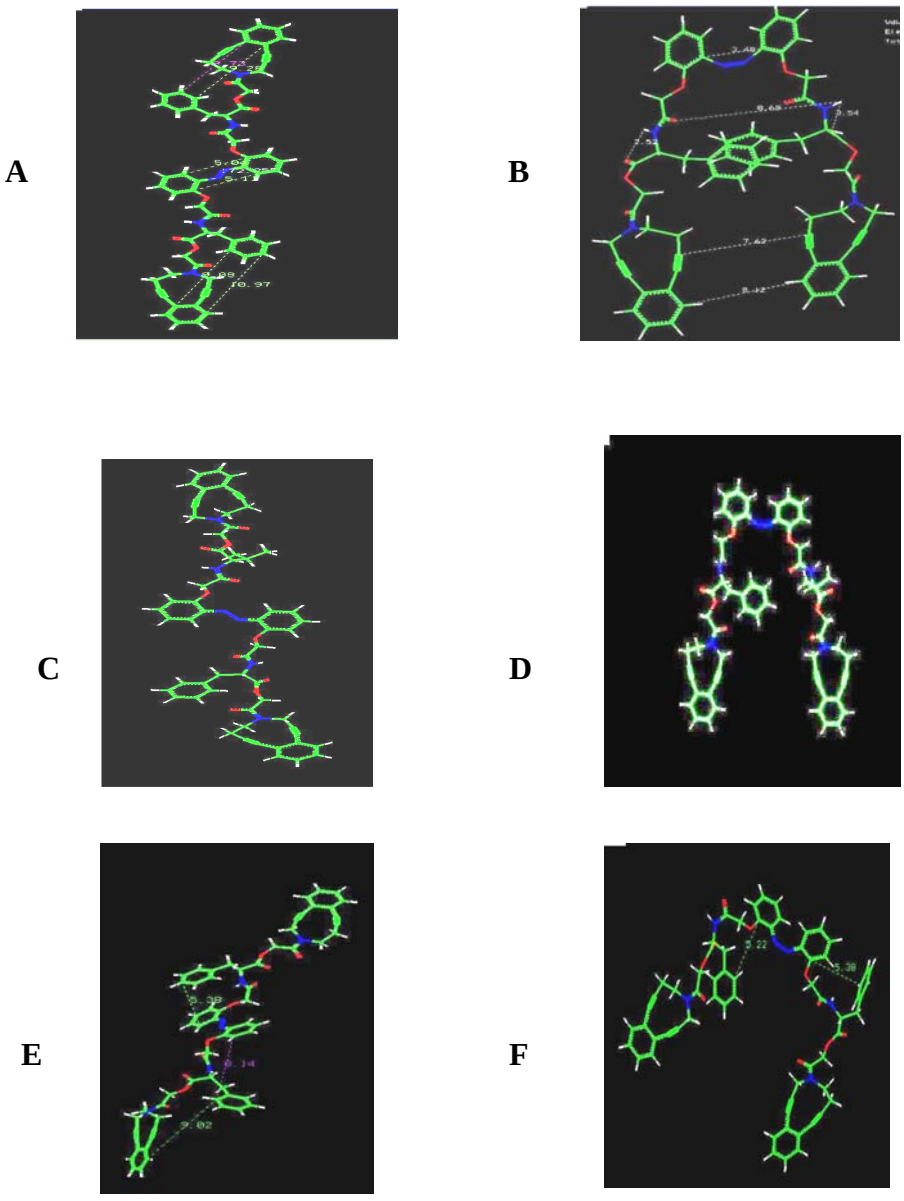


Figure S93: Energy minimized conformations of **1a (A)**, **2a (B)**, **1d (C)/ 2d (D),** and **1e (E)/2e (F)**

Gel Documentation

The gel documentation was carried with UVP-GELDOC, Cambridge UK. The cleavage efficiency was measured by densitometry using image processing software (Kodak 1D version V.3.6.3).

Energy Minimization

The energy minimizations were carried out in Silicon Graphics using PDB coordinates from the Dundee PRODRG 2.5 Server (beta).

Selected spectral data

For compound **1a**: δ_H (400 MHz, $CDCl_3$) 7.55 (dd, *J* = 8.4 Hz, 15.6 Hz, 2 x 2H), 7.29-7.16 (m, 12H), 6.99-6.94 (m, 10H), 6.86 (d, *J* = 8 Hz, 2H), 4.95 (m, 2H), 4.76 (d, *J* = 13.6 Hz, 2H), 4.66 (d, *J* = 13.6 Hz, 2H), 4.54 (s, 4H), 4.05 (s, 4H), 3.64 (bs, 4H), 3.18 (d, *J* = 4 Hz, 2H), 2.89 (dd, *J* = 8, 13.6 Hz, 2H), 2.80 (bs, 4H); δ_C (100 MHz, $CDCl_3$) 170.5, 168.0, 165.7, 154.9, 142.6, 135.8, 132.6, 129.7, 129.1, 129.03, 128.5, 128.3, 128.3, 128.1, 127.9, 127.6, 127.5, 127.3, 126.8, 122.7, 117.8, 115.2, 98.1, 92.4, 88.0, 82.5, 68.9, 61.9, 52.8, 51.2, 40.8, 37.8, 18.2; HRMS: calcd for $C_{64}H_{54}N_6O_{10} + H^+$ 1067.3983 found 1067.3987.

For compound **2a**: δ_H (400 MHz, $CDCl_3$) 7.38-7.08 (m, 22H), 6.79 (t, *J* = 7.6 Hz, 2H), 6.66 (d, *J* = 8.4 Hz, 2H), 6.51 (d, *J* = 8 Hz, 2H), 4.89, 4.83 (ABq, *J* = 16.0 Hz, 2 x 2H), 4.71 (m, 2H), 4.48, 4.38 (ABq, *J* = 16.0 Hz, 2 x 2H), 4.16 (m, 4H), 3.75 (bm, 4H), 3.35 (m, 2H), 3.01 (m, 2H), 2.94 (bm, 4H).

For compound **1c**: δ_H (400 MHz, $CDCl_3$) 7.67 (t, *J* = 7.6 Hz, 2H), 7.61 (d, *J* = 8.0 Hz, 2H), 7.43 (t, *J* = 7.6 Hz, 2H), 7.28-6.99 (m, 14H), 5.89, 5.81 (Abq, *J* = 9.6 Hz, 2 x 2H), 5.04 (2H, m), 4.84 (2H, m), 4.76, 4.73 (ABq, *J* = 12.6 Hz, 2 x 2H), 4.75 (m, obscured, 2H), 4.11 (s, 4H), 3.75 (bs, 4H), 3.29 (dd, *J* = 4.8, 14.0 Hz, 2H), 2.99 (dd, *J* = 4.0, 14.0 Hz, 2H), 2.86 (bs, 4H); δ_C (100 MHz, $CDCl_3$) 170.5, 168.0, 165.7, 155.0, 142.7, 135.7, 132.6, 129.1, 129.0, 128.5, 128.3, 126.8, 125.5, 122.7, 121.5, 117.9, 115.3, 102.7, 95.9, 88.4, 82.7, 69.0, 61.7, 52.8, 51.3, 40.8, 37.7, 18.4; HRMS: calcd for $C_{56}H_{50}N_6O_{10} + H^+$ 967.3669 found 967.3673.

For compound **2c**: δ_H (400 MHz, $CDCl_3$) 7.22-6.99 (m, 14H), 6.82 (t, *J* = 7.4 Hz, 2H), 6.69 (d, *J* = 8.4 Hz, 2H), 6.53 (d, *J* = 7.6 Hz, 2H), 5.90, 5.82 (ABq, *J* = 9.2 Hz, 4H), 4.87 (m, 2H), 4.84,

4.77 (ABq, *J* = 14.2 Hz, 4H), 4.50, 4.37 (ABq, *J* = 14.8 Hz, 4H), 4.12 (m, 4H), 3.70 (m, 4H), 3.37 (dd, *J* = 4.4, 14.4 Hz, 2H), 3.03 (dd, *J* = 8.8, 14.0 Hz, 2H), 2.88 (m, 4H).

For compound **2i**: δ_H (400 MHz, $CDCl_3$) 7.66 (d, *J* = 8.4 Hz, 2H), 7.60 (d, *J* = 8.0 Hz, 2H), 7.38-7.21 (m, 12H), 7.15-7.0 (m, 10H), 6.94 (d, *J* = 8.0 Hz, 2H), 5.04 (m, 2H), 4.82, 4.75 (ABq, *J* = 14.4 Hz, 2H), 4.64 (s, 4H), 4.36 (s, 4H), 3.73 (t, *J* = 4.6 Hz, 4H), 3.26 (dd, *J* = 5.4, 14.4 Hz, 2H), 3.01-2.9 (m, 2H), 2.89 (t, *J* = 4.8 Hz, 4H); δ_C (100 MHz, $CDCl_3$) 170.6, 168.1, 165.8, 155.0, 142.7, 135.8, 132.6, 129.8, 129.1, 129, 128.5, 128.4, 128.3, 128.2, 127.9, 127.8, 127.5, 127.4, 126.8, 122.8, 117.8, 115.3, 98.1, 92.4, 88, 82.5, 68.9, 61.9, 52.8, 51.3, 40.9, 37.8, 18.2; MS (ES^+) m/z 1067 (MH^+), 1089 (MNa^+); HRMS Calcd. For $C_{64}H_{54}N_6O_{10}$ + H^+ 1067.3982 found 1067.3969.

For compound **2j**: δ_H (400 MHz, $CDCl_3$) 7.40-7.21 (m, 10H), 7.15-7.03 (m, 10H), 6.79 (t, *J* = 7.6 Hz, 2H), 6.87 (d, *J* = 8.4 Hz, 2H), 6.51 (d, *J* = 7.6 Hz, 2H), 4.95-4.80 (m, 6H), 4.47 (d, *J* = 15.6 Hz, 2H), 4.32 (d, *J* = 15.6 Hz, 4H), 4.18 (s, 4H), 3.75 (m, 4H), 3.38 (dd, *J* = 4.4, 14.0 Hz, 2H), 3.05 (dd, *J* = 5.2, 14.0 Hz, 2H), 2.92 (m, 4H).