Supporting Information

Peri-dimethylamino substituent effects on proton transfer at carbon in α-naphthylacetate esters: a model for mandelate racemase

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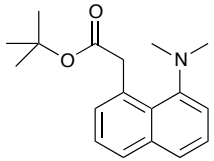
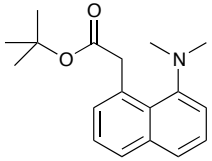
Table of Contents

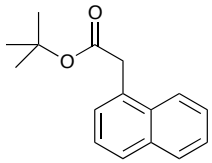
8-(*N*, *N*-Dimethylamino-naphthalen-1-yl)-acetic acid *tert*-butyl ester **1**:
^{1}H NMR ($CDCl_3$) 700 MHz



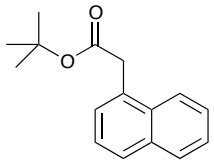
8-(*N*, *N*-Dimethylamino-naphthalen-1-yl)-acetic acid *tert*-butyl ester **1**:
^{13}C NMR ($CDCl_3$) 175 MHz



Naphthalen-1-yl-acetic acid *tert*-butyl ester **2**: ^{1}H NMR ($CDCl_3$) 700 MHz



Naphthalen-1-yl-acetic acid *tert*-butyl ester **2**: ^{13}C NMR ($CDCl_3$) 175 MHz



Determination of first and second order rate constants for deuteroxide-ion catalysed exchange

Figure S1: Representative ^{1}H NMR spectra at 500 MHz of the deuterium exchange reaction of 8-(*N*, *N*-dimethylamino-naphthalen-1-yl)-acetic acid *tert*-butyl ester (**1**) (5.0 mM) in 0.070 M KOD solution in 1:1 D_2O:CD_3CN at 25 ºC and I=0.1 M (KCl). The time elapsed is indicated above each spectrum.

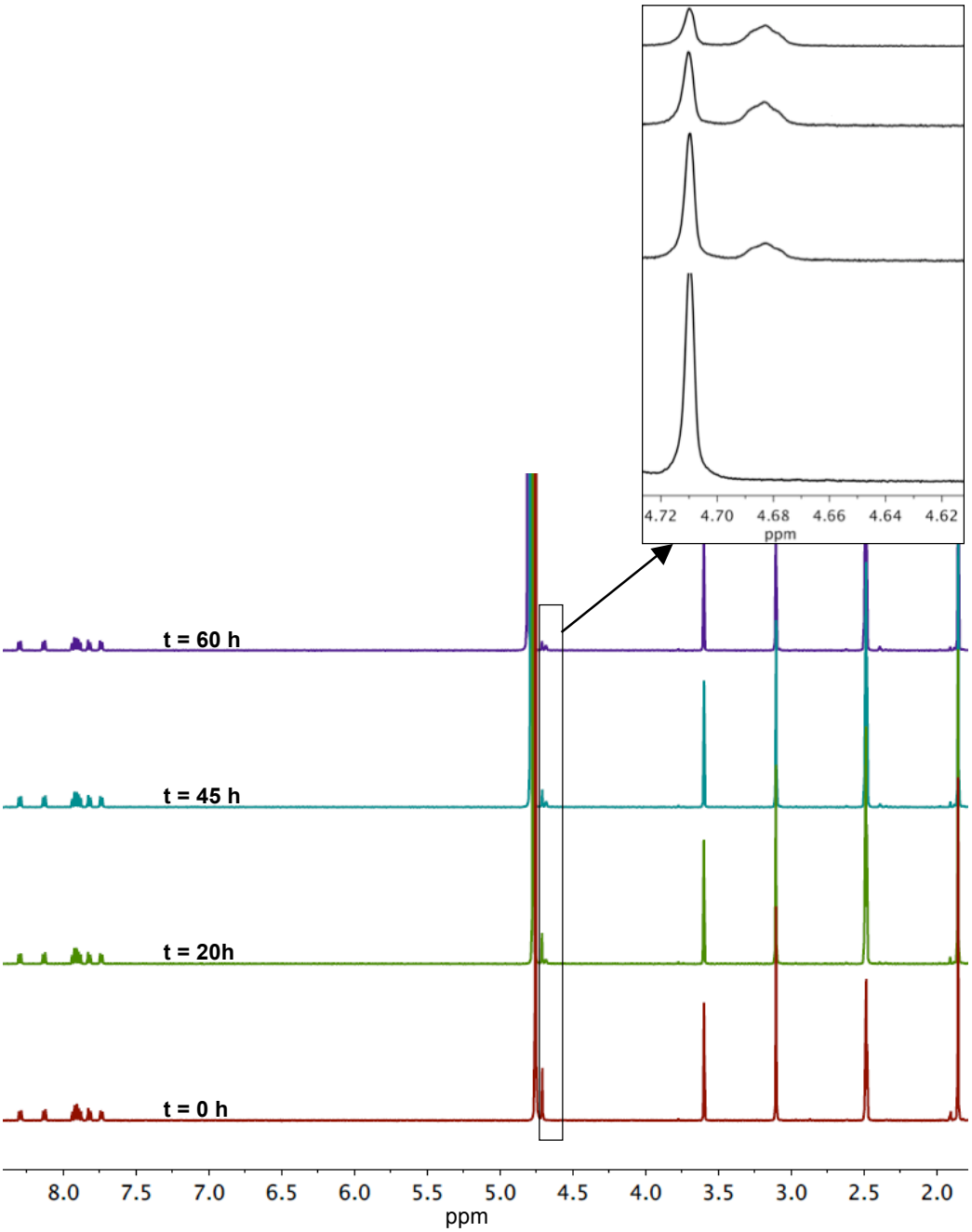


Figure S2: Semi-logarithmic plot of the fraction of remaining α-CH_2 hydrogens against time for the deuterium exchange of 8-(*N, N*-dimethylamino-naphthalen-1-yl)-acetic acid *tert*-butyl ester (**1**) (5.0 mM) at 0.023 M (■), 0.046 M (●), 0.060 M (♦), 0.070 M (▼), 0.083 M (▲), and 0.092 M (◢) KOD in 1:1 D_2O:CD_3CN at 25 ºC, I=0.1 M (KCl).

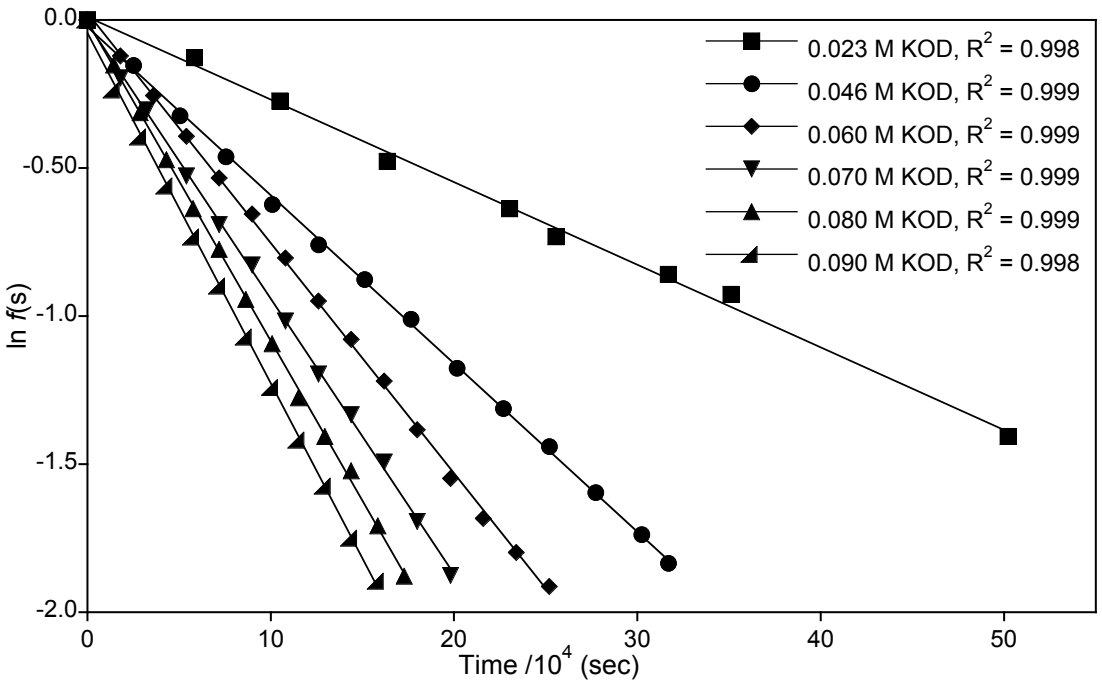


Figure S3: Plot of k_{obs} (s^{-1}) against [DO^-] (M) for the deuterium exchange reaction of 8-(*N*, *N*-dimethylamino-naphthalen-1-yl)-acetic acid *tert*-butyl ester **1** in 1:1 D_2O:CD_3CN at 25 ºC, I=0.1 M (KCl).

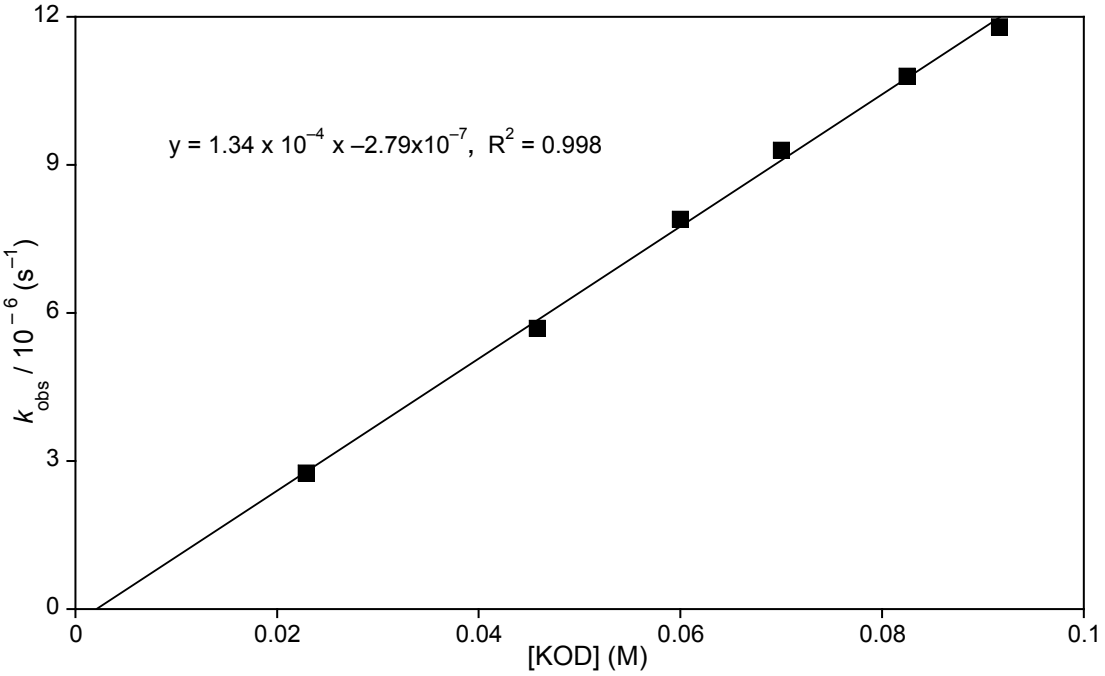


Figure S4: Representative ^{1}H NMR spectra at 400 MHz of the deuterium exchange of naphthalen-1-yl-acetic acid *tert*-butyl ester (**2**) (5.0 mM, 0.083 M KOD), obtained during exchange of the α-CH_2 for deuterium in 1:1 D_2O:CD_3CN at 25 ºC and I=0.1 M (KCl). The time elapsed is indicated above each spectrum.

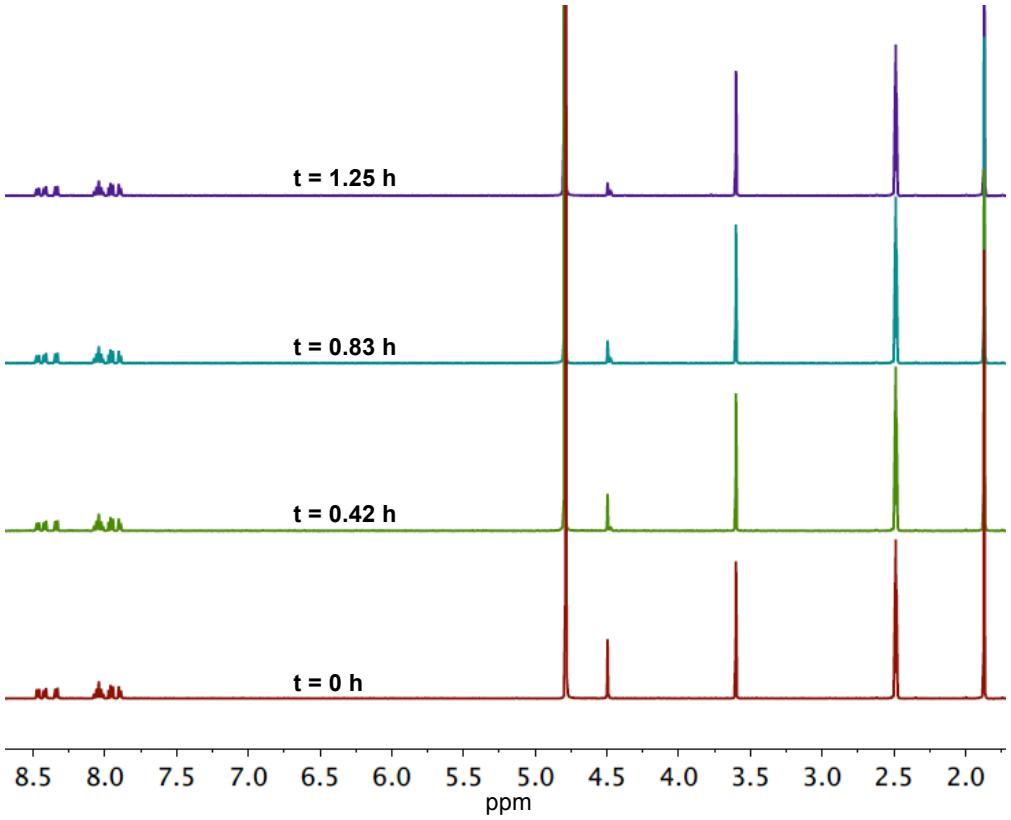


Figure S5: Semi-logarithmic plot of the fraction of remaining α-CH_2 hydrogens against time for the deuterium exchange reaction of naphthalen-1-yl-acetic acid *tert*-butyl ester (**2**) at 0.023 M (■), 0.046 M (●), 0.060 M (♦), 0.070 M (▼), 0.083 M (▲), and 0.092 M (◢) KOD in 1:1 D_2O:CD_3CN at 25 ºC, I=0.1 M (KCl).

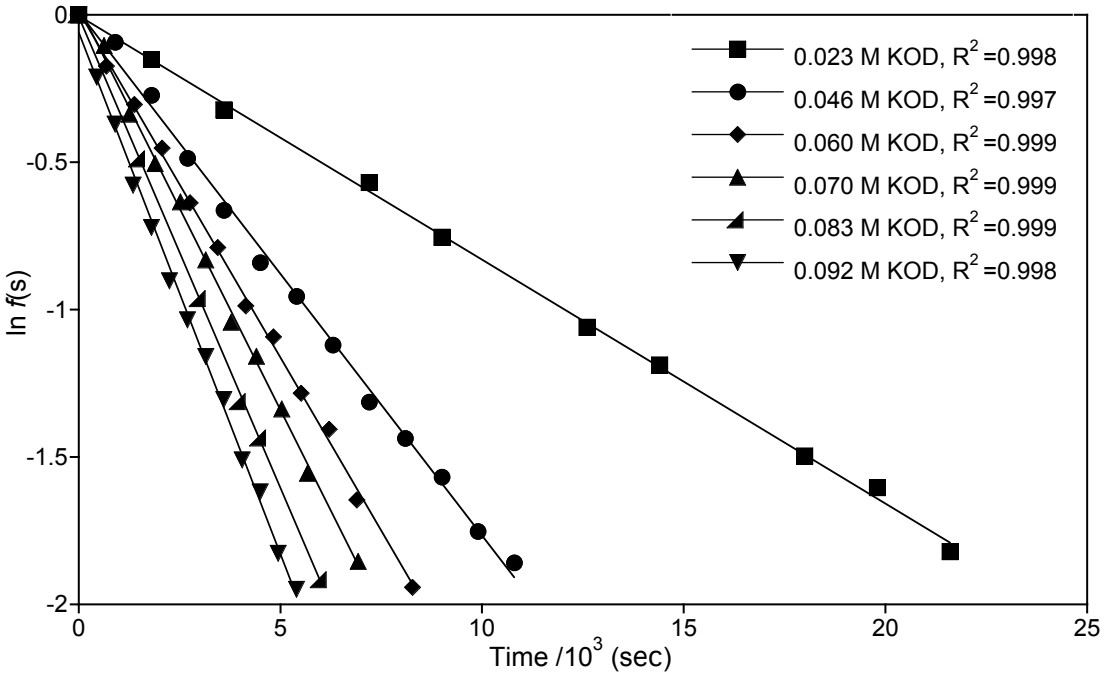
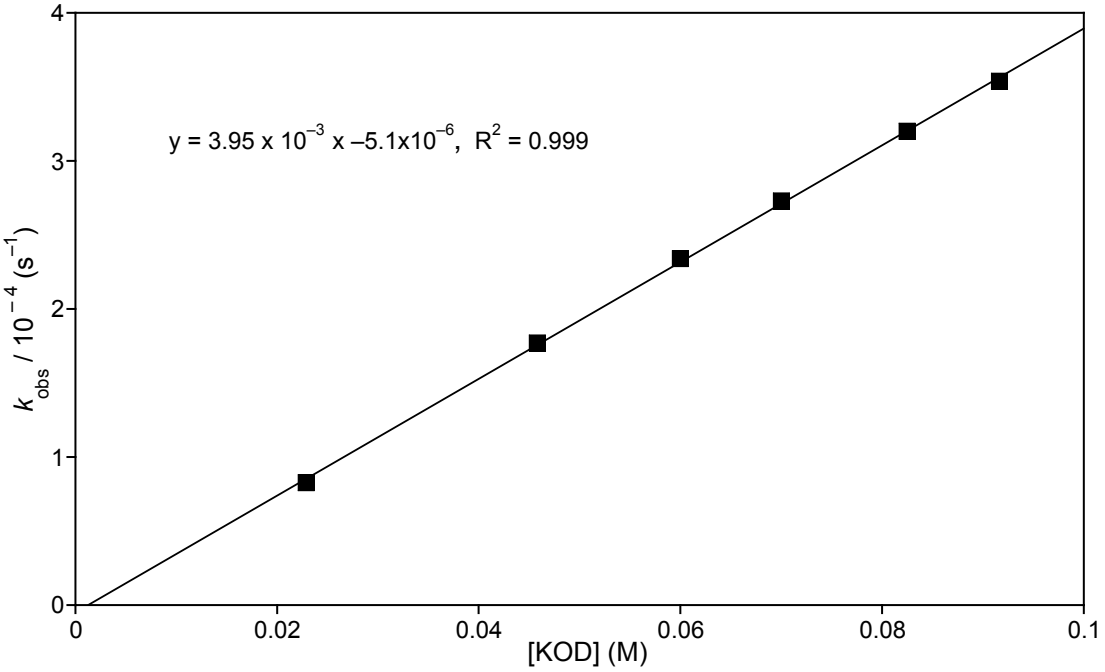


Figure S6: Plot of k_{obs} (s^{-1}) against [KOD] (M) for the deuterium exchange reaction of naphthalen-1-yl-acetic acid *tert*-butyl ester (**2**) in 1:1 D_2O:CD_3CN at 25 ºC, I=0.1 M (KCl).



Determination of the pK_a of the *peri*-dimethylammonium substituent of naphthyl ester 1

Table S1: Absorbance data for solutions of **1** in 1:1 H_2O:CH_3CN of varying pH at 25 °C, I=0.1 M (KCl).

Buffer	pH	A_{obs}
0.1 M KOH	13.95	1.207
0.025 M KH_2PO_4 / 0.025 M K_2HPO_4	7.50	1.200
0.045 M H_3PO_4 / 0.005 M KH_2PO_4	2.37	1.151
0.01 M HCl	1.89	1.032
0.015 M HCl	1.71	1.004
0.02 M HCl	1.61	0.952
0.025 M HCl	1.51	0.895
0.03 M HCl	1.40	0.852
0.04 M HCl	1.26	0.790
0.05 M HCl	1.18	0.724
0.06 M HCl	1.11	0.681
0.1 M HCl	0.88	0.524
0.5 M HCl[a]	0.18	0.224
2 M HCl[a]	0.03	0.136

(a) Measurements taken at an ionic strength greater than 0.1 M.

Figure S7: Non-linear least squares fitting to eq 4 of the change in the observed absorbance, A_{obs} (325 nm), of ester **1** with pH in 1:1 H_2O:CH_3CN solutions (main paper).