

## Supporting Information

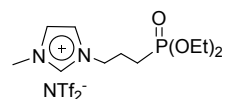
### Click chemistry mediated synthesis of novel bio-inspired phosphonyl-functionalized ionic liquids

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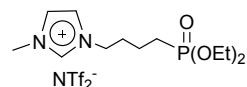
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#### IL 1:



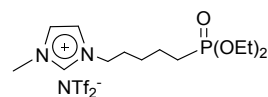
<sup>1</sup>H NMR (DMSO-*d*<sub>6</sub>): δ<sub>H</sub> 9.07 (s, 1H); 7.72 (d, *J* = 2.3 Hz, 2H); 4.21 (t, *J* = 7.4 Hz, 2H); 4.15 (t, *J* = 7.4 Hz, 2H); 3.99 (quart, 4H); 3.84 (s, 3H); 2.00 (t, 2H); 1.72-1.78 (m, 2H); 1.23 (t, 6H). <sup>13</sup>C NMR (DMSO-*d*<sub>6</sub>): δ<sub>C</sub> 136.7; 123.7; 122.1; 120.7; 118.2; 115.6; 61.0; 48.9; 35.7; 23.1; 21.9; 16.2. <sup>31</sup>P NMR (DMSO-*d*<sub>6</sub>): δ<sub>P</sub> 30.91. MS (EI): *m/z* 261.22 (M, calcd. 261.14).

#### IL 2:



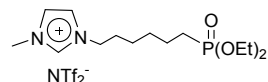
<sup>1</sup>H NMR (DMSO-*d*<sub>6</sub>): δ<sub>H</sub> 9.09 (s, 1H); 7.76 (s, 1H); 7.69 (s, 1H); 4.15 (t, *J* = 7.4 Hz, 2H); 3.97 (quart, 4H); 3.85 (s, 3H); 1.77 (quint, 2H); 1.66-1.71 (m, 2H); 1.45 (m, 2H); 1.21 (m, 8H). <sup>13</sup>C NMR (DMSO-*d*<sub>6</sub>): δ<sub>C</sub> 136.4; 123.6; 122.4; 120.7; 118.1; 115.6; 60.8; 48.6; 35.7; 29.3; 29.2; 25.2; 16.1. <sup>31</sup>P NMR (DMSO-*d*<sub>6</sub>): δ<sub>P</sub> 31.58. MS (EI): *m/z* 275.21 (M, calcd. 275.14).

#### IL 3:

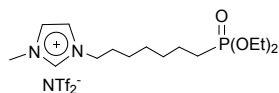


<sup>1</sup>H NMR (DMSO-*d*<sub>6</sub>): δ<sub>H</sub> 9.09 (s, 1H); 7.76 (s, 1H); 7.69 (s, 1H); 4.15 (t, *J* = 7.4 Hz, 2H); 3.97 (quart, 4H); 3.85 (s, 3H); 1.77 (quint, 2H); 1.66-1.71 (m, 2H); 1.45 (m, 2H); 1.21 (m, 10H). <sup>13</sup>C NMR (DMSO-*d*<sub>6</sub>): δ<sub>C</sub> 136.4; 123.6; 122.4; 120.7; 118.1; 115.6; 60.8; 48.6; 35.7; 29.3; 27.9; 25.2; 21.9; 16.1. <sup>31</sup>P NMR (DMSO-*d*<sub>6</sub>): δ<sub>P</sub> 32.14. MS (EI): *m/z* 289.34 (M, calcd. 289.16).

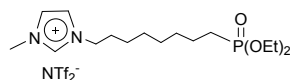
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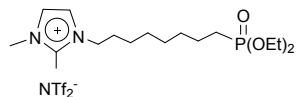
<sup>1</sup>H NMR (DMSO-*d*<sub>6</sub>): δ<sub>H</sub> 9.09 (s, 1H); 7.76 (s, 1H); 7.69 (s, 1H); 4.15 (t, *J* = 7.4 Hz, 2H); 3.97 (quart, 4H); 3.85 (s, 3H); 1.77 (quint, 2H); 1.66-1.71 (m, 2H); 1.45 (m, 2H); 1.21 (m, 12H). <sup>13</sup>C NMR (DMSO-*d*<sub>6</sub>): δ<sub>C</sub> 136.4; 123.6; 122.2; 120.7; 118.1; 115.6; 60.7; 48.6; 35.7; 29.2; 27.7; 25.2; 24.9; 23.8; 16.2. <sup>31</sup>P NMR (DMSO-*d*<sub>6</sub>): δ<sub>P</sub> 32.42. MS (EI): *m/z* 303.45 (M, calcd. 303.18).

**IL 5:**

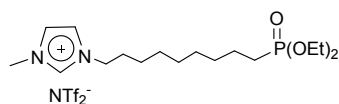
$^1\text{H}$  NMR (DMSO- $d_6$ ):  $\delta_{\text{H}}$  9.09 (s, 1H); 7.76 (s, 1H); 7.69 (s, 1H); 4.15 (t,  $J = 7.4$  Hz, 2H); 3.93-3.98 (quart, 4H); 3.85 (s, 3H); 1.77 (quint, 2H), 1.68 (m, 2H); 1.45 (m, 2H); 1.21 (t, 12H).  $^{13}\text{C}$  NMR (DMSO- $d_6$ ):  $\delta_{\text{C}}$  136.4; 123.6; 122.2; 120.7; 118.1; 115.6; 60.7; 48.6; 35.7; 29.5; 29.4; 29.3; 27.7; 25.2; 23.8; 16.2.  $^{31}\text{P}$  NMR (DMSO- $d_6$ ):  $\delta_{\text{P}}$  32.50. MS (EI):  $m/z$  317.23 (M, calcd. 317.20).

**IL 6:**

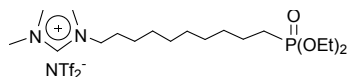
$^1\text{H}$  NMR (DMSO- $d_6$ ):  $\delta_{\text{H}}$  9.10 (s, 1H); 7.76 (t,  $J = 1.7$  Hz, 1H); 7.69 (t,  $J = 1.7$  Hz, 1H); 4.15 (t,  $J = 7.4$  Hz, 2H); 3.97 (quart, 4H); 3.85 (s, 3H); 1.67-1.80 (m, 4H); 1.45 (m, 2H); 1.21-1.34 (m, 14H).  $^{13}\text{C}$  NMR (DMSO- $d_6$ ):  $\delta_{\text{C}}$  136.4; 123.3; 122.2; 120.7; 118.2; 115.6; 60.7; 48.7; 35.7; 29.7; 29.5; 28.2; 28.1; 25.4; 23.8; 21.9; 16.2.  $^{31}\text{P}$  NMR (DMSO- $d_6$ ):  $\delta_{\text{P}}$  32.53. MS (EI):  $m/z$  331.80 (M, calcd. 331.41).

**IL 7:**

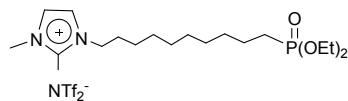
$^1\text{H}$  NMR (DMSO- $d_6$ ):  $\delta_{\text{H}}$  7.64 (d,  $J = 2.3$  Hz, 1H); 7.60 (d,  $J = 2.3$  Hz, 1H); 4.09 (t,  $J = 7.4$  Hz, 2H); 3.96 (quart, 4H); 3.74 (s, 3H); 2.57 (s, 3H); 1.66-1.71 (m, 4H); 1.44 (m, 2H); 1.20-1.34 (m, 14H).  $^{13}\text{C}$  NMR (DMSO- $d_6$ ):  $\delta_{\text{C}}$  144.1; 123.3; 122.2; 120.8; 118.2; 115.6; 60.7; 47.4; 34.6; 29.7; 29.5; 29.1; 28.3; 25.5; 24.9; 23.8; 21.2; 16.2, 9.0.  $^{31}\text{P}$  NMR (DMSO- $d_6$ ):  $\delta_{\text{P}}$  32.53. MS (EI):  $m/z$  343.60 (M, calcd. 343.23).

**IL 8:**

$^1\text{H}$  NMR (DMSO- $d_6$ ):  $\delta_{\text{H}}$  9.09 (s, 1H); 7.76 (s, 1H); 7.69 (s, 1H); 4.14 (t,  $J = 7.4$  Hz, 2H); 3.97 (m, 4H); 3.84 (s, 3H); 1.76 (m, 4H); 1.18-1.24 (m, 14H).  $^{13}\text{C}$  NMR (DMSO- $d_6$ ):  $\delta_{\text{C}}$  136.4; 123.3; 122.2; 120.7; 118.2; 115.6; 60.7; 48.7; 35.7; 29.8; 29.5; 29.2; 28.2; 28.0; 25.9; 24.8; 23.6; 21.3; 16.1.  $^{31}\text{P}$  NMR (DMSO- $d_6$ ):  $\delta_{\text{P}}$  32.58. MS (EI):  $m/z$  343.65 (M, calcd. 343.23).

**IL 9**

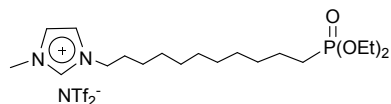
$^1\text{H}$  NMR (DMSO- $d_6$ ):  $\delta_{\text{H}}$  9.09 (s, 1H); 7.76 (t,  $J = 1.7$  Hz, 1H); 7.69 (t,  $J = 1.7$  Hz, 1H); 4.14 (t,  $J = 7.4$  Hz, 2H); 3.94-3.98 (m, 4H); 3.84 (s, 3H); 1.65-1.78 (m, 4H); 1.28 (m, 2H); 1.21-1.24 (m, 18H).  $^{13}\text{C}$  NMR (DMSO- $d_6$ ):  $\delta_{\text{C}}$  136.5; 123.6; 122.2; 120.7; 118.2; 115.6; 60.7; 48.7; 35.7; 29.8; 29.6; 28.7; 28.5; 28.3; 25.4; 23.9; 16.2.  $^{31}\text{P}$  NMR (DMSO- $d_6$ ):  $\delta_{\text{P}}$  32.57. MS (EI):  $m/z$  359.82 (M, calcd. 359.25).

**IL 10:**

$^1\text{H}$  NMR (DMSO- $d_6$ ):  $\delta_{\text{H}}$  7.64 (d,  $J = 2.3$  Hz, 1H); 7.60 (d,  $J = 2.3$  Hz, 1H); 4.09 (t,  $J = 7.4$  Hz, 2H); 3.95 (quart, 4H); 3.74 (s, 3H); 2.57 (s, 3H); 1.64-1.71 (m, 4H); 1.40-1.49 (m, 2H); 1.20-1.32 (m, 18H).  $^{13}\text{C}$  NMR (DMSO- $d_6$ ):  $\delta_{\text{C}}$  144.2; 123.3; 122.3; 120.8;

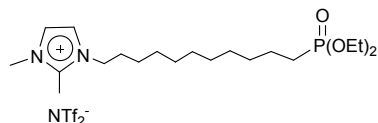
118.2; 115.6; 60.7; 47.5; 34.6; 29.6; 29.2; 28.7; 28.6; 28.5; 28.4; 25.5; 23.9; 21.9; 16.3; 9.0.  $^{31}\text{P}$  NMR (DMSO- $d_6$ ):  $\delta_{\text{p}}$  32.57. MS (EI):  $m/z$  373.83 (M, calcd. 373.49).

**IL 11:**



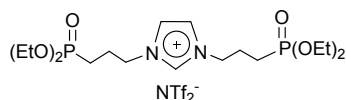
$^1\text{H}$  NMR (DMSO- $d_6$ ):  $\delta_{\text{H}}$  9.09 (s, 1H); 7.76 (d,  $J = 1.7$  Hz, 1H); 7.69 (d,  $J = 1.7$  Hz, 1H); 4.13 (t,  $J = 7.4$  Hz, 2H); 3.94 (quart, 4H); 3.84 (s, 3H); 1.65-1.76 (m, 4H); 1.43 (m, 2H); 1.21-1.23 (s, 20H).  $^{13}\text{C}$  NMR (DMSO- $d_6$ ):  $\delta_{\text{C}}$  136.4; 123.6; 122.2; 120.7; 118.2; 115.6; 60.7; 48.8; 35.7; 29.8; 29.6; 29.3; 28.7; 28.5; 28.3; 25.4; 25.0; 23.9; 22.0; 16.2.  $^{31}\text{P}$  NMR (DMSO- $d_6$ ):  $\delta_{\text{p}}$  32.58. MS (EI):  $m/z$  373.58 (M, calcd. 373.26).

**IL 12:**



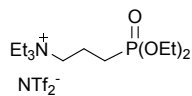
$^1\text{H}$  NMR (DMSO- $d_6$ ):  $\delta_{\text{H}}$  7.64 (d,  $J = 2.3$  Hz, 1H); 7.61 (d,  $J = 2.3$  Hz, 1H); 4.09 (t,  $J = 7.4$  Hz, 2H); 3.95 (quart, 4H); 3.74 (s, 3H); 2.58 (s, 3H); 1.70 (t, 2H); 1.20-1.46 (m, 24H).  $^{13}\text{C}$  NMR (DMSO- $d_6$ ):  $\delta_{\text{C}}$  144.2; 123.2; 122.3; 120.8; 118.2; 115.6; 47.5; 34.6; 30.1; 29.1; 28.8; 28.8; 28.7; 28.6; 28.5; 28.4; 25.5; 9.0.  $^{31}\text{P}$  NMR (DMSO- $d_6$ ):  $\delta_{\text{p}}$  32.68. MS (EI):  $m/z$  387.58 (M, calcd. 387.28).

**IL 13:**



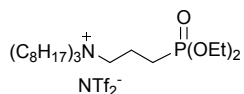
$^1\text{H}$  NMR (DMSO- $d_6$ ):  $\delta_{\text{H}}$  9.14 (s, 1H); 7.80 (s, 2H); 4.20 (t,  $J = 7.4$  Hz, 4H); 4.00 (quart, 8H); 2.30 (t, 4H); 1.75 (m, 4H); 1.23 (s, 12H).  $^{13}\text{C}$  NMR (DMSO- $d_6$ ):  $\delta_{\text{C}}$  136.3; 123.2; 122.4; 120.7; 118.1; 115.4; 48.9; 35.7; 23.0; 16.2.  $^{31}\text{P}$  NMR (DMSO- $d_6$ ):  $\delta_{\text{p}}$  31.27. MS (EI):  $m/z$  425.35 (M, calcd. 425.20).

**IL 14:**



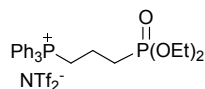
$^1\text{H}$  NMR (DMSO- $d_6$ ):  $\delta_{\text{H}}$  4.06 (t, 2H); 3.47 (t, 6H); 3.40 (quart, 4H); 3.10 (t, 2H); 2.92 (m, 2H); 1.14-1.31 (m, 15H).  $^{13}\text{C}$  NMR (DMSO- $d_6$ ):  $\delta_{\text{C}}$  123.3; 120.8; 118.2; 115.6; 63.0; 53.6; 53.0; 16.1; 15.9; 8.5; 7.1.  $^{31}\text{P}$  NMR (DMSO- $d_6$ ):  $\delta_{\text{p}}$  27.54. MS (EI):  $m/z$  280.45 (M, calcd. 280.20).

**IL 15:**



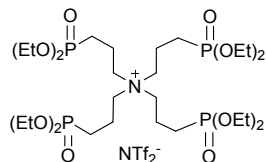
$^1\text{H}$  NMR (DMSO- $d_6$ ):  $\delta_{\text{H}}$  3.92 (t, 2H); 3.48 (t, 6H); 3.40 (quart, 4H); 3.11 (t, 2H); 2.49 (m, 2H); 1.16 (s, 57H).  $^{13}\text{C}$  NMR (DMSO- $d_6$ ):  $\delta_{\text{C}}$  124.1; 120.1; 118.2; 115.5; 63.0; 53.8; 53.2; 16.1; 16.0; 15.9; 15.8; 15.6; 15.3; 14.9; 8.1; 6.8.  $^{31}\text{P}$  NMR (DMSO- $d_6$ ):  $\delta_{\text{p}}$  36.81. MS (EI):  $m/z$  532.87 (M, calcd. 532.49).

**IL 16:**



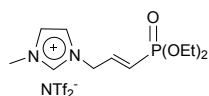
$^1\text{H}$  NMR (DMSO- $d_6$ ):  $\delta_{\text{H}}$  7.55-8.02 (m, 10H); 7.16-7.23 (m, 5H); 4.02 (t, 2H); 3.95 (quart, 4H); 2.28 (s, 2H); 1.70 (t, 2H); 1.22 (m, 6H).  $^{13}\text{C}$  NMR (DMSO- $d_6$ ):  $\delta_{\text{C}}$  144.2; 123.2; 122.3; 120.8; 118.2; 115.6; 47.5; 34.6; 30.1; 29.1; 28.8; 28.8; 28.7; 28.6; 28.5; 28.4; 25.5; 9.0.  $^{31}\text{P}$  NMR (DMSO- $d_6$ ):  $\delta_{\text{P}}$  25.63; 15.34. MS (EI):  $m/z$  441.45 (M, calcd. 441.17).

**IL 17:**



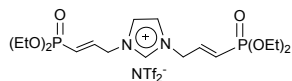
$^1\text{H}$  NMR (DMSO- $d_6$ ):  $\delta_{\text{H}}$  4.02 (m, 16H); 3.44 (t, 8H); 1.71 (t, 8H); 1.25 (m, 24H).  $^{13}\text{C}$  NMR (DMSO- $d_6$ ):  $\delta_{\text{C}}$  123.3; 120.8; 118.2; 115.6; 63.1. 63.0; 61.9;  $^{31}\text{P}$  NMR (DMSO- $d_6$ ):  $\delta_{\text{P}}$  30.55. MS (EI):  $m/z$  458.32 (M, calcd. 730.34).

**IL 18:**



$^1\text{H}$  NMR (DMSO- $d_6$ ):  $\delta_{\text{H}}$  9.16 (s, 1H); 7.61 (s, 2H); 5.02 (d, 2H); 3.94 (quart, 4H); 3.84 (t, 2H); 3.64 (s, 3H); 1.16 (s, 6H).  $^{13}\text{C}$  NMR (DMSO- $d_6$ ):  $\delta_{\text{C}}$  136.3; 122.9; 120.8; 118.2; 115.6; 114.0; 79.0; 75.9; 61.2; 47.5; 16.1.  $^{31}\text{P}$  NMR (DMSO- $d_6$ ):  $\delta_{\text{P}}$  8.90. MS (EI):  $m/z$  260.32 (M, calcd. 260.13).

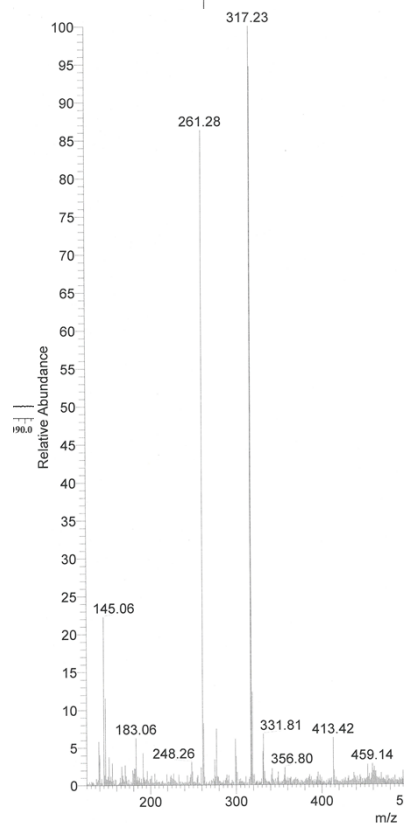
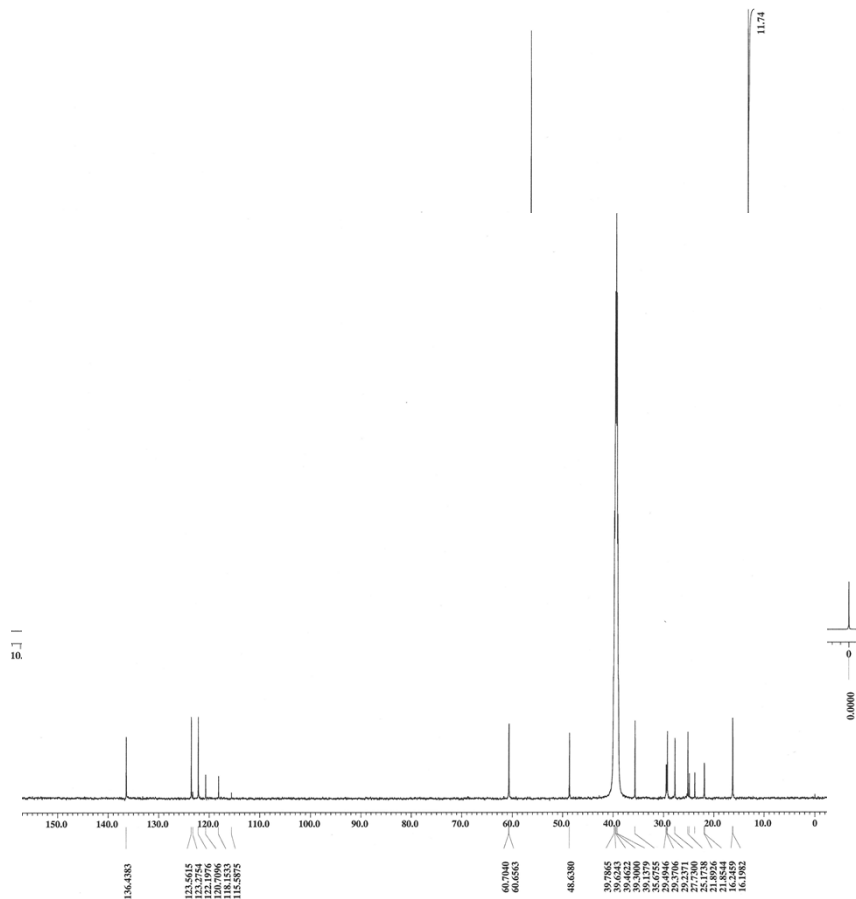
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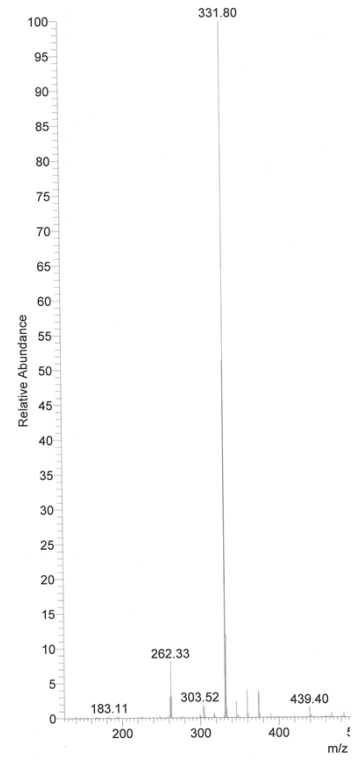
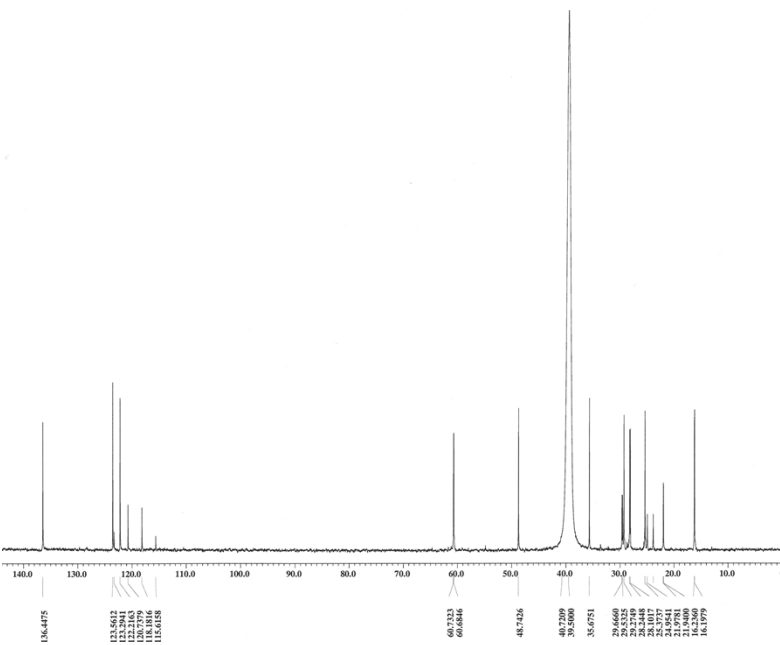
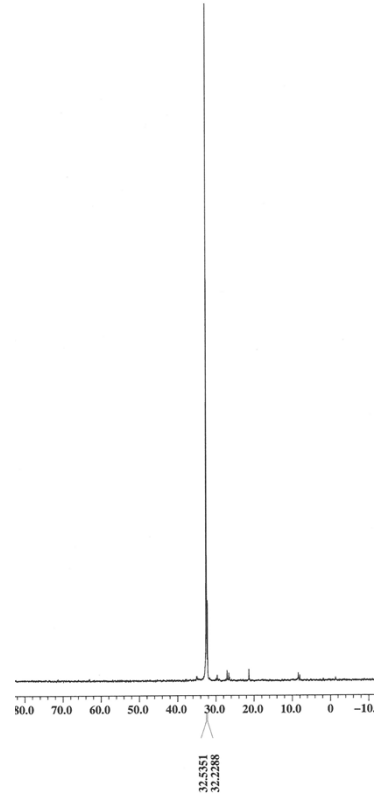
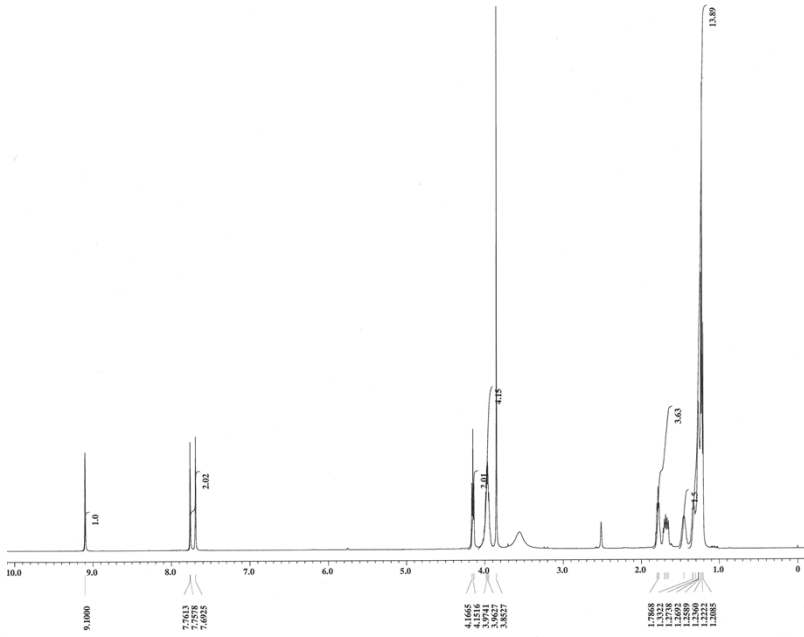
$^1\text{H}$  NMR (DMSO- $d_6$ ):  $\delta_{\text{H}}$  9.17 (s, 1H); 7.67 (s, 2H); 5.02 (d,  $J = 2.8 \text{ Hz}$ , 4H); 3.85 (m, 8H); 3.63 (t,  $J = 2.8 \text{ Hz}$ , 4H); 1.06 (t, 12H).  $^{13}\text{C}$  NMR (DMSO- $d_6$ ):  $\delta_{\text{C}}$  136.3; 122.9; 120.8; 118.2; 115.6; 114.0; 79.0; 75.9; 61.2; 16.1.  $^{31}\text{P}$  NMR (DMSO- $d_6$ ):  $\delta_{\text{P}}$  8.91. MS (EI):  $m/z$  422.45 (M, calcd. 422.17).

# NMR and MS Spectra of the representative products

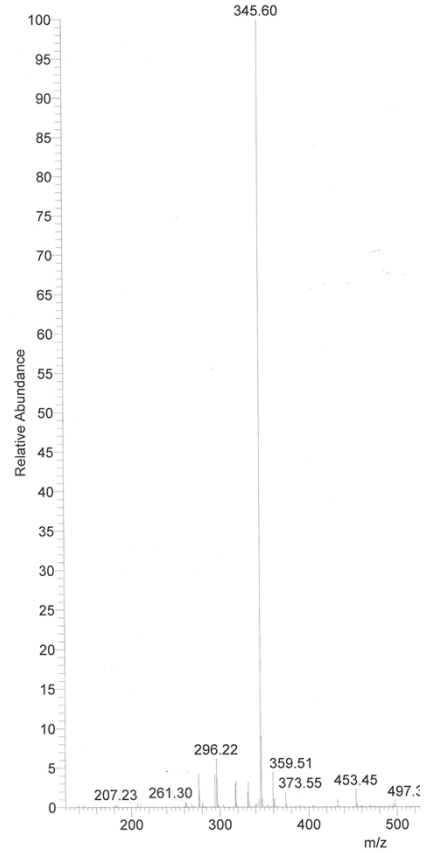
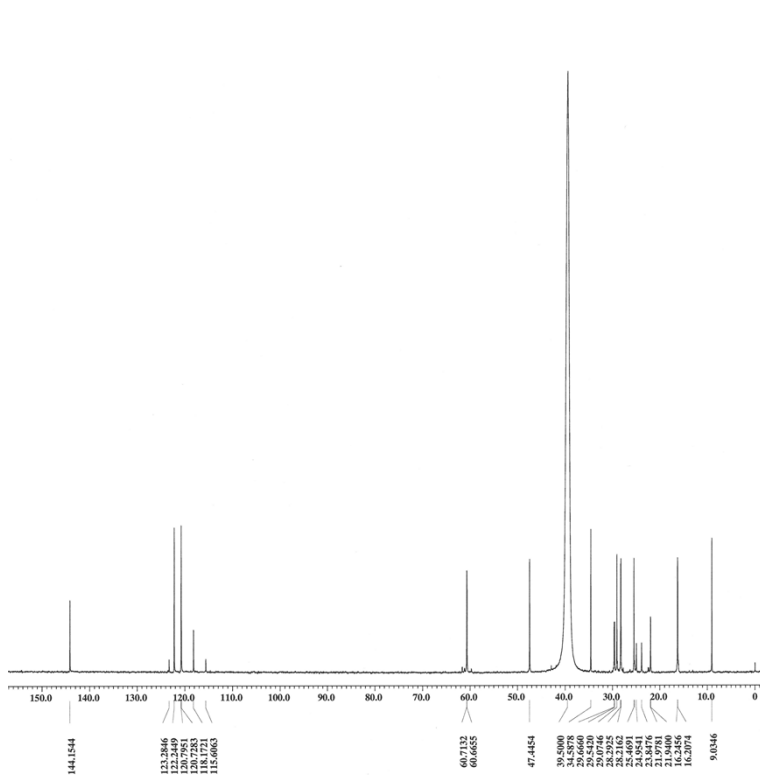
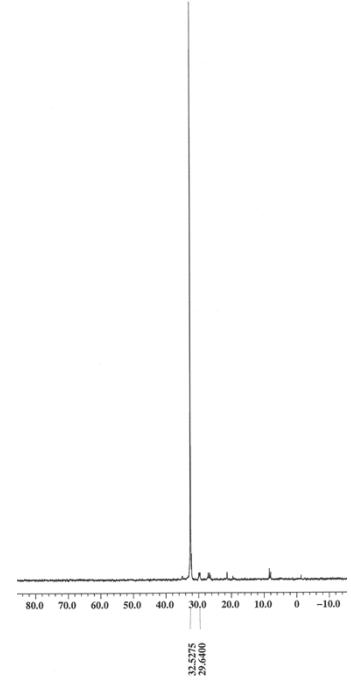
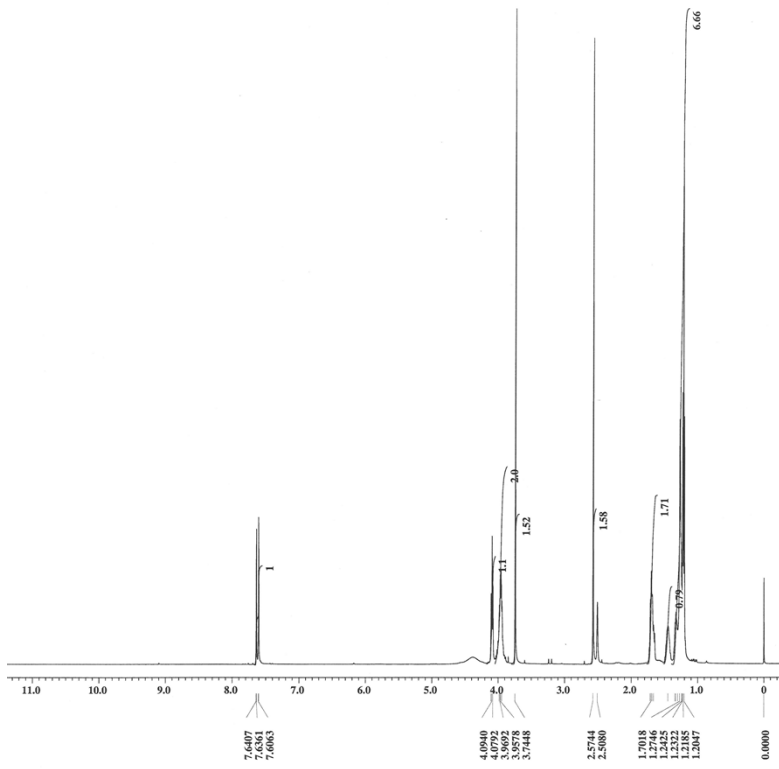
IL 5



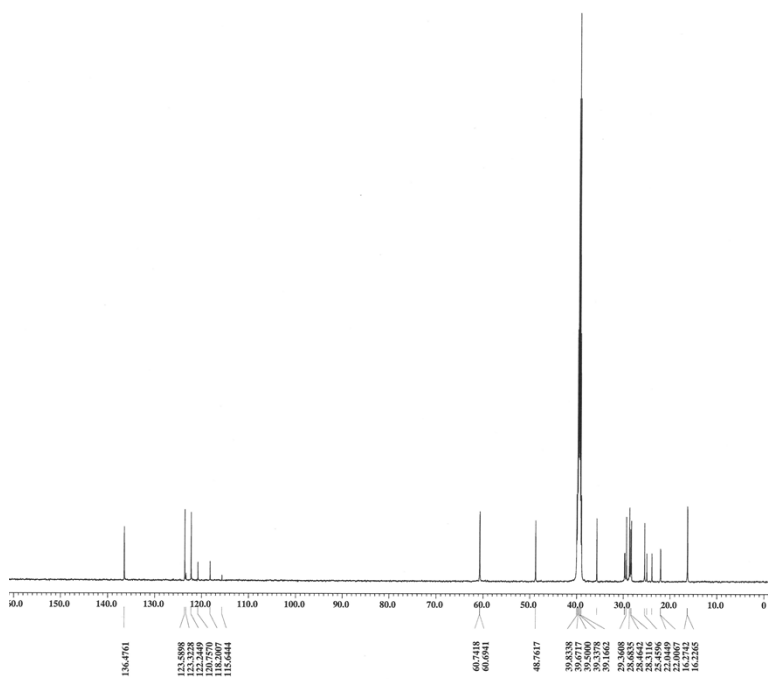
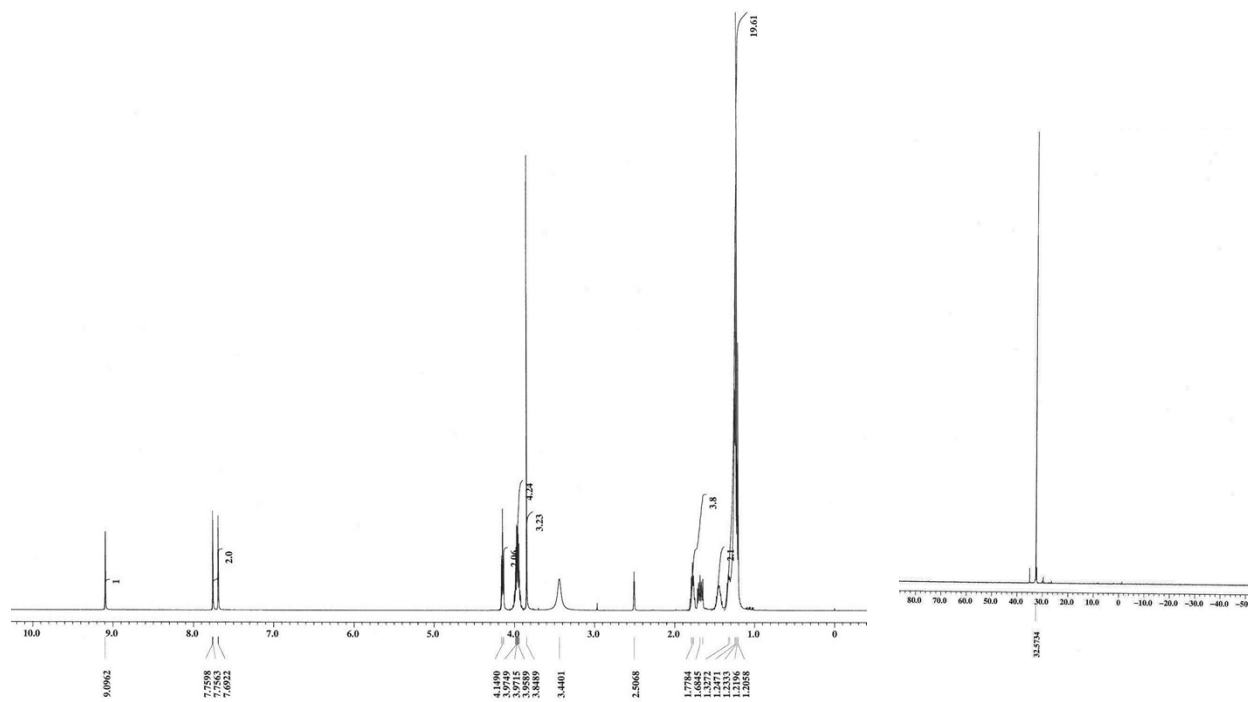
IL 6



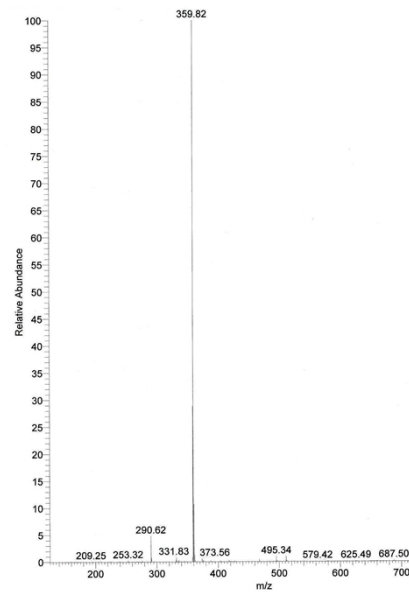
IL 7



IL 9



on : 13C





IL 10

