

Supporting Information

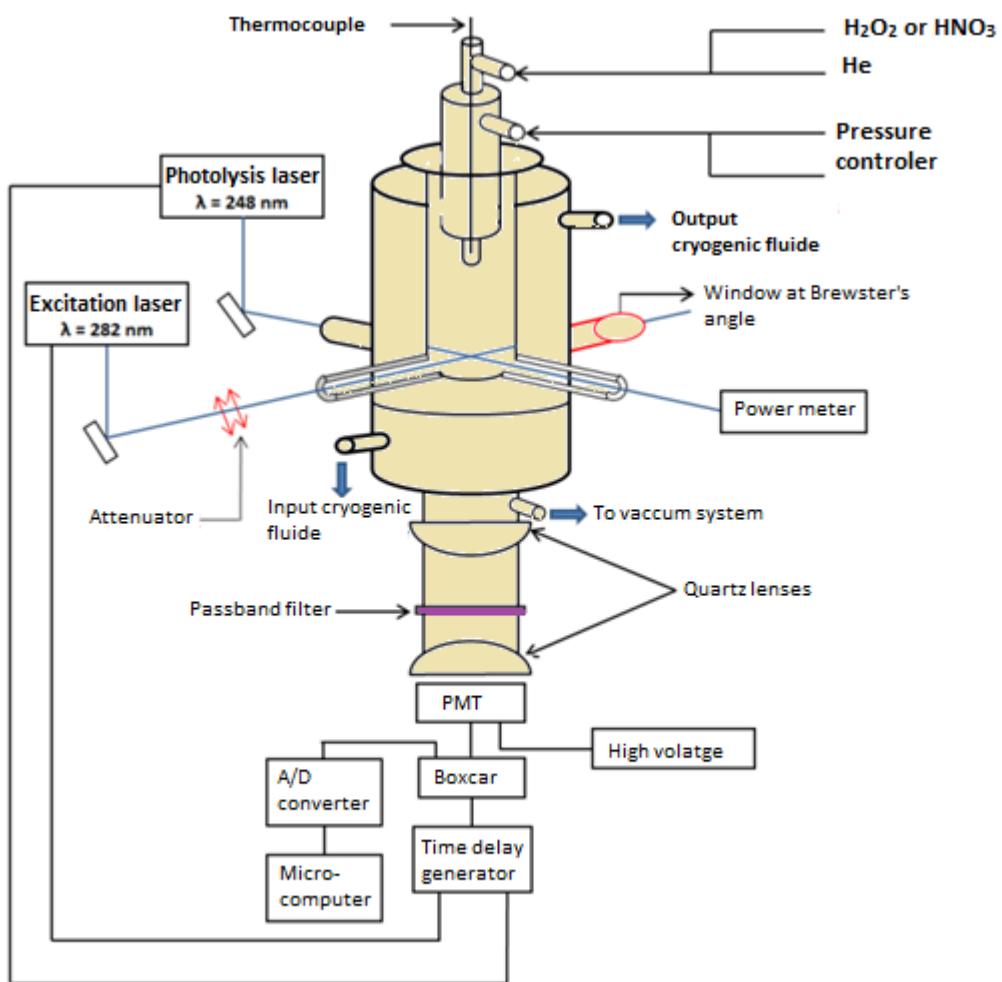


Figure S1. Schematic diagram of the pulsed laser photolysis–laser induced fluorescence (PLP–LIF) apparatus used to measure k_1 .

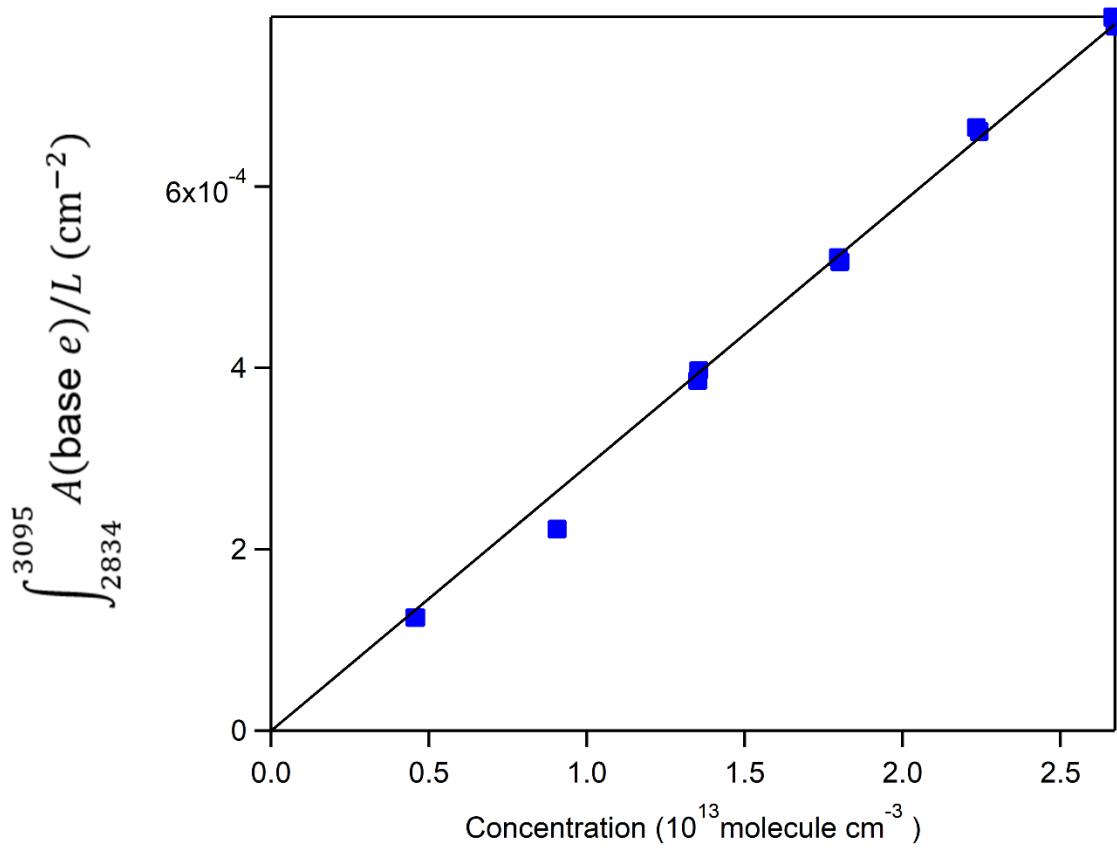


Figure S2. Plot of the integrated band intensity determination for EPB.

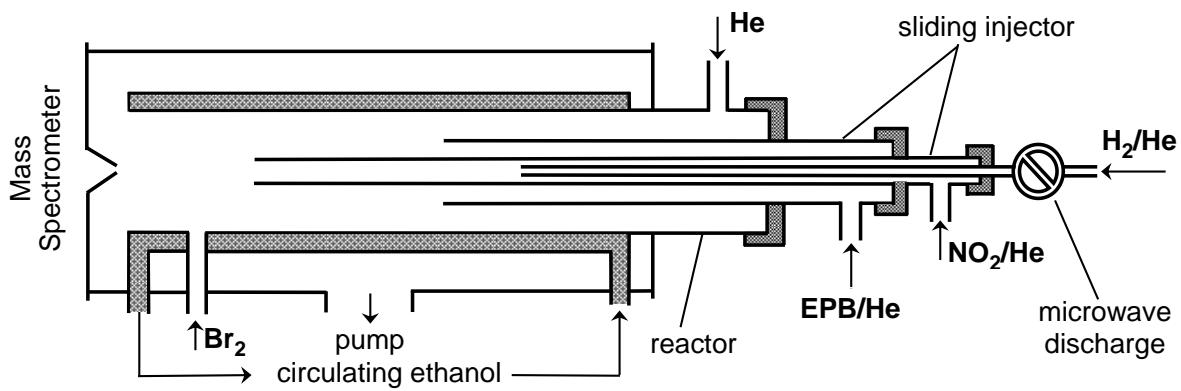


Figure S3. Diagram of the low-temperature flow reactor: configuration used in the absolute measurements of k_1 .

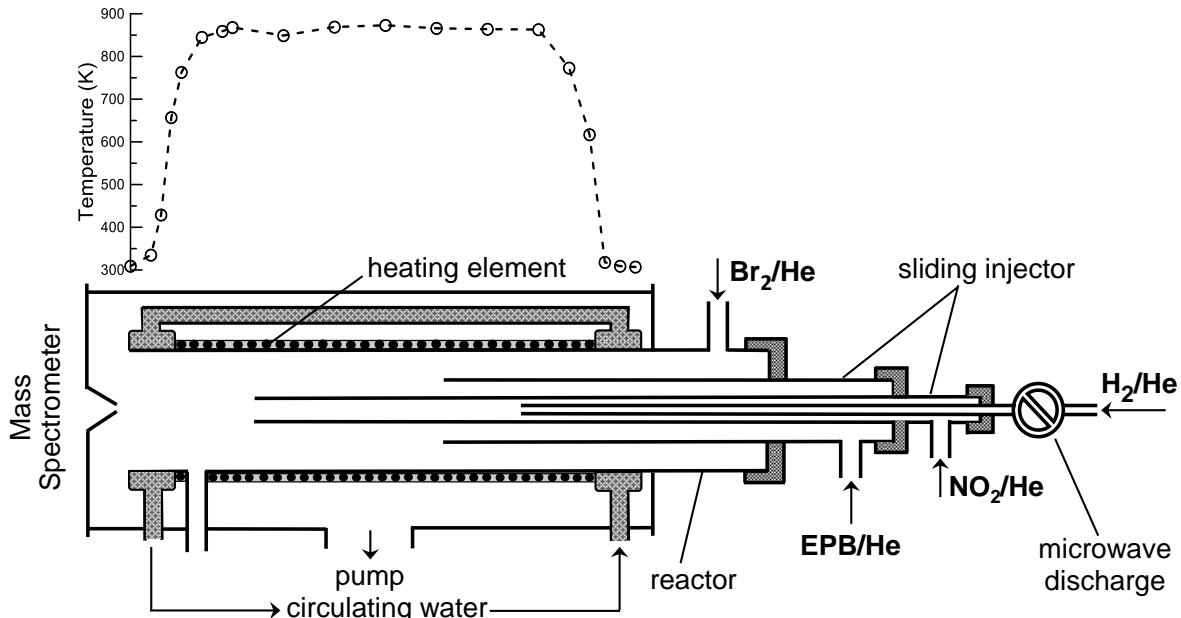


Figure S4. Diagram of the high temperature flow reactor: configuration used in the relative measurements of k_1 using $\text{OH} + \text{Br}_2$ reaction as a reference.

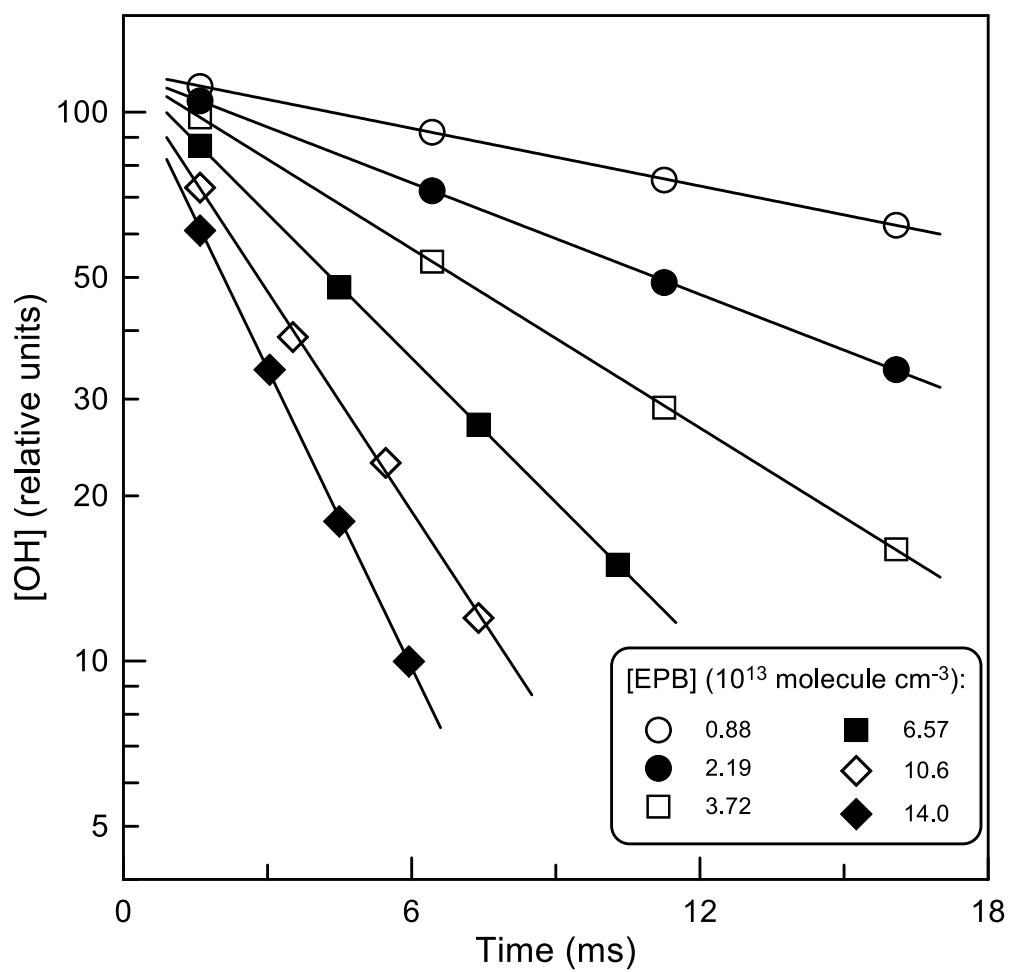


Figure S5. Examples of temporal profiles of OH radicals observed at T = 480 K using the DF-MS apparatus.

T (K)	P (Torr)	bath gas	OH source	Photolysis laser fluence	[OH] ₀ (10 ¹⁰ molecules cm ⁻³)	k _d (s ⁻¹)	[EPB] (10 ¹⁵ molecule cm ⁻³)	k' range (s ⁻¹)	k(T)±2σ (10 ⁻¹² cm ³ molecule ⁻¹ s ⁻¹)
243	108	He	HNO ₃	6	5.77	107.52	1.75–9.75	3429–20549	2.08±0.1
253	112	He	HNO ₃	6	7.05	103.97	3.09–16.6	6074–27165	2.04±0.08
261	109	He	HNO ₃	6	9.6	144.04	1.46–11.7	3166–21255	2.06±0.06
263	112	He	HNO ₃	2	9.50	300.27	1.76–8.81	3742–13249	1.93±0.08
277	112	He	HNO ₃	18	30.4	300.27	1.83–8.08	3505–15605	1.99±0.02
278	108	He	HNO ₃	6	15.7	190.97	1.59–9.73	3043–18866	1.88±0.04
282	112	He	HNO ₃	6	11.9	121.60	2.10–13.8	4803–21159	1.99±0.05
295	114	He	HNO ₃	3	6.16	155.81	1.76–8.06	3433–14105	1.93±0.02
318	109	He	HNO ₃	5	10.9	101.66	0.55–5.37	1563–10678	2.04±0.04
322	111	He	HNO ₃	18	30.4	79.54	1.59–6.76	2987–14000	2.01±0.03
337	109	He	HNO ₃	4	9.05	107.96	1.53–4.98	2928–1328	2.09±0.04
338	110	He	HNO ₃	5	18.6	165.72	1.36–5.99	3049–12077	2.05±0.04
346	108	He	HNO ₃	4	11.8	133.86	1.08–5.31	2249–10028	2.21±0.05
356	112	He	HNO ₃	5	38.6	313.18	1.45–6.65	3146–11779	2.13±0.05
359	110	He	HNO ₃	3	12.1	144.48	1.38–5.63	3105–11779	2.15±0.05
372	108	He	HNO ₃	5	35.3	266.75	0.57–4.74	1767–10900	2.29±0.05
252	109	He	HNO ₃	3	2.08	71.30	0.96–7.01	1878–13096	2.08±0.08
264	107	He	HNO ₃	2	3.29	110.47	0.75–4.97	1723–9472	2.09±0.04
243	107	He	HNO ₃	2	3.39	157.64	0.97–5.47	2046–11345	2.25±0.07
292	107	He	H ₂ O ₂	15	26.3	133.32	0.92–4.71	1743–8940	2.01±0.06
321	107	He	H ₂ O ₂	15	15.4	79.97	0.90–4.18	1746–8109	2.05±0.02
371	106	He	H ₂ O ₂	15	52.4	290.39	0.73–3.26	1833–7433	2.40±0.02

Table S1. Summary of kinetic data for OH + EPB → products, together with the experimental conditions employed using the PLP–LIF apparatus.

T (K)	Number of measurements	[EPB] (10^{13} molecule cm $^{-3}$)	k_1^a
298 ^b	9	1.62–20.0	2.05 ± 0.05
320 ^b	9	1.16–19.0	2.08 ± 0.04
340 ^b	7	1.18–20.4	2.26 ± 0.03
430 ^c	9	1.12–18.6	2.81 ± 0.04
480 ^c	9	0.88–17.4	3.13 ± 0.04
530 ^c	9	0.65–11.7	3.82 ± 0.07
595 ^c	10	0.95–14.4	4.78 ± 0.07
670 ^c	8	0.44–6.62	6.68 ± 0.02
720 ^c	8	0.57–7.89	7.54 ± 0.02

Table S2. Summary of the absolute measurements of k_1 using the DF-MS apparatus.

^aUncertainties on k_1 are 2σ statistical errors, total estimated uncertainty is nearly 15%, units of 10^{-12} cm 3 molecule $^{-1}$ s $^{-1}$.

^bHalocarbon wax-coated reactor.

^cUncoated quartz reactor.

T (K) ^a	No./exp. ^b	[EPB] ^c	[Br ₂] ^c	<i>k</i> ₁ / <i>k</i> ₅ ^d	<i>k</i> ₁ ^e
240	12	1.86–46.2	0.75	0.041	2.10
250	10	1.90–43.4	1.03	0.040	1.98
260	13	2.51–53.7	1.35	0.042	2.01
283	9	2.24–55.9	1.53	0.045	2.02
335	10	1.17–23.9	0.78	0.049	1.98
360	10	2.69–69.1	0.82	0.059	2.26
410	10	2.33–45.5	0.64	0.070	2.51
450	12	2.31–118	1.42	0.079	2.70
505	10	1.69–32.8	0.90	0.105	3.42
550	13	1.50–93.9	1.31	0.120	3.78
625	10	0.87–30.4	1.31	0.178	5.35
810	10	1.36–20.2	1.81	0.390	10.9

Table S3. Summary of the relative rate measurements of *k*₁ with reaction OH + Br₂ as a reference using the DF-MS.

^a T = 240–335 K: halocarbon wax coated reactor; T = 360–810 K: uncoated quartz reactor.

^b Number of data points.

^c Units of 10¹³ molecule cm⁻³.

^d Statistical (2σ) uncertainty on *k*₁/*k*₃ is <2%, total estimated uncertainty is nearly 15%.

^e Units of 10⁻¹² cm³ molecule⁻¹ s⁻¹, estimated uncertainty on *k*₁ is nearly 20% and includes that on reference reaction.

T (K)	No./exp. ^b	$k_1/k_4 (\pm 2\sigma)$	k_1^c
275	13	1.02±0.01	2.12
295	13	0.84±0.02	1.96
310	11	0.80±0.02	2.03
375	9	0.67±0.01	2.35
450	14	0.61±0.01	2.93
580	9	0.67±0.01	5.00
745	9	0.76±0.01	8.80
850	9	0.97±0.01	14.2
950	10	1.00±0.01	17.8

TableS4. Summary of the relative measurements of k_1 with reaction OH + n -C₄H₁₀ as a reference using the DF-MS.

^a T = 275–310 K: halocarbon wax coated reactor; T = 375–950 K: uncoated quartz reactor;

^b Number of data points;

^c Units of 10⁻¹² cm³ molecule⁻¹ s⁻¹, estimated total uncertainty on k_1 is nearly 15% and includes that of the reference reaction.

run	[EPB] 10^{13} molec. cm $^{-3}$	refs	$k/k_{\text{ref}}^{\text{a}}$	$k_{\text{ref}}^{\text{b}}$	k^{c}	k_{av}^{d}
1	2.74	ethanol	0.50 ± 0.005	3.33 ± 0.33	1.66 ± 0.17	$1.71 \pm 0.11^{\text{d}}$
		2-propanol	0.31 ± 0.002	5.24 ± 0.52	1.65 ± 0.17	$1.70 \pm 0.14^{\text{e}}$
2	1.37	ethanol	0.51 ± 0.009	3.33 ± 0.33	1.70 ± 0.17	
		2-propanol	0.32 ± 0.005	5.24 ± 0.52	1.70 ± 0.17	
3	1.37	ethanol	0.54 ± 0.004	3.33 ± 0.33	1.80 ± 0.18	
		2-propanol	0.33 ± 0.002	5.24 ± 0.52	1.73 ± 0.17	

Table S5. Rate coefficients and experimental conditions for the reaction of 1,2-epoxy butane with OH radical obtained using the relative rate method in the atmospheric simulation chamber at 293 ± 1 K.

^a Twice the standard division from the linear fitting of Figure 5.

^b k_{ref} obtained from McGillen et al., 2020, units of 10^{-12} cm 3 molecule $^{-1}$ s $^{-1}$.

^c bimolecular rate coefficients for Reaction 1, units of 10^{-12} cm 3 molecule $^{-1}$ s $^{-1}$. Uncertainties,

calculated as follows: $\sigma(k) = \frac{k}{k_{\text{ref}}} k_{\text{ref}} \sqrt{\left[\frac{\sigma_{k_{\text{ref}}}}{k_{\text{ref}}} \right]^2 + \left[\frac{\text{error}}{\frac{k}{k_{\text{ref}}}} \right]^2}$

^d unweighted average, units of 10^{-12} cm 3 molecule $^{-1}$ s $^{-1}$.

^e weighted average $k = (w_1 k_1 + w_2 k_2 + \dots) / (w_1 + w_2 + \dots)$, where $w = 1/\sigma^2$, etc. The error, 2σ , was given by: $2\sigma = 2 * (1/\sigma_{\text{ref1}}^2 + 1/\sigma_{\text{ref2}}^2 + \dots)^{0.5}$, units of 10^{-12} cm 3 molecule $^{-1}$ s $^{-1}$.