Supplementary Information

Anti-trypanosomal, Anti-leishmanial and Anti-malarial Activities of Quaternary Arylalkylammonium 2-Amino-4-Chlorophenyl Phenyl Sulfides, a New Class of Trypanothione Reductase Inhibitor, and of N-Acyl Derivatives of 2-Amino-4-Chlorophenyl Phenyl Sulfide.

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Contains tables of the following data:

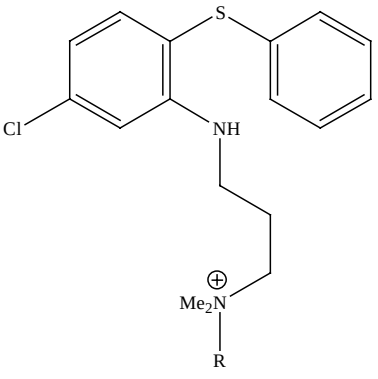
Table SI-1. Physical constants and analytical data for quaternary alkylammonium derivatives of 2-amino-4-chlorophenyl phenyl sulphides.

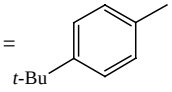
Table SI-2. Physical constants and analytical data for N-acyl derivatives of 2-amino-4-chlorophenyl phenyl sulphide.

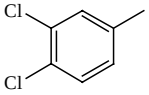
Table SI-3. ^{1}H NMR (270 MHz, CD_3OD) spectroscopic data for quaternary alkylammonium derivatives of 2-amino-4-chlorophenyl phenyl sulphides.

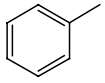
Table SI-4. ^{1}H NMR (270 MHz, CD_3OD) spectroscopic data for N-acyl derivatives of 2-amino-4-chlorophenyl phenyl sulphide.

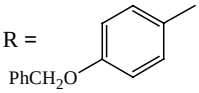
Table SI-1. Physical constants and analytical data for quaternary alkylammonium derivatives of 2-amino-4-chlorophenyl phenyl sulphides.



10, R = 

11, R = 

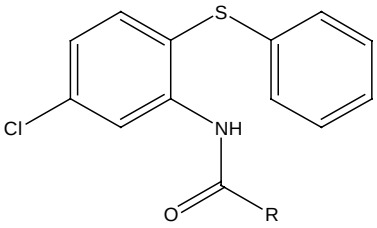
12, R = 

13, R = 

14, R = -CHPh$_2$

Compound	Yield (%)	R_f[A] Value	mp (^oC)	Formula	Analysis % (C, H, N) Calcd	Found	FAB-MS Data Calcd	Found
10	60	0.60	>250	$C_{28}H_{38}Cl_2N_2S$	66.5, 7.6, 5.5	66.3, 7.8, 5.3	467.2	467
11	80	0.57	81-83	$C_{24}H_{26}N_2Cl_3BrS.1/2H_2O$	50.7, 4.7, 4.9	50.6, 4.6, 4.8	479.0	479
12	89	0.53	141-143	$C_{24}H_{28}N_2ClBrS$	58.6, 5.7, 5.7	58.8, 5.7, 5.8	411.1	411
13	86	0.55	122-124	$C_{31}H_{34}Cl_2N_2SO.H_2O$	65.1, 6.3, 4.9	65.5, 6.4, 4.9	517.2	517
14	70	0.55	162-163	$C_{30}H_{32}ClBrN_2S$	63.4, 5.7, 4.9	63.3, 5.8, 4.8	487.2	487

Table SI-2. Physical constants and analytical data for N-acyl derivatives of 2-amino-4-chlorophenyl phenyl sulphide.



15, R = Et

16, R = *n*Pr

17, R = CH_2Ph

18, R = Ph

19, R = 4-$NO_2C_6H_4$-

Compound	Yield %	R_f[X] value	Mp (^{o}C)	Formula	ES-MS	Analysis % (C, H, N) Calculated	Found
15	65	0.45[B]	58-61	$C_{15}H_{14}ClNOS$	291	61.7, 4.8, 4.8	61.6, 4.6, 4.7
16	66	0.5[B]	129-132	$C_{16}H_{16}ClNOS$	305	62.8, 5.3, 4.6	62.6, 5.2, 4.3
17	75	0.55[B]	105-108	$C_{20}H_{16}ClNOS$	353	67.9, 4.6, 4.0	67.8, 4.4, 3.9
18	70	0.6[B]	153-156	$C_{19}H_{14}ClNOS$	339	67.2, 4.2, 4.1	67.1, 4.1, 4.0
19	78	0.7[B]	149-152	$C_{19}H_{13}ClN_2O_3S$	384	59.3, 3.4, 7.3	58.9, 3.3, 7.2

Table SI-3. ^{1}H NMR (270 MHz, CD_3OD) spectroscopic data for quaternary alkylammonium derivatives of 2-amino-4-chlorophenyl phenyl sulphides.

Compound	NMR, δ_H (ppm)
12	6.7-7.55 (13H, m, Ar), 4.45 (2H, s, CH_2-Bz), 3.4-3.1 (4H, m, C^1H_2-& C^3H_2-Pr), 2.95 (6H, s, $(CH_3)_2N^+$), 2.1 (2H, m, C^2H_2-Pr).
[a]**11**	7.8-6.65 (11H, m, Ph), 5.95* (1H, t, broad, NH), 4.45 (1H, s, CH_2-N^+), 3.5-3.2 (4H, q, CH_2-NHPh, CH_2-N^+), 2.9 (6H, s, $(CH_3)_2N$), 2.0 (2H, m, -CH_2-).
14	6.7-7.8 (18H, m, Ar), 5.7 (1H, s, Ph_2CH-N^+), 3.3-3.1 (4H, m, C^1H_2-& C^3H_2-Pr), 3.0 (6H, s, $(CH_3)_2N$), 2.1 (2H, m, C^2H_2-Pr).
13	6.7-7.45 (17H, m, Ar), 5.1 (2H, Ph-OCH_2-Ph) 4.3 (2H, s, CH_2-Bz), 3.4-3.0 (4H, q, C^1H_2- & C^3H_2-Pr), 2.9 (6H, s, $(CH_3)_2N$), 2.1 (2H, m, C^2H_2-Pr).
10	6.7-7.5 (13H, m, Ar), 4.4 (2H, s, Bz-CH_2-N^+), 3.4-3.0 (4H, q, C^1H_2-& C^3H_2-N^+), 2.9 (6H, s, $(CH_3)_2N$), 2.1 (2H, m, -C^2H_2-), 1.3 (9H, 3xCH_3)

[a] Spectrum recorded in d_6-DMSO.

Table SI-4. ^{1}H NMR (270 MHz, CD_3OD) spectroscopic data for N-acyl derivatives of 2-amino-4-chlorophenyl phenyl sulphide.

Compound	^{1}H-NMR ($CDCl_3$, 300 MHz)
15	δ_H 1.08 (t, 3H, *J* = 7.6 Hz, CH_3-H), 2.27 (q, 2H, *J* = 7.6 Hz, CH_2-H), 7.05 – 7.28 (m, 6H, Ar-H), 7.51 (d, 1H, *J* = 8.3 Hz, H-3), 8.22 (bs, 1H, -NH), 8.60 (d, 1H, *J* = 2.2 Hz, H-6).
16	δ_H 0.86 (t, 3H, *J* = 7.4 Hz, CH_3-H), 1.57 (sextuplet, 2H, *J* = 7.4 Hz, CH_2^1-H), 2.22 (t, 2H, *J* = 7.4 Hz, CH_2^2-H), 7.04 – 7.28 (m, 6H, Ar-H), 7.5 (d, 1H, *J* = 8.3 Hz, H-3), 8.22 (bs, 1H, -NH), 8.61 (d, 1H, *J* = 2.0 Hz, H-6).
17	δ_H 3.64 (s, 2H, CH_2), 6.79 (d, 1H, *J* = 2.0 Hz, H-4), 7.04 – 7.27 (m, 10H, Ar-H), 7.43 (d, 1H, *J* = 8.3 Hz, H-3), 8.32 (bs, 1H, -NH), 8.62 (d, 1H, *J* = 2.2 Hz, H-6).
18	δ_H 7.11 – 7.32 (m, 6H, Ar-H), 7.60 (s, 1H, H-6), 7.75 (d, 2H, *J* = 8.5 Hz, H-3 & H-4), 8.22 (d, 2H, *J* = 8.6 Hz, H-9 & H-11), 8.76 (d, 1H, *J* = 2.2 Hz, H-6), 9.02 (bs, 1H, -NH).
19	δ_H 7.13 – 7.4 (m, 6H, Ar-H), 7.61 (d, 1H, *J* = 8.3 Hz, H-3), 7.80 (d, 2H, *J* = 8.6 Hz, H-8 & H-12), 8.25 (d, 2H, *J* = 8.6 Hz, H-9 & H-11), 8.81 (d, 1H, *J* = 2.2 Hz, H-6), 9.13 (bs, 1H, -NH).

Table SI-5. ^{13}C NMR (270 MHz, $CDCl_3$) spectroscopic data for N-acyl derivatives of 2-amino-4-chlorophenyl phenyl sulphide.

Compound	^{13}C-NMR ($CDCl_3$, 75 MHz)
15	9.3 (CH_3), 30.9 (CH_2), 117.9 (C-2), 120.7 (C-6), 124.3 (C-4), 126.6 (C-4'), 127.1 (C-3' & C-5'), 129.5 (C-2' & C-6'), 135.1 (C-1'), 137.1 (C-5), 137.2 (C-3), 140.8 (C-1), 171.9 (C=O).
16	11.0 (CH_3), 16.8 (CH_2), 33.1 (CH_2), 120.4 (C-2), 121.8 (C-6), 124.9 (C-4), 127.0 (C-4'), 128.1 (C-3' & C-5'), 130.2 (C-2' & C-6'), 132.8 (C-1'), 136.5 (C-5), 139.2 (C-3), 143.7 (C-1), 172.6 (C=O).
17	45.22 (CH_2), 117.73 (C-6), 120.34 (C-2), 124.52 (C-4), 126.19 (C-4'), 126.59(C-10), 127.68 (C-9 & C-11), 129.20 (C-3' & C-5'), 129.52 (C-8 & C-12), 133.48 (C-2' & C-6'), 135.03 (C-1'), 137.11 (C-3), 137.2 (C-5), 137.54 (C-7), 140.85 (C-1), 169.31 (C=O).
18	116.43 (C-6), 118.75 (C-2), 121.78 (C-4), 123.03 (C-4'), 125.32 (C-8 and C-12), 125.89 (C-9 & C-11), 126.85 (C-3' & C-5'), 128.31 (C-2' & C-6'), 130.72 (C-1'), 135.03 (C-10), 137.11 (C-5), 137.2 (C-3), 137.54 (C-7), 140.85 (C-1), 169.31 (C=O).

19	118.52 (C-6), 120.69 (C-2), 124.05 (C-9 and C-11), 125.29 (C-4), 126.92 (C-4'), 126.98 (C-8 & C-12), 128.14 (C-3' & C-5'), 129.72 (C-2' & C-6'), 134.51 (C-1'), 137.41 (C-5), 137.44 (C-3), 139.75 (C-7), 140.06 (C-1), 149.86 (C-10), 163.09 (C=O).