

Electronic Supplementary Informations (ESI)

SI Figure Captions

SI Fig. 1 Plot of k against DPPC for Cis-[Co(dpq)₂(C₁₂H₂₅NH₂)₂](ClO₄)₃ under different temperatures; cis-[Co(ip)₂(C₁₂H₂₅NH₂)₂](ClO₄)₃ = 4×10^{-4} mol dm⁻³, μ = 1.0 mol dm⁻³, [iron(II)] = 0.01 mol dm⁻³

5 SI Fig. 2 Plot of k against DPPC for Cis-[Co(dpqc)₂(C₁₂H₂₅NH₂)₂](ClO₄)₃ under different temperatures; cis-[Co(ip)₂(C₁₂H₂₅NH₂)₂](ClO₄)₃ = 4×10^{-4} mol dm⁻³, μ = 1.0 mol dm⁻³, [iron(II)] = 0.01 mol dm⁻³

SI Fig. 3 Plot of k against [BMIM]Br for Cis-[Co(dpq)₂(C₁₂H₂₅NH₂)₂](ClO₄)₃ at different temperatures; Cis-[Co(ip)₂(C₁₂H₂₅NH₂)₂](ClO₄)₃ = 4×10^{-4} mol dm⁻³, μ = 1.0 mol dm⁻³, [iron(II)] = 0.01 mol dm⁻³

SI Fig. 4 Plot of k against [BMIM]Br for Cis-[Co(dpqc)₂(C₁₂H₂₅NH₂)₂](ClO₄)₃ at different temperatures; Cis-
10 [Co(ip)₂(C₁₂H₂₅NH₂)₂](ClO₄)₃ = 4×10^{-4} mol dm⁻³, μ = 1.0 mol dm⁻³, [iron(II)] = 0.01 mol dm⁻³

SI Fig. 5 Eyring plot for Cis-[Co(ip)₂(C₁₂H₂₅NH₂)₂](ClO₄)₃ in DPPC medium. [Complex] = 4×10^{-4} mol dm⁻³; [iron(II)] = 0.01 mol dm⁻³; $[\mu]$ = 1.0 mol dm⁻³.

SI Fig. 6 Eyring plot for Cis-[Co(dpq)₂(C₁₂H₂₅NH₂)₂](ClO₄)₃ in DPPC medium. [Complex] = 4×10^{-4} mol dm⁻³; [iron(II)] = 0.01 mol dm⁻³; $[\mu]$ = 1.0 mol dm⁻³.

15 SI Fig. 7 Eyring plot for Cis-[Co(dpqc)₂(C₁₂H₂₅NH₂)₂](ClO₄)₃ in DPPC medium. [Complex] = 4×10^{-4} mol dm⁻³; [iron(II)] = 0.01 mol dm⁻³; $[\mu]$ = 1.0 mol dm⁻³.

SI Fig. 8 Eyring plot for Cis-[Co(ip)₂(C₁₂H₂₅NH₂)₂](ClO₄)₃ in [BMIM]Br medium. [Complex] = 4×10^{-4} mol dm⁻³; [iron(II)] = 0.01 mol dm⁻³; $[\mu]$ = 1.0 mol dm⁻³.

SI Fig. 9 Eyring plot for Cis-[Co(dpq)₂(C₁₂H₂₅NH₂)₂](ClO₄)₃ in [BMIM]Br medium. [Complex] = 4×10^{-4} mol dm⁻³; [iron(II)] =
20 0.01 mol dm⁻³; $[\mu]$ = 1.0 mol dm⁻³.

SI Fig. 10 Eyring plot for Cis-[Co(dpqc)₂(C₁₂H₂₅NH₂)₂](ClO₄)₃ in [BMIM]Br medium. [Complex] = 4×10^{-4} mol dm⁻³; [iron(II)] = 0.01 mol dm⁻³; $[\mu]$ = 1.0 mol dm⁻³.

SI Fig. 11 Isokinetic plot of the activation parameters for the reduction of Cis-[Co(ip)₂(C₁₂H₂₅NH₂)₂](ClO₄)₃ by ion(II) in DPPC medium. [Complex] = 4×10^{-4} mol dm⁻³; [iron(II)] = 0.01 mol dm⁻³; $[\mu]$ = 1.0 mol dm⁻³.

25 SI Fig. 12 Isokinetic plot of the activation parameters for the reduction of Cis-[Co(dpq)₂(C₁₂H₂₅NH₂)₂](ClO₄)₃ by ion(II) in DPPC medium. [Complex] = 4×10^{-4} mol dm⁻³; [iron(II)] = 0.01 mol dm⁻³; $[\mu]$ = 1.0 mol dm⁻³.

SI Fig. 13 Isokinetic plot of the activation parameters for the reduction of Cis-[Co(dpqc)₂(C₁₂H₂₅NH₂)₂](ClO₄)₃ by ion(II) in aqueous solutions. [Complex] = 4×10^{-4} mol dm⁻³; [iron(II)] = 0.01 mol dm⁻³; $[\mu]$ = 1.0 mol dm⁻³.

SI Fig. 14 Isokinetic plot of the activation parameters for the reduction of Cis-[Co(ip)₂(C₁₂H₂₅NH₂)₂](ClO₄)₃ by ion(II) in
30 [BMIM]Br medium. [Complex] = 4×10^{-4} mol dm⁻³; [iron(II)] = 0.01 mol dm⁻³; $[\mu]$ = 1.0 mol dm⁻³.

SI Fig. 15 Isokinetic plot of the activation parameters for the reduction of Cis-[Co(dpq)₂(C₁₂H₂₅NH₂)₂](ClO₄)₃ by ion(II) in [BMIM]Br medium. [Complex] = 4 x 10⁻⁴ mol dm⁻³; [iron(II)] = 0.01 mol dm⁻³; [μ] = 1.0 mol dm⁻³.

SI Fig. 16 Isokinetic plot of the activation parameters for the reduction of Cis-[Co(dpqc)₂(C₁₂H₂₅NH₂)₂](ClO₄)₃ by ion(II) in [BMIM]Br medium. [Complex] = 4 x 10⁻⁴ mol dm⁻³; [iron(II)] = 0.01 mol dm⁻³; [μ] = 1.0 mol dm⁻³.

5 SI Table Captions

SI Table 1. Second-order rate constants for the reduction of cobalt(III) complex ion by iron(II) in DPPC under different temperatures. Cis-[Co(dpq)₂(C₁₂H₂₅NH₂)₂](ClO₄)₃ = 4 x 10⁻⁴ mol dm⁻³, μ = 1.0 mol dm⁻³, [iron(II)] = 0.01 mol dm⁻³

SI Table 2. Second-order rate constants for the reduction of cobalt(III) complex ion by iron(II) in DPPC under different temperatures. Cis-[Co(dpqc)₂(C₁₂H₂₅NH₂)₂](ClO₄)₃ = 4 x 10⁻⁴ mol dm⁻³, μ = 1.0 mol dm⁻³, [Fe²⁺] = 0.01 mol dm⁻³

10 SI Table 3. Second-order rate constants for the reduction of cobalt(III) complex ion by iron(II) in the presence of [BMIM]Br medium under different temperatures. Cis-[Co(dpq)₂(C₁₂H₂₅NH₂)₂](ClO₄)₃ = 4 x 10⁻⁴ mol dm⁻³, μ = 1.0 mol dm⁻³, [iron(II)] = 0.01 mol dm⁻³

SI Table 4. Second-order rate constants for the reduction of cobalt(III) complex ion by iron(II) in the presence of [BMIM]Br medium under different temperatures. Cis-[Co(dpqc)₂(C₁₂H₂₅NH₂)₂](ClO₄)₃ = 4 x 10⁻⁴ mol dm⁻³, μ = 1.0 mol dm⁻³, [iron(II)] =
15 0.01 mol dm⁻³

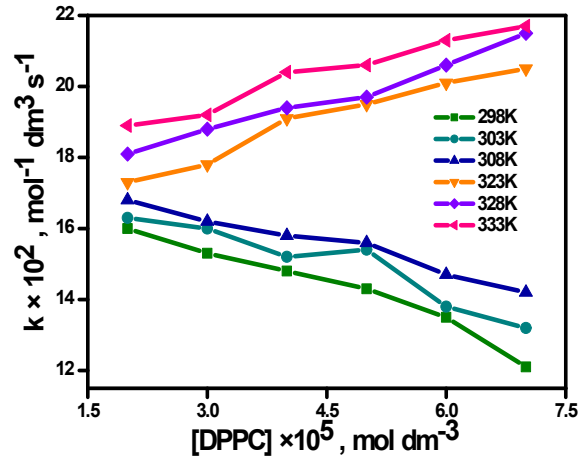
SI Table 5. Activation parameters for the reduction of Cis-[Co(dpq)₂(C₁₂H₂₅NH₂)₂](ClO₄)₃, μ = 1.0 moldm⁻³ in DPPC medium

SI Table 6. Activation parameters for the reduction of Cis-[Co(dpqc)₂(C₁₂H₂₅NH₂)₂](ClO₄)₃, μ = 1.0 moldm⁻³ in DPPC medium

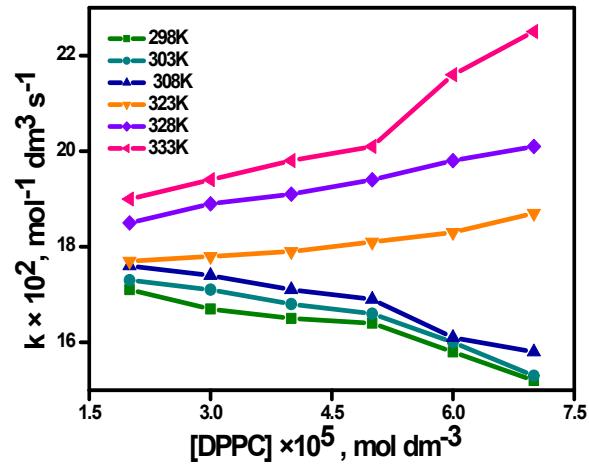
SI Table 7. Activation parameters for the reduction of Cis-[Co(dpq)₂(C₁₂H₂₅NH₂)₂](ClO₄)₃, μ = 1.0 moldm⁻³ in [BMIM]Br medium medium

20 SI Table 8. Activation parameters for the reduction of Cis-[Co(dpqc)₂(C₁₂H₂₅NH₂)₂](ClO₄)₃, μ = 1.0 moldm⁻³ in [BMIM]Br medium

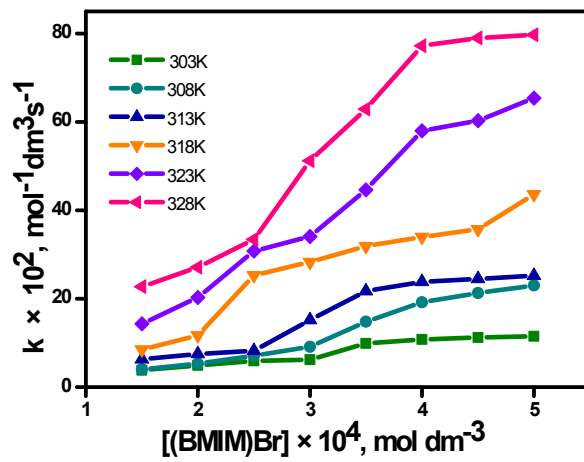
SI Figures



SI Fig. 1



SI Fig. 2



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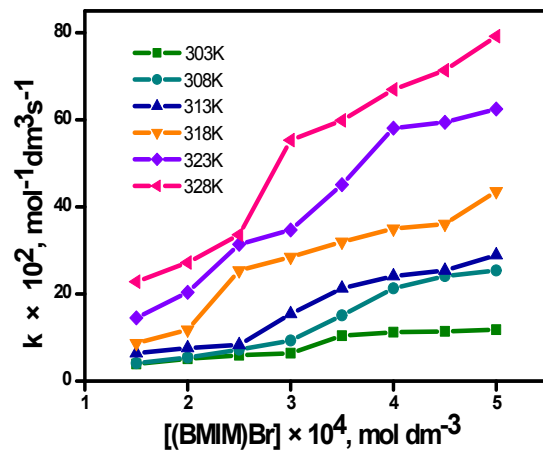
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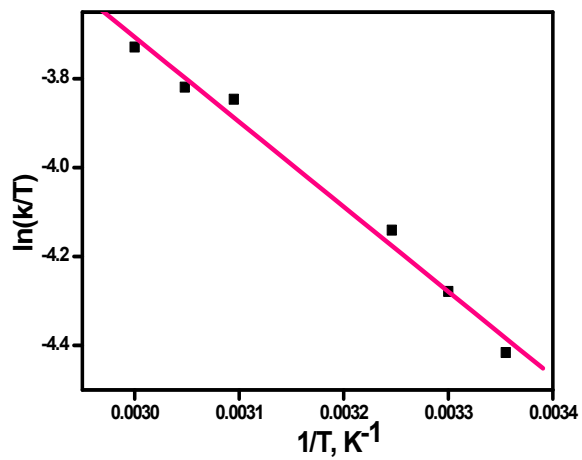
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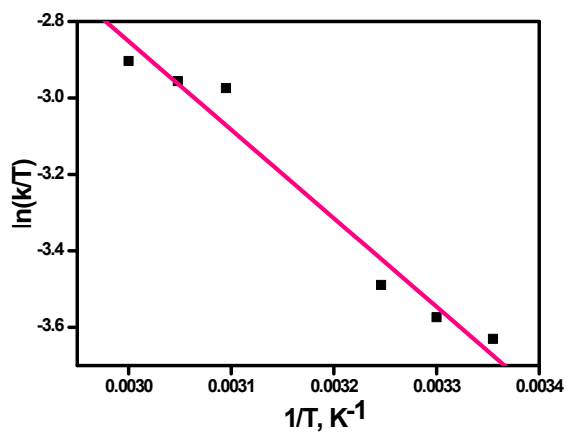
SI Fig. 3



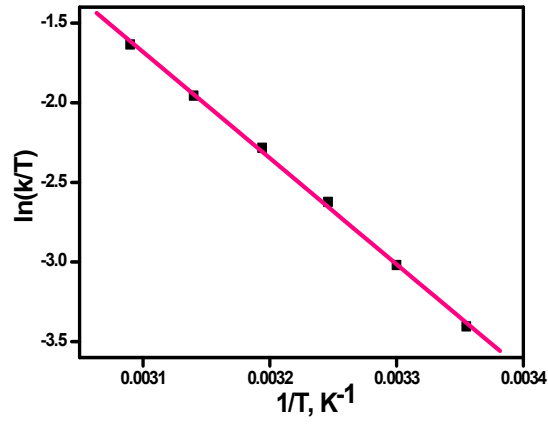
SI Fig. 4



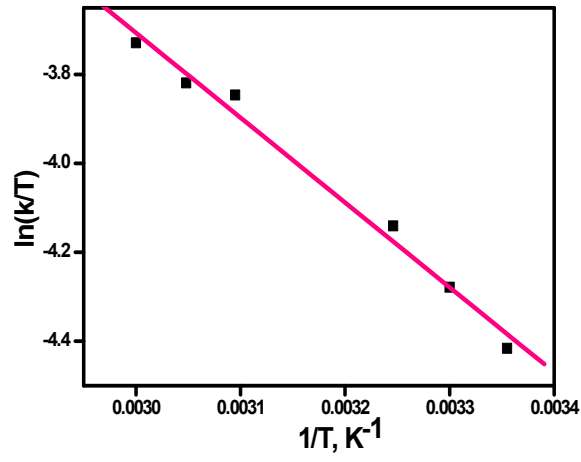
SI Fig. 5



SI Fig. 6



SI Fig. 7



SI Fig. 8

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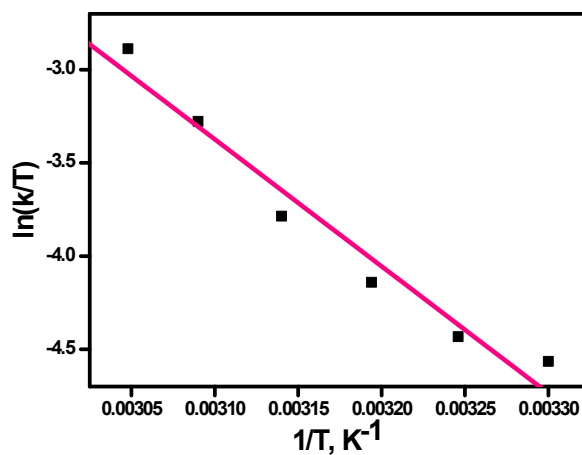
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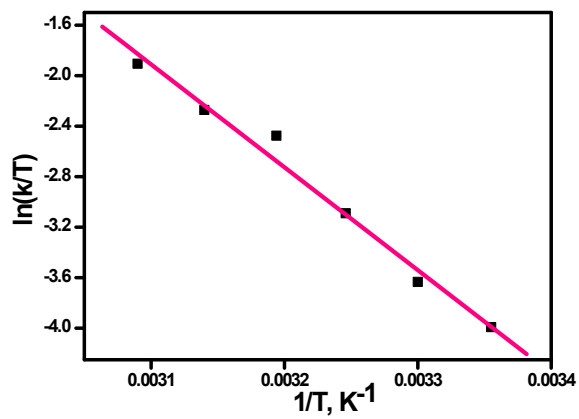
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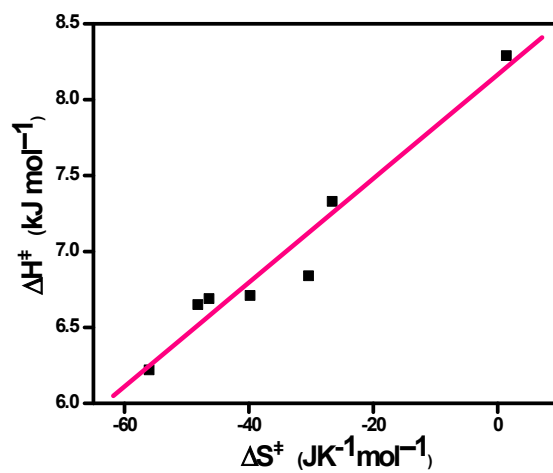
SI Fig. 9

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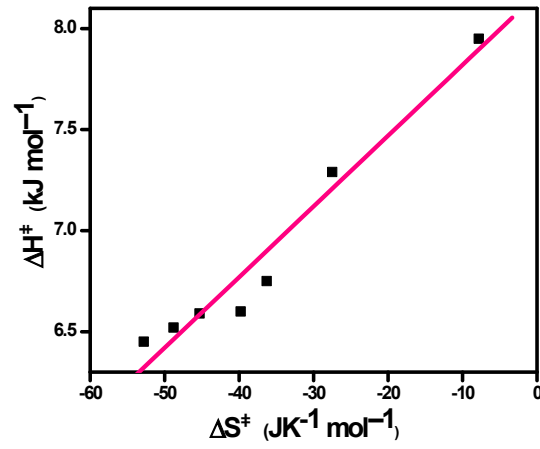
SI Fig. 10

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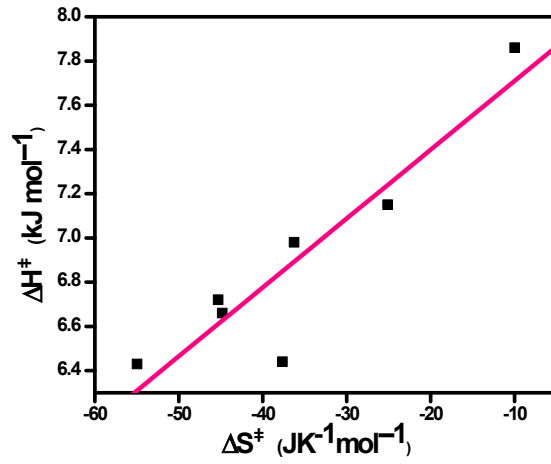
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SI Fig. 11



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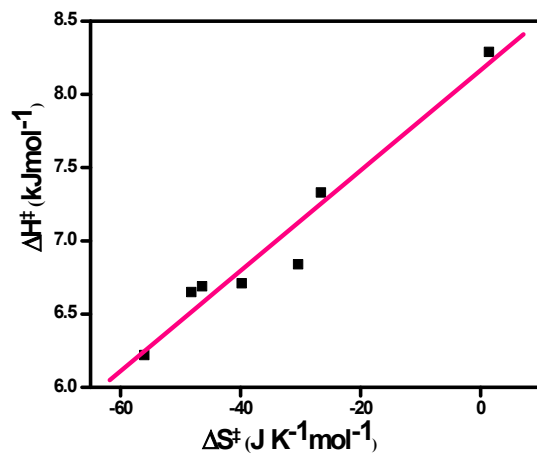
S Fig. 12



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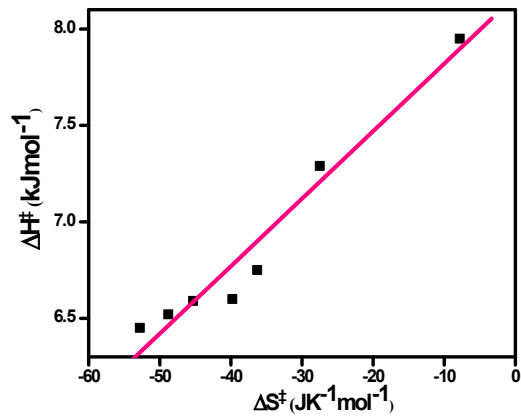
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SI Fig. 13



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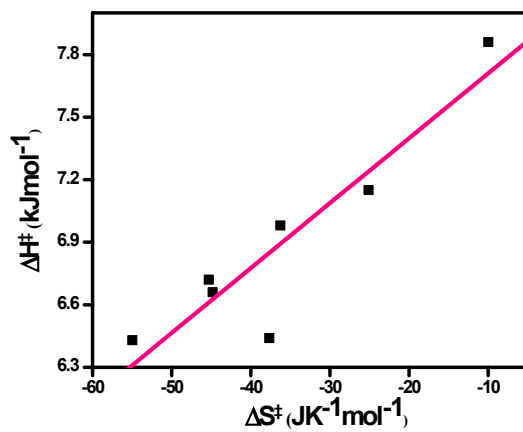
SI Fig. 14



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SI Fig. 15



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SI Fig. 16

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SI Tables

SI Table 1

[DPPC] × 10 ⁵ (mol dm ⁻³)		k × 10 ² , dm ³ mol ⁻¹ s ⁻¹					
		298K	303K	308K	323K	328K	333K
5	2.0	16.0	16.3	16.8	17.3	18.1	18.9
	3.0	15.3	16.0	16.2	17.8	18.8	19.2
	4.0	14.8	15.2	15.8	19.1	19.4	20.4
	5.0	14.3	15.4	15.6	19.5	19.7	20.6
	6.0	13.5	13.8	14.7	20.1	20.6	21.3
10	7.0	12.1	13.2	14.2	20.5	21.5	21.7

SI Table 2

[DPPC] × 10 ⁵ (mol dm ⁻³)		k × 10 ² , dm ³ mol ⁻¹ s ⁻¹					
		298K	303K	308K	323K	328K	333K
15	2.0	17.1	17.3	17.6	17.7	18.5	19.0
	3.0	16.7	17.1	17.4	17.8	18.9	19.4
	4.0	16.5	16.8	17.1	17.9	19.1	19.8
	5.0	16.4	16.6	16.9	18.1	19.4	20.1
	6.0	15.8	16.0	16.1	18.3	19.8	21.6
20	7.0	15.2	15.3	15.8	18.7	20.1	22.5

SI Table 3

		$k \times 10^2, \text{ dm}^3 \text{ mol}^{-1} \text{ s}^{-1}$					
$[(\text{BMIM})\text{Br}] \times 10^4, \text{ mol dm}^{-3}$		303K	308K	313K	318K	323K	328K
5	1.5	4.1	4.3	6.7	9.1	15.0	23.1
	2.0	5.2	5.5	7.8	11.5	21.2	28.1
	2.5	6.0	7.3	8.5	25.6	31.4	33.8
	3.0	6.5	9.4	15.5	28.9	34.8	56.1
	3.5	10.8	15.3	21.4	32.1	45.4	63.8
	4.0	11.5	21.0	24.7	35.3	59.4	78.2
10	4.5	11.9	22.4	25.8	37.1	60.0	79.4

SI Table 4

		$k \times 10^2, \text{ dm}^3 \text{ mol}^{-1} \text{ s}^{-1}$						
$[(\text{BMIM})\text{Br}] \times 10^4, \text{ mol dm}^{-3}$		303K	308K	313K	318K	323K	328K	
15	1.5	4.2	4.4	6.8	9.2	15.1	23.2	
	2.0	5.3	5.6	7.9	17.6	23.0	29.1	
	2.5	6.3	7.4	8.1	25.7	31.6	33.9	
	3.0	6.6	9.8	15.7	28.9	34.9	56.6	
	20	3.5	10.9	15.4	21.6	32.7	45.8	64.1
		4.0	11.6	21.1	25.2	35.8	60.1	71.6
		4.5	12.1	22.6	27.9	38.4	64.5	80.1

SI Table 5

	[DPPC] $\times 10^5$ (mol dm $^{-3}$)	ΔH^\ddagger kJmol $^{-1}$	ΔS^\ddagger JK $^{-1}$
	2.0	6.45	-52.8
5	3.0	6.52	-48.8
	4.0	6.59	-45.3
	5.0	6.60	-39.8
	6.0	6.75	-36.3
	7.0	7.29	-27.5
	8.0	7.95	-7.8

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SI Table 6

	[DPPC] $\times 10^5$ (mol dm $^{-3}$)	ΔH^\ddagger kJmol $^{-1}$	ΔS^\ddagger JK $^{-1}$
	2.0	6.43	-54.9
15	3.0	6.44	-37.6
	4.0	6.66	-44.8
	5.0	6.72	-45.3
	6.0	6.98	-36.2
	7.0	7.15	-25.1
20	8.0	7.86	-9.97

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SI Table 7

	$[(\text{BMIM})\text{Br}] \times 10^3,$ mol dm^{-3}	ΔH^\ddagger kJmol^{-1}	ΔS^\ddagger JK^{-1}
	1.5	6.45	-52.8
5	2.0	6.52	-48.8
	2.5	6.59	-45.3
	3.0	6.60	-39.8
	3.5	6.75	-36.3
	4.0	7.29	-27.5
	4.5	7.95	-7.8

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SI Table 8

	$[(\text{BMIM})\text{Br}] \times 10^3,$ mol dm^{-3}	ΔH^\ddagger kJmol^{-1}	ΔS^\ddagger JK^{-1}
	1.5	6.43	-54.9
15	2.0	6.44	-37.7
	2.5	6.66	-44.8
	3.0	6.72	-45.3
	3.5	6.98	-36.3
	4.0	7.15	-25.1
	4.5	7.86	-9.9

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