

Supplementary Table S2. Reaction rate constants of different channels (HPL: High-pressure limit).

Reaction	A	n	E	T (K)	P (Torr)
R1	1.14E-21	3.04	-1408	500-2500	HPL
R2	1.20E-22	3.06	11616	500-2500	HPL
R3	1.79E-23	3.11	20911	500-2500	HPL
R4	4.83E-23	3.06	3828	500-2500	HPL
R5	7.88E-23	3.06	10877	500-2500	HPL
R6	9.17E-23	3.01	6551	500-2500	HPL
P0 → int1	9.05E+29	-12.79	80073	500-1100	5
	5.22E+15	-8.07	69513	500-1500	760
P0 → P1 + H	3.69E-05	-2.43	51003	500-2500	5
	5.09E+94	-33.36	30840	500-2500	760
	3.07E+118	-33.36	61279		
P0 → P2 + H	2.21E-05	-1.72	48900	500-2500	5
	1080210	-4.54	102162	500-2500	760
P0 → P3 + H	4.46E-06	-2.15	52976	500-2500	5
	1.02E+14	-7.29	143871	500-2500	760
int1 → P0	1.29E+16	-0.53	197345	500-2500	HPL
int1 → i8	9.27E+09	0.58	120375	500-2500	HPL
i13 → i17	4.36E+12	0.24	146257	500-2500	HPL
int1 → P2 + H	3.45E+13	0.20	172649	500-2500	HPL
P2 + H → P0	3.29E+17	-7.24	160208	500-2500	760
	5.44E+22	-8.54	198557	500-2500	7600
P2 + H → int1	1.92E+23	-10.25	8485	500-1800	760
	1.16E+47	-10.25	16860		
	8.20E+13	-7.28	6962	500-2100	7600
	4.94E+37	-7.28	13834		
P2 + H → i8	1.71E-09	-0.32	58697	500-1100	760
	1.24E-25	4.64	41437	500-1100	7600
P2 + H → i13	7.12E-17	1.94	40670	500-1000	760
	4.89E-18	2.31	46771	500-1200	7600
P1 + H → i11	5.53E-16	1.55	43725	500-2500	HPL
P3 + H → i16	4.08E-16	1.54	37058	500-2500	HPL
C₆H₅ + C₈H₆ → 1,2-diphenylethene	9.54E-19	1.97	1401	500-2500	HPL
	1.24E+05	-5.22	4452	500-1700	7600
	7.44E+28	-5.22	8846		
1-C₁₀H₇ + C₈H₆ → 1-styrylnaphthalene	1.49E-21	3.06	-1785	500-2500	HPL
	8.84E+11	-7.14	5880	500-2000	7600
	5.32E+35	-7.14	11685		
2-C₁₀H₇ + C₈H₆ → 2-styrylnaphthalene	2.22E-18	1.89	1937	500-2500	HPL
	2.19E+10	-6.77	5612	500-2100	7600
	1.32E+34	-6.77	11152		
C₆H₅ + C₈H₆ → diphenylacetylene + H	9.07E+132	-45.44	32600	500-2500	7600
	5.46E+156	-45.44	64777		
1-C₁₀H₇ + C₈H₆ → acenaphthylene + pheny	2.47E+71	-22.45	42258	500-2500	7600
	1.49E+95	-22.45	83967		
1-C₁₀H₇ + C₈H₆ → phenyl-acenaphthylene + H	1.96E+73	-26.41	22385	500-2500	7600
	1.18E+97	-26.41	44479		
2-C₁₀H₇ + C₈H₆ → 2-phenylethynyl-naphthalene + H	684623	-4.37	118496	500-2500	7600

Reaction	A	n	E	T (K)	P (Torr)
i8 → i9	9.58E+34	0.45	29485	500-2500	HPL
i9 → i10	3.85E+12	0.21	167560	500-2500	HPL
i10 → i11	2.42E+08	0.88	12648	500-2500	HPL
i8 → i12	9.86E+11	0.46	133148	500-2500	HPL
i12 → i10	2.05E+11	0.30	19375	500-2500	HPL
i13 → i14	9.62E+34	0.51	33135	500-2500	HPL
i14 → i15	9.03E+34	0.65	41677	500-2500	HPL
i15 → i16	1.88E+08	0.82	9551	500-2500	HPL
i17 → i15	5.76E+11	0.36	24607	500-2500	HPL

[#] Rate constant is expressed in modified Arrhenius or double modified Arrhenius, with units s⁻¹, cm³, cal and mol:

modified Arrhenius: $k = A T^n \exp(-E/RT)$;

double modified Arrhenius: $k = A_1 T^{n_1} \exp(-E_1/RT) + A_2 T^{n_2} \exp(-E_2/RT)$.