Supplemental Information

Functional group	**Hammett's constant, σ_p**
Bis *o*-trifluoromethyl phenyl	0.15[c]
Bis 2-tolyl[a]	-0.03
Bis *t*-butyl	-0.20
Bis 2-norbonyl[b]	-0.15
o-trifluoromethyl phenyl, *m*-trifluoromethyl phenyl	0.15 [c]
Bis 2,4,4' trimethylpentyl (Cyanex 301)[c]	-0.12
Bis *m*-trifluoromethyl phenyl	0.15 [d]
Dicyclohexyl	-0.15
Diphenyl	-0.01
Bis 3,5 bis(*m*-trifluoromethyl) phenyl	0.20 [d]

Table 1: Hammett's constants for the DPAH functional groups.

[a] value for *para*- tolyl

[b] value for cyclohexyl

[c]value for $CH_2CH(Me)_2$

[d]values interpolated from the tabulated values for $-C_6H_4$-3Cl and $-C_6H_4$-3NO_2. The trifluoromethyl group appears to have a σ_p of 0.54, between–Cl (0.23) and -NO_2 (0.78)

Bisortho DPAH, 6	**1 h**	**1 week**	**2 weeks**	**1 month**	**2 months**
1 mM HNO_3	ND	ND	ND	ND	PD (<5%)
+ 10 mM $La(NO_3)_3$	ND	ND	ND	ND	PD (<10%)
+ 10 mM $La(NO_3)_3$ & 1 mM urea	ND	ND	ND	PD (<5%)	-
+ 10 mM $La(NO_3)_3$ & 1 mM hydrazine	ND	ND	ND	PD (<5%)	PD (<10%)
+ 1 mM urea	ND	ND	ND	PD (<5%)	-
+ 1 mM hydrazine	ND	ND	ND	ND	PD (<5%)
0.1 M HNO_3	ND	PD (<5%)	PD (<10%)	PD (<25%)	-
+ 10 mM $La(NO_3)_3$ & 1 mM urea	ND	PD (<2%)	PD (<10%)	PD (<25%)	
+ 10 mM $La(NO_3)_3$ & 1 mM hydrazine	ND	PD(<2%)	PD (<5%)	-	-
+ 1 mM urea	ND	PD (<2%)	PD (<5%)	PD (<33%)	-
+ 1 mM hydrazine	ND	PD (<2%)	PD (<10%)	PD (<20%)	-
0.5 M HNO_3	PD (<20%)	CD	-	-	-
+ 10 mM $La(NO_3)_3$ & 1 mM urea	PD (<10%)	CD	-	-	-
+ 10 mM $La(NO_3)_3$ & 1 mM hydrazine	ND	ND	PD (<3%)	PD (<10%)	-
+ 1 mM urea	PD (<10%)	CD	-	-	-
+ 1 mM hydrazine	ND	ND	PD (<3%)	PD (<10%)	-
2 M HNO_3	CD	-	-	-	-
+ 10 mM $La(NO_3)_3$	CD	-	-	-	-
+ 10 mM $La(NO_3)_3$ & 1 mM urea	CD	-	-	-	-
+ 10 mM $La(NO_3)_3$ & 1 mM hydrazine	CD	-	-	-	-
+ 1 mM urea	ND	CD	-	-	-
+ 1 mM hydrazine	ND	CD	-	-	-

Table 2: The stability of 0.01 M Bisortho DPAH in toluene (ND – no degradation, PD – partially degraded, CD – complete degradation, as determined by ^{31}P NMR)

Cyanex 301	**1 h**	**1 week**	**2 weeks**	**1 month**	**2 months**
1 mM HNO_3	ND	ND	ND	ND	PD (<2%)
+ 10 mM $La(NO_3)_3$	ND	ND	ND	ND	PD (<5%)
+ 10 mM $La(NO_3)_3$ + 1 mM urea	ND	ND	ND	PD (<5%)	PD (<5%)
+ 10 mM $La(NO_3)_3$ + 1 mM hydrazine	ND	ND	ND	PD (<5%)	PD (<5%)
+ 1 mM urea	ND	ND	ND	PD (<5%)	PD (<5%)
+ 1 mM hydrazine	ND	ND	ND	ND	PD (<10%)
0.1 M HNO_3	ND	ND	ND	ND	ND
+ 1 mM urea	ND	ND	ND	ND	ND
+ 1 mM hydrazine	ND	ND	ND	ND	PD (<5%)
+ 10 mM $La(NO_3)_3$ + 1 mM urea	ND	ND	ND	ND	PD (<5%)
+ 10 mM $La(NO_3)_3$ + 1 mM hydrazine	ND	ND	ND	ND	PD (<5%)
0.5 M HNO_3	PD (50%)	CD	-	-	-
+ 1 mM urea	ND	CD	-	-	-
+ 1 mM hydrazine	ND	ND	ND	ND	PD
+ 10 mM $La(NO_3)_3$+ 1 mM urea	PD (5%)	CD	-	-	-
+ 10 mM $La(NO_3)_3$+ 1 mM hydrazine	ND	ND	ND	ND	PD
2 M HNO_3	CD	-	-	-	-
+ 10 mM $La(NO_3)_3$	CD	-	-	-	-
+ 10 mM $La(NO_3)_3$ + 1 mM urea	CD	-	-	-	-
+ 10 mM $La(NO_3)_3$ + 1 mM hydrazine	CD	-	-	-	-
+ 1 mM urea	CD	-	-	-	-
+ 1 mM hydrazine	CD	-	-	-	-

Table 3: The stability of 0.01 M Cyanex 301 in toluene (ND – no degradation, PD – partially degraded, CD – complete degradation, as determined by ^{31}P NMR)

Diphenyl DPAH, 4	**1 h**	**1 week**	**2 weeks**	**1 month**
2 M HNO_3	CD	-	-	-
+ 10 mM $La(NO_3)_3$	CD	-	-	-
+ 1 mM hydrazine	ND	ND	ND	PD (<3%)
+ 1 mM urea	CD	-	-	-
+ 10 mM $La(NO_3)_3$ + 1 mM hydrazine	ND	ND	ND	PD (~3%)
+ 10 mM $La(NO_3)_3$ + 1 mM urea	CD	-	-	-
Dicyclohexyl DPAH, 3				
2 M HNO_3	CD	-	-	-
+ 10 mM $La(NO_3)_3$	CD	-	-	-
+ 1 mM hydrazine	ND	ND	ND	PD (~5%)
+ 1 mM urea	ND	CD	-	-
+ 10 mM $La(NO_3)_3$ + 1 mM hydrazine	ND	ND	ND	PD (~5%)
+ 10 mM $La(NO_3)_3$ + 1 mM urea	ND	CD	-	-

Table 4: Stability of 0.01 M Diphenyl and Dicyclohexyl DPAH in toluene contacted with various aqueous phases (ND – no degradation, PD – partially degraded, CD – complete degradation, as determined by ^{31}P NMR)

DPAH	1 h	1 week	2 weeks	1 month	2 months
1	CD	-	-	-	-
2	CD	-	-	-	-
3	ND	ND	ND	ND	PD (<10%)
4	ND	ND	ND	ND	PD (<10%)
5	ND	ND	ND	ND	PD (<10%)
6	ND	ND	ND	ND	PD (<10%)
7	ND	ND	ND	ND	PD (<10%)
8	PD (<5%)	-	-	-	-
9	PD (<5%)	-	-	-	-
10	CD	-	-	-	-

Table 5: 0.01 M DPAH in toluene contacted with 2 M HNO_3 with 10 mM hydrazine (ND – no degradation, PD – partially degraded, CD – complete degradation, as determined by ^{31}P NMR)