On the basicity of organic bases in different media

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Compound	pK_{aH}	Directly measured ΔpK_{aH} in acetonitrile
Ph–CH$_2$–P(=NMe–CH$_2$–CH$_2$)$_3$N	33.14	
t-Bu$_3$P (dma)	33.09	
Ph$_3$P (pyrr)	32.74	
Ph–CH$_2$–P(pyrr)$_3$	32.42	
ProtonSp-N-P(pyrr)$_3$	32.06	
4-MeO–C$_6$H$_4$–P(dma)$_3$	31.95	
PhP (dma)$_2$	31.44	
PhP (tmg)$_2$	31.34	
Ph–CH$_2$–P(dma)$_3$	31.31	
2-Cl–C$_6$H$_4$–P (pyrr)$_3$ NEt$_2$	31.07	
ProtonSp-N-P(*n*-Bu)$_3$	30.98	
4-NO$_2$–C$_6$H$_4$–CH$_2$–P(tmg)$_3$	30.68	
ProtonSp-N-P(pip)$_3$	30.55	
4-CF$_3$–C$_6$H$_4$–P(pyrr)$_3$	30.40	
ProtonSp-N=P(NMe$_2$)$_3$	30.32	
ProtonSp-N=P(*n*-Pr)$_3$	30.32	
(*n*-Bu)$_3$P=P-tBu	30.24	
2-Cl–C$_6$H$_4$P (dma)$_2$NEt$_2$	30.14	
[CH$_2$=CH$_2$–*n*-Bu$_3$P]$^+$	29.99	
ProtonSp-N=P(dma)$_3$	29.89	
(*n*-Bu)$_3$P=CH$_2$–*n*-Bu$_3$PX	29.89	
[CH$_2$–*n*-Bu$_3$P]$^+$	29.87	
HP (pyrr-2-CH$_2$–*N*-pyrr)$_2$	29.31	
2,5-Cl$_2$–C$_6$H$_3$P (pyrr)$_2$NEt$_2$	29.16	
4-CF$_3$–C$_6$H$_4$P (dma)$_2$	29.08	
PhP (tmg)$_2$ dma	29.06	
N,*C*(tmg)	28.97	
EtP (pyrr)$_2$	28.88	
t-BuP (pyrr)$_2$	28.42	
4-MeO–C$_6$H$_4$P (pyrr)$_2$	28.23	
[*t*-PrP]$_2$-*P*(*t*)*t*A	27.98	
[(CH$_2$)$_4$dma][(CH$_2$)$_4$dma]TMAMG	27.86	
PhP (pyrr)$_2$	27.56	
[EtP(CH$_2$)$_4$dma]TMAMG	27.54	
BnP (dma)$_2$	27.52	
t-BuP (*t*ACD)	27.38	
[ch$_2$ch]TMAMG	27.25	
[Me]$_2$-*P*(*t*)*t*A	27.2	
[dma][dma]Guanidine	27.15	
[*i*-Pr]$_2$-*P*(*t*)TMAMG	27.11	
HP (pyrr)$_2$	27.01	
t-BuP (dma)$_2$	26.98	
t-BuP (pip)$_2$	26.70	
[(CH$_2$)$_4$Me][CH$_2$cMe]TMAMG	26.66	
[H][dma]Guanidine	26.63	
PhP (dma)$_2$	26.44	
4-Br–C$_6$H$_4$P (pyrr)$_2$	26.30	
[CH$_2$–*n*-Bu]$_2$-*P*(*t*)*t*A	26.25	
TBD	26.02	
HP (dma)$_2$	25.85	
[dma][H]Guanidine	25.83	
2,6-[hpp]$_2$C$_6$H$_3$N	25.7	
IP	25.52	
4-NO$_2$–C$_6$H$_4$–CH$_2$–P(pyrr)$_3$	25.48	
MTBD	25.47	
2-Cl–C$_6$H$_4$P (pyrr)$_2$	25.4	
Me$_2$-IP	25.30	
4-CF$_3$–C$_6$H$_4$P (pyrr)$_2$	25.27	
ProtonSp-tmg	24.92	
[H][H]Guanidine	24.90	
[H][OMe]Guanidine	24.82	
[OMe][OMe]Guanidine	24.79	
[OMe][OMe]Guanidine	24.73	
PhP (dma)$_2$(tmg)	24.67	
4-NO$_2$–C$_6$H$_4$–CH$_2$–P(dma)$_3$	24.51	
[Me]$_2$-*P*(*t*)*t*A	24.44	
DBU	24.34	
2-Cl–C$_6$H$_4$P (dma)$_2$	24.23	
2-(hpp)C$_6$H$_4$N	24.2	
4-dma-C$_5$H$_4$N	23.86	
TMG	23.35	
[4-MeO–C$_6$H$_4$]$_2$-*P*(*t*)*t*A	23.24	
4-MeO–C$_6$H$_4$P (pyrr)$_2$	23.11	
[Me]$_2$-*P*(*t*)Hatube	23.02	
N,*N*′-Me$_2$-Bisgdine	22.73	
PhP (pyrr)$_2$	22.32	
(*n*)-Sparteine	21.67	
Bisgdine	21.54	
N,*N*′-Bn$_2$-Bisgdine	21.39	
N,*N*′-(CH$_2$)$_4$-Bisgdine	21.38	
PhP (dma)$_2$	21.36	
4-Br–C$_6$H$_4$P (pyrr)$_2$	21.20	
4-(4′-dma-C$_6$H$_4$-N-N-N)-C$_6$H$_4$P (pyrr)$_2$	20.88	
PhTMG	20.86	
1-NaphtP (pyrr)$_2$	20.61	
MeHN–(CH$_2$)$_3$–NHMe	20.45	
4-(Ph–(*p*)Ph–dma)-C$_6$H$_4$P (pyrr)$_2$	20.27	
4-CF$_3$–C$_6$H$_4$P (pyrr)$_2$	20.25	
2-Cl–C$_6$H$_4$P (pyrr)$_2$	20.19	
Me$_2$*N*–(CH$_2$)$_3$–NHMe	20.14	
MeNH–(CH$_2$)$_3$–NH$_2$	20.10	
MeNH–(CH$_2$)$_3$–NMe$_2$	20.07	
Me$_2$*N*–(CH$_2$)$_3$–NMe$_2$	19.96	
NH$_2$–(CH$_2$)$_3$–NH$_2$	19.76	
1-(*o*-Tol)Biguanide	19.67	
Me$_2$*N*–(CH$_2$)$_3$–NH$_2$	19.63	
Pyrrolidine	19.62	
Quino[7,8-*h*]quinoline	19.60	
4-(4-NO$_2$–C$_6$H$_4$-N-N-N)-C$_6$H$_4$P (pyrr)$_2$	19.51	
Piperidine	19.43	
Me$_2$*N*–(CH$_2$)$_2$–NMe$_2$	19.28	
[Me][Ph]Triazine	19.17	
Homopiperazine	19.11	
2-Cl–C$_6$H$_4$P (dma)$_2$	19.10	
4-(4′-dma-C$_6$H$_4$-N=N-)-C$_6$H$_4$P (pyrr)$_2$/Ph	19.04	
Me$_2$NH	18.93	
MeNHEt	18.93	
N′-Me-Cyclohexylamine	18.91	
Et$_2$N	18.83	
i-Pr$_2$NH	18.82	
Piperazine	18.69	
Me$_2$*N*–C(=N)–NMe$_2$	18.68	
N,*N*′-Me$_2$-Cyclohexylamine	18.67	
ProtonSp-dma	18.63	
4-CF$_3$-7-*N*-P-(pyrr)$_3$-Coumarin	18.58	
2,6-Cl$_2$–C$_6$H$_3$P (pyrr)$_2$	18.54	
[H][Ph]Triazine	18.52	
2,3-Cl$_2$–C$_6$H$_3$P (pyrr)$_2$	18.51	
4-NO$_2$–C$_6$H$_4$P (pyrr)$_2$	18.50	
PrNH$_2$	18.44	
4-(Ph-N=N)-C$_6$H$_4$P (pyrr)$_2$/Ph	18.36	
Cyclohexylamine	18.34	
9-NH$_2$-Acridine	18.36	
4-pyrr-Pyridine	18.25	
Me$_2$EtN	18.33	
PrN	18.25	
Me$_2$BuN	18.25	
N′-Me-Piperidine	18.24	
N′-Me-Piperazine	18.06	
4-dma-Pyridine	17.96	
N,*N*′-(CH$_2$)$_4$-Bisgdine	17.79	
4-(4′-NH$_2$-C$_6$H$_4$-N=N-)-C$_6$H$_4$P (pyrr)$_2$/Ph	17.77	
2-NO$_2$–4-Cl–C$_6$H$_3$P (pyrr)$_2$	17.70	
9-NH$_2$-Pyridine	17.61	
4-(Ph-N=N)-C$_6$H$_4$P (dma)$_2$	17.51	
9-O–1,5-(NH$_2$)$_2$-*N*′-Bn$_2$-Bisgdine	17.49	
N,*N*′-Me$_2$-Piperazine	17.43	
4-(4′-dma-C$_6$H$_4$-N=N-)-C$_6$H$_4$P (dma)$_2$/Ph	17.39	
2-NO$_2$–5-Cl–C$_6$H$_3$P (pyrr)$_2$	17.28	
9-O–*N*,*N*′-Bn$_2$-Bisgdine	16.94	
BnNH$_2$	16.92	
4-(Ph-N=N)-C$_6$H$_4$P (Ph)$_2$/pyrr	16.86	
4-CF$_3$-7-*N*-P-(pyrr)$_3$-Coumarin	16.84	
2-NO$_2$–4-CF$_3$–C$_6$H$_3$P (pyrr)$_2$	16.54	
3-NH$_2$-Isoquinoline	16.40	
2-NH$_2$-(*t*-Me-Benzimidazole	16.32	
4-(4′-NO$_2$–C$_6$H$_4$-N=N-)-C$_6$H$_4$P (Ph)$_2$/pyrr	16.22	
4-(4′-dma-C$_6$H$_4$-N=N-)-C$_6$H$_4$P (Ph)$_2$/pyrr	16.18	
2-NH$_2$-Benzimidazole	16.10	
Me$_2$*P*–(CH$_2$)$_2$–PMe$_2$	15.92	
4-(Ph-N=N)-C$_6$H$_4$P (Ph)$_2$	15.52	
Me$_2$P	15.48	
2,2′-(NH$_2$)$_2$-Pyridine	15.26	
4-CF$_3$-7-*N*-P-(Ph)$_2$/pyrr-Coumarin	15.24	
Imidazole	15.07	
2,4,6-Me$_3$-Pyridine	15.00	
2-(NO$_2$)$_2$–C$_6$H$_3$P (pyrr)$_2$	14.94	
4-(4′-NO$_2$–C$_6$H$_4$-N=N-)-C$_6$H$_4$P (Ph)$_2$	14.90	
2,6-(NH$_2$)$_2$-Pyridine	14.78	
2-NH$_2$-Pyridine	14.55	
2,6-Cl$_2$–4-NO$_2$–C$_6$H$_3$P (pyrr)$_2$	14.52	
4-MeO-Pyridine	14.24	
3-NH$_2$-Pyridine	14.21	
2,6-(NO$_2$)$_2$–C$_6$H$_3$P (pyrr)$_2$	14.17	
2,6-Me$_2$-Pyridine	14.16	
N,*N*′-Ph$_2$-Bisgdine	14.00	
4-CF$_3$-7-*N*-P-(Ph)$_2$/pyrr-Coumarin	13.92	
9-O–1,5-(COOMe)$_2$-*N*′-Bn$_2$-Bisgdine	13.84	
Phenanthridine	13.65	
2-NH$_2$-Acridine	13.67	
Benzimidazole	13.54	
9-O–*N*,*N*′-(CH$_2$)$_4$-Bisgdine	13.51	
2-Me-Pyridine	13.28	
4-MeO-*N*,*N*-Dimethylaniline	12.72	
Isoquinoline	12.68	
Acridine	12.66	
Me$_3$P	12.65	
Pyridine	12.53	
Thiabendazole	12.41	
DEP	12.38	
2,2′-Bipyridine	12.27	
Carbendazim	12.25	
4-Me-*N*,*N*-Dimethylaniline	12.24	
Quinoline	11.97	
5,6-Benzoquinoline	11.96	
4-MeO-Acridine	11.87	
Phthalazine	11.56	
8-NH$_2$-2-Me-Quinoline	11.56	
N,*N*-Dimethylaniline	11.47	
3,3′-Bipyridine	11.28	
4-NO-*N*,*N*-Dimethylaniline	11.27	
3-MeO-*N*,*N*-Dimethylaniline	11.22	
9-Cl-Acridine	11.07	
N-Me-Aniline	10.97	
7,8-Benzoquinoline	10.85	
Aniline	10.64	
2-Me-Aniline	10.49	
TPP	10.49	
5-NO$_2$-Benzimidazole	10.41	
dma-Phenylfulvene	10.30	
Ph$_2$P–(CH$_2$)$_2$–PPh$_2$	10.23	
TMP	10.16	
4-Br-*N*,*N*-Dimethylaniline	10.13	
(4-MeO-C$_6$H$_4$)$_2$P	10.06	
Pyridazine	10.00	
TCPP	10.00	
MePh$_2$P	9.97	
2-MeO-Pyridine	9.94	
Ph$_2$P–(CH$_2$)$_3$–PPh$_2$	9.84	
1-NaphthNH$_2$	9.78	
3-Br-*N*,*N*-Dimethylaniline	9.64	
3-Cl-Pyridine	9.56	
4-Br-Aniline	9.44	
Ph$_2$P–(CH$_2$)$_4$–PPh$_2$	9.32	
Quinazoline	9.29	
Pyrazole	9.1	
TPPF	9.0	
4-SCN-*N*,*N*-Dimethylaniline	8.78	
Pyrimidine	8.72	
4-CF$_3$-*N*,*N*-Dimethylaniline	8.70	
TCPPF	8.5	
4-(4′-NO$_2$–C$_6$H$_4$-N-N)-Aniline	8.40	
2,4-F$_2$-Aniline	8.39	
Ph$_2$P–(CH$_2$)$_2$–PPh$_2$·H$^+$	8.3	
3-NO$_2$-*N*,*N*-Dimethylaniline	8.26	
9-O–1,5-(COOMe)$_2$-*N*,*N*′-Ph$_2$-Bisgdine	8.14	
4-CF$_3$-Aniline	8.03	
BIPHEP	7.99	
1,2,3-Triazole	8.0	
2-Cl-Aniline	7.86	
BINAP	7.79	
OEP$^+$	7.8	
Pyridine	7.74	
3-NO$_2$-Aniline	7.68	
4-(*t*-3-NO$_2$-Aniline	7.66	
2,6-(MeO)$_2$-Pyridine	7.65	
Ph$_3$P	7.62	
Indazole	7.61	
Caffeine	7.51	
Quinoxaline	7.47	
Ph$_2$P–(CH$_2$)$_3$–PPh$_2$·H$^+$	7.4	
TMPH$^+$	7.0	
Benzotriazole	6.89	
2-Cl-Pyridine	6.72	
(1-Naphth)$_2$P	6.55	
MePh$_2$P	6.52	
4-NO$_2$-*N*,*N*-Dimethylaniline	6.46	
4-NO$_2$-Imidazole	6.34	
2,5-Cl$_2$-Aniline	6.23	
4-NO$_2$-Aniline	6.22	
(2-F-C$_6$H$_4$)$_3$P	6.11	
Ph$_3$NH	5.98	
Ph$_2$P–(CH$_2$)$_2$–PPh$_2$·H$^+$	5.8	
2-NO$_2$-Imidazole	5.58	
(2,6-F$_2$–C$_6$H$_3$)$_3$P	5.17	
2,6-Cl$_2$-Aniline	5.07	
5-NO$_2$-Indazole	4.93	
5-NO$_2$-Indazole	4.87	
2-NO$_2$-Aniline	4.53	
MeO-Phenylfulvene	4.56	
(2-F-C$_6$H$_4$)$_2$PhP	4.56	
BIPHEPF	4.5	
BINAPH	4.37	
4-Cl-2-NO$_2$-Aniline	3.68	
2-Cl-4-NO$_2$-Aniline	3.55	
Me-Phenylfulvene	3.50	
Uracil	3.36	
5-Cl-2-NO$_2$-Aniline	3.18	
(2-F-C$_6$H$_4$)$_2$P	3.01	
H-Phenylfulvene	2.90	
2,3,5,6-Cl$_4$-Aniline	2.72	
Thymine	2.68	
Cl-Phenylfulvene	2.59	
(C$_6$F$_5$)$_3$P	2.54	
(2,6-F$_2$–C$_6$H$_3$)$_2$PhP	2.50	
2,3,4,5,6-Cl$_5$-Aniline	2.32	
(2,6-Cl$_2$–C$_6$H$_3$)$_3$P	1.70	
Ph$_3$N	1.26	

dma pyrr pip cp ch tmg bn 1-Napht tmp

Ph-CH$_2$-P(-NMe-CH$_2$-CH$_2$)$_3$N

Proton*Sp-II

XP$_3$(R)$_3$ XP$_2$(R)$_2$ XP(R)$_3$ XP$_3$(R)$_3$NO$_3$

P-Bu$_3$P(TAC2) HP (pyrr-2-CH$_2$-*N*-pyrr)$_2$ 4,*C*$_2$-7-*N*-P-(R)$_2$ Coumarin

Pyrrolidine Piperidine Piperazine Homopiperazine Bispidine (-)-Sparteine

TBD MTBD DBU

BIPHEP BINAP

* Protonation site

Compound family: Phosphorylides; 1,8-Naphtyl-Proton Sponges; Aliphatic amines; Porphyrines; Phosphanes; Phosphazenes; Amidines; Heterocycles; Aromatic amines; Phenylfulvenes