N-(n-2, 3, 4, 5, 6-Pentahydroxylhex-1-yl)-L-aspartic acid (4a) Yield: 15%. Mp171-173°C, $[\alpha]_D^{25}$=-20.0 (C=2.0, H_2O), IR (KBr) 3569, 3366, 3233, 2894, 2367, 1730, 1617, 1559, 1397, 1175, 1087, 826, 676, 610. ESI (m/e) 298 $[M+H]^+$; ^{1}HNMR (D_2O) δ=4.15 (m, *J*=4.6Hz 1H), 4.03 (dd, *J*=5.0Hz, *J*=7.0Hz, 1H), 3.86 (dd, *J*=3.0Hz, *J*=5.0Hz, 1H), 3.81 (dd, *J*=3.0Hz, *J*=12.0Hz, 1H), 3.75 (m, *J*=3.6Hz 1H), 3.65(m, *J*=4.1Hz 2H), 3.37(dd, *J*=3.5Hz, *J*=13.0Hz, 1H), 3.28 (dd, *J*=9.0Hz, *J*=13.0 Hz, 1H), 3.08 (dd, *J*=5.0Hz, *J*=18.0Hz, 1H), 3.01 (dd, *J*=7.0Hz, *J*=18.0Hz, 1H). Anal Calcd for $C_{10}H_{19}NO_9$: C 44.40, H 6.44, N 4.71; Found: C 44.58, H 6.30, N 4.86.

N-(n-2, 3, 4, 5, 6-Pentahydroxylhex-1-yl)-L-glutamic acid (4b) Yield: 21%. Mp151-153°C, $[\alpha]_D^{25}$=-45.0(C=2.0, H_2O), IR (KBr) 3407, 3352, 3094, 2967, 2916, 1617, 1400, 1354, 1080, 1041, 741, 675, 534. ESI (m/e) 312 $[M+H]^{+1}$HNMR (D_2O) δ=4.12 (m, *J*=4.4Hz 1H), 3.82 (dd, *J*=3.3Hz, *J*=5.0Hz, 1H), 3.77 (dd, *J*=3.5Hz, *J*=12.0Hz, 1H), 3.72 (m, *J*=3.4Hz 1H), 3.63(m, *J*=4.0Hz 2H), 3.55 (t, *J*=4.5Hz 1H), 3.24(dd, *J*=3.4Hz, *J*=12.7Hz, 1H), 3.11 (dd, *J*=8.7Hz, *J*=12.8 Hz, 1H), 2.26 (d, *J*=5.0Hz, 2H), 2.00 (m, *J*=4.8Hz, 2H). Anal Calcd for $C_{11}H_{21}NO_9$: C 42.44, H 6.80, N 4.50; Found: C 42.60, H 6.95, N 4.38.

N-(n-2, 3, 4, 5, 6-Pentahydroxylhex-1-yl)-L-threonine (4c) Yield: 25%. Mp 195-197°C, $[\alpha]_D^{25}$=-19.0 (C=2.0, H_2O), IR (KBr) 3421, 2975, 2939, 1612, 1571, 1415, 1385, 1084, 1045, 841, 756, 731. ESI (m/e) 284$[M+H]^+$, ^{1}HNMR (D_2O) δ=4.12 (m, *J*=4.6Hz, 1H), 3.95 (d, *J*=4.5Hz, 1H), 3.81 (m, *J*=4.5Hz, 1H), 3.80 (m, *J*=3.4Hz, 1H), 3.75 (m, *J*=3.6Hz, 1H), 3.64 (m, *J*=4.1Hz, 2H), 3.57(d, *J*=4.7Hz, 1H), 3.26 (dd, *J*=3.1Hz, *J*=13.0Hz, 1H), 3.12 (dd, *J*=10.1Hz, *J*=13.0Hz, 1H), 1.24 (d, *J*=4.7Hz, 3H). Anal Calcd for $C_{10}H_{21}NO_8$: C 42.40, H 7.47, N 4.94; Found: C 42.57, H 7.64, N 4.77.

N-(n-2, 3, 4, 5, 6-Pentahydroxylhex-1-yl)-L-tyrosine (4d) Yield: 22%. Mp 239-240°C, $[\alpha]_D^{25}$=-50.0 (C=2.0, H_2O), IR(KBr) 3307, 3353, 3085, 2968, 2916, 1605, 1560, 1458, 1400, 1354, 1080, 1041, 742, 675, 534. ESI (m/e) 346$[M+H]^+$, ^{1}HNMR (D_2O) δ=7.02(d,

J=7.0Hz, 2H), 6.78(d, *J*=7.1Hz, 2H), 4.10 (m, *J*=4.7Hz, 1H), 3.90 (t, *J*=5.4Hz, 1H), 3.80 (m, *J*=4.7Hz, 1H), 3.78 (m, *J*=3.5Hz, 1H), 3.73 (m, *J*=3.5Hz, 1H), 3.63 (m, *J*=4.0Hz, 2H), 3.23 (dd, *J*=3.1Hz, *J*=13.0Hz, 1H), 3.14 (dd, *J*=3.1Hz, *J*=13.0Hz, 1H), 3.00 (d, *J*=4.5Hz, 2H). Anal Calcd for $C_{15}H_{23}NO_8$: C 52.17, H 6.71, N 4.06; Found: C 52.33, H 6.90, N 3.95.

N-(n-2, 3, 4, 5, 6-Pentahydroxylhex-1-yl)-L-serine (4e) Yield: 24%. Mp195-197°C, $[\alpha]_D^{25}$=-31.0 (C=2.0, H_2O), IR(KBr) 3222, 2941, 2901, 1621, 1565, 1424, 1337, 1093, 1040, 706. ESI (m/e) 270$[M+H]^+$, ^{1}HNMR(D_2O) δ=4.12 (m, *J*=4.6Hz, 1H), 3.88 (d, *J*=5.5Hz, 2H), 3.82 (dd, *J*=5.0Hz, *J*=12.5Hz, 1H), 3.80 (t, *J*=2.5Hz, 1H), 3.75 (dd, *J*=1.0Hz, *J*=3.0Hz, 1H), 3.66 (m, *J*=4.0Hz, 2H), 3.62(t, *J*=5.5Hz, 1H), 3.26 (dd, *J*=3.0Hz, *J*=13.0Hz, 1H), 3.14 (dd, *J*=10.0Hz, *J*=13.0Hz, 1H). Anal Calcd for $C_9H_{19}NO_8$: C 40.15, H 7.11, N 5.20; Found: C 40.01, H 6.98, N 5.37.

N-(n-2, 3, 4, 5, 6-Pentahydroxylhex-1-yl)-L-asparagine (4f) Yield: 23%. Mp 240-241°C, $[\alpha]_D^{25}$=-20.0 (C=2.0, H_2O), IR(KBr) 3407, 3353, 3095, 2968, 2916, 1687, 1400, 1354, 1080, 1041, 742, 675, 534. ESI (m/e) 297$[M+H]^+$, ^{1}HNMR(D_2O) δ=4.14 (m, *J*=4.3Hz 1H), 3.83(dd, *J*=5.1Hz, *J*=7.2Hz, 1H), 3.81 (dd, *J*=3.2Hz, *J*=5.2Hz, 1H), 3.79 (dd, *J*=3.3Hz, *J*=11.7Hz, 1H), 3.75 (t, *J*=5.2Hz 1H), 3.72 (m, *J*=3.5Hz 1H), 3.67(m, *J*=4.0Hz 2H), 3.27(dd, *J*=3.4Hz, *J*=12.6Hz, 1H), 3.14 (dd, *J*=9.1Hz, *J*=12.7 Hz, 1H), 2.58 (d, *J*=5.2Hz, 2H). Anal Calcd for $C_{10}H_{20}N_2O_8$: C 40.54, H 6.80, N 9.46; Found: C 40.68, H 6.95, N 9.33.

N-(n-2, 3, 4, 5, 6-Pentahydroxylhex-1-yl)-L-glutamine (4g) Yield: 18%. Mp251-253°C, $[\alpha]_D^{25}$=-23.0 (C=2.0, H_2O), IR(KBr) 3402, 3350, 3088, 2968, 2917, 1685, 1405, 1352, 1084, 1040, 743, 698. ESI (m/e) 311$[M+H]^+$, ^{1}HNMR(D_2O) δ=4.10 (m, *J*=4.4Hz, 1H), 3.80 (dd, *J*=5.0Hz, *J*=7.0Hz, 1H), 3.78 (dd, *J*=3.3Hz, *J*=5.0Hz, 1H), 3.74 (dd, *J*=3.4Hz, *J*=11.5Hz, 1H), 3.71 (m, *J*=3.6Hz 1H), 3.61(m, *J*=4.1Hz 2H), 3.52(t, *J*=5.1Hz, 1H), 3.26(dd, *J*=3.5Hz, *J*=12.3Hz, 1H), 3.12 (dd, *J*=9.0Hz, *J*=12.5 Hz, 1H), 2.24 (t, *J*=5.0Hz, 2H), 2.02 (m, *J*=5.3Hz, 1H), 2.00 (m, *J*=5.0Hz, 1H). Anal Calcd for $C_{11}H_{22}N_2O_8$: C 42.58, H 7.15, N 9.03; Found: C 40.68, H 6.95, N 9.33.

N-(n-2, 3, 4, 5, 6-Pentahydroxylhex-1-yl)-L-glycine (4h) Yield: 36%. Mp182-183°C, $[\alpha]_D^{25}$= -40.0 (C=2.0, H_2O), IR(KBr) 3532, 3242, 2963, 2897, 2365, 1627, 1561, 1402, 1378, 1061, 1037, 848, 691, 579. ESI (m/e) 240$[M+H]^+$, ^{1}HNMR(D_2O) δ=4.11(m, *J*=4.5Hz, 1H), 3.81(m, *J*=5.0Hz, 1H), 3.79(m, *J*=5.2Hz, 1H), 3.76(m, *J*=3.6Hz, 1H), 3.65(d, *J*=5.2Hz, 2H), 3.56(s, 2H), 3.26(dd, *J*=3.5Hz, *J*=13.0Hz, 1H), 3.13(dd, *J*=9.5Hz, *J*=13.0Hz, 1H). Anal Calcd for $C_8H_{17}NO_7$: C 40.17, H 7.16, N 5.86; Found: C 40.00, H 6.99, N 5.71.

N-(n-2, 3, 4, 5, 6-Pentahydroxylhex-1-yl)-L-cysteine (4i) Yield: 45%. Mp171-172°C, $[\alpha]_D^{25}$= -33.0 (C=2.0, H_2O), IR(KBr) 3275, 2975, 2936, 1607, 1567, 1417, 1391, 1082, 1036, 695, 632. ESI (m/e) 286$[M+H]^+$, ^{1}HNMR(D_2O) δ=4.16 (m, *J*=4.6Hz, 1H), 3.97 (t, *J*=5.0Hz, 1H), 3.86 (dd, *J*=3.0Hz, *J*=4.5Hz, 1H), 3.81 (dd, *J*=3.0Hz, *J*=12.0Hz, 1H), 3.76 (m, *J*=4.2Hz, 1H), 3.69 (m, *J*=4.2Hz, 2H), 3.27(dd, *J*=9.5Hz, *J*=13.0Hz, 1H), 3.16 (dd, *J*=5.0Hz, *J*=18.0Hz, 1H), 3.08 (d, *J*=5.0Hz, 2H). Anal Calcd for $C_9H_{19}NO_7S$: C 37.89, H 6.71, N 4.91; Found: C 38.04, H 6.55, N 4.76.

N-(n-2, 3, 4, 5, 6-Pentahydroxylhex-1-yl)-L-methionine (4j) Yield: 41%. Mp 197-199°C, $[\alpha]_D^{25}$= -57.0 (C=2.0, H_2O), IR(KBr) 3464, 3431, 3291, 3117, 2930, 2340, 1601, 1554, 1433, 1398, 1089, 849, 692. ESI (m/e) 314$[M+H]^+$, ^{1}HNMR(D_2O) δ=4.10 (m, *J*=4.5Hz, 1H), 3.81(m, *J*=4.2Hz, 2H), 3.79 (t, *J*=3.0Hz, 1H), 3.76 (m, *J*=3.5Hz, 1H), 3.65 (d, *J*=5.0Hz, 2H), 3.50 (t, *J*=7.0Hz, 1H), 3.23(dd, *J*=3.0Hz, *J*=13.0Hz, 1H), 3.12 (dd, *J*=10.0Hz, *J*=13.0Hz, 1H), 2.55 (t, *J*=4.2Hz, 2H), 2.09 (q, *J*=7.0Hz, 2H), 2.13 (s, 3H). Anal Calcd for $C_{10}H_{21}NO_7S$: C 40.12, H 7.07, N 4.68; Found: C 40.00, H 6.93, N 4.83.

N-(n-2, 3, 4, 5, 6-Pentahydroxylhex-1-yl)-L-alanine (4k) Yield: 30%. Mp201-202°C, $[\alpha]_D^{25}$= -20.0(C=2.0, H_2O), IR(KBr) 3420, 3273, 2973, 2905, 1622, 1587, 1424, 1400, 1083, 1038, 704, 668. ESI (m/e) 254$[M+H]^+$, ^{1}HNMR(D_2O) δ=4.14(m, *J*=4.3Hz, 1H), 3.84(m, *J*=5.1Hz, 1H), 3.81(m, *J*=5.0Hz, 1H), 3.79(m, *J*=3.4Hz, 1H), 3.70(d, *J*=5.0Hz, 2H), 3.68(m, *J*=5.6Hz, 1H), 3.30(dd, *J*=3.4Hz, *J*=12.7Hz, 1H), 3.22(dd, *J*=9.2Hz,

J=12.4Hz, 1H), 1.26(d, *J*=5.6Hz, 3H). Anal Calcd for $C_9H_{19}NO_7$: C 42.68, H 7.56, N 5.53; Found: C 42.86, H 7.72, N 5.70.

N-(n-2, 3, 4, 5, 6-Pentahydroxylhex-1-yl)-L-phenylalanine (4l) Yield: 24%. Mp 205-207°C, $[\alpha]_D^{25}$= -60.0(C=2.0, H_2O), IR(KBr) 3423, 3271, 2975, 2902, 1621, 1586, 1426, 1402, 1086, 1035, 706, 665. ESI (m/e) 330$[M+H]^+$, ^{1}HNMR(D_2O) δ=7.22(t, *J*=7.6Hz, 2H), 7.14(d, *J*=7.4Hz, 2H), 7.10(t, *J*=7.5Hz, 1H), 4.16(m, *J*=4.5Hz, 1H), 4.07(m, *J*=5.3Hz, 1H), 3.84(m, *J*=5.2Hz, 1H), 3.81(m, *J*=3.6Hz, 1H), 3.76(d, *J*=4.8Hz, 1H), 3.66(m, *J*=5.4Hz, 2H), 3.28(dd, *J*=3.5Hz, *J*=12.4Hz, 1H), 3.16(dd, *J*=9.0Hz, *J*=12.1Hz, 1H), 2.93(d, *J*=5.3Hz, 2H). Anal Calcd for $C_{15}H_{23}NO_7$: C 54.70, H 7.04, N 4.25; Found: C 54.88, H 7.19, N 4.09.

N-(n-2, 3, 4, 5, 6-Pentahydroxylhex-1-yl)-L-leucine (4m) Yield: 53%. Mp 207-208°C, $[\alpha]_D^{25}$= -40.0(C=2.0, H_2O), IR(KBr) 3365, 3097, 2962, 2924, 1616, 1432, 1374, 1294, 1083, 1044, 761, 677. ESI (m/e) 296$[M+H]^+$, ^{1}HNMR(D_2O) δ=4.02 (m, *J*=4.6Hz, 1H), 3.81(m, *J*=4.7Hz, 1H), 3.80(m, *J*=3.8Hz, 1H), 3.75(m, *J*=5.0Hz, 1H), 3.68 (t, *J*=6.0Hz, 1H), 3.66 (m, *J*=5.4Hz, 2H), 3.26 (dd, *J*=3.0Hz, *J*=13.0Hz, 1H), 3.14 (dd, *J*=10.0Hz, *J*=13.0Hz, 1H), 1.72 (m, *J*=4.1Hz, 1H), 1.70 (m, *J*=3.7Hz, 2H), 0.95 (dd, *J*=3.0Hz, *J*=6.0Hz, 6H). Anal Calcd for $C_{12}H_{25}NO_7$: C 48.80, H 8.53, N 4.74; Found: C 48.73, H 8.39, N 4.92.

N-(n-2, 3, 4, 5, 6-Pentahydroxylhex-1-yl)-L-isoleucine (4n) Yield: 42%. Mp 228-230°C, $[\alpha]_D^{25}$= -12.8(C=2.0, H_2O), IR(KBr) 3365, 3097, 2962, 2924, 1616, 1432, 1374, 1294, 1083, 1044, 761, 677. ESI (m/e) 296$[M+H]^+$, ^{1}HNMR(D_2O) δ=4.04 (m, *J*=4.5Hz, 1H), 3.83(m, *J*=4.8Hz, 1H), 3.80(m, *J*=3.7Hz, 1H), 3.77(m, *J*=5.1Hz, 1H), 3.71 (t, *J*=5.8Hz, 1H), 3.65 (m, *J*=5.3Hz, 2H), 3.55 (d, *J*=4.2Hz, 1H), 3.26 (dd, *J*=3.2Hz, *J*=13.1Hz, 1H), 3.20 (dd, *J*=9.8Hz, *J*=12.6Hz, 1H), 2.35 (m, *J*=4.2Hz, 1H), 1.33 (m, *J*=3.7Hz, 2H), 1.10 (d *J*=36Hz, 3H), 0.92 (dd, *J*=3.2Hz, *J*=6.3Hz, 3H). Anal Calcd for $C_{12}H_{25}NO_7$: C 48.80, H 8.53, N 4.74; Found: C 48.95, H 8.76, N 4.56.

N-(n-2, 3, 4, 5, 6-Pentahydroxylhex-1-yl)-L-tryptophane (4o) Yield: 22%. Mp 206-207°C, $[\alpha]_D^{25}$=10.0(C=2.0, H_2O), IR(KBr) 3407, 3353, 3095, 2968, 2916, 1617, 1400, 1354, 1080, 1041, 742, 675, 534. ESI (m/e) 369$[M+H]^+$, ^{1}HNMR(D_2O) δ=7.22(d, *J*=7.5Hz, 1H), 7.20(d, *J*=7.5Hz, 1H), 7.16(t, *J*=7.8Hz, 1H), 7.14(t, *J*=7.7Hz, 1H), 6.92(s, 1H), 4.16(m, *J*=4.9Hz, 1H), 3.90(t, *J*=5.0Hz, 1H), 3.85(m, *J*=5.2Hz, 1H), 3.83(m, *J*=5.3Hz, 1H), 3.77(m, *J*=3.9Hz, 1H), 3.71(d, *J*=5.3Hz, 2H), 3.27(dd, *J*=3.6Hz, *J*=12.9Hz, 1H), 3.20(dd, *J*=9.3Hz, *J*=12.9Hz, 1H), 2.93(d, *J*=4.9Hz, 2H). Anal Calcd for $C_{17}H_{24}N_2O_7$: C 55.43, H 6.57, N 7.60; Found: C55.25, H 6.39, N 7.76.

N-(n-2, 3, 4, 5, 6-Pentahydroxylhex-1-yl)-L-valine (4p) Yield: 19%. Mp 216-217°C, $[\alpha]_D^{25}$= -35.0(C=2.0, H_2O), IR(KBr) 3339, 3186, 2972, 2940, 2362, 1603, 1551, 1421, 1318, 1080, 1035, 825, 695, 617. ESI (m/e) 282$[M+H]^+$. ^{1}HNMR(D_2O) δ=4.03 (m, *J*=4.9Hz, 1H), 3.80 (m, *J*=5.1Hz, 1H), 3.79 (m, *J*=4.7Hz, 1H), 3.77 (m, *J*=3.9Hz, 1H), 3.67 (m, *J*=4.2Hz, 2H), 3.65 (dd, *J*=4.5Hz, *J*=16.0Hz, 1H), 3.22 (dd, *J*=3.0Hz, *J*=13.0Hz, 1H), 3.13 (dd, *J*=10.0Hz, *J*=13.0Hz, 1H), 2.38 (m, *J*=4.6Hz, 1H), 1.05 (dd, *J*=7.0Hz, *J*=16.0Hz, 6H). Anal Calcd for $C_{11}H_{23}NO_7$: C 46.97, H 8.24, N 4.98; Found: C46.97, H 8.24, N 4.98.

N-(n-2, 3, 4, 5, 6-Pentahydroxylhex-1-yl)-L-lysine (4q) Yield: 27%. Mp 147-148°C, $[\alpha]_D^{25}$= -40.0 (C=2.0, H_2O), IR(KBr) 3567, 3370, 3231, 2921, 2884, 1728, 1610, 1558, 1455, 1175, 1057, 1023, 829, 792, 614. ESI (m/e) 311$[M+H]^+$, ^{1}H NMR(D_2O) δ=4.07(m, *J*=4.6Hz, 1H), 3.80(m, *J*=5.2Hz, 1H), 3.78(m, *J*=5.2Hz, 1H), 3.74(m, *J*=3.8Hz, 1H), 3.67(m, *J*=5.0Hz, 2H), 3.60(d, *J*=4.5Hz, 1H), 3.27(dd, *J*=3.6Hz, *J*=12.6Hz, 1H), 3.15(dd, *J*=9.2Hz, *J*=12.4Hz, 1H), 2.70(t, *J*=4.9Hz, 2H), 1.68(m, *J*=4.4Hz, 2H), 1.57(m, *J*=4.9Hz, 2H), 1.32(m, *J*=4.7Hz, 2H). Anal Calcd for $C_{12}H_{26}N_2O_7$: C 46.44, H 8.44, N 9.03; Found: C 46.27, H 8.29, N 8.89.

N-(n-2, 3, 4, 5, 6-Pentahydroxylhex-1-yl)-L-arginine (4r) Yield: 28%. Mp 186-187°C, $[\alpha]_D^{25}$= -65.0(C=2.0, H_2O), IR(KBr) 3437, 3150, 2925, 2882, 1642, 1510,1396, 1078, 1026, 905. ESI (m/e) 339$[M+H]^+$, ^{1}HNMR(D_2O) δ=4.08(m, *J*=4.9Hz, 1H), 3.82(m, *J*=5.0Hz, 1H), 3.79(m, *J*=5.1Hz, 1H), 3.76(m, *J*=3.9Hz, 1H), 3.65(m, *J*=5.2Hz, 2H),

3.60(t, *J*=4.7Hz, 1H), 3.29(dd, *J*=3.3Hz, *J*=12.5Hz, 1H), 3.18(dd, *J*=9.0Hz, *J*=12.6Hz, 1H), 2.68(t, *J*=4.7Hz, 2H), 1.66(m, *J*=4.6Hz, 2H), 1.56(m, *J*=4.8Hz, 2H). Anal Calcd for $C_{12}H_{26}N_4O_7$: C 42.60, H 7.75, N 16.56; Found: C 42.46, H 7.51, N 16.73.

N-(n-2, 3, 4, 5, 6-Pentahydroxylhex-1-yl)-L-histidine (4s) Yield: 28%. Mp 232-235°C, $[\alpha]_D^{25}$= -130.0(C=2.0, H_2O), IR(KBr) 3443, 3337, 3125, 2910, 1618, 1448, 1398, 1112, 1057, 1016, 957, 620. ESI (m/e) 320$[M+H]^+$, ^{1}H NMR(D_2O) δ=7.46(s, 1H), 6.81(s, 1H), 4.11(m, *J*=4.7Hz, 1H), 3.91(t, *J*=5.3Hz, 1H), 3.84(m, *J*=5.1Hz, 1H), 3.82(m, *J*=5.3Hz, 1H), 3.78(m, *J*=4.2Hz, 1H), 3.66(m, *J*=5.1Hz, 2H), 3.26(dd, *J*=3.5Hz, *J*=12.7Hz, 1H), 3.17(dd, *J*=9.1Hz, *J*=12.4Hz, 1H), 2.88(d, *J*=5.3Hz, 2H). Anal Calcd for $C_{12}H_{21}N_3O_7$: C 45.14, H 6.63, N 13.16; Found: C 42.46, H 7.51, N 16.73.

N-(n-2, 3, 4, 5, 6-Pentahydroxylhex-1-yl)-L-proline(4t) Yield: 21%. Mp 138-141°C, $[\alpha]_D^{25}$= -70.0(C=2.0, H_2O), IR(KBr) 3374, 2927, 2872, 1719, 1634, 1458, 1404, 1328, 1226, 1084, 932, 880. ESI (m/e) 280$[M+H]^+$, ^{1}HNMR(D_2O) δ=4.00(m, *J*=4.7Hz, 1H), 3.77(m, *J*=5.2Hz, 1H), 3.75(m, *J*=5.0Hz, 1H), 3.73(m, *J*=3.9Hz, 1H), 3.63(m, *J*=5.2Hz, 2H), 3.22(dd, *J*=3.4Hz, *J*=12.3Hz, 1H), 3.14(t, *J*=4.9Hz, 1H), 3.10(dd, *J*=9.1Hz, *J*=12.4Hz, 1H), 2.32(t, *J*=4.9Hz, 2H), 1.82(m, *J*=5.0Hz, 2H), 1.60(m, *J*=4.9Hz, 2H). Anal Calcd for $C_{11}H_{21}NO_7$: C 47.31, H 7.58, N 5.02; Found: C 47.49, H 7.74, N 4.84.

Table 5. The kidney concentrations of essential metals in mice after chelating treatment[a]

Group	Fe	Cu	Zn	Mn	Ca
Pb only	93.13±7.35	3.55±0.26	27.20±3.11	1.32±0.11	76.02±9.15
Pb and **4a**	95.51±6.06	3.37±0.27	28.01±3.31	1.28±0.08	75.49±7.50
Pb and **4b**	94.04±6.10	3.60±0.31	27.64±3.20	1.29±0.12	76.71±8.09
Pb and **4c**	93.66±7.55	3.90±0.33	28.06±3.15	1.45±0.16	75.83±7.79
Pb and **4d**	95.35±6.90	3.22±0.28	27.50±3.03	1.38±0.14	75.99±7.89
Pb and **4e**	92.99±6.05	3.30±0.24	26.95±3.00	1.40±0.13	76.41±8.44
Pb and **4f**	92.87±6.11	3.48±0.22	27.11±3.13	1.37±0.09	75.87±7.18
Pb and **4g**	94.10±7.54	3.82±0.25	28.11±3.05	1.43±0.15	76.63±8.18
Pb and **4h**	92.95±6.51	3.43±0.22	27.84±3.27	1.39±0.17	76.74±8.00
Pb and **4i**	94.24±6.86	3.49±0.28	28.00±3.30	1.30±0.08	75.90±8.33
Pb and **4*J***	93.55±7.62	3.78±0.30	28.41±3.19	1.29±0.09	77.01±8.36
Pb and **4k**	92.86±6.36	3.55±0.20	27.77±3.39	1.27±0.14	75.89±8.54
Pb and **4l**	94.28±7.12	3.50±0.29	27.00±3.00	1.39±0.14	76.35±7.19
Pb and **4m**	93.02±7.23	3.39±0.28	27.97±3.05	1.35±0.16	75.96±8.74
Pb and **4n**	92.93±7.04	3.40±0.29	26.88±3.04	1.38±0.15	76.57±8.19
Pb and **4o**	93.69±7.00	3.59±0.25	27.83±3.24	1.43±0.17	77.27±8.80
Pb and **4p**	95.00±7.23	3.73±0.29	28.38±3.30	1.44±0.18	77.40±8.42
Pb and **4q**	94.87±7.01	3.63±0.25	27.94±3.22	1.30±0.09	75.88±8.09
Pb and **4r**	95.32±7.09	3.69±0.27	27.77±3.27	1.38±0.15	76.86±8.31
Pb and **4s**	94.45±7.04	3.83±0.23	28.28±3.31	1.39±0.20	77.07±8.08
Pb and **4t**	95.15±7.05	3.39±0.28	27.99±3.18	1.50±0.19	75.92±8.01

[a]Microgram per gram of tissue weight (X±SD) where n = 10, dose=4.0 mmol/kg.

Table 6. The liver concentrations of essential metals in mice after chelating treatment[a]

Group	Fe	Cu	Zn	Mn	Ca
Pb only	152.87±6.06	3.60±0.34	36.95±4.30	1.33±0.10	59.31±7.50
Pb and **4a**	152.20±5.89	3.42±0.30	36.58±4.03	1.30±0.08	58.98±7.07
Pb and **4b**	153.34±6.21	3.52±0.35	36.61±4.17	1.51±0.12	59.68±7.30
Pb and **4c**	152.32±6.24	3.71±0.37	37.24±4.25	1.39±0.13	59.56±7.11
Pb and **4d**	152.52±6.12	3.39±0.31	36.44±4.11	1.42±0.13	60.11±7.59
Pb and **4e**	153.38±6.00	3.55±0.30	37.41±4.34	1.40±0.11	59.11±7.00
Pb and **4f**	152.01±6.30	3.70±0.32	36.77±4.14	1.31±0.12	59.69±7.21
Pb and **4g**	153.70±6.09	3.75±0.33	37.22±4.07	1.48±0.14	60.34±7.08
Pb and **4h**	153.68±6.11	3.58±0.30	37.60±4.25	1.45±0.13	59.80±7.13
Pb and **4i**	152.20±6.04	3.74±0.31	37.38±4.19	1.47±0.15	59.78±7.02
Pb and **4*J***	154.04±6.32	3.79±0.37	37.90±4.14	1.50±0.16	60.33±7.28
Pb and **4k**	152.23±6.00	3.49±0.32	36.67±4.13	1.38±0.11	59.00±7.10
Pb and **4l**	154.11±6.15	3.83±0.38	37.86±4.20	1.51±0.14	60.22±7.32
Pb and **4m**	153.38±6.20	3.73±0.35	36.43±4.11	1.44±0.15	59.06±7.13
Pb and **4n**	154.04±6.09	3.84±0.38	38.00±4.12	1.52±0.17	61.01±7.30
Pb and **4o**	153.07±6.03	3.74±0.33	37.90±4.22	1.45±0.16	59.61±7.17
Pb and **4p**	152.00±6.24	3.47±0.31	36.03±4.09	1.28±0.07	58.66±7.09
Pb and **4q**	152.43±6.11	3.51±0.30	36.41±4.10	1.30±0.11	59.00±7.12
Pb and **4r**	153.36±6.21	3.75±0.36	37.02±4.04	1.38±0.14	59.81±7.22
Pb and **4s**	154.24±6.32	3.82±0.38	37.39±4.13	1.41±0.17	60.27±7.08
Pb and **4t**	153.33±6.22	3.68±0.33	36.09±4.03	1.31±0.13	59.02±7.11

[a]Microgram per gram of tissue weight (X±SD) where n =10, dose=4.0 mmol/kg

Table 7. The brain concentrations of essential metals in mice after chelating treatment[a]

Group	Fe	Cu	Zn	Mn	Ca
Pb only	56.94±3.07	2.47±0.32	34.07±5.08	0.81±0.06	69.70±5.56
Pb and **4a**	56.38±3.12	2.40±0.35	33.76±4.96	0.72±0.08	69.11±5.34
Pb and **4b**	56.07±3.20	2.36±0.30	33.53±4.83	0.73±0.07	69.03±5.27
Pb and **4c**	57.38±3.22	2.54±0.34	34.30±4.87	0.86±0.11	70.14±5.35
Pb and **4d**	57.43±3.26	2.61±0.37	34.44±4.79	0.88±0.12	70.29±5.27
Pb and **4e**	56.42±3.14	2.38±0.33	33.82±4.85	0.74±0.09	69.23±5.30
Pb and **4f**	57.37±3.30	2.56±0.36	34.55±4.90	0.90±0.13	70.38±5.40
Pb and **4g**	56.17±3.03	2.42±0.34	33.83±4.95	0.78±0.14	69.02±5.34
Pb and **4h**	57.66±3.25	2.61±0.36	34.63±4.89	0.89±0.16	70.25±5.28
Pb and **4i**	57.23±3.11	2.58±0.35	34.39±4.91	0.87±0.11	69.92±5.29
Pb and **4*J***	56.00±3.00	2.44±0.30	33.90±4.82	0.79±0.08	69.50±5.31
Pb and **4k**	56.37±3.12	2.51±0.33	34.59±4.88	0.85±0.09	69.93±5.41
Pb and **4l**	56.64±3.31	2.37±0.35	33.93±4.82	0.78±0.12	69.17±5.29
Pb and **4m**	57.67±3.11	2.53±0.31	34.39±4.90	0.83±0.09	70.46±5.34
Pb and **4n**	58.00±3.37	2.71±0.38	34.80±4.84	0.93±0.16	71.09±5.36
Pb and **4o**	56.55±3.27	2.48±0.36	34.34±4.76	0.90±0.15	70.31±5.33
Pb and **4p**	57.69±3.35	2.59±0.37	34.66±4.81	0.88±0.16	69.99±5.31
Pb and **4q**	58.11±3.39	2.76±0.35	35.01±4.91	0.95±0.15	71.22±5.35
Pb and **4r**	57.00±3.27	2.39±0.33	33.97±4.75	0.79±0.09	69.26±5.23
Pb and **4s**	56.38±3.11	2.41±0.30	34.00±4.83	0.80±0.13	69.61±5.22
Pb and **4t**	57.30±3.04	2.56±0.34	34.30±4.94	0.85±0.17	69.92±5.35

[a]Microgram per gram of tissue weight (X±SD) where n = 10, dose=4.0 mmol/kg

Table 8. Effect of **4a-t** on the body weight of the mice[a]

Group	Body weight(X±S.Dg)	
	Before intoxication	After last treatment
Control	23.9±2.6	30.8±2.5
4a	24.5±2.8	29.9±3.0
4b	24.7±2.7	31.2±3.1
4c	24.1±2.5	29.4±2.9
4d	23.2±2.5	29.1±2.8
4e	23.5±2.8	29.8±2.9
4f	24.8±2.9	31.6±3.0
4g	25.0±3.1	31.5±3.3
4h	22.7±2.5	29.1±2.7
4i	22.9±2.8	29.6±2.9
4j	24.3±3.1	30.3±3.2
4k	23.7±2.9	29.6±3.1
4l	24.0±3.2	30.5±2.8
4m	22.2±2.7	29.0±2.8
4n	23.3±2.9	29.7±3.0
4o	23.5±2.8	30.2±2.9
4p	24.3±2.9	31.3±3.1
4q	23.0±2.7	29.9±2.8
4r	22.9±2.8	29.6±2.9
4s	24.4±3.1	31.7±3.0
4t	25.0±3.3	32.2±3.3

[a]n =10, dose=0.4 mmol/kg