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Rate coefficients for the reactions of OH radicals with C_3–C_{11} alkanes determined by the relative-rate technique

Yanyan Xin et al.

Correspondence to: Chengtang Liu (ctliu@rcees.ac.cn)

This file contains, Supplementary Tables: 1-2 and Supplementary Figures:1-15

Table S1. Initial conditions of the various species injected into the reactor.

Alkanes	H_2O_2	N_2/Air	PAMs
10 ppb	100 ul	250 L	2.5 L

Table S2. Rate coefficients for OH + Alkanes in the N_2 and O_2 at 298±1 K.

			This work		
Alkanes	**Bath gas**	**Reference**	**$k_{OH}/k_{reference}$ ±1σ**	**k_{OH} ±1σ ($\times 10^{-12}$ cm^3 molecule^{-1} s^{-1})**	**$k_{OH\text{-}av}$[a] ±1σ ($\times 10^{-12}$ cm^3 molecule^{-1} s^{-1})**
Propane	N_2	n-Hexane	0.278±0.001	(1.38±0.01)	(1.38±0.05)
		Cyclohexane	0.187±0.004	(1.25±0.03)	
		n-Octane	0.174±0.020	(1.34±0.04)	
	O_2	n-Hexane	0.178±0.002	(0.886±0.012)	(0.888±0.084)
		Cyclohexane	0.133±0.004	(0.893±0.026)	
		n-Octane	0.109±0.008	(0.925±0.065)	
Isobutane	N_2	n-Hexane	0.427±0.048	(2.12±0.24)	(2.10±0.32)
		Cyclohexane	0.302±0.052	(2.02±0.35)	
		n-Octane	0.254±0.041	(2.15±0.35)	
	O_2	n-Hexane	0.422±0.004	(2.10±0.02)	(2.09±0.09)
		Cyclohexane	0.312±0.002	(2.24±0.02)	
		n-Octane	0.262±0.006	(2.22±0.05)	
n-Butane	N_2	n-Hexane	0.511±0.071	(2.54±0.35)	(2.64±0.43)
		Cyclohexane	0.423±0.120	(2.83±0.80)	
		n-Octane	0.343±0.084	(2.91±0.71)	
	O_2	n-Hexane	0.517±0.032	(2.57±0.16)	(2.62±0.28)
		Cyclohexane	0.396±0.039	(2.65±0.26)	
		n-Octane	0.333±0.044	(2.82±0.37)	
Isopentane	N_2	n-Hexane	0.715±0.038	(3.55±0.19)	(3.40±0.32)
		Cyclohexane	0.434±0.061	(2.91±0.41)	
		n-Octane	0.363±0.054	(3.08±0.46)	
	O_2	n-Hexane	0.446±0.020	(2.21±0.10)	(2.33±0.07)
		Cyclohexane	0.330±0.012	(2.21±0.08)	
		n-Octane	0.275±0.001	(2.33±0.01)	

	N_2	n-Hexane	0.764±0.039	(3.80±0.20)	
		Cyclohexane	0.533±0.006	(3.57±0.04)	(3.80±0.07)
		n-Octane	0.448±0.001	(3.80±0.01)	
n-pentane	Air	n-Hexane	0.709±0.042	(3.52±0.21)	
		Cyclohexane	0.527±0.021	(3.53±0.14)	(3.59±0.25)
		n-Octane	0.454±0.029	(3.85±0.24)	
	O_2	n-Hexane	0.754±0.011	(3.75±0.06)	
		Cyclohexane	0.558±0.005	(3.74±0.03)	(3.75±0.13)
		n-Octane	0.467±0.012	(3.96±0.10)	
Cyclopentane	N_2	n-Hexane	0.944±0.026	(4.69±0.13)	
		Cyclohexane	0.702±0.019	(4.70±0.13)	(4.88±0.19)
		n-Octane	0.593±0.010	(5.03±0.08)	
	O_2	n-Hexane	0.924±0.007	(4.59±0.04)	
		Cyclohexane	0.673±0.010	(4.50±0.07)	(4.59±0.14)
		n-Octane	0.576±0.014	(4.89±0.12)	
2,2-Dimethylbutane	N_2	n-Hexane	0.363±0.001	(1.80±0.01)	
		Cyclohexane	0.254±0.016	(1.70±0.11)	(1.80±0.06)
		n-Octane	0.213±0.011	(1.81±0.09)	
	O_2	n-Hexane	0.327±0.015	(1.63±0.08)	
		Cyclohexane	0.238±0.016	(1.59±0.11)	(1.63±0.18)
		n-Octane	0.204±0.016	(1.73±0.13)	
2,3-Dimethylbutane	N_2	n-Hexane	1.133±0.032	(5.63±0.16)	
		Cyclohexane	0.815±0.005	(5.45±0.03)	(5.72±0.11)
		n-Octane	0.686±0.002	(5.82±0.02)	
	O_2	n-Hexane	1.093±0.018	(5.43±0.09)	
		Cyclohexane	0.786±0.008	(5.25±0.06)	(5.32±0.17)
		n-Octane	0.650±0.019	(5.52±0.17)	
2-Methylpentane	N_2	n-Hexane	0.920±0.016	(4.57±0.08)	
		Cyclohexane	0.662±0.035	(4.43±0.23)	(4.58±0.21)
		n-Octane	0.557±0.024	(4.72±0.20)	
	O_2	n-Hexane	0.899±0.001	(4.47±0.01)	
		Cyclohexane	0.646±0.003	(4.32±0.02)	(4.46±0.06)
		n-Octane	0.535±0.007	(4.54±0.06)	
3-Methylpentane	N_2	n-Hexane	1.000±0.035	(4.97±0.17)	
		Cyclohexane	0.718±0.001	(4.80±0.01)	(4.81±0.08)
		n-Octane	0.604±0.005	(5.13±0.04)	

		n-Hexane	0.973±0.039	(4.83±0.20)	
	O_2	Cyclohexane	0.701±0.025	(4.69±0.16)	(4.79±0.26)
		n-Octane	0.582±0.028	(4.94±0.24)	
methylcyclopentane		n-Hexane	1.455±0.044	(7.23±0.22)	
	N_2	Cyclohexane	1.046±0.004	(7.00±0.28)	(7.14±0.13)
		n-Octane	0.881±0.005	(7.47±0.04)	
		n-Hexane	1.404±0.046	(6.98±0.23)	
	O_2	Cyclohexane	1.010±0.027	(6.76±0.18)	(6.89±0.28)
		n-Octane	0.838±0.037	(7.11±0.31)	
2,4-Dimethylpentane		n-Hexane	0.967±0.025	(4.81±0.12)	
	N_2	Cyclohexane	0.775±0.088	(5.18±0.59)	(4.96±0.07)
		n-Octane	0.585±0.001	(4.96±0.01)	
		n-Hexane	0.944±0.032	(4.69±0.16)	
	O_2	Cyclohexane	0.679±0.019	(4.54±0.13)	(4.87±0.24)
		n-Octane	0.564±0.026	(4.63±0.23)	
Cyclohexane		n-Hexane	1.392±0.049	(6.92±0.25)	
	N_2	Cyclohexane	--	--	(7.12±0.23)
		n-Octane	0.842±0.008	(7.14±0.07)	
		n-Hexane	1.388±0.010	(6.90±0.05)	
	O_2	Cyclohexane	--	--	(6.92±0.18)
		n-Octane	0.830±0.013	(7.04±0.11)	
2-Methylhexane		n-Hexane	1.366±0.055	(6.79±0.27)	
	N_2	Cyclohexane	0.979±0.003	(6.55±0.02)	(6.57±0.12)
		n-Octane	0.825±0.010	(7.00±0.09)	
		n-Hexane	1.415±0.015	(7.03±0.08)	
	O_2	Cyclohexane	1.020±0.022	(6.83±0.14)	(7.14±0.16)
		n-Octane	0.852±0.006	(7.22±0.05)	
3-Methylhexane		n-Hexane	1.310±0.022	(6.51±0.11)	
	N_2	Cyclohexane	0.938±0.023	(6.27±0.15)	(6.53±0.21)
		n-Octane	0.794±0.015	(6.73±0.13)	
		n-Hexane	1.401±0.017	(6.96±0.08)	
	O_2	Cyclohexane	1.007±0.019	(6.73±0.13)	(7.11±0.10)
		n-Octane	0.840±0.002	(7.12±0.02)	
2,2,4-Trimethylpentane		n-Hexane	0.635±0.013	(3.16±0.06)	
	N_2	Cyclohexane	0.458±0.026	(3.06±0.17)	(3.16±0.19)
		n-Octane	0.384±0.018	(3.26±0.15)	

	O_2	n-Hexane	0.587±0.019	(2.92±0.10)	(2.94±0.17)
		Cyclohexane	0.421±0.018	(2.82±0.12)	
		n-Octane	0.352±0.008	(2.98±0.07)	
n-Heptane	N_2	n-Hexane	1.302±0.004	(6.47±0.02)	(6.47±0.13)
		Cyclohexane	0.937±0.029	(6.27±0.20)	
		n-Octane	0.789±0.017	(6.47±0.13)	
	O_2	n-Hexane	1.271±0.004	(6.32±0.02)	(6.23±0.10)
		Cyclohexane	0.912±0.004	(6.10±0.03)	
		n-Octane	0.760±0.012	(6.45±0.10)	
Methylcyclohexane	N_2	n-Hexane	1.914±0.070	(9.51±0.35)	(9.20±0.08)
		Cyclohexane	1.374±0.001	(9.19±0.01)	
		n-Octane	1.156±0.013	(9.80±0.11)	
	O_2	n-Hexane	1.944±0.025	(9.66±0.12)	(9.43±0.17)
		Cyclohexane	1.400±0.007	(9.37±0.05)	
		n-Octane	1.165±0.023	(9.88±0.20)	
2,3,4-Trimethylpentane	N_2	n-Hexane	1.383±0.013	(6.88±0.06)	(6.88±0.21)
		Cyclohexane	0.997±0.043	(6.67±0.29)	
		n-Octane	0.839±0.028	(7.12±0.24)	
	O_2	n-Hexane	1.266±0.032	(6.29±0.16)	(6.35±0.21)
		Cyclohexane	0.908±0.031	(6.08±0.21)	
		n-Octane	0.757±0.010	(6.42±0.09)	
2-Methylheptane	N_2	n-Hexane	1.521±0.009	(7.56±0.05)	(7.57±0.18)
		Cyclohexane	1.096±0.053	(8.07±0.38)	
		n-Octane	0.923±0.029	(7.83±0.24)	
	O_2	n-Hexane	1.444±0.017	(7.18±0.09)	(7.33±0.04)
		Cyclohexane	1.037±0.021	(6.94±0.14)	
		n-Octane	0.865±0.001	(7.33±0.01)	
3-Methylheptane	N_2	n-Hexane	1.525±0.022	(7.58±0.11)	(7.59±0.26)
		Cyclohexane	1.099±0.054	(7.35±0.36)	
		n-Octane	0.925±0.036	(7.85±0.31)	
	O_2	n-Hexane	1.448±0.020	(7.20±0.10)	(7.34±0.11)
		Cyclohexane	1.040±0.024	(6.96±0.16)	
		n-Octane	0.867±0.002	(7.35±0.02)	
n-Octane	N_2	n-Hexane	1.651±0.043	(8.20±0.21)	(7.97±0.24)
		Cyclohexane	1.186±0.012	(7.93±0.08)	
		n-Octane	--	--	

	O_2	n-Hexane	1.666±0.013	(8.28±0.06)	
		Cyclohexane	1.199±0.019	(8.02±0.13)	(8.23±0.21)
		n-Octane	--	--	
Nonane	N_2	n-Hexane	2.124±0.057	(10.57±0.28)	
		Cyclohexane	1.525±0.016	(10.20±0.10)	(10.90±0.04)
		n-Octane	1.286±0.001	(10.90±0.01)	
	O_2	n-Hexane	2.117±0.002	(10.52±0.01)	
		Cyclohexane	1.525±0.011	(10.20±0.08)	(10.52±0.09)
		n-Octane	1.269±0.012	(10.76±0.10)	
n-Decane	N_2	n-Hexane	2.355±0.078	(11.71±0.39)	
		Cyclohexane	1.691±0.047	(11.31±0.10)	(11.54±0.16)
		n-Octane	1.425±0.009	(12.09±0.07)	
	O_2	n-Hexane	2.506±0.028	(12.45±0.14)	
		Cyclohexane	1.804±0.034	(12.07±0.22)	(12.35±0.29)
		n-Octane	1.503±0.004	(12.75±0.03)	
n-Undecane	N_2	n-Hexane	2.685±0.042	(13.34±0.21)	
		Cyclohexane	1.880±0.093	(12.58±0.63)	(13.30±0.34)
		n-Octane	1.592±0.056	(13.50±0.47)	
	O_2	n-Hexane	2.684±0.266	(13.34±1.32)	
		Cyclohexane	1.829±0.132	(12.24±0.88)	(13.92±0.65)
		n-Octane	1523±0.069	(12.92±0.58)	

a: Weighted average $k_{av} = (w_{ref1}k_{ref1}+w_{ref2}k_{ref2}+\ldots)/ (w_{ref1}+w_{ref2}+\ldots)$, where $_{ref1}=1/\sigma_{ref1}^{2}$, etc. The error, σ_{av}, was given by: $\sigma_{av} = (1/\sigma_{ref1}+1/\sigma_{ref2}+\ldots)^{-0.5}$.

Table S3. Rate coefficients for OH + Alkanes in N_2 and Air at 273-323 K.

T (K)	$\boldsymbol{k_{OH+n\text{-}Hexane}}$ **(cm³ molecule⁻¹ s⁻¹)**	**Slope[a]**	$\boldsymbol{k_{OH}}$[b] **(cm³ molecule⁻¹ s⁻¹)**	**Bath gas**
		2,3-Dimethylbutane		
273	4.17×10^{-12}	1.224±0.005	$(5.10\pm0.05)\times10^{-12}$	Air
		1.220	5.09×10^{-12}	N_2
283	4.44×10^{-12}	1.201±0.008	$(5.33\pm0.07)\times10^{-12}$	Air
		1.187	5.27×10^{-12}	N_2
293	4.70×10^{-12}	1.181±0.009	$(5.55\pm0.09)\times10^{-12}$	Air
		1.146	5.39×10^{-12}	N_2

303	4.97×10^{-12}	1.126±0.004	$(5.60\pm0.04)\times10^{-12}$	Air
		1.134	5.64×10^{-12}	N_2
313	5.22×10^{-12}	1.091±0.001	$(5.70\pm0.01)\times10^{-12}$	Air
		1.088	5.68×10^{-12}	N_2
323	5.48×10^{-12}	1.061±0.001	$(5.82\pm0.01)\times10^{-12}$	Air
		1.052	5.76×10^{-12}	N_2
		Methylcyclopentane		
273	4.17×10^{-12}	1.544±0.006	$(6.44\pm0.03)\times10^{-12}$	Air
		1.515	6.32×10^{-12}	N_2
283	4.44×10^{-12}	1.447±0.040	$(6.43\pm0.18)\times10^{-12}$	Air
		1.478	6.56×10^{-12}	N_2
293	4.70×10^{-12}	1.417±0.016	$(6.66\pm0.08)\times10^{-12}$	Air
		1.448	6.80×10^{-12}	N_2
303	4.97×10^{-12}	1.398±0.014	$(6.95\pm0.07)\times10^{-12}$	Air
		1.430	7.11×10^{-12}	N_2
313	5.22×10^{-12}	1.388±0.002	$(7.24\pm0.01)\times10^{-12}$	Air
		1.359	7.09×10^{-12}	N_2
323	5.48×10^{-12}	1.337±0.010	$(7.33\pm0.05)\times10^{-12}$	Air
		1.334	7.31×10^{-12}	N_2
		n-Heptane		
273	4.17×10^{-12}	1.287±0.040	$(5.37\pm0.17)\times10^{-12}$	Air
		1.288	5.37×10^{-12}	N_2
283	4.44×10^{-12}	1.308±0.020	$(5.81\pm0.09)\times10^{-12}$	Air
		1.340	5.95×10^{-12}	N_2
293	4.70×10^{-12}	1.311±0.049	$(6.16\pm0.23)\times10^{-12}$	Air
		1.318	6.19×10^{-12}	N_2
303	4.97×10^{-12}	1.323±0.011	$(6.58\pm0.06)\times10^{-12}$	Air
		1.312	6.52×10^{-12}	N_2
313	5.22×10^{-12}	1.359±0.005	$(7.09\pm0.01)\times10^{-12}$	Air
		1.275	6.66×10^{-12}	N_2
323	5.48×10^{-12}	1.318±0.005	$(7.22\pm0.03)\times10^{-12}$	Air
		1.264	6.93×10^{-12}	N_2
		3-Methylheptane		
273	4.17×10^{-12}	1.584±0.018	$(6.61\pm0.07)\times10^{-12}$	Air
		1.616	6.74×10^{-12}	N_2
283	4.44×10^{-12}	1.591±0.003	$(7.06\pm0.02)\times10^{-12}$	Air
		1.643	7.29×10^{-12}	N_2
293	4.70×10^{-12}	1.612±0.076	$(7.58\pm0.36)\times10^{-12}$	Air
		1.630	7.66×10^{-12}	N_2
303	4.97×10^{-12}	1.595±0.047	$(7.93\pm0.24)\times10^{-12}$	Air
		1.639	8.14×10^{-12}	N_2

313	5.22×10^{-12}	1.598±0.072	$(8.34\pm0.38)\times10^{-12}$	Air
		1.558	8.13×10^{-12}	N_2
323	5.48×10^{-12}	1.550±0.001	$(8.49\pm0.01)\times10^{-12}$	Air
		1.526	8.36×10^{-12}	N_2
		n-Octane		
273	4.17×10^{-12}	1.637±0.075	$(6.83\pm0.31)\times10^{-12}$	Air
		1.607	6.70×10^{-12}	N_2
283	4.44×10^{-12}	1.642±0.007	$(7.29\pm0.03)\times10^{-12}$	Air
		1.716	7.62×10^{-12}	N_2
293	4.70×10^{-12}	1.617±0.020	$7.60\pm0.10)\times10^{-12}$	Air
		1.655	7.78×10^{-12}	N_2
303	4.97×10^{-12}	1.643±0.009	$(8.17\pm0.04)\times10^{-12}$	Air
		1.687	8.38×10^{-12}	N_2
313	5.22×10^{-12}	1.689±0.041	$(8.82\pm0.22)\times10^{-12}$	Air
		1.666	8.70×10^{-12}	N_2
323	5.48×10^{-12}	1.625±0.053	$(5.90\pm0.29)\times10^{-12}$	Air
		1.633	8.95×10^{-12}	N_2
		Propane		
273	4.17×10^{-12}	0.170	7.09×10^{-13}	Air
		0.167	6.97×10^{-13}	N_2
283	4.44×10^{-12}	0.181±0.041	8.97×10^{-13}	Air
		0.197	8.75×10^{-13}	N_2
293	4.70×10^{-12}	0.215±0.027	$(1.01\pm0.13)\times10^{-12}$	Air
		0.195	9.14×10^{-13}	N_2
303	4.97×10^{-12}	0.199±0.013	$(9.91\pm0.63)\times10^{-13}$	Air
		0.208	1.04×10^{-12}	N_2
313	5.22×10^{-12}	0.220±0.010	$(1.15\pm0.05)\times10^{-12}$	Air
		0.214	1.12×10^{-12}	N_2
323	5.48×10^{-12}	0.223±0.051	$(1.22\pm0.28)\times10^{-12}$	Air
		0.224	1.23×10^{-12}	N_2
		Isobutane		
273	4.17×10^{-12}	0.350±0.033	$(1.46\pm0.14)\times10^{-12}$	Air
		0.338	1.41×10^{-12}	N_2
283	4.44×10^{-12}	0.400±0.020	$(1.78\pm0.09)\times10^{-12}$	Air
		0.378	1.68×10^{-12}	N_2
293	4.70×10^{-12}	0.389±0.024	$(1.83\pm0.11)\times10^{-12}$	Air
		0.394	1.85×10^{-12}	N_2
303	4.97×10^{-12}	0.416±0.054	$(2.07\pm0.27)\times10^{-12}$	Air
		0.421	2.09×10^{-12}	N_2
313	5.22×10^{-12}	0.398±0.025	$(2.08\pm0.13)\times10^{-12}$	Air
		0.415	2.17×10^{-12}	N_2
323	5.48×10^{-12}	0.424±0.009	$(2.32\pm0.05)\times10^{-12}$	Air

		0.428	2.34×10^{-12}	N_2
		n-Butane		
273	4.17×10^{-12}	0.316±0.140	$(1.32\pm0.58)\times10^{-12}$	Air
		0.224	9.34×10^{-13}	N_2
283	$4. 44\times10^{-12}$	0.389±0.068	$(1.73\pm0.30)\times10^{-12}$	Air
		0.418	1.86×10^{-12}	N_2
293	4.70×10^{-12}	0.408±0.004	$(1.92\pm0.02)\times10^{-12}$	Air
		0.436	2.05×10^{-12}	N_2
303	4.97×10^{-12}	0.449±0.031	$(2.23\pm0.15)\times10^{-12}$	Air
		0.470	2.34×10^{-12}	N_2
313	5.22×10^{-12}	0.455±0.027	$(2.37\pm0.15)\times10^{-12}$	Air
		0.481	2.51×10^{-12}	N_2
323	5.48×10^{-12}	0.468±0.024	$(2.57\pm0.13)\times10^{-12}$	Air
		0.489	2.68×10^{-12}	N_2
		Isopentane		
273	4.17×10^{-12}	0.713±0.040	$(2.97\pm0.33)\times10^{-12}$	Air
		0.686	2.86×10^{-12}	N_2
283	$4. 44\times10^{-12}$	0.700±0.021	$(3.11\pm0.18)\times10^{-12}$	Air
		0.679	3.01×10^{-12}	N_2
293	4.70×10^{-12}	0.689±0.018	$(3.24\pm0.17)\times10^{-12}$	Air
		0.707	3.32×10^{-12}	N_2
303	4.97×10^{-12}	0.664±0.024	$(3.30\pm0.24)\times10^{-12}$	Air
		0.656	3.26×10^{-12}	N_2
313	5.22×10^{-12}	0.681±0.020	$(3.56\pm0.21)\times10^{-12}$	Air
		0.664	3.47×10^{-12}	N_2
323	5.48×10^{-12}	0.661±0.019	$(3.63\pm0.22)\times10^{-12}$	Air
		0.654	3.58×10^{-12}	N_2
		n-pentane		
273	4.17×10^{-12}	0.687±0.020	$(2.86\pm0.08)\times10^{-12}$	Air
		0.651	2.71×10^{-12}	N_2
283	$4. 44\times10^{-12}$	0.681±0.001	$(3.02\pm0.03)\times10^{-12}$	Air
		0.658	2.92×10^{-12}	N_2
293	4.70×10^{-12}	0.664±0.051	$(3.12\pm0.24)\times10^{-12}$	Air
		0.670	3.15×10^{-12}	N_2
303	4.97×10^{-12}	0.655±0.078	$(3.25\pm0.39)\times10^{-12}$	Air
		0.675	3.36×10^{-12}	N_2
313	5.22×10^{-12}	0.641±0.058	$(3.35\pm0.30)\times10^{-12}$	Air
		0.668	3.49×10^{-12}	N_2
323	5.48×10^{-12}	0.623±0.017	$(3.41\pm0.09)\times10^{-12}$	Air
		0.653	3.58×10^{-12}	N_2
		Cyclopentane		
273	4.17×10^{-12}	0.898±0.049	$(3.75\pm0.20)\times10^{-12}$	Air
		0.878	3.66×10^{-12}	N_2

283	4. 44×10^{-12}	0.918±0.006	(4.08±0.03)×10^{-12}	Air
		0.933	4.14×10^{-12}	N_2
293	4.70×10^{-12}	0.972±0.021	(4.57±0.10)×10^{-12}	Air
		0.948	4.45×10^{-12}	N_2
303	4.97×10^{-12}	0.949±0.001	(4.72±0.01)×10^{-12}	Air
		0.950	4.72×10^{-12}	N_2
313	5.22×10^{-12}	0.993±0.007	(5.18±0.04)×10^{-12}	Air
		0.943	4.92×10^{-12}	N_2
323	5.48×10^{-12}	0.959±0.003	(5.26±0.02)×10^{-12}	Air
		0.961	5.27×10^{-12}	N_2
		2,2-Dimethylbutane		
273	4.17×10^{-12}	0.299±0.010	(1.25±0.01)×10^{-12}	Air
		0.299	1.25×10^{-12}	N_2
283	4. 44×10^{-12}	0.329±0.023	(1.46±0.10)×10^{-12}	Air
		0.337	1.49×10^{-12}	N_2
293	4.70×10^{-12}	0.371±0.004	(1.74±0.02)×10^{-12}	Air
		0.346	1.63×10^{-12}	N_2
303	4.97×10^{-12}	0.372±0.028	(1.85±0.14)×10^{-12}	Air
		0.387	1.92×10^{-12}	N_2
313	5.22×10^{-12}	0.389±0.009	(2.03±0.05)×10^{-12}	Air
		0.394	2.06×10^{-12}	N_2
323	5.48×10^{-12}	0.376±0.009	(2.06±0.05)×10^{-12}	Air
		0.38826	2.17×10^{-12}	N_2
		2-Methylpentane		
273	4.17×10^{-12}	0.938±0.002	(3.91±0.01)×10^{-12}	Air
		0.924	3.85×10^{-12}	N_2
283	4. 44×10^{-12}	0.962±0.031	(4.17±0.14)×10^{-12}	Air
		0.951	4.22×10^{-12}	N_2
293	4.70×10^{-12}	0.982±0.002	(4.62±0.01)×10^{-12}	Air
		0.961	4.52×10^{-12}	N_2
303	4.97×10^{-12}	0.954±0.002	(4.74±0.01)×10^{-12}	Air
		0.964	4.79×10^{-12}	N_2
313	5.22×10^{-12}	0.957±0.028	(5.00±0.15)×10^{-12}	Air
		0.929	4.85×10^{-12}	N_2
323	5.48×10^{-12}	0.943±0.001	(5.17±0.01)×10^{-12}	Air
		0.932	5.11×10^{-12}	N_2
		3-Methylpentane		
273	4.17×10^{-12}	0.882±0.016	(3.68±0.07)×10^{-12}	Air
		0.908	3.79×10^{-12}	N_2
283	4. 44×10^{-12}	0.908±0.017	(4.03±0.08)×10^{-12}	Air
		0.967	4.30×10^{-12}	N_2
293	4.70×10^{-12}	0.921±0.056	(4.33±0.26)×10^{-12}	Air
		0.951	4.47×10^{-12}	N_2

303	4.97×10^{-12}	0.928±0.035	$(4.61\pm0.17)\times10^{-12}$	Air
		0.983	4.88×10^{-12}	N_2
313	5.22×10^{-12}	0.886±0.073	$(4.63\pm0.38)\times10^{-12}$	Air
		0.940	4.91×10^{-12}	N_2
323	5.48×10^{-12}	0.914±0.010	$(5.01\pm0.06)\times10^{-12}$	Air
		0.927	5.08×10^{-12}	N_2
		2,4-Dimethylpentane		
273	4.17×10^{-12}	0.921±0.008	$(3.84\pm0.04)\times10^{-12}$	Air
		0.922	3.84×10^{-12}	N_2
283	$4. 44\times10^{-12}$	0.928±0.032	$(4.12\pm0.14)\times10^{-12}$	Air
		0.943	4.19×10^{-12}	N_2
293	4.70×10^{-12}	0.932±0.028	$(4.38\pm0.13)\times10^{-12}$	Air
		0.946	4.45×10^{-12}	N_2
303	4.97×10^{-12}	0.924±0.011	$(4.59\pm0.06)\times10^{-12}$	Air
		0.929	4.62×10^{-12}	N_2
313	5.22×10^{-12}	0.927±0.024	$(4.84\pm0.12)\times10^{-12}$	Air
		0.898	4.69×10^{-12}	N_2
323	5.48×10^{-12}	0.901±0.011	$(4.94\pm0.06)\times10^{-12}$	Air
		0.878	4.81×10^{-12}	N_2
		Cyclohexane		
273	4.17×10^{-12}	1.252±0.044	$(5.22\pm0.18)\times10^{-12}$	Air
		1.260	5.25×10^{-12}	N_2
283	$4. 44\times10^{-12}$	1.310±0.033	$(5.82\pm0.15)\times10^{-12}$	Air
		1.379	6.12×10^{-12}	N_2
293	4.70×10^{-12}	1.307±0.036	$(6.14\pm0.17)\times10^{-12}$	Air
		1.354	6.36×10^{-12}	N_2
303	4.97×10^{-12}	1.310±0.050	$(6.51\pm0.25)\times10^{-12}$	Air
		1.261	6.21×10^{-12}	N_2
313	5.22×10^{-12}	1.332±0.047	$(6.96\pm0.25)\times10^{-12}$	Air
		1.243	6.49×10^{-12}	N_2
323	5.48×10^{-12}	1.276±0.008	$(6.99\pm0.05)\times10^{-12}$	Air
		1.118	6.13×10^{-12}	N_2
		2-Methylhexane		
273	4.17×10^{-12}	1.365±0.001	$(5.69\pm0.01)\times10^{-12}$	Air
		1.372	5.72×10^{-12}	N_2
283	$4. 44\times10^{-12}$	1.347±0.046	$(5.98\pm0.20\times10^{-12}$	Air
		1.327	5.89×10^{-12}	N_2
293	4.70×10^{-12}	1.303±0.035	$(6.12\pm0.16)\times10^{-12}$	Air
		1.280	6.02×10^{-12}	N_2
303	4.97×10^{-12}	1.263±0.012	$(6.28\pm0.06)\times10^{-12}$	Air
		1.250	6.21×10^{-12}	N_2
313	5.22×10^{-12}	1.222±0.030	$(6.38\pm0.16)\times10^{-12}$	Air
		1.212	6.33×10^{-12}	N_2

323	5.48×10^{-12}	1.184±0.029	$(6.49\pm0.16)\times10^{-12}$	Air
		1.170	6.41×10^{-12}	N_2
		3-Methylhexane		
273	4.17×10^{-12}	0746±0.028	$(3.11\pm0.12)\times10^{-12}$	Air
		0.875	3.65×10^{-12}	N_2
283	$4. 44\times10^{-12}$	0.811±0.172	$(3.60\pm0.76)\times10^{-12}$	Air
		0.868	3.85×10^{-12}	N_2
293	4.70×10^{-12}	0.702±0.014	$(3.30\pm0.07)\times10^{-12}$	Air
		0.722	3.39×10^{-12}	N_2
303	4.97×10^{-12}	0.701±0.153	$(3.48\pm0.76)\times10^{-12}$	Air
		0.715	$3.143.55\times10^{-12}$	N_2
313	5.22×10^{-12}	0.787±0.160	$(4.11\pm0.08)\times10^{-12}$	Air
		0.726	4.79×10^{-12}	N_2
323	5.48×10^{-12}	0.824±0.107	$(4.52\pm0.06)\times10^{-12}$	Air
		0.738	4.05×10^{-12}	N_2
		2,2,4-Trimethylpentane		
273	4.17×10^{-12}	0.611±0.001	$(2.55\pm0.01)\times10^{-12}$	Air
		0.629	2.62×10^{-12}	N_2
283	$4. 44\times10^{-12}$	0.634±0.022	$(2.81\pm0.10)\times10^{-12}$	Air
		0.633	2.81×10^{-12}	N_2
293	4.70×10^{-12}	0.625±0.006	$(2.94\pm0.03)\times10^{-12}$	Air
		0.632	2.97×10^{-12}	N_2
303	4.97×10^{-12}	0.638±0.024	$(3.17\pm0.12)\times10^{-12}$	Air
		0.632	3.14×10^{-12}	N_2
313	5.22×10^{-12}	0.633±0.030	$(3.30\pm0.16)\times10^{-12}$	Air
		0.614	3.20×10^{-12}	N_2
323	5.48×10^{-12}	0.616±0.008	$(3.38\pm0.04)\times10^{-12}$	Air
		0.608	3.33×10^{-12}	N_2
		Methylcyclohexane		
273	4.17×10^{-12}	1.806±0.005	$(7.53\pm0.26)\times10^{-12}$	Air
		1.860	7.76×10^{-12}	N_2
283	$4. 44\times10^{-12}$	1.873±0.018	$(8.31\pm0.08)\times10^{-12}$	Air
		1.883	8.36×10^{-12}	N_2
293	4.70×10^{-12}	1.869±0.017	$(8.77\pm0.06)\times10^{-12}$	Air
		1.835	8.62×10^{-12}	N_2
303	4.97×10^{-12}	1.848±0.001	$(9.18\pm0.01)\times10^{-12}$	Air
		1.833	9.11×10^{-12}	N_2
313	5.22×10^{-12}	1.859±0.019	$(9.70\pm0.10)\times10^{-12}$	Air
		1.793	9.36×10^{-12}	N_2
323	5.48×10^{-12}	1.804±0.022	$(9.89\pm0.12)\times10^{-12}$	Air
		1.742	9.55×10^{-12}	N_2
		2,3,4-Trimethylpentane		
273	4.17×10^{-12}	1.522±0.023	$(6.35\pm0.09)\times10^{-12}$	Air

		1.527	6.37×10^{-12}	N_2
283	$4. 44\times10^{-12}$	1.477±0.034	$(6.56\pm0.15)\times10^{-12}$	Air
		1.502	6.67×10^{-12}	N_2
293	4.70×10^{-12}	1.435±0.022	$(6.74\pm0.11)\times10^{-12}$	Air
		1.439	6.76×10^{-12}	N_2
303	4.97×10^{-12}	1.377±0.014	$(6.84\pm0.07)\times10^{-12}$	Air
		1.379	6.85×10^{-12}	N_2
313	5.22×10^{-12}	1.355±0.017	$(7.07\pm0.09)\times10^{-12}$	Air
		1.333	6.96×10^{-12}	N_2
323	5.48×10^{-12}	1.296±0.019	$(7.10\pm0.10)\times10^{-12}$	Air
		1.297	7.11×10^{-12}	N_2
		2-Methylheptane		
273	4.17×10^{-12}	1.586±0.188	$(6.61\pm0.78)\times10^{-12}$	Air
		1.654	6.90×10^{-12}	N_2
283	$4. 44\times10^{-12}$	1.499±0.016	$(6.66\pm0.07)\times10^{-12}$	Air
		1.563	6.94×10^{-12}	N_2
293	4.70×10^{-12}	1.332±0.038	$(6.26\pm0.18)\times10^{-12}$	Air
		1.409	6.62×10^{-12}	N_2
303	4.97×10^{-12}	1.344±0.092	$(6.68\pm0.46)\times10^{-12}$	Air
		1.335	6.64×10^{-12}	N_2
313	5.22×10^{-12}	1.396±0.017	$(7.29\pm0.09)\times10^{-12}$	Air
		1.318	6.88×10^{-12}	N_2
323	5.48×10^{-12}	1.339±0.035	$(7.34\pm0.19)\times10^{-12}$	Air
		1.312	7.19×10^{-12}	N_2
		Nonane		
273	4.17×10^{-12}	1.882±0.008	$(7.85\pm0.04)\times10^{-12}$	Air
		2.009	8.38×10^{-12}	N_2
283	$4. 44\times10^{-12}$	1.924±0.003	$(8.54\pm0.02)\times10^{-12}$	Air
		1.982	8.80×10^{-12}	N_2
293	4.70×10^{-12}	1.858±0.039	$(8.73\pm0.18)\times10^{-12}$	Air
		1.888	8.87×10^{-12}	N_2
303	4.97×10^{-12}	1.909±0.016	$(9.49\pm0.08)\times10^{-12}$	Air
		1.917	9.53×10^{-12}	N_2
313	5.22×10^{-12}	1.950±0.167	$(1.02\pm0.09)\times10^{-12}$	Air
		1.858	9.70×10^{-12}	N_2
323	5.48×10^{-12}	1.917±0.040	$(1.05\pm0.02)\times10^{-11}$	Air
		1.842	1.01×10^{-11}	N_2
		n-Decane		
273	4.17×10^{-12}	2.483±0.608	$(1.04\pm0.25)\times10^{-11}$	Air
		2.391	9.97×10^{-12}	N_2
283	$4. 44\times10^{-12}$	2.237±0.008	$(9.93\pm0.04)\times10^{-12}$	Air
		2.309	1.03×10^{-11}	N_2
293	4.70×10^{-12}	2.225±0.181	$(1.05\pm0.08)\times10^{-11}$	Air

		2.232	1.05×10^{-11}	N_2
303	4.97×10^{-12}	2.206±0.095	$(1.10\pm0.05)\times10^{-11}$	Air
		2.280	1.2132×10^{-11}	N_2
313	5.22×10^{-12}	2.278±0.050	$(1.19\pm0.03)\times10^{-11}$	Air
		2.240	1.17×10^{-11}	N_2
323	5.48×10^{-12}	2.261±0.083	$(1.24\pm0.05\times10^{-11}$	Air
		2.193	1.20×10^{-11}	N_2
		n-Undecane		
273	4.17×10^{-12}	2.426	1.01×10^{-11}	Air
		2.598	1.08×10^{-11}	N_2
283	4.44×10^{-12}	2.425±0.032	$(1.08\pm0.02)\times10^{-11}$	Air
		2.488	1.10×10^{-11}	N_2
293	4.70×10^{-12}	2.287±0.008	$(1.07\pm0.01)\times10^{-11}$	Air
		2.374	1.12×10^{-11}	N_2
303	4.97×10^{-12}	2.288±0.261	$(1.14\pm0.13)\times10^{-11}$	Air
		2.396	1.19×10^{-11}	N_2
313	5.22×10^{-12}	2.456±0.086	$(1.28\pm0.05)\times10^{-11}$	Air
		2.337	1.22×10^{-11}	N_2
323	5.48×10^{-12}	2.446±0.065	$(1.34\pm0.04)\times10^{-11}$	Air
		2.350	1.29×10^{-11}	N_2

[a] [b]The error bar was taken as 2σ.

Table S4. Lifetime of OH + Alkanes.

Alkanes	Lifetime (day)
Propane	11.46
Isobutane	5.29
n-Butane	4.40
Isopentane	3.32
n-pentane	3.22
Cyclopentane	2.40
2,2-Dimethylbutane	5.65
2,3-Dimethylbutane	2.06
2-Methylpentane	2.38
3-Methylpentane	2.28
Methylcyclopentane	1.58
2,4-Dimethylpentane	2.41
Cyclohexane	1.61
2-Methylhexane	1.70
3-Methylhexane	1.84
2,2,4-Trimethylpentane	3.23
n-Heptane	1.71
Methylcyclohexane	1.25

2,3,4-Trimethylpentane	1.68
2-Methylheptane	1.55
3-Methylheptane	1.50
n-Octane	1.44
Nonane	1.10
n-Decane	0.98
n-Undecane	0.87

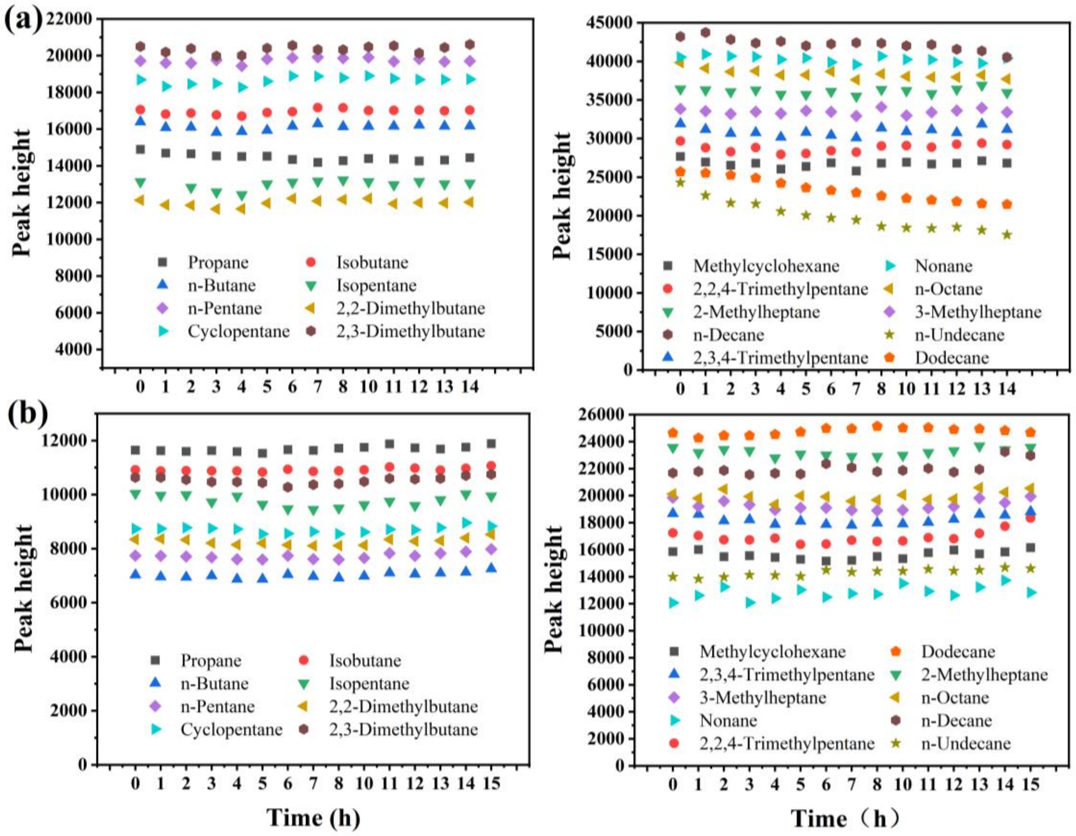

Figure S1. (a) Peak height of C3-C11 alkanes in Alkanes+N_2+dark at 0-14 h. (b) Peak height of C3-C11 alkanes in Alkanes+N_2+H_2O_2+dark at 0-15h. The following data have been displaced for reasons of clarity: a) Propane, Isobutane, n-Butane, Isopentane, 2,2-Dimethylbutane, Methylcyclohexane, 2,2,4-Trimethylpentane, 2,3,4-Trimethylpentane, 2-Methylheptane, 3-Methylheptane, n-Undecane, Ducedane vertically displaced by 8000, 2000, -3000, -6000, -8000, -4000, -4000, -2500, -1000, -4000, -12000, 8000 units, respectively; b) Propane, Isobutane, n-Butane, n-pentane, Cyclopentane, 2,2-Dimethylbutane, 2,3,4-Trimethylpentane, 2-Methylheptane, Nonane, n-Decane, n-Undecane, Ducedane vertically displaced by 8000, 3000, -3000, -2000, -2500, -1000, 1000, 4000, -8000,1000,-1500,17000 units, respectively.

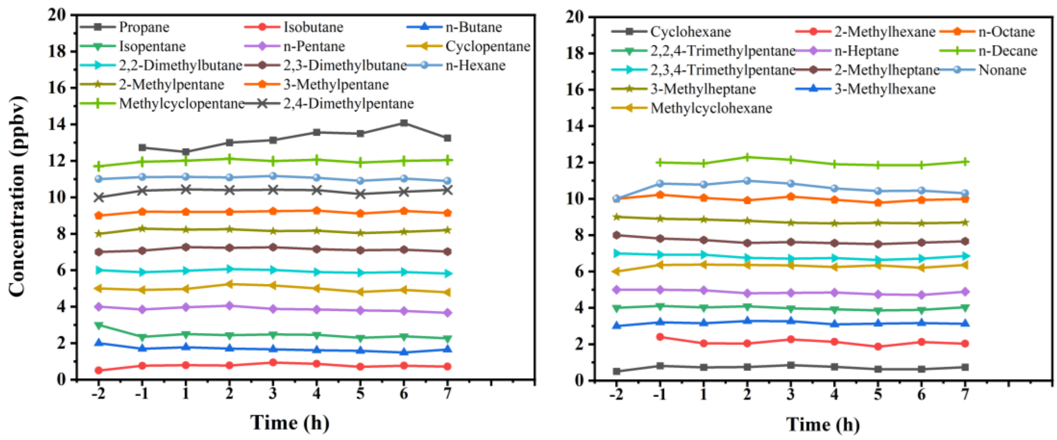

Figure S2. Concentration of C3-C11 alkanes in Alkanes+N_2+UV light at different time. The following data have been displaced for reasons of clarity: Propane, Isobutane, n-Butane, Isopentane, n-pentane, Cyclopentane, 2,2-Dimethylbutane, 2,3-Dimethylbutane, 2-Methylpentane, 3-Methylpentane, n-Hexane, Methylcyclopentane, Cyclohexane, 2-Methylhexane, 3-Methylhexane, 2,2,4-Trimethylpentane, n-Heptane, Methylcyclohexane, 2,3,4-Trimethylpentane, 2-Methylheptane, 3-Methylheptane, n-Decane, vertically displaced by -3, -9.5, -8, -7, -6, -5, -4, -3, -2, -1, 1, 1.7, 9.5, -19, -7, -6, -5, -4, -3, -2, -1, 2 units, respectively. The -2 and -1 of abscissa refer to 2 and 1 hours before turning on the light respectively. 1-7 refers to 1-7 hours after turning on the light respectively.

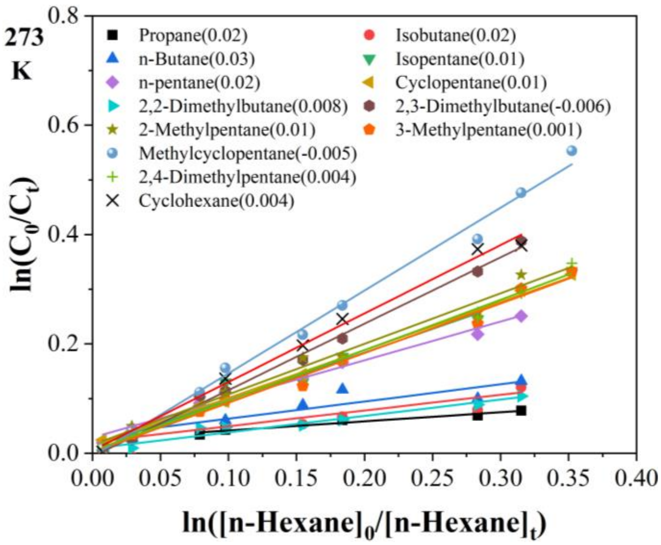

Figure S3. Typical kinetic data as acquired with the multivariate relative rate technique at 273 K for the reaction of the alkanes with the OH radical using n-hexane as reference compound. Numbers in parentheses are intercepts.

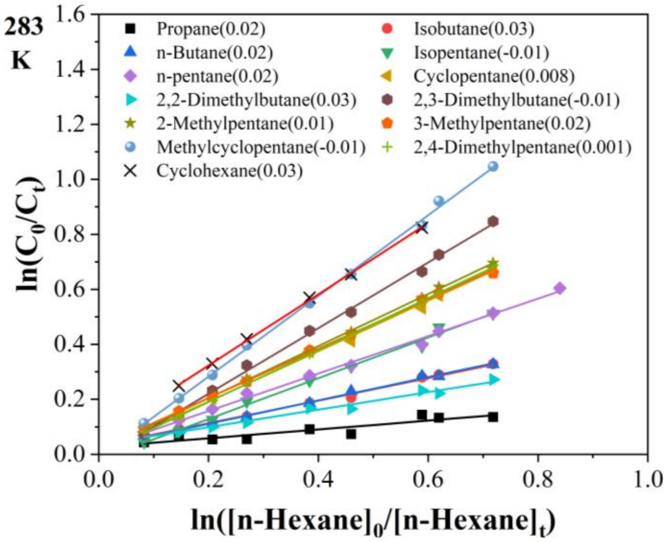

Figure S4. Typical kinetic data as acquired with the multivariate relative rate technique at 283 K for the reaction of the alkanes with the OH radical using n-hexane as reference compound. Numbers in parentheses are intercepts.

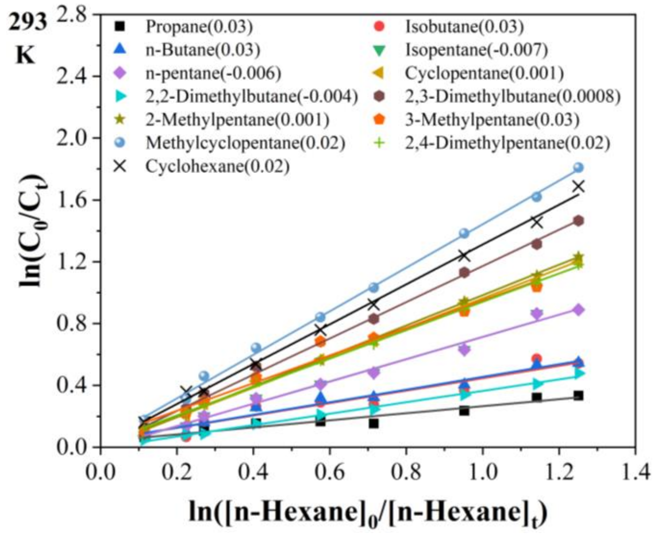

Figure S5. Typical kinetic data as acquired with the multivariate relative rate technique at 293 K for the reaction of the alkanes with the OH radical using n-hexane as reference compound. Numbers in parentheses are intercepts.

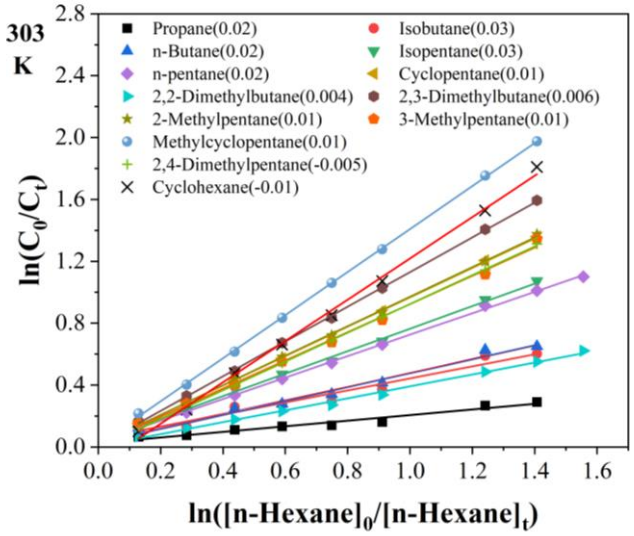

Figure S6. Typical kinetic data as acquired with the multivariate relative rate technique at 303 K for the reaction of the alkanes with the OH radical using n-hexane as reference compound. Numbers in parentheses are intercepts.

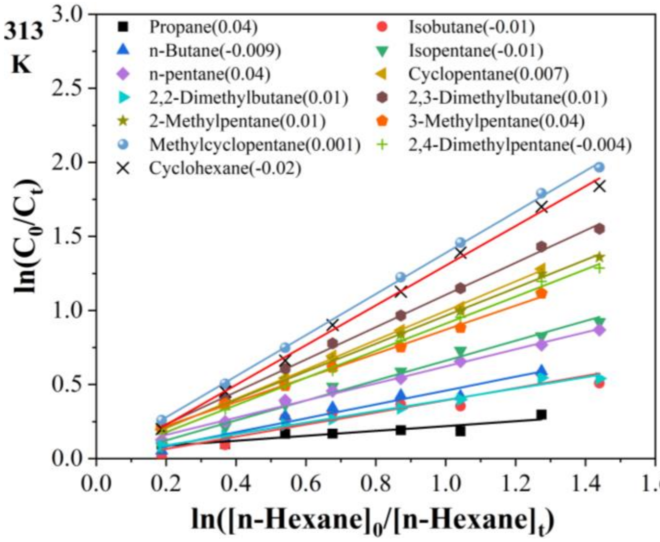

Figure S7. Typical kinetic data as acquired with the multivariate relative rate technique at 313 K for the reaction of the alkanes with the OH radical using n-hexane as reference compound. Numbers in parentheses are intercepts.

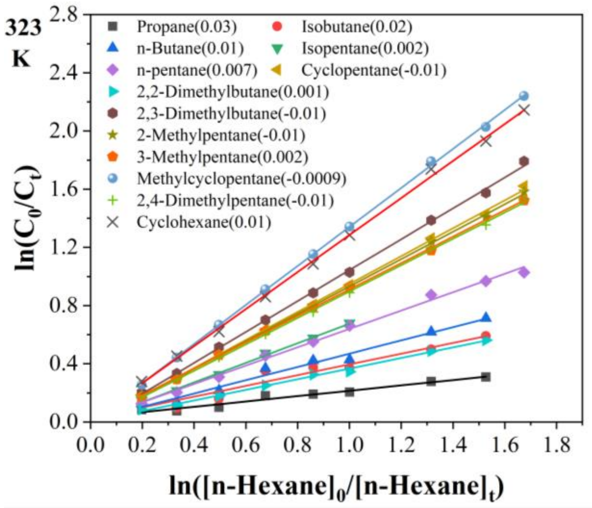

Figure S8. Typical kinetic data as acquired with the multivariate relative rate technique at 323 K for the reaction of the alkanes with the OH radical using n-hexane as reference compound. Numbers in parentheses are intercepts.

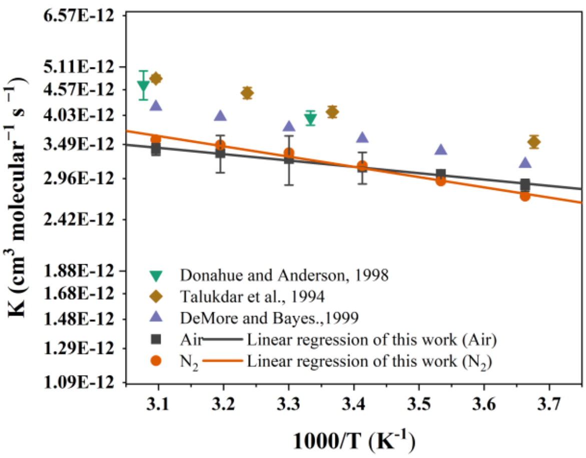

Figure S9. Arrhenius plot for the reaction of n-pentane with OH at 273-323 K along with available literature data. The error bar was taken as 2σ.

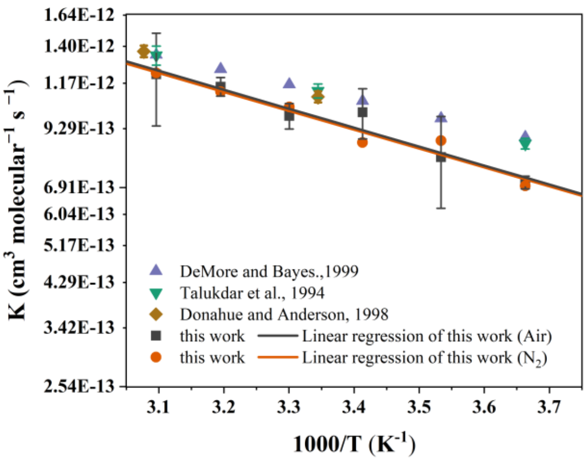

Figure S10. Arrhenius plot for the reaction of propane with OH at 273-323 K along with available literature data. The error bar was taken as 2σ.

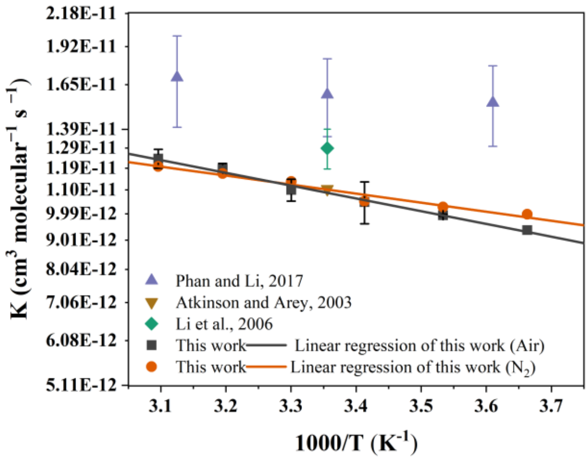

Figure S11. Arrhenius plot for the reaction of methylcyclopentane with OH at 273-323 K along with available literature data. The error bar was taken as 2σ.

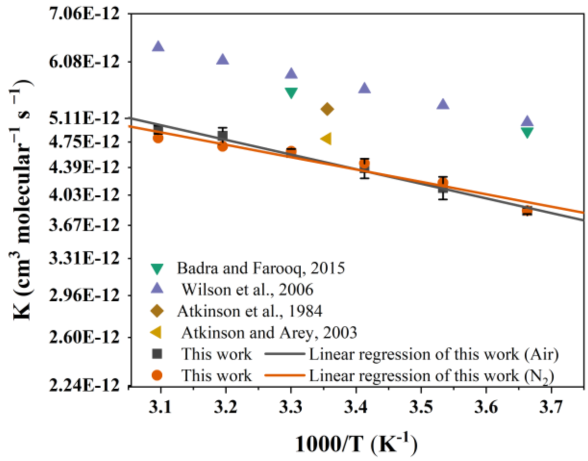

Figure S12. Arrhenius plot for the reaction of 2,4-Dimethylpentane with OH at 273-323 K along with available literature data. The error bar was taken as 2σ.

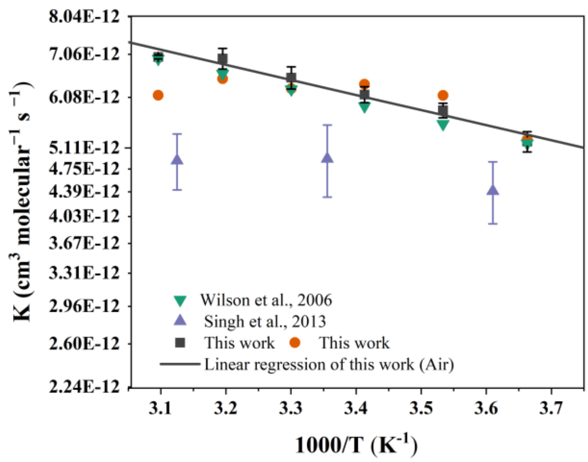

Figure S13. Arrhenius plot for the reaction of cyclohexane with OH at 273-323 K along with available literature data. The error bar was taken as 2σ.

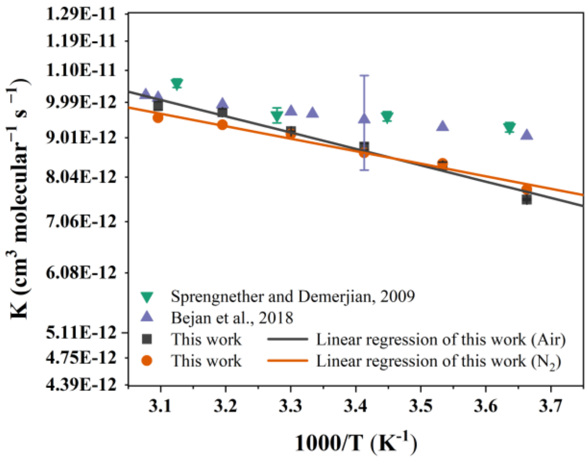

Figure S14. Arrhenius plot for the reaction of methylcyclohexane with OH at 273-323 K along with available literature data. The error bar was taken as 2σ.

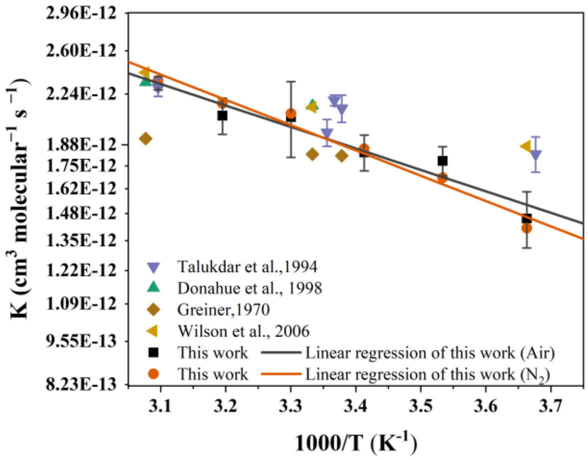

Figure S15. Arrhenius plot for the reaction of Isobutane with OH at 273-323 K along with available literature data. The error bar was taken as 2σ.

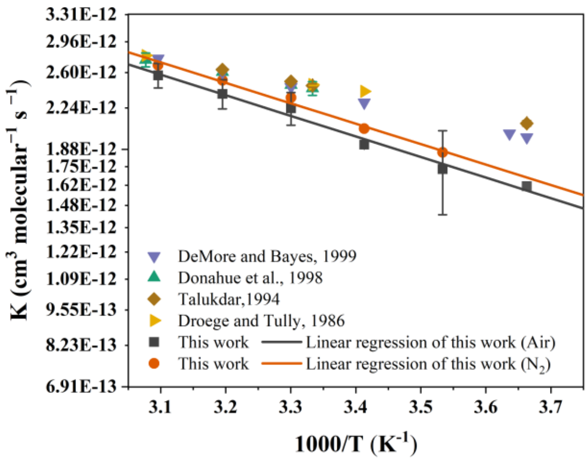

Figure S16. Arrhenius plot for the reaction of n-butane with OH at 273-323 K along with available literature data. The error bar was taken as 2σ.

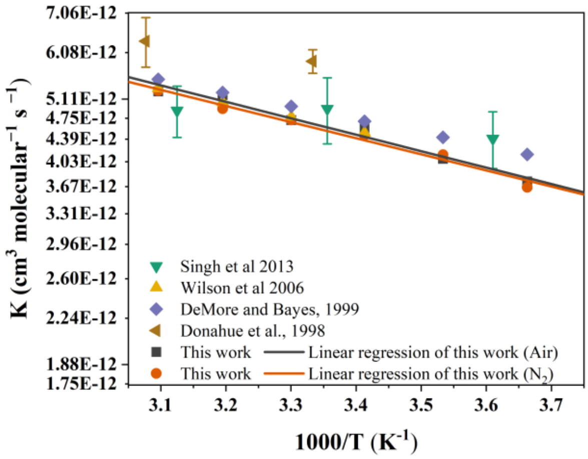

Figure S17. Arrhenius plot for the reaction of Cyclopentane with OH at 273-323 K along with available literature data. The error bar was taken as 2σ.

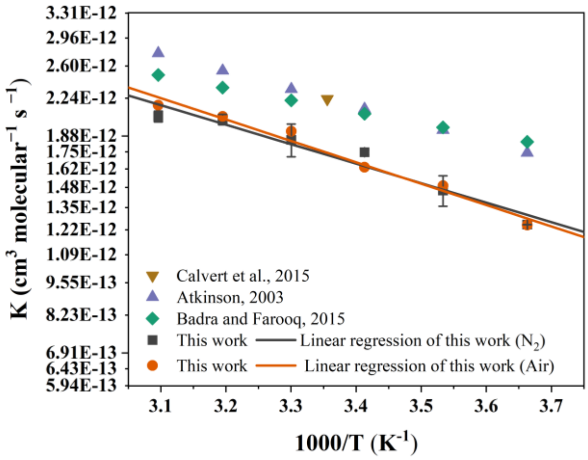

Figure S18. Arrhenius plot for the reaction of 2,2-Dimethylbutane with OH at 273-323 K along with available literature data. The error bar was taken as 2σ.

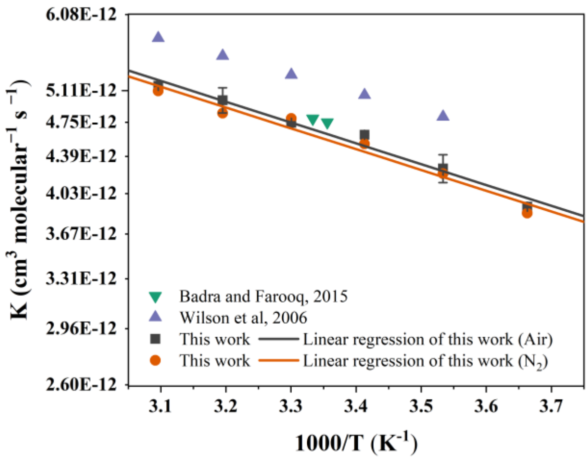

Figure S19. Arrhenius plot for the reaction of 2-Methylpentane with OH at 273-323 K along with available literature data. The error bar was taken as 2σ.

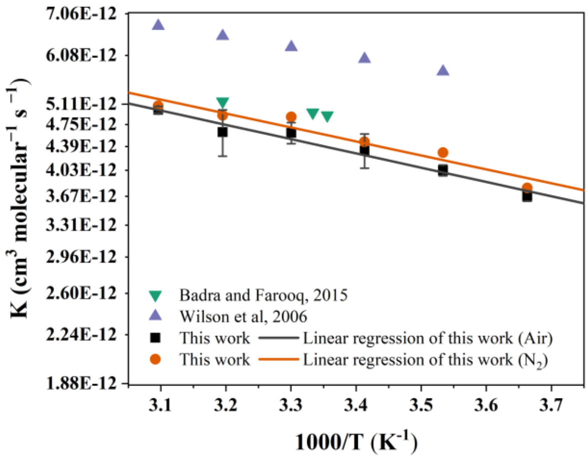

Figure S20. Arrhenius plot for the reaction of 3-Methylpentane with OH at 273-323 K along with available literature data. The error bar was taken as 2σ.

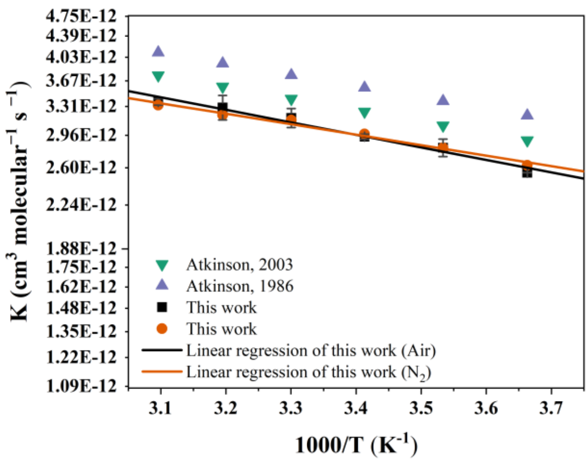

Figure S21. Arrhenius plot for the reaction of 2,2,4-Trimethylpentane with OH at 273-323 K along with available literature data. The error bar was taken as 2σ.