Appendix B. Input Data

Appendix B.1. Physical Parameters

Molecular Diffusion. Type 1 is calculated from

$$b = AT^s \tag{B.1}$$

Type 2 is calculated from

$$b = AT^s \exp\left(-S/T\right) \tag{B.2}$$

Type 3 from

$$b = AT^s \left[\ln(\phi/kT)\right]^{-2} \exp\left(-S/T - S'/T^2\right) \tag{B.3}$$

Parameters for all these types are obtained from Mason et al. [1, 2].

Type 4 is calculated from the kinetic theory formula based on a Lennard-Jones 6-12 potential

$$b_{i,j} = \frac{3}{16} \frac{\sqrt{2\pi k^3 T/\mu_{i,j}}}{\pi \sigma_{i,j}^2 \Omega^{(1,1)\star}(T_{i,j}^\star)} \tag{B.4}$$

where $\mu_{i,j}$ is the reduced collision mass , $\sigma_{i,j}$ is the collision diameter, and $\Omega^{(1,1)\star}(T_{i,j}^\star)$ is a Chapman-Cowling transport integral calculated at the reduced temperature

$$T_{i,j}\star = kT/\epsilon_{i,j} \tag{B.5}$$

The force parameter $\epsilon_{i,j}$ and collision diameter $\sigma_{i,j}$ are calculated from the Lennard-Jones parameters for the individual molecules by

$$\sigma_{i,j} = \frac{1}{2}\left(\sigma_i + \sigma_j\right) \tag{B.6}$$

$$\epsilon_{i,j} = \sqrt{\epsilon_i \epsilon_j} \tag{B.7}$$

Lennard-Jones parameters are obtained from Poling et al. [3].

For molecules not included in the table, the binary diffusion parameter is obtained from the kinetic theory expression for hard sphere collisions

$$b = \frac{3}{8} \frac{kT/\mu}{\sqrt{\pi}\sigma^2} \tag{B.8}$$

Table B.1: Molecular diffusion coefficients.

Species	Type	A	s	S	S′	ϕ/k
CH_4	1	7.34×10^{16}	0.750	0	0	0
^{40}Ar	1	6.73×10^{16}	0.749	0	0	0
H_2	1	1.88×10^{17}	0.820	0	0	0
C_2H_2 [a]	1	7.91×10^{16}	0.730	0	0	0
C_2H_4	1	7.77×10^{16}	0.730	0	0	0
C_2H_6	1	3.74×10^{16}	0.774	0	0	0
C_4H_2 [a]	1	6.54×10^{16}	0.668	0	0	0
N	1	9.69×10^{16}	0.774	0	0	0
HCN	4	1.17×10^{16}	1.012	0	0	0
HNC	4	1.17×10^{16}	1.012	0	0	0
H_2O	1	1.38×10^{16}	1.072	0	0	0
CO	3	3.24×10^{19}	0.576	-36.23	3.83×10^{3}	1.57×10^{8}
CO_2	2	2.32×10^{17}	0.570	113.6	0	0
H_2CO [b]	3	3.19×10^{19}	0.576	-36.23	3.83×10^{3}	1.57×10^{8}

[a] Estimated from the values for C_2H_4 and C_2H_6.
[b] Estimated from the value for CO.

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Saturation Vapor Pressure.

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Table B.2: Saturation vapor pressures.

Species	Expression (μbar)	T (K)	Ref.
C_2H_2	$10^6 \times e^{(13.4-2536/T)}$	< 192	[1]
C_2H_4	$10^6 \times e^{(1.540\times10^1-2.206\times10^3/T-1.216\times10^4/T^2+2.843\times10^5/T^3-2.203\times10^6/T^4)}$	20-104	[1]
C_2H_6	$10^6 \times e^{(1.511\times10^1-2.207\times10^3/T-2.411\times10^4/T^2+7.744\times10^5/T^3-1.161\times10^7/T^4+6.763\times10^7/T^5)}$	20-90	[1]
CH_3CCH	$1333 \times 10^{(7.7759-1240.32/T)}$	162-250	[2]
CH_2CCH_2	$1333 \times 10^{(7.7759-1240.32/T)}$	-	assumed same as CH_3CCH
C_3H_6	$1333 \times 10^{(7.7759-1240.32/T)}$	-	assumed same as CH_3CCH
C_3H_8	$1333 \times 10^{(8.16173-1176/T)}$	105-238	based on data from [3]
C_4H_2	$1333 \times 10^{(5.3817-3300.5/T+16.63415\times log_{10}(1000/T))}$	127-249	[2]
C_4H_4	$1333 \times 10^{(5.3817-3300.5/T+16.63415\times log_{10}(1000/T))}$	-	assumed same as C_4H_2
C_4H_6	$1333 \times 10^{(8.032581-1441.42/T)}$	181-282	[2]
C_4H_8	$1333 \times 10^{(8.032581-1441.42/T)}$	-	assumed same as C_4H_6
C_4H_{10}	$1333 \times 10^{(8.446-1461.2/T)}$	128-196	[2]
C_6H_2	$1333 \times 10^{(5.3817-3300.5/T+16.63415\times log_{10}(1000/T))}$	-	assumed same as C_4H_2
C_6H_6	$10^6 \times e^{(1.735\times10^1-5.663\times10^3/T)}$	< 279	[1]
NH_3	$10^6 \times e^{(1.596\times10^1-3.537\times10^3/T-3.310\times10^4/T^2+1.742\times10^6/T^3-2.995\times10^7/T^4)}$	15-195	[1]
N_2H_4	$10^6 \times e^{(1.596\times10^1-3.537\times10^3/T-3.310\times10^4/T^2+1.742\times10^6/T^3-2.995\times10^7/T^4)}$	-	assumed same as NH_3
CH_2NH	$10^3 \times e^{(19.413-3333.325/T)}$	-	assumed same as CH_2NH
CH_3NH_2	$10^3 \times e^{(19.413-3333.325/T)}$	196-267	[4]
HCN	$10^6 \times e^{(1.393\times10^1-3.624\times10^3/T-1.325\times10^5/T^2+6.314\times10^6/T^3-1.128\times10^8/T^4)}$	15-260	[1]
HNC	$10^6 \times e^{(1.393\times10^1-3.624\times10^3/T-1.325\times10^5/T^2+6.314\times10^6/T^3-1.128\times10^8/T^4)}$	-	assumed same as HCN
CH_3CN	$10^3 \times e^{(18.2432-4017.098/T)}$	295-354	[4]
HC_3N	$10^6 \times e^{(1.301\times10^1-4.426\times10^3/T)}$	< 202	[1]
C_2H_3CN	$10 \times 10^{(21.058-2371.0/T-1.560\times log(T))}$	291-350	[4]
C_2H_5CN	$10^3 \times e^{(18.7211-4352.66/T)}$	204-371	[4]
HC_5N	$10^6 \times e^{(1.301\times10^1-4.426\times10^3/T)}$	-	assumed same as HC_3N
C_2N_2	$10^6 \times e^{(1.653\times10^1-4.109\times10^3/T)}$	< 245	[1]
C_4N_2	$10^6 \times e^{(1.909\times10^1-6.036\times10^3/T)}$	< 273	[1]
H_2O	$10^6 \times 6.11657 \times 10^{-3} \times e^{(1.5\times log(T/273.16)+(1-273.16/T)\times(20.9969665107897 +3.72437478271362\times(T/273.16)-13.9205483215524\times(T/273.16)^2+29.6988765013566\times(T/273.16)^3 -40.1972392635944\times(T/273.16)^4+29.7880481050215\times(T/273.16)^5-9.13050963547721\times(T/273.16)^6))}$	< 273	[1]
CO_2	$10^6 \times e^{(1.476\times10^1-2.571\times10^3/T-7.781\times10^4/T^2+4.325\times10^6/T^3-1.207\times10^8/T^4+1.350\times10^9/T^5)}$	40-195	[1]

"log" means log base e

Appendix B.2. Chemical Parameters

Appendix B.2.1. Chemical Species

Table B.3: Neutral species included in the model.

Closed-shell molecules
H_2, CH_4, C_2H_2, C_2H_4, C_2H_6, CH_3CCH, CH_2CCH_2, C_3H_6, C_3H_8
C_4H_2, C_4H_4, C_4H_6, C_4H_8, C_4H_{10}, C_6H_2, C_6H_6, C_7H_8
N_2, NH_3, N_2H_4, CH_2NH, CH_3NH_2, HCN, HNC, CH_3CN
HC_3N, C_2H_3CN, C_2H_5CN, HC_5N, C_2N_2, C_4N_2
H_2O, CO, H_2CO, CH_2CO, CH_3CHO, CO_2, HNO
Radicals
H, C, CH, $^3CH_2$, $^1CH_2$, CH_3, C_2, C_2H, C_2H_3, C_2H_5
C_3, C_3H, C_3H_2, C_3H_3, C_3H_5, C_3H_7
C_4H, C_4H_3, C_4H_5, C_4H_7, C_4H_9, C_6H, C_6H_3, C_6H_5, C_7H_7
$N(^4S)$, $N(^2D)$, NH, NH_2
CN, H_2CN, C_2N, HC_2N, CH_2CN, C_3N, C_2H_2CN, C_2H_4CN
$O(^3P)$, $O(^1D)$, $O(^1S)$, OH, HCO, CHOH, CH_2OH, HCCO, CH_3CO
NO, NCO

Table B.4: Ion species included in the model.

Positive ions
H^+, H_2^+, H_3^+, H_5^+, C^+, CH^+, CH_2^+, CH_3^+, CH_4^+, CH_5^+
C_2H^+, $C_2H_2^+$, $C_2H_3^+$, $C_2H_4^+$, $C_2H_5^+$, $C_2H_6^+$, $C_2H_7^+$
C_3^+, C_3H^+, $C_3H_2^+$, l-$C_3H_3^+$, c-$C_3H_3^+$, $C_3H_4^+$, $C_3H_5^+$, $C_3H_6^+$, $C_3H_7^+$, $C_3H_8^+$, $C_3H_9^+$
C_4H^+, $C_4H_2^+$, $C_4H_3^+$, $C_4H_4^+$, $C_4H_5^+$, $C_4H_6^+$, $C_4H_7^+$, $C_4H_8^+$, $C_4H_9^+$
C_5H^+, $C_5H_2^+$, $C_5H_3^+$, $C_5H_4^+$, $C_5H_5^+$, $C_5H_6^+$, $C_5H_7^+$, $C_5H_8^+$, $C_5H_9^+$, $C_5H_{10}^+$, $C_5H_{11}^+$
C_6H^+, $C_6H_2^+$, $C_6H_3^+$, $C_6H_4^+$, $C_6H_5^+$, $C_6H_6^+$, $C_6H_7^+$, $C_6H_9^+$, $C_6H_{11}^+$, $C_6H_{13}^+$
C_7H^+, $C_7H_2^+$, $C_7H_3^+$, $C_7H_4^+$, $C_7H_5^+$, $C_7H_6^+$, $C_7H_7^+$, $C_7H_8^+$, $C_7H_9^+$
C_8H^+, $C_8H_2^+$, $C_8H_3^+$, $C_8H_4^+$, $C_8H_5^+$, $C_8H_6^+$, $C_8H_7^+$, $C_8H_9^+$
C_9H^+, $C_9H_2^+$, $C_9H_3^+$, $C_9H_4^+$, $C_9H_7^+$, $C_9H_8^+$
N^+, NH^+, NH_2^+, NH_3^+, NH_4^+, N_2^+, N_3^+, N_4^+, N_2H^+, $N_2H_5^+$
CN^+, HCN^+, HNC^+, $HCNH^+$, CH_2NH^+, $CH_2NH_2^+$, $CH_3NH_2^+$, $CH_3NH_3^+$
CNC^+, C_2N^+, HC_2N^+, HC_2NH^+, $C_2H_3N^+$, $C_2H_3NH^+$, $C_2H_5N^+$
C_3N^+, HC_3N^+, HC_3NH^+, $C_3H_3N^+$, $C_3H_3NH^+$, $C_3H_5N^+$, $C_3H_5NH^+$, $C_3H_7NH^+$, $C_3H_9NH^+$
C_4N^+, HC_4N^+, HC_4NH^+, $C_4H_3N^+$, $C_4H_3NH^+$, $C_4H_5N^+$, $C_4H_5NH^+$, $C_4H_7NH^+$, $C_4H_9NH^+$
C_5N^+, HC_5N^+, HC_5NH^+, $C_5H_3N^+$, $C_5H_3NH^+$, $C_5H_5N^+$, $C_5H_5NH^+$, $C_5H_7NH^+$
C_6N^+, HC_6NH^+, $C_6H_3NH^+$, $C_6H_5NH^+$, $C_6H_7N^+$, $C_6H_7NH^+$, $C_6H_9N^+$, $C_6H_9NH^+$
C_7N^+, HC_7N^+, HC_7NH^+, $C_7H_3N^+$, $C_7H_3NH^+$, $C_7H_7N^+$, $C_7H_7NH^+$
$C_2N_2^+$, $C_2N_2H^+$, $C_4N_2^+$, $C_4N_2H^+$, $C_6N_2^+$, $C_6N_2H^+$, $C_xH_yN_z^+$
O^+, OH^+, H_2O^+, H_3O^+, CO^+, HCO^+, HOC^+, CH_2O^+, CH_2OH^+, $CH_3OH_2^+$
HC_2O^+, CH_2CO^+, CH_3CO^+, CH_3COH^+, CH_3CHOH^+, HC_3O^+, $C_2H_2CO^+$, $C_2H_3CO^+$
CO_2^+, $OCOH^+$, NO^+, HNO^+, NCO^+, $HNCO^+$
$CH_5^+ \cdot CH_4$, $C_2H_5^+ \cdot CH_4$, $C_2H_7^+ \cdot CH_4$, $C_3H_7^+ \cdot CH_4$, $Adduct^+$
$CH_2^+ \cdot N_2$, $CH_3^+ \cdot N_2$, $CH_5^+ \cdot N_2$, $C_2H_5^+ \cdot N_2$, $C_3H_7^+ \cdot N_2$
$CH_5^+ \cdot HNC$, $HCNH^+ \cdot CH_4$, $HCNH^+ \cdot N_2$, $AdductN^+$
$C_4H_3^+ \cdot CO$, $CO^+ \cdot N_2$, $HCO^+ \cdot H_2$, $HCO^+ \cdot CO$
Negative ions
H^-, CH_2^-, CH_3^-, C_2H^-, C_4H^-, C_6H^-, CN^-, C_3N^-, C_5N^-, O^-, OH^-, $C_xH_yN_z^-$

Appendix B.2.2. Primary Processes

Table B.5: Energy thresholds and references for N_2, CH_4 and CO dissociation and ionization by photons and electrons.

Reaction	Channels		ΔE (eV)	Photons		Electrons
				Branching Ratios	Cross-sections	
(J_d1a)	N_2	$\rightarrow N(^2D) + N(^4S)$	12.1	[1]	[2] (100-83.5)	[3]
(J_d1b)		$\rightarrow N(^2D) + N(^2D)$	14.5	[4]	[5] (83.5-79.5)	
(J_i1a)	N_2	$\rightarrow {N_2}^+ + e^-$	15.6	[6]	[7] (79.5-65.0)	[8]
(J_i1b)		$\rightarrow N^+ + N(^4S) + e^-$	24.3	[9]	[10] as reported in [5] (65.0-11.5)	
(J_i1c)		$\rightarrow N^+ + N(^2D) + e^-$	26.7	[11]	[12] (11.5-1.50)	
(J_d2a)	CH_4	$\rightarrow CH_3 + H$	4.48	[13]	[14] (160-140)	[15, 16]
(J_d2b)		$\rightarrow {}^1CH_2 + H_2$	5.14		[17] (140-100)	
(J_d2c)		$\rightarrow CH + H_2 + H$	9.05			
(J_d2d)		$\rightarrow {}^3CH_2 + 2\ H$	9.18			
(J_i2a)	CH_4	$\rightarrow {CH_4}^+ + e^-$	12.6		[18] (95-11)	[19]
(J_i2b)		$\rightarrow {CH_3}^+ + H + e^-$	14.3			[15, 16]
(J_i2c)		$\rightarrow {CH_2}^+ + H_2 + e^-$	15.2			
(J_i2d)		$\rightarrow H^+ + CH_3 + e^-$	18.0			
(J_i2e)		$\rightarrow C^+ + H_2 + H_2 + e^-$	19.4			
(J_i2f)		$\rightarrow {CH_2}^+ + H + H + e^-$	19.7			
(J_i2g)		$\rightarrow CH^+ + H_2 + H + e^-$	19.8			
(J_i2h)		$\rightarrow {H_2}^+ + {}^3CH_2 + e^-$	20.2			
(J_d3a)	CO	$\rightarrow O(^3P) + C(^3P)$	11.1	[20]	[21] (100-60)	
(J_d3b)		$\rightarrow O(^1D) + C(^1D)$	13.1	[20]	[22] (60-1.50)	
(J_i3a)		$\rightarrow CO^+ + e^-$	14.0	[23, 24]		
(J_i3b)		$\rightarrow C^+ + O(^3P) + e^-$	22.6	[25, 24]		
(J_i3c)		$\rightarrow O^+ + C(^3P) + e^-$	24.6	[25, 24]		

Notes. ΔE is the adiabatic energy threshold for the given reaction channel.
The values in parenthesis represent the energy range in nm.
CO is largely shielded from photolysis by N_2 and CH_4 but we do include photoionization. Predissociation in the electronic band systems is not included.

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Table B.6: Photodissociation reactions

Reaction	Channels		ΔE	Branching Ratios			Cross-sections		
			(nm)	λ (nm)	Values (%)	Ref.	λ (nm)	T (K)	Ref.
(J_d1)	H_2	→	Not included (cf. section 2.6.2.1)						
(J_d2)	C_2H_2	→ $C_2H + H$	217	>110	1.0	[1]	100-110	295	[2]
						[3]	110-147	298	[4]
							147-153	195	[5]
							153-189	155	[6]
							189-225	200	[7]
(J_d3a)	C_2H_4	→ $C_2H_2 + H_2$	713	>118	0.5	[8]	100-185	295	[9]
(J_d3b)		→ $C_2H_2 + 2H$	200	>118	0.5	[10]	185-197	295	[11]
(J_d4a)	C_2H_6	→ $C_2H_4 + H_2$	925	108-140 / >140	0.14 / 0.56	[12]	110-125	295	[13]
(J_d4b)		→ $C_2H_2 + H_2 + H_2$	403	108-140 / >140	0.27 / 0.29	[14]	125-150	150	[15]
(J_d4c)		→ $CH_3 + CH_3$	325	108-140 / >140	0.06 / 0.00	[16]	150-161	295	[17]
(J_d4d)		→ $CH_4 + {}^1CH_2$	278	108-140 / >140	0.22 / 0.02				
(J_d4e)		→ $C_2H_4 + 2H$	213	108-140 / >140	0.31 / 0.13				
(J_d5a)	CH_3CCH	→ $C_3H_2 + H_2$	394	>119	0.01	[18]	120-160	295	[19]
(J_d5b)		→ $C_3H_3 + H$	318	>119	0.89	[20]	160-195	233	[21]
(J_d5c)		→ $C_2H_2 + {}^1CH_2$	230	>119	0.10	[22]	195-219	183	[23]
(J_d6a)	CH_2CCH_2	→ $C_3H_2 + H_2$	400	128-157 / >157	0.11 / 0.10	[24]	100-185	200	[25]
(J_d6b)		→ $C_3H_3 + H$	322	128-157 / 157-218 / >218	0.70 / 0.89 / 0.90	[20]	185-229	183	[23]
(J_d6c)		→ $C_2H_2 + {}^1CH_2$	260	128-157 / 157-218 / >218	0.19 / 0.01 / 0.00	[26]			
(J_d6d)						[27]			
(J_d7a)	C_3H_6	→ $C_2H_2 + CH_4$	942	>127	0.05	[28]	100-110	295	[29]
(J_d7b)		→ $C_3H_5 + H$	330	127-140 / >140	0.30 / 0.40	[30]	110-155	295	[31]
(J_d7c)		→ $C_2H_3 + CH_3$	288	127-140 / >140	0.25 / 0.35	[32]	155-200	223	[21]
(J_d7d)		→ $C_2H_4 + {}^3CH_2$	287	127-140 / >140	0.05 / 0.03	[33]			
(J_d7e)		→ $CH_3CCH + H + H$	203	127-140 / >140	0.14 / 0.07	[34]			
(J_d7f)		→ $CH_2CCH_2 + H + H$	201	127-140 / >140	0.21 / 0.10	[35]			
(J_d8a)	C_3H_8	→ $C_2H_4 + CH_4$	1577	114-140 / >140	0.20 / 0.06	[36]	100-115	295	[13]
(J_d8b)		→ $C_3H_6 + H_2$	1024	114-140 / >140	0.33 / 0.94	[37]	115-120	298	[38]
(J_d8c)		→ $C_2H_5 + CH_3$	329	114-140 / >140	0.38 / 0.00		120-160	295	[39]
(J_d8d)		→ $C_2H_6 + {}^1CH_2$	271	114-140 / >140	0.09 / 0.00				
(J_d9a)	C_4H_2	→ $C_4H + H$	215	122-150 / 150-180 / 180-205 / >205	0.75 / 0.80 / 0.88 / 1.0	[40]	120-160	296	[41]
(J_d9b)		→ $C_2H_2 + C_2$	203	122-150 / 150-180 / 180-205 / >205	0.06 / 0.16 / 0.12 / 0.0		160-195	223	[42]
(J_d9c)		→ $C_4 + H_2$	192	122-150 / 150-180 / 180-205 / >205	0.05 / 0.01 / 0.0 / 0.0		195-250	193	[43]
(J_d9d)		→ $C_2H + C_2H$	179	122-150 / 150-180 / 180-205 / >205	0.14 / 0.03 / 0.0 / 0.0				
(J_d10a)	C_4H_4	→ $C_2H_2 + C_2H_2$	745	>129	0.66	[44]	160-240	220	[21]
(J_d10b)		→ $C_4H_2 + H_2$	744	>129	0.07				
(J_d10c)		→ $C_4H_3 + H$	287	>129	0.27				
(J_d11a)	C_4H_6	→ $C_2H_4 + C_2H_2$	733	>137	0.20	[45]	160-240	218	[42]
(J_d11b)		→ $C_4H_4 + H_2$	701	>137	0.02				
(J_d11c)		→ $C_3H_3 + CH_3$	317	>137	0.50				
(J_d11d)		→ $C_4H_5 + H$	291	>137	0.20				
(J_d11e)		→ $C_2H_3 + C_2H_3$	251	>137	0.08				

Table B.6 – Continued from previous page

Reaction	Channels		ΔE	Branching Ratios			Cross-sections		
			(nm)	λ (nm)	Values (%)	Ref.	λ (nm)	T (K)	Ref.
(J_d12a)	C_4H_8	→ $C_4H_6 + H_2$	893	130-150 / >150	0.37 / 0.07	[46]	100-105	298	[29]
(J_d12b)		→ $CH_3CCH + CH_4$	872	130-150 / >150	0.20 / 0.01	[47]	105-115	298	[31]
(J_d12c)		→ $C_4H_7 + H$	337	130-150 / >150	0.00 / 0.46		115-205	296	[48]
(J_d12d)		→ $C_3H_6 + {}^3CH2$	276	130-150 / >150	0.04 / 0.00				
(J_d12e)		→ $C_3H_5 + CH_3$	274	130-150 / >150	0.00 / 0.44				
(J_d12f)		→ $C_2H_2 + CH_3 + CH_3$	223	130-150 / >150	0.27 / 0.00				
(J_d12g)		→ $C_2H_5 + C_2H_2 + H$	205	130-150 / >150	0.08 / 0.01				
(J_d12h)		→ $C_2H_4 + C_2H_3 + H$	204	130-150 / >150	0.04 / 0.01				
(J_d13a)	C_4H_{10}	→ $C_3H_6 + CH_4$	1162	116-140 / 140-160	0.05 / 0.01	[39]	120-160	298	[38]
(J_d13b)		→ $C_2H_6 + C_2H_4$	946	116-140 / 140-160	0.20 / 0.12	[49]			
(J_d13c)		→ $C_4H_8 + H_2$	896	116-140 / 140-160	0.40 / 0.70	[50]			
(J_d13d)		→ $C_2H_5 + C_2H_5$	301	116-140 / 140-160	0.15 / 0.10				
(J_d13e)		→ $C_2H_4 + CH_3 + CH_3$	327	116-140 / 140-160	0.10 / 0.03				
(J_d13f)		→ $C_3H_6 + CH_3 + H$	223	116-140 / 140-160	0.10 / 0.04				
(J_d14a)	C_6H_2	→ $C_6H + H$	215	131-150 / 150-180 / 180-205 / >205	0.75 / 0.80 / 0.88 / 1.0	Estimate after C_4H_2	120-185	300	[51]
(J_d14b)		→ $C_4H_2 + C_2$	203	131-150 / 150-180 / 180-205 / >205	0.06 / 0.16 / 0.12 / 0.0		185-300	233	[52]
(J_d14c)		→ $C_6 + H_2$	192	131-150 / 150-180 / 180-205 / >205	0.05 / 0.01 / 0.0 / 0.0				
(J_d14d)		→ $C_4H + C_2H$	179	131-150 / 150-180 / 180-205 / >205	0.14 / 0.03 / 0.0 / 0.0				
(J_d15)	C_6H_6	→ $C_6H_5 + H$	254	>134	1.0	[53]	100-115	295	[54]
							115-210	250	[55]
							210-270	295	[56]
(J_d16a)	C_7H_8	→ $C_7H_7 + H$	653	>140	0.75	[57]	185-240	300	[58]
(J_d16b)		→ $C_6H_5 + CH_3$	295	>140	0.25	[59]	240-270	296	[60]
(J_d17)	NH_3	→ $NH_2 + H$	270	>123	1.0	[61]	140-175	298	[62]
							175-225	175	[63]
(J_d18)	N_2H_4	→ $N_2H_3 + H$	354	>153	1.0	[64]	191-291	296	[65]
(J_d19)	HCN	→ $CN + H$	229	>100	1.0	[66]	100-105	295	[67]
							105-190	295	[66]
(J_d20)	HNC	→		Not included (cf. section 2.6.2.1)					
(J_d21)	CH_2NH	→ $HCN + H + H$	258	>124	1.0	[68]	234-260	298	[69]
(J_d22a)	CH_3NH_2	→ $CH_2NH + H + H$	224	139-165 / >165	1.0 / 0.55	[70]	100-249	298	[71]
(J_d22b)		→ $HCN + H_2 + H + H$	211	139-165 / >165	0.0 / 0.20				
(J_d23)	CH_3CN	→ $CN + CH_3$	237	>102	1.0	[72]	100-106	295	[67]
							106-184	298	[73]
(J_d24a)	HC_3N	→ $C_3N + H$	213	107-191 / >191	0.57 / 1.0	[74]	100-165	295	[75]
(J_d24b)		→ $CN + C_2H$	191	107-191 / >191	0.43 / 0.0		185-230	213	[76]
(J_d25a)	C_2H_3CN	→ $HC_3N + H_2$	668	>114	0.59	[77]	100-230	298	[78]
(J_d25b)		→ $HNC + C_2H_2$	528	>114	0.04	[79]			
(J_d25c)		→ $HCN + C_2H_2$	345	>114	0.12				
(J_d25d)		→ $CH_2CCN + H$	273	>114	0.24				
(J_d25e)		→ $CN + C_2H_3$	221	>114	0.01				
(J_d26a)	C_2H_5CN	→ $HCN + C_2H_4$	864	>104	0.16	Estimate after C_2H_3CN	100-152	298	[80]
(J_d26b)		→ $C_2H_3CN + H_2$	840	>104	0.59		152-217	-	Same as C_2H_2
(J_d26c)		→ $CN + C_2H_5$	232	>104	0.01				
(J_d26d)		→ $CH_3CHCN + H$		>104	0.24				

Table B.6 – Continued from previous page

Reaction	Channels		ΔE (nm)	Branching Ratios λ (nm)	Branching Ratios Values (%)	Branching Ratios Ref.	Cross-sections λ (nm)	Cross-sections T (K)	Cross-sections Ref.
(J_d27a)	HC_5N	$\rightarrow C_5N + H$	209	<174 / >174	0.50 / 1.0	Estimate after HC_3N	115-298	233	[81]
(J_d27b)		$\rightarrow CN + C_4H$	189	<174 / >174	0.25 / 0.0				
(J_d27c)		$\rightarrow C_3N + C_2H$	176	<174 / >174	0.25 / 0.0				
(J_d28a)	C_2N_2	$\rightarrow CN + CN$	213	>100	1.0	[82]	100-114	295	[67]
(J_d28b)							114-170	295	[75]
(J_d28c)							185-214	293	LISA[a]
(J_d28d)							214-225	183	LISA[a]
(J_d29)	C_4N_2	$\rightarrow C_3N + CN$	193	>105	1.0	[83]	100-176	295	[75]
							195-275	233	LISA[a]
(J_d30a)	H_2O	$\rightarrow OH + H$	243	<124 / 124-140 / >140	0.78 / 0.89 / 1.0	[84]	100-115	298	[85]
(J_d30b)		$\rightarrow O(^1D) + H_2$	179	<140 / >140	0.11 / 0.0	[86]	115-194	298	[87]
(J_d30c)		$\rightarrow O(^3P) + H + H$	129	<124 / >124	0.11 / 0.0	[88]			
(J_d31a)	H_2CO	$\rightarrow CO + H_2$	361	114-250 / > 250	0.5 / Table B.7	[89]	100-225	298	[90]
(J_d31b)		$\rightarrow HCO + H$	330	114-250 / >250	0.5 / Table B.7	[91]	225-375	223	[92]
(J_d32a)	CH_2CO	$\rightarrow CO + {}^3CH_2$	371	129-332 / > 332	0.0 / 1.0	[93]	290-354	298	[94]
(J_d32b)		$\rightarrow CO + {}^1CH_2$	332	129-332 / > 332	1.0 / 0.0	[95]			
(J_d33)	CH_3CHO	$\rightarrow CO + CH_4$	-[b]	>113	1.0	[91]	113-184	298	[96]
							202-300	298	[91]
(J_d34a)	CO_2	$\rightarrow CO + O(^3P)$	228	>100	Table B.8	[97]	100-117	298	[98]
(J_d34b)		$\rightarrow CO + O(^1D)$	167	>100	Table B.8	[99]	117-163	195	[100]
(J_d34c)		$\rightarrow CO + O(^1S)$	129	>100	Table B.8		163-192	195	[101]
							192-300	298	[102]

Notes. [a]LISA cross-sections are taken from http://www.lisa.univ-paris12.fr/GPCOS/SCOOPweb/index.html.
[b]Exothermic reaction.

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Table B.7: Photodissociation of H_2CO: Branching ratios.

Wavelength (nm)	Products	
	$CO + H_2$	$HCO + H$
250	0.490	0.310
251	0.492	0.308
252	0.493	0.307
253	0.494	0.306
254	0.495	0.305
255	0.496	0.304
256	0.496	0.304
257	0.497	0.303
258	0.497	0.303
259	0.496	0.304
260	0.493	0.307
261	0.490	0.312
262	0.487	0.318
263	0.485	0.325
264	0.482	0.333
265	0.477	0.343
266	0.471	0.354
267	0.465	0.365
268	0.458	0.377
269	0.450	0.390
270	0.441	0.404
271	0.432	0.418
272	0.422	0.433
273	0.412	0.448
274	0.401	0.464
275	0.391	0.479
276	0.380	0.495
277	0.371	0.512
278	0.362	0.528
279	0.356	0.544
280	0.347	0.560
281	0.337	0.576
282	0.329	0.591
283	0.321	0.606
284	0.313	0.620
285	0.307	0.633
286	0.302	0.645
287	0.296	0.657
288	0.291	0.669
289	0.284	0.680
290	0.278	0.690
291	0.272	0.700
292	0.266	0.710
293	0.262	0.718
294	0.259	0.726
295	0.256	0.734
296	0.254	0.740
297	0.252	0.746
298	0.249	0.751
299	0.245	0.755
300	0.242	0.758

Table B.8: Photodissociation of CO_2: Branching ratios.

Wavelength (nm)	Products		
	CO + O(^{3}P)	CO + O(^{1}D)	CO + O(^{1}S)
100	0.35	0	0.65
101	0.30	0	0.70
102	0.25	0	0.75
103	0.21	0	0.79
104	0.17	0	0.83
105	0.13	0	0.87
106	0.095	0	0.91
107	0.045	0	0.96
108	0	0	1
109	0	0	1
110	0	0	1
111	0	0	1
112	0	0	1
113	0	0.010	0.99
114	0	0.025	0.975
115	0	0.08	0.92
116	0	0.19	0.81
117	0	0.33	0.67
118	0	0.54	0.46
119	0	0.70	0.30
120	0	0.80	0.20
121	0	0.86	0.14
122	0	0.91	0.09
123	0	0.954	0.046
124	0	0.974	0.026
125	0	0.98	0.020
126	0	0.99	0.010
127	0	0.99	0.010
$\geq$128	0	1	0

Table B.9: Photodissociation reactions for radicals.

Reaction			Wavelength (nm)	Branching Ratio	Ref. Cross-section	Ref. Branching Ratio
(J_d1)	$CH_3 + h\nu$	$\rightarrow {}^1CH_2 + H$	200-240	1.0	[1]	[2, 3] [4]
(J_d2)	$C_2H_3 + h\nu$	$\rightarrow C_2H_2 + H$	160-170	1.0	[5]	
			225-238	1.0	[6]	[7]
			360-505	1.0	[8]	[9]
(J_d3)	$C_2H_5 + h\nu$	$\rightarrow C_2H_4 + H$	200-260	1.0	[10]	[11]
(J_d4a)	$C_3H_3 + h\nu$	$\rightarrow C_3H_2 + H$	230-300	0.97	[12]	
(J_d4b)		$\rightarrow C_3H + H_2$		0.03		[13]
(J_d4a)	$C_3H_3 + h\nu$	$\rightarrow C_3H_2 + H$	305-340	0.97		[14]
(J_d4b)		$\rightarrow C_3H + H_2$		0.03	[15]	
(J_d4a)	$C_3H_3 + h\nu$	$\rightarrow C_3H_2 + H$	340-347	1.0		
(J_d5a)	$C_3H_5 + h\nu$	$\rightarrow CH_3CCH + H$	210-233	0.30		
(J_d5b)		$\rightarrow CH_2CCH_2 + H$		0.40	[16]	[17]
(J_d5c)		$\rightarrow C_2H_2 + CH_3$		0.30		[18]
(J_d5a)	$C_3H_5 + h\nu$	$\rightarrow CH_3CCH + H$	370-420	0.40		[19]
(J_d5b)		$\rightarrow CH_2CCH_2 + H$		0.30	[20]	
(J_d5c)		$\rightarrow C_2H_2 + CH_3$		0.30		
(J_d6)	$C_3H_7 + h\nu$	$\rightarrow C_3H_6 + H$	200-350	1.0	[21]	[22]
(J_d7)	$C_6H_5 + h\nu$	$\rightarrow C_6H_4 + H$	225-360	1.0	[23]	[24]
(J_d8)	$C_7H_7 + h\nu$	$\rightarrow C_7H_6 + H$	220-340	1.0	[25]	[26]
(J_d9)	$H_2CN + h\nu$	$\rightarrow HCN + H$	278-287	1.0	[27] [29]	[28]
(J_d10)	$HCO + h\nu$	$\rightarrow CO + H$	613-616	1.0	[30]	

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Table B.10: Photoionization reactions leading to ion-pair formation.

Reaction			Resonance Position (eV)	Cross-section (cm^2)	Ref.
($J_{ip}2$)	$CH_4 + h\nu$	$\rightarrow H^- + CH_3^+$	21.5	1.0×10^{-20}	[1]
($J_{ip}3$)	$H_2 + h\nu$	$\rightarrow H^- + H^+$	17.3	2.5×10^{-23}	[2]
($J_{ip}4$)	$C_2H_2 + h\nu$	$\rightarrow C_2H^- + H^+$	18.8	6.0×10^{-21}	[3]
($J_{ip}20$)	$HCN + h\nu$	$\rightarrow CN^- + H^+$	15.2	4.4×10^{-20}	[4]
($J_{ip}31$)	$H_2O + h\nu$	$\rightarrow OH^- + H^+$	16.9	1.1×10^{-20}	[5]
($J_{ip}32$)	$CO + h\nu$	$\rightarrow O^- + C^+$	20.9	1.1×10^{-19}	[6]

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Table B.11: Dissociative electron attachment reactions.

Reaction			Resonance Position (eV)	Cross-section (cm^2)	Ref.
($J_{dea}2$)	$CH_4 + e^-$	$\rightarrow CH_2^- + H_2$	10.4	1.4×10^{-19}	[1]
		$\rightarrow H^- + CH_3$	9.8	1.6×10^{-18}	
($J_{dea}3$)	$H_2 + e^-$	$\rightarrow H^- + H$	3.7	1.5×10^{-21}	[2]
			10.5	1.2×10^{-20}	
			14.0	1.7×10^{-20}	
($J_{dea}4$)	$C_2H_2 + e^-$	$\rightarrow C_2H^- + H$	3.0	3.5×10^{-20}	[3]
		$\rightarrow H^- + C_2H$	7.9	3.9×10^{-20}	
($J_{dea}7$)	$CH_3CCH + e^-$	$\rightarrow H^- + C_3H_3$	3.6	6.0×10^{-22}	[4]
			6.9	1.2×10^{-20}	
			11.6	1.4×10^{-20}	
($J_{dea}11$)	$C_4H_2 + e^-$	$\rightarrow C_4H^- + H$	2.5	3.0×10^{-20}	[5]
			5.3	7.3×10^{-19}	
		$\rightarrow C_2H^- + C_2H$	6.0	2.1×10^{-20}	
			8.7	4.5×10^{-21}	
($J_{dea}18$)	$NH_3 + e^-$	$\rightarrow H^- + NH_2$	5.7	2.3×10^{-18}	[1]
			10.5	5.0×10^{-19}	
($J_{dea}20$)	$HCN + e^-$	$\rightarrow CN^- + H$	1.9	9.4×10^{-18}	[6]
($J_{dea}21$)	$HNC + e^-$	$\rightarrow CN^- + H$	3.0	1.0×10^{-17}	[7]
($J_{dea}24$)	$CH_3CN + e^-$	$\rightarrow CN^- + CH_3$	2.0	4.2×10^{-25}	[8]
			8.0	1.1×10^{-24}	
($J_{dea}25$)	$HC_3N + e^-$	$\rightarrow C_3N^- + H$	2.6	3.8×10^{-18}	[9]
		$\rightarrow CN^- + C_2H$	4.9	4.0×10^{-18}	
($J_{dea}26$)	$C_2H_3CN + e^-$	$\rightarrow CN^- + C_2H_3$	4.9	3.7×10^{-18}	[10]
			7.6	4.9×10^{-18}	
($J_{dea}29$)	$C_2N_2 + e^-$	$\rightarrow CN^- + CN$	5.5	1.9×10^{-17}	[11]
($J_{dea}30$)	$C_4N_2 + e^-$	$\rightarrow C_3N^- + CN$	2.9	1.7×10^{-17}	[12]
			6.0	1.4×10^{-18}	
		$\rightarrow CN^- + C_3N$	3.3	2.6×10^{-18}	
			6.0	1.9×10^{-18}	
($J_{dea}31$)	$H_2O + e^-$	$\rightarrow OH^- + H$	6.9	4.9×10^{-20}	[13]
			8.5	2.4×10^{-20}	[14]
			11.3	2.8×10^{-20}	
		$\rightarrow O^- + H_2$	7.1	2.1×10^{-19}	
			9.2	6.4×10^{-19}	
			11.9	9.1×10^{-19}	
		$\rightarrow H^- + OH$	6.4	6.4×10^{-18}	
			8.5	1.1×10^{-18}	
($J_{dea}32$)	$CO + e^-$	$\rightarrow O^- + C$	9.8	2.0×10^{-19}	[15]
					[16]

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Table B.12: Mass-to-charge (m/z), electron affinities (EA) and asymptotic cross-sections σ_0 used in the calculation of the photodetachment cross-sections.

Ion species	m/z (u)	EA (eV)	σ_0 (cm^2)	Ref.
H^-	1	0.75	1.0×10^{-17}	[1, 2]
CH_2^-	14	0.65	1.0×10^{-17}	[3, 2]
CH_3^-	15	0.08	1.0×10^{-17}	[4, 2]
C_2H^-	25	3.0	8.8×10^{-18}	[5]
C_4H^-	49	3.6	7.7×10^{-18}	[6, 5]
C_6H^-	73	3.8	4.8×10^{-18}	[6, 5]
CN^-	26	3.9	2.8×10^{-17}	[7, 8]
C_3N^-	50	4.3	5.2×10^{-17}	[9, 8]
C_5N^-	74	4.5	1.0×10^{-17}	[9, 2]
O^-	16	1.5	1.2×10^{-17}	[1, 10]
OH^-	17	1.8	3.3×10^{-17}	[11, 10]

Notes. The asymptotic cross-sections for O^- and OH^- are derived from fits to Eq. (E.15) using the literature electron affinities shown in column 2, and measured cross-sections at 1.87 and 2.33 eV for O^- and 1.87 and 1.96 eV for OH^- (cf. [10]).

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Table B.13: Column production rate (cm^{-2}) for the fragments of the ionization and dissociation of CH_4 and N_2 from GCRs.

Reaction			Total rate
(J_{gcr}1a)	N_2 + GCR	$\rightarrow {N_2}^+ + e^-$	9.1×10^7
(J_{gcr}1b)		$\rightarrow N(^4S) + N(^2D)$	6.9×10^7
(J_{gcr}1c)		$\rightarrow N^+ + N(^4S) + e^-$	2.3×10^7
(J_{gcr}2a)	CH_4 + GCR	$\rightarrow {}^3CH_2 + H_2$	2.4×10^6
(J_{gcr}2b)		$\rightarrow CH_3 + H$	2.0×10^6
(J_{gcr}2c)		$\rightarrow {CH_4}^+ + e^-$	1.8×10^6
(J_{gcr}2d)		$\rightarrow {CH_3}^+ + H + e^-$	1.4×10^6
(J_{gcr}2e)		$\rightarrow {CH_2}^+ + H_2 + e^-$	2.4×10^5

Appendix B.2.3. Representation of Rate Coefficients

The model simulations require simple representations of the temperature and pressure dependence of the rate coefficients. The entries in Tables B.15 to B.20 correspond in order to the modified Arrhenius representations for k_1, k_2, and k_3 as outlined below.

Neutral Reactions. Here, the temperature dependence of the various rate coefficients are represented with modified Arrhenius forms:

$$k(T) = AT^B exp(C/T), \tag{B.9}$$

where T is the temperature, and A, B, and C are fitting parameters.

Our most general rate representations employ 10 parameters: A, B, and C for $k_\circ$, for k_∞, and for k_R and a temperature independent parameter F_c. However, in some cases we employ various limiting and alternative representations.

- Type 1: Pressure independent unimolecular reactions in the high-pressure limit:
  $k = k_1$, with k_1 in s^{-1}.
- Type 2: Pressure independent bimolecular reactions:
  $k = k_1$, with k_1 in $cm^3\ s^{-1}$.
- Type 3: Pressure dependent bimolecular reactions:
  The Troe form with $k_\infty = k_1$ in s^{-1} and $k_\circ = k_2$ in $cm^3\ s^{-1}$.

$$k(T,[M]) = Fk_\infty k_\circ[M]/(k_\infty + k_\circ[M]) \tag{B.10}$$

- Type 4: Pressure dependent association reactions:
  Our modified Troe form with $k_\infty = k_1$ in $cm^3\ s^{-1}$, $k_\circ = k_2$ in $cm^6\ s^{-1}$, and $k_R = k_3$ in $cm^3\ s^{-1}$.

$$k(T,[M]) = k_R + Fk'_\infty k_\circ[M]/(k'_\infty + k_\circ[M]) \tag{B.11}$$

  where $k'_\infty = k_\infty - k_R$.
- Types 5 and 6: Special case for OH + CO pressure dependent bimolecular reactions (section 2.1 in Sander et al. [1]):
  $OH + CO \rightarrow H + CO_2$

$$k([M]) = \left(\frac{k_\circ}{1+\frac{k_\circ[M]}{k_\infty}}\right) 0.6^{\left[1+\left(log_{10}\left(\frac{k_\circ[M]}{k_\infty}\right)\right)^2\right]^{-1}} \tag{B.12}$$

  $k_\infty = k_1$ in s^{-1} and $k_\circ = k_2$ in $cm^3\ s^{-1}$.
  $OH + CO \rightarrow HOCO$

$$k([M]) = \left(\frac{k_\circ[M]}{1+\frac{k_\circ[M]}{k_\infty}}\right) 0.6^{\left[1+\left(log_{10}\left(\frac{k_\circ[M]}{k_\infty}\right)\right)^2\right]^{-1}} \tag{B.13}$$

  $k_\infty = k_1$ in $cm^3\ s^{-1}$ and $k_\circ = k_2$ in $cm^6\ s^{-1}$.

- Type 7: Special case for $H + C_2H_3$: The Troe form does not accurately reproduce the master equation results and so we instead interpolate the data from a table.

Positive and Negative Ion Reactions Here, the temperature dependence of the various rate coefficients are represented with modified Arrhenius forms:

$$k = A(300/T)^B exp(+C/T) \tag{B.14}$$

where T is the temperature, and A, B, and C are fitting parameters.

- Type 1: Unimolecular reactions.

  $$k = k_\infty \tag{B.15}$$

  with $T=T_n=T_i$, the ion and neutral temperature, respectively.
  k_∞ in s^{-1}.

- Type 2: Bimolecular ion-neutral reactions.

  $$k = k_\infty \tag{B.16}$$

  with $T=T_n=T_i$.
  k_∞ in $cm^3\ s^{-1}$.

- Type 3: Termolecular ion-neutral reactions.

  $$k([M]) = \frac{k_\infty k_\circ [M]}{k_\infty + k_\circ [M]} \tag{B.17}$$

  with $T=T_n=T_i$.
  k_∞ in $cm^3\ s^{-1}$ and k_0 in $cm^6\ s^{-1}$.

- Type 4: Electron recombination reactions.

  $$k = k_\infty \tag{B.18}$$

  with $T=T_e$, the electron temperature.
  k_∞ in $cm^3\ s^{-1}$.

- Type 5: Ion-neutral association reactions.

  $$k([M]) = F \times \frac{(k'_R + k_\circ [M])k_\infty}{k_\circ [M] + k'_R + k_\infty} \tag{B.19}$$

  where

  $$k'_R = \frac{k_R k_\infty}{k_\infty - k_R} \tag{B.20}$$

  and

$$F = 10^{\left(\frac{log_{10}(F_c)}{1+\left(\frac{(log_{10}[P_r]+C)}{N-0.14(log_{10}[P_r]+C)} \right)^2} \right)}, \tag{B.21}$$

where $P_r = k_\circ[M]/k_\infty$, $N = 0.75 - 1.27log_{10}(F_c)$ and $C = -0.4 - 0.67log_{10}(F_c)$.

with T=T_n=T_i.

k_∞ and k_R in $cm^3\ s^{-1}$, k_0 in $cm^6\ s^{-1}$.

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Table B.14: Radiative association reactions.

	Type	Reaction	k	Ref.
$R_{ra}1$	4	H + e → H^-	$3.37\times10^{-16}(300/\mathrm{T})^{-0.64}e^{-9.2/T}$	[1]
$R_{ra}2$	2	$^3CH_2$ + e → $CH_2{}^-$	1.00×10^{-14}	est.(CN+e)
$R_{ra}3$	2	CH_3 + e → $CH_3{}^-$	1.00×10^{-14}	est.(CN+e)
$R_{ra}4$	2	C_2H + e → C_2H^-	$2.00\times10^{-15}(300/\mathrm{T})^{0.50}$	[2]
$R_{ra}5$	4	C_4H + e → C_4H^-	$6.60\times10^{-09}(300/\mathrm{T})^{0.41}e^{-0.6/T}$	[3]
$R_{ra}6$	4	C_6H + e → C_6H^-	$8.62\times10^{-08}(300/\mathrm{T})^{0.23}e^{-0.5/T}$	[3]
$R_{ra}7$	2	CN + e → CN^-	1.00×10^{-14}	[4]
$R_{ra}8$	4	C_3N + e → C_3N^-	$2.60\times10^{-10}(300/\mathrm{T})^{0.50}$	[2]
$R_{ra}9$	4	C_5N + e → C_5N^-	$1.25\times10^{-07}(300/\mathrm{T})^{0.50}$	[2],[5]
$R_{ra}10$	2	$O(^3P)$ + e → O^-	1.50×10^{-15}	[6]
$R_{ra}11$	2	OH + e → OH^-	1.00×10^{-14}	est.(CN+e)

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Table B.15: Neutral reaction list

	Type	Reaction	k	F_c	T range	Ref.
R_n1	4	H + H → H_2	1.00×10^{-10}		200-2500	[1]
			$1.80\times10^{-30}T^{-1.00}$	0.40		
R_n2	2	H + CH → C + H_2	$2.81\times10^{-12}T^{0.26}$		50-500	[2]
R_n3	2	H + $^3CH_2$ → CH + H_2	$3.54\times10^{-11}T^{0.32}$		185-800	[3]
R_n4	2	H + $^1CH_2$ → CH + H_2	1.00×10^{-10}		290	[4]
R_n5a	4	H + CH_3 → CH_4	$1.40\times10^{-10}T^{0.15}e^{-1./T}$		50-300	[5]
			$7.68\times10^{-25}T^{-1.66}e^{-22./T}$	0.56		
			$4.56\times10^{-14}T^{-1.09}e^{-11./T}$			
R_n5b	2	H + CH_3 → $^1CH_2$ + H_2	$2.10\times10^{-08}T^{-0.56}e^{-8000./T}$		300-2500	[1]
R_n6	4	H + C_2H → C_2H_2	$3.73\times10^{-11}T^{0.32}$		200-2000	[6],est.(AtomNumber)
			9.00×10^{-26}	0.40		
			1.00×10^{-13}			
R_n7a	4	H + C_2H_2 → C_2H_3	$1.72\times10^{-34}T^{8.41}e^{358./T}$		50-300	[5]
			$2.18\times10^{-27}T^{-1.07}e^{-83./T}$	0.18		
			$1.05\times10^{-17}T^{-0.27}e^{-34./T}$			
R_n7b	2	H + C_2H_2 → C_2H + H_2	$1.67\times10^{-14}T^{1.64}e^{-15250./T}$		200-3000	[1]
R_n8a	4	H + C_2H_3 → C_2H_4	Tabulated		140	ThisWork
R_n8b	4	H + C_2H_3 → C_2H_2 + H_2	Tabulated		140	ThisWork
R_n9a	4	H + C_2H_4 → C_2H_5	$4.26\times10^{-26}T^{5.31}e^{173./T}$		50-300	[5]
			$5.08\times10^{-25}T^{-1.51}e^{-72./T}$	0.20		
			$9.02\times10^{-16}T^{-0.53}e^{-18./T}$			
R_n9b	2	H + C_2H_4 → C_2H_3 + H_2	$3.90\times10^{-22}T^{3.62}e^{-5670./T}$		400-2000	[1]
R_n10a	4	H + C_2H_5 → CH_3 + CH_3	$9.04\times10^{-11}T^{0.16}$		200-2000	[6],est.(AtomNumber)
			9.00×10^{-26}	0.40		
			1.00×10^{-13}			
R_n10b	2	H + C_2H_5 → C_2H_4 + H_2	7.00×10^{-11}		298-2000	[1]
R_n11	4	H + C_3 → C_3H	2.00×10^{-10}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-23}	0.40		
			2.00×10^{-12}			
R_n12	4	H + C_3H → C_3H_2	2.00×10^{-10}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-23}	0.40		
			2.00×10^{-12}			
R_n13	4	H + C_3H_2 → C_3H_3	$1.26\times10^{-10}T^{0.22}e^{43./T}$		200-2000	[7],est.(AtomNumber)
			1.00×10^{-23}	0.40		
			2.00×10^{-12}			
R_n14a	4	H + C_3H_3 → CH_3CCH	$1.06\times10^{-10}T^{0.10}e^{15./T}$		200-2000	[7],est.(AtomNumber)
			1.00×10^{-23}	0.40		
			2.00×10^{-12}			
R_n14b	4	H + C_3H_3 → CH_2CCH_2	$3.40\times10^{-11}T^{0.21}e^{87./T}$		200-2000	[7],est.(AtomNumber)
			1.00×10^{-23}	0.40		
			2.00×10^{-12}			
R_n15a	4	H + CH_3CCH → C_3H_5	$5.01\times10^{-30}T^{6.79}e^{214./T}$		50-300	ThisWork
			$2.32\times10^{-20}T^{-2.67}e^{-265./T}$	0.11		
			$2.93\times10^{-12}T^{-1.30}e^{-256./T}$			
R_n15b	4	H + CH_3CCH → C_3H_5	$5.01\times10^{-30}T^{6.79}e^{214./T}$		50-300	ThisWork
			$4.78\times10^{-28}T^{-1.69}e^{-133./T}$	0.50		
			$6.50\times10^{-16}T^{-1.38}e^{-163./T}$			
R_n15c	3	H + CH_3CCH → CH_2CCH_2 + H	$2.46\times10^{-16}T^{8.57}e^{-803./T}$		50-300	ThisWork

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	Type	Reaction	k	F_c	T range	Ref.
R_n15d	3	$H + CH_3CCH \rightarrow C_2H_2 + CH_3$	$1.03\times10^{-17}T^{9.30}e^{-776./T}$		50-300	ThisWork
R_n16a	4	$H + CH_2CCH_2 \rightarrow C_3H_5$	$2.18\times10^{-38}T^{9.58}e^{418./T}$		50-300	ThisWork
			$5.84\times10^{-20}T^{-2.23}e^{-261./T}$	0.06		
			$6.73\times10^{-25}T^{3.74}e^{0./T}$			
R_n16b	4	$H + CH_2CCH_2 \rightarrow C_3H_5$	$7.57\times10^{-29}T^{6.30}e^{186./T}$		50-300	ThisWork
			$2.64\times10^{-25}T^{-1.81}e^{-164./T}$	0.60		
			$2.99\times10^{-13}T^{-1.62}e^{-171./T}$			
R_n16c	3	$H + CH_2CCH_2 \rightarrow CH_3CCH + H$	$7.20\times10^{-21}T^{10.40}e^{13./T}$		50-300	ThisWork
R_n17a	4	$H + C_3H_5 \rightarrow C_3H_6$	$9.69\times10^{-11}T^{0.18}e^{63./T}$		200-2000	[7],est.(AtomNumber)
			1.00×10^{-23}	0.40		
			2.00×10^{-12}			
R_n17b	2	$H + C_3H_5 \rightarrow CH_2CCH_2 + H_2$	3.00×10^{-11}		300-1000	[1]
R_n18a	4	$H + C_3H_6 \rightarrow C_3H_7$	$5.02\times10^{-32}T^{7.22}e^{298./T}$		50-300	ThisWork
			$3.93\times10^{-30}T^{0.40}e^{-89./T}$	0.80		
R_n18b	4	$H + C_3H_6 \rightarrow C_3H_7$	$1.27\times10^{-27}T^{6.03}e^{157./T}$		50-300	ThisWork
			$4.38\times10^{-17}T^{-2.36}e^{-273./T}$	0.20		
			$1.29\times10^{-13}T^{-0.79}e^{-140./T}$			
R_n18c	3	$H + C_3H_6 \rightarrow CH_3 + C_2H_4$	$1.01\times10^{-26}T^{10.82}e^{438./T}$		50-300	ThisWork
R_n18d	2	$H + C_3H_6 \rightarrow C_3H_5 + H_2$	$1.14\times10^{-29}T^{5.25}e^{312./T}$		50-300	ThisWork
R_n19a	4	$H + C_3H_7 \rightarrow C_3H_8$	$2.76\times10^{-11}T^{0.22}$		200-2000	[7],est.(AtomNumber)
			1.00×10^{-23}	0.40		
			2.00×10^{-12}			
R_n19b	2	$H + C_3H_7 \rightarrow C_3H_6 + H_2$	1.00×10^{-10}		-	ThisWork
R_n20	4	$H + C_4H \rightarrow C_4H_2$	$9.69\times10^{-11}T^{0.24}e^{12./T}$		50-300	ThisWork
			$2.39\times10^{-16}T^{-2.85}e^{-125./T}$	0.48		
			$5.51\times10^{-06}T^{-2.25}e^{-106./T}$			
R_n21	4	$H + C_4H_2 \rightarrow C_4H_3$	$1.28\times10^{-26}T^{5.70}e^{164./T}$		50-300	ThisWork
			$5.69\times10^{-18}T^{-2.77}e^{-179./T}$	0.30		
			$3.98\times10^{-20}T^{2.89}e^{-39./T}$			
R_n22a	4	$H + C_4H_3 \rightarrow C_4H_4$	$1.03\times10^{-10}T^{0.05}e^{9./T}$		50-300	[5]
			$2.87\times10^{-14}T^{-3.73}e^{-208./T}$	0.72		
			$6.79\times10^{-05}T^{-2.85}e^{-145./T}$			
R_n22b	2	$H + C_4H_3 \rightarrow C_4H_2 + H_2$	1.00×10^{-10}		-	ThisWork
R_n23	4	$H + C_4H_4 \rightarrow C_4H_5$	$6.69\times10^{-21}T^{3.40}e^{-6./T}$		50-300	ThisWork
			$2.38\times10^{-15}T^{-3.60}e^{-134./T}$	0.39		
			$7.03\times10^{-12}T^{-0.63}e^{-260./T}$			
R_n24	4	$H + C_4H_5 \rightarrow C_4H_6$	$3.28\times10^{-11}T^{0.29}e^{80./T}$		200-2000	[7],est.(AtomNumber)
			1.00×10^{-21}	0.40		
			2.00×10^{-11}			
R_n25	4	$H + C_4H_7 \rightarrow C_4H_8$	2.00×10^{-10}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-21}	0.40		
			2.00×10^{-11}			
R_n26	4	$H + C_4H_9 \rightarrow C_4H_{10}$	$8.60\times10^{-12}T^{0.28}$		200-2000	[6],est.(AtomNumber)
			1.00×10^{-21}	0.40		
			2.00×10^{-11}			
R_n27	2	$H + C_6H \rightarrow C_6H_2$	3.00×10^{-10}		50-300	ThisWork
R_n28	4	$H + C_6H_2 \rightarrow C_6H_3$	$2.86\times10^{-26}T^{5.55}e^{153./T}$		-	est.(H+C4H2)
			$5.64\times10^{-20}T^{-2.24}e^{-1074./T}$	0.30		
			$8.70\times10^{-20}T^{2.75}e^{-50./T}$			

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	Type	Reaction	k	F_c	T range	Ref.
R_n29	4	$H + C_6H_3 \rightarrow C_6H_4$	2.00×10^{-10} 1.00×10^{-17} 2.00×10^{-10}	0.40	-	est.(Rad+Rad),est.(AtomNumber)
R_n30	4	$H + C_6H_5 \rightarrow C_6H_6$	$1.41\times10^{-10}T^{0.01}e^{14./T}$ $9.86\times10^{-12}T^{-2.54}e^{-122./T}$ $1.41\times10^{-10}T^{0.01}e^{14./T}$	0.51	50-300	[5]
R_n31	4	$H + C_6H_6 \rightarrow C_6H_7$	$1.41\times10^{-10}T^{0.01}e^{14./T}$ $4.52\times10^{-21}T^{-2.16}e^{-270./T}$ $1.42\times10^{-24}T^{3.27}e^{-71./T}$	0.07	50-300	ThisWork
R_n32	4	$H + C_7H_7 \rightarrow C_7H_8$	4.30×10^{-10} 1.00×10^{-15} 4.30×10^{-10}	0.40	300-2000	[1],est.(AtomNumber)
R_n33	4	$H + C_8H_9 \rightarrow C_8H_{10}$	2.00×10^{-10} 1.00×10^{-13} 2.00×10^{-10}	0.40	-	est.(Rad+Rad),est.(AtomNumber)
R_n34	4	$C + H_2 \rightarrow {}^3CH_2$	$2.06\times10^{-11}e^{-57./T}$ 2.50×10^{-28} 6.00×10^{-16}	0.40	300-2000	[8]
R_n35	2	$C + CH_3 \rightarrow C_2H_2 + H$	1.00×10^{-10}		10-300	[9]
R_n36a	2	$C + C_2H_2 \rightarrow C_3H + H$	$8.62\times10^{-11}T^{-0.12}$		15-295	[10],[11],[12]
R_n36b	2	$C + C_2H_2 \rightarrow C_3 + H_2$	$4.88\times10^{-10}T^{-0.12}$		15-295	[10],[11],[12]
R_n37	2	$C + C_2H_4 \rightarrow C_3H_3 + H$	$5.61\times10^{-10}T^{-0.11}$		15-295	[10],[11],[13]
R_n38	2	$C + CH_3CCH \rightarrow C_4H_3 + H$	$5.06\times10^{-10}T^{-0.11}$		15-295	[11],[14]
R_n39	2	$C + CH_2CCH_2 \rightarrow C_4H_3 + H$	$3.71\times10^{-10}T^{-0.01}$		15-295	[11],[15]
R_n40a	2	$C + C_3H_6 \rightarrow C_4H_5 + H$	$2.29\times10^{-10}T^{-0.08}$		15-295	[10],[14],[16]
R_n40b	2	$C + C_3H_6 \rightarrow C_3H_3 + CH_3$	$2.29\times10^{-10}T^{-0.08}$		15-295	[10],[14],[16]
R_n41	2	$C + C_4H_2 \rightarrow C_5H + H$	$5.75\times10^{-10}T^{-0.12}$		-	est.(C+C2H2)
R_n42	2	$C + C_4H_4 \rightarrow C_5H_3 + H$	$5.75\times10^{-10}T^{-0.12}$		-	est.(C+C2H2),[17]
R_n43	2	$C + C_4H_6 \rightarrow C_5H_5 + H$	1.10×10^{-09}		300	[18],[19]
R_n44a	2	$C + C_4H_8 \rightarrow C_5H_7 + H$	2.15×10^{-10}		300	[20]
R_n44b	2	$C + C_4H_8 \rightarrow C_4H_5 + CH_3$	2.15×10^{-10}		300	[20]
R_n45	2	$C + C_6H_2 \rightarrow C_7H + H$	$5.75\times10^{-10}T^{-0.12}$		-	est.(C+C2H2)
R_n46	4	$CH + H_2 \rightarrow CH_3$	$4.16\times10^{-11}T^{0.20}$ $5.72\times10^{-34}T^{1.60}$ 6.00×10^{-16}	0.63	53-744	[21],[22]
R_n47	2	$CH + CH_4 \rightarrow C_2H_4 + H$	$4.00\times10^{-08}T^{-1.04}e^{-36./T}$		23-295	[23]
R_n48	2	$CH + C_2H_2 \rightarrow C_3H_2 + H$	$1.59\times10^{-09}T^{-0.23}e^{-16./T}$		23-295	[23],[24]
R_n49a	2	$CH + C_2H_4 \rightarrow CH_3CCH + H$	$2.32\times10^{-09}T^{-0.55}e^{-29./T}$		23-295	[23],[25],[26]
R_n49b	2	$CH + C_2H_4 \rightarrow CH_2CCH_2 + H$	$5.42\times10^{-09}T^{-0.55}e^{-29./T}$		23-295	[23],[25],[26]
R_n50a	2	$CH + C_2H_6 \rightarrow C_2H_4 + CH_3$	$3.27\times10^{-08}T^{-0.86}e^{-53./T}$		23-295	[23],[25]
R_n50b	2	$CH + C_2H_6 \rightarrow C_3H_6 + H$	$5.32\times10^{-09}T^{-0.86}e^{-53./T}$		23-295	[23],[25]
R_n51	2	$CH + CH_3CCH \rightarrow C_4H_4 + H$	$1.83\times10^{-08}T^{-0.67}e^{-59./T}$		77-170	[27],[26],[28]
R_n52	2	$CH + CH_2CCH_2 \rightarrow C_4H_4 + H$	$2.12\times10^{-08}T^{-0.69}e^{-67./T}$		77-170	[27],[26],[28]
R_n53a	2	$CH + C_3H_6 \rightarrow C_4H_6 + H$	$2.84\times10^{-09}T^{-0.39}e^{-19./T}$		77-300	[27],[28],[29]
R_n53b	2	$CH + C_3H_6 \rightarrow CH_3CCH + CH_3$	$3.15\times10^{-10}T^{-0.39}e^{-19./T}$		77-300	[27],[28],[29]
R_n54a	2	$CH + C_3H_8 \rightarrow C_2H_4 + C_2H_5$	$1.20\times10^{-09}T^{-0.40}e^{-4./T}$		10-300	[30],Faure(PersComm),[31]
R_n54b	2	$CH + C_3H_8 \rightarrow C_3H_6 + CH_3$	$7.02\times10^{-10}T^{-0.40}e^{-4./T}$		10-300	[30],Faure(PersComm),[31]
R_n54c	2	$CH + C_3H_8 \rightarrow C_4H_8 + H$	$2.97\times10^{-10}T^{-0.40}e^{-4./T}$		10-300	[30],Faure(PersComm),[31]
R_n55	2	$CH + C_4H_2 \rightarrow C_5H_2 + H$	$1.59\times10^{-09}T^{-0.23}e^{-16./T}$		-	est.(CH+C2H2)
R_n56	2	$CH + C_4H_4 \rightarrow C_5H_4 + H$	$1.59\times10^{-09}T^{-0.23}e^{-16./T}$		-	est.(CH+C2H2)

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	Type	Reaction	k	F_c	T range	Ref.
R_n57	2	$CH + C_4H_6 \rightarrow C_5H_6 + H$	$2.12\times10^{-08}T^{-0.69}e^{-67./T}$		-	est.(CH+CH2CCH2)
R_n58a	2	$CH + C_4H_8 \rightarrow C_5H_8 + H$	$6.06\times10^{-09}T^{-0.53}e^{-33./T}$		23-295	[23],[28]
R_n58b	2	$CH + C_4H_8 \rightarrow C_4H_6 + CH_3$	$2.72\times10^{-09}T^{-0.53}e^{-33./T}$		23-295	[23],[28]
R_n59a	2	$CH + C_4H_{10} \rightarrow C_5H_{10} + H$	$2.52\times10^{-10}T^{-0.33}e^{-4./T}$		10-300	Faure(PersComm),[30]
R_n59b	2	$CH + C_4H_{10} \rightarrow C_4H_8 + CH_3$	$1.55\times10^{-09}T^{-0.33}e^{-4./T}$		10-300	Faure(PersComm),[30]
R_n60	2	$CH + C_6H_2 \rightarrow C_7H_2 + H$	$1.59\times10^{-09}T^{-0.23}e^{-16./T}$		-	est.(CH+C2H2)
R_n61	1	$^1CH_2 \rightarrow {}^3CH_2 + h\nu$	5.56×10^{-02}		-	[32]
R_n62	2	$^1CH_2 + N_2 \rightarrow {}^3CH_2 + N_2$	$2.00\times10^{-11}e^{-237./T}$		200-1000	[1]
R_n63	2	$^1CH_2 + {}^{15}N^{14}N \rightarrow {}^3CH_2 + {}^{15}N^{14}N$	$2.00\times10^{-11}e^{-237./T}$		-	est.(1CH2+N2)
R_n64a	2	$^1CH_2 + H_2 \rightarrow {}^3CH_2 + H_2$	3.05×10^{-11}		195-798	[33]
R_n64b	2	$^1CH_2 + H_2 \rightarrow CH_3 + H$	7.46×10^{-11}		195-798	[33]
R_n65	2	$^1CH_2 + CH_3 \rightarrow C_2H_4 + H$	3.00×10^{-11}		300-2500	[34]
R_n66a	2	$^1CH_2 + CH_4 \rightarrow {}^3CH_2 + CH_4$	$3.10\times10^{-12}e^{250./T}$		200-1000	[1]
R_n66b	2	$^1CH_2 + CH_4 \rightarrow CH_3 + CH_3$	$1.40\times10^{-11}e^{250./T}$		200-1000	[1]
R_n66c	2	$^1CH_2 + CH_4 \rightarrow C_2H_5 + H$	$1.40\times10^{-11}e^{250./T}$		200-1000	[1]
R_n67a	2	$^1CH_2 + C_2H_2 \rightarrow {}^3CH_2 + C_2H_2$	$2.03\times10^{-09}T^{-0.39}$		195-798	[35],[36]
R_n67b	2	$^1CH_2 + C_2H_2 \rightarrow C_3H_3 + H$	$7.90\times10^{-10}T^{-0.39}$		195-798	[35],[36]
R_n68a	2	$^1CH_2 + C_2H_4 \rightarrow {}^3CH_2 + C_2H_4$	$1.63\times10^{-08}T^{-0.84}$		195-798	[35],[36]
R_n68b	2	$^1CH_2 + C_2H_4 \rightarrow C_3H_5 + H$	$8.80\times10^{-09}T^{-0.84}$		195-798	[35],[36]
R_n69a	2	$^1CH_2 + C_2H_6 \rightarrow {}^3CH_2 + C_2H_6$	3.60×10^{-11}		300-2000	[37]
R_n69b	2	$^1CH_2 + C_2H_6 \rightarrow C_2H_5 + CH_3$	$2.24\times10^{-08}T^{-0.90}$		210-475	[38]
R_n70a	2	$^1CH_2 + CH_3CCH \rightarrow {}^3CH_2 + CH_3CCH$	1.68×10^{-10}		298	[39]
R_n70b	2	$^1CH_2 + CH_3CCH \rightarrow C_4H_5 + H$	$4.25\times10^{-09}T^{-0.52}e^{92./T}$		200-2000	[40]
R_n71a	2	$^1CH_2 + CH_2CCH_2 \rightarrow {}^3CH_2 + CH_2CCH_2$	1.68×10^{-10}		298	[39]
R_n71b	2	$^1CH_2 + CH_2CCH_2 \rightarrow C_4H_5 + H$	$1.12\times10^{-09}T^{-0.35}e^{232./T}$		200-2000	[40]
R_n72a	2	$^1CH_2 + C_3H_6 \rightarrow {}^3CH_2 + C_3H_6$	$6.13\times10^{-10}T^{-0.13}$		195-798	[36]
R_n72b	2	$^1CH_2 + C_3H_6 \rightarrow C_4H_7 + H$	$6.06\times10^{-11}T^{-0.13}$		195-798	[36]
R_n73a	2	$^1CH_2 + C_3H_8 \rightarrow {}^3CH_2 + C_3H_8$	1.12×10^{-10}		298	[39]
R_n73b	2	$^1CH_2 + C_3H_8 \rightarrow C_4H_9 + H$	1.12×10^{-10}		298	[39]
R_n74a	2	$^1CH_2 + C_4H_2 \rightarrow {}^3CH_2 + C_4H_2$	$2.03\times10^{-09}T^{-0.39}$		-	est.(1CH2+C2H2)
R_n74b	2	$^1CH_2 + C_4H_2 \rightarrow C_5H_3 + H$	$7.90\times10^{-10}T^{-0.39}$		-	est.(1CH2+C2H2)
R_n75a	2	$^1CH_2 + C_4H_4 \rightarrow {}^3CH_2 + C_4H_4$	$2.03\times10^{-09}T^{-0.39}$		-	est.(1CH2+C2H2)
R_n75b	2	$^1CH_2 + C_4H_4 \rightarrow C_5H_5 + H$	$7.90\times10^{-10}T^{-0.39}$		-	est.(1CH2+C2H2)
R_n76a	2	$^1CH_2 + C_4H_6 \rightarrow {}^3CH_2 + C_4H_6$	1.68×10^{-10}		-	est.(1CH2+CH2CCH2)
R_n76b	2	$^1CH_2 + C_4H_6 \rightarrow C_5H_7 + H$	$2.92\times10^{-09}T^{-0.48}e^{220./T}$		200-2000	[40]
R_n77a	2	$^1CH_2 + C_4H_8 \rightarrow {}^3CH_2 + C_4H_8$	1.13×10^{-10}		295	[41]
R_n77b	2	$^1CH_2 + C_4H_8 \rightarrow C_5H_9 + H$	1.13×10^{-10}		295	[41]
R_n78a	2	$^1CH_2 + C_4H_{10} \rightarrow {}^3CH_2 + C_4H_{10}$	1.27×10^{-10}		298	[39]
R_n78b	2	$^1CH_2 + C_4H_{10} \rightarrow C_5H_{11} + H$	1.27×10^{-10}		298	[39]
R_n79a	2	$^1CH_2 + C_6H_2 \rightarrow {}^3CH_2 + C_6H_2$	$2.03\times10^{-09}T^{-0.39}$		-	est.(1CH2+C2H2)
R_n79b	2	$^1CH_2 + C_6H_2 \rightarrow C_7H_3 + H$	$7.90\times10^{-10}T^{-0.39}$		-	est.(1CH2+C2H2)
R_n80a	4	$^3CH_2 + {}^3CH_2 \rightarrow C_2H_2 + H_2$	$2.94\times10^{-11}e^{-4./T}$		300-2500	[42],est.(AtomNumber)
			1.00×10^{-25}	0.40		
			1.00×10^{-13}			
R_n80b	4	$^3CH_2 + {}^3CH_2 \rightarrow C_2H_2 + H + H$	$1.18\times10^{-10}e^{-4./T}$		300-2500	[42],est.(AtomNumber)
			1.00×10^{-25}	0.40		
			1.00×10^{-13}			
R_n81	4	$^3CH_2 + CH_3 \rightarrow C_2H_4 + H$	$1.99\times10^{-09}T^{-0.34}e^{-77./T}$		300	[42],est.(AtomNumber)
			1.00×10^{-25}	0.40		
			1.00×10^{-13}			

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	Type	Reaction							k	F_c	T range	Ref.
R_n82	4	$^3CH_2$	+	C_2H	→	C_3H_2	+	H	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
									1.00×10^{-23}	0.40		
									2.00×10^{-12}			
R_n83a	4	$^3CH_2$	+	C_2H_3	→	C_3H_5			8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
									1.00×10^{-23}	0.40		
									2.00×10^{-12}			
R_n83b	2	$^3CH_2$	+	C_2H_3	→	C_2H_2	+	CH_3	3.00×10^{-11}		300-2500	[34]
R_n84a	4	$^3CH_2$	+	C_2H_5	→	C_3H_7			8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
									1.00×10^{-23}	0.40		
									2.00×10^{-12}			
R_n84b	2	$^3CH_2$	+	C_2H_5	→	C_2H_4	+	CH_3	3.00×10^{-11}		300-2500	[34]
R_n85	4	$^3CH_2$	+	C_3	→	C_4H_2			8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
									1.00×10^{-21}	0.40		
									2.00×10^{-11}			
R_n86	4	$^3CH_2$	+	C_3H	→	C_4H_3			8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
									1.00×10^{-21}	0.40		
									2.00×10^{-11}			
R_n87	4	$^3CH_2$	+	C_3H_2	→	C_4H_4			8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
									1.00×10^{-21}	0.40		
									2.00×10^{-11}			
R_n88	4	$^3CH_2$	+	C_3H_3	→	C_4H_5			8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
									1.00×10^{-21}	0.40		
									2.00×10^{-11}			
R_n89	2	$^3CH_2$	+	C_3H_5	→	C_4H_6	+	H	5.00×10^{-11}		300-2500	[34]
R_n90	4	CH_3	+	CH_3	→	C_2H_6			$3.84\times10^{-10}T^{-0.29}e^{-28./T}$		50-300	ThisWork
									$5.53\times10^{-17}T^{-3.79}e^{-64./T}$	0.37		
									$3.20\times10^{-06}T^{-3.25}e^{-74./T}$			
R_n91	2	CH_3	+	C_2H	→	C_3H_3	+	H	4.00×10^{-11}		300-2500	[34]
R_n92a	4	CH_3	+	C_2H_3	→	C_3H_6			$8.87\times10^{-10}T^{-0.38}e^{39./T}$		50-300	ThisWork
									$1.66\times10^{-24}T^{-2.11}e^{-167./T}$	0.80		
									$3.63\times10^{-12}T^{-2.18}e^{-122./T}$			
R_n92b	3	CH_3	+	C_2H_3	→	C_3H_5	+	H	$1.24\times10^{+05}T^{0.61}e^{54./T}$		50-300	ThisWork
R_n92c	2	CH_3	+	C_2H_3	→	C_2H_2	+	CH_4	$1.50\times10^{-11}e^{385./T}$		308-900	[43]
R_n93a	4	CH_3	+	C_2H_5	→	C_3H_8			$2.86\times10^{-09}T^{-0.61}e^{-44./T}$		50-300	ThisWork
									$4.31\times10^{-12}T^{-4.75}e^{-96./T}$	0.95		
									$3.62\times10^{-02}T^{-4.25}e^{-189./T}$			
R_n93b	3	CH_3	+	C_2H_5	→	C_2H_4	+	CH_4	$4.88\times10^{-09}T^{4.59}e^{464./T}$		50-300	ThisWork
R_n94	4	CH_3	+	C_3	→	C_4H_3			8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
									1.00×10^{-21}	0.40		
									2.00×10^{-11}			
R_n95	4	CH_3	+	C_3H	→	C_4H_4			8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
									1.00×10^{-21}	0.40		
									2.00×10^{-11}			
R_n96	4	CH_3	+	C_3H_2	→	C_4H_5			8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
									1.00×10^{-21}	0.40		
									2.00×10^{-11}			
R_n97a	4	CH_3	+	C_3H_3	→	C_4H_6			$6.80\times10^{-11}e^{130./T}$		301-800	[44],est.(AtomNumber)
									1.00×10^{-21}	0.40		
									2.00×10^{-11}			
R_n97b	2	CH_3	+	C_3H_3	→	C_3H_2	+	CH_4	$1.50\times10^{-11}e^{385./T}$		50-300	ThisWork

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	Type	Reaction	k	F_c	T range	Ref.
R_n98a	4	$CH_3 + C_3H_5 \rightarrow C_4H_8$	$1.55\times10^{-09}T^{-0.54}e^{117./T}$		301-800	[44],[1],est.(AtomNumber)
			1.00×10^{-21}	0.40		
			2.00×10^{-11}			
R_n98b	2	$CH_3 + C_3H_5 \rightarrow CH_2CCH_2 + CH_4$	6.00×10^{-13}		500-800	[1]
R_n99a	4	$CH_3 + C_3H_7 \rightarrow C_4H_{10}$	$5.33\times10^{-10}T^{-0.47}e^{97./T}$		200-2000	[45],est.(AtomNumber)
			1.00×10^{-21}	0.40		
			2.00×10^{-11}			
R_n99b	2	$CH_3 + C_3H_7 \rightarrow C_3H_6 + CH_4$	1.00×10^{-10}		-	ThisWork
R_n100a	4	$CH_3 + C_4H_3 \rightarrow C_5H_6$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-19}	0.40		
			8.00×10^{-11}			
R_n100b	2	$CH_3 + C_4H_3 \rightarrow C_4H_2 + CH_4$	$1.50\times10^{-11}e^{385./T}$		-	est.(CH3+C2H3)
R_n101	4	$CH_3 + C_4H_5 \rightarrow C_5H_8$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-19}	0.40		
			8.00×10^{-11}			
R_n102	4	$CH_3 + C_4H_7 \rightarrow C_5H_{10}$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-19}	0.40		
			8.00×10^{-11}			
R_n103	4	$CH_3 + C_4H_9 \rightarrow C_5H_{12}$	$1.16\times10^{-09}T^{-0.67}e^{73./T}$		-	[45],est.(AtomNumber)
			1.00×10^{-19}	0.40		
			$1.16\times10^{-09}T^{-0.67}e^{73./T}$			
R_n104a	4	$CH_3 + C_6H_3 \rightarrow C_7H_6$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-15}	0.40		
			8.00×10^{-11}			
R_n104b	2	$CH_3 + C_6H_3 \rightarrow C_6H_2 + CH_4$	$1.50\times10^{-11}e^{385./T}$		-	est.(CH3+C2H3)
R_n105	4	$CH_3 + C_6H_5 \rightarrow C_7H_8$	$3.62\times10^{-09}T^{-0.62}e^{-29./T}$		50-300	[5]
			1.00×10^{-15}	0.40		
			$3.62\times10^{-09}T^{-0.62}e^{-29./T}$			
R_n106	4	$CH_3 + C_7H_7 \rightarrow C_8H_{10}$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-13}	0.40		
			8.00×10^{-11}			
R_n107	4	$CH_3 + C_8H_9 \rightarrow C_9H_{12}$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-11}	0.40		
			8.00×10^{-11}			
R_n108	2	$C_2 + H_2 \rightarrow C_2H + H$	$5.60\times10^{-11}e^{-1095./T}$		293-395	[46]
R_n109	2	$C_2 + CH_4 \rightarrow C_2H + CH_3$	$9.83\times10^{-11}T^{-0.42}e^{-13./T}$		24-300	[47]
R_n110	2	$C_2 + C_2H_2 \rightarrow C_4H + H$	$1.92\times10^{-07}T^{-1.14}e^{-77./T}$		49-300	[47],[48],[49]
R_n111a	2	$C_2 + C_2H_4 \rightarrow C_2H_2 + C_2H_2$	$2.57\times10^{-08}T^{-0.93}e^{-58./T}$		49-300	[47],[50]
R_n111b	2	$C_2 + C_2H_4 \rightarrow C_4H_3 + H$	$2.13\times10^{-08}T^{-0.93}e^{-58./T}$		49-300	[47],[50],[51]
R_n111c	2	$C_2 + C_2H_4 \rightarrow C_4H_2 + H_2$	$4.03\times10^{-09}T^{-0.93}e^{-58./T}$		49-300	[47],[50]
R_n112	2	$C_2 + C_2H_6 \rightarrow C_2H_5 + C_2H$	$2.77\times10^{-08}T^{-0.94}e^{-44./T}$		24-300	[47]
R_n113a	2	$C_2 + CH_3CCH \rightarrow C_5H_3 + H$	4.41×10^{-10}		77-296	[52],[53],[54]
R_n113b	2	$C_2 + CH_3CCH \rightarrow C_5H_2 + H_2$	9.00×10^{-12}		77-296	[52],[54]
R_n114	2	$C_2 + CH_2CCH_2 \rightarrow C_5H_3 + H$	5.00×10^{-10}		77-296	[52],[55]
R_n115a	2	$C_2 + C_3H_6 \rightarrow C_5H_5 + H$	2.86×10^{-10}		77-296	[52],[56]
R_n115b	2	$C_2 + C_3H_6 \rightarrow C_4H_3 + CH_3$	1.18×10^{-10}		77-296	[52],[56]
R_n115c	2	$C_2 + C_3H_6 \rightarrow CH_3CCH + C_2H_2$	1.52×10^{-11}		77-296	[52],[56]
R_n116	2	$C_2 + C_3H_8 \rightarrow C_3H_7 + C_2H$	$3.89\times10^{-07}T^{-1.31}e^{-94./T}$		24-300	[47]
R_n117	2	$C_2H + H_2 \rightarrow C_2H_2 + H$	$3.50\times10^{-18}T^{2.32}e^{-444./T}$		180-3000	[1]
R_n118	2	$C_2H + CH_4 \rightarrow C_2H_2 + CH_3$	$3.60\times10^{-14}T^{0.94}e^{-328./T}$		150-780	[1]

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	Type	Reaction							k	F_c	T range	Ref.
R_n119a	2	C_2H	+	C_2H	→	C_4H	+	H	3.00×10^{-11}		300-2500	[34]
R_n119b	2	C_2H	+	C_2H	→	C_2H_2	+	C_2	3.00×10^{-12}		300-2500	[34]
R_n120	2	C_2H	+	C_2H_2	→	C_4H_2	+	H	$4.37\times10^{-10}T^{-0.25}$		15-295	[57]
R_n121a	2	C_2H	+	C_2H_3	→	C_4H_3	+	H	3.00×10^{-11}		300-2500	[34]
R_n121b	2	C_2H	+	C_2H_3	→	C_2H_2	+	C_2H_2	1.60×10^{-12}		300-2500	[34]
R_n122	2	C_2H	+	C_2H_4	→	C_4H_4	+	H	$7.80\times10^{-11}e^{134./T}$		150-359	[58],[59],[60]
R_n123a	2	C_2H	+	C_2H_5	→	C_2H_4	+	C_2H_2	3.00×10^{-12}		300-2500	[34]
R_n123b	2	C_2H	+	C_2H_5	→	C_3H_3	+	CH_3	3.00×10^{-11}		300-2500	[34]
R_n124	2	C_2H	+	C_2H_6	→	C_2H_2	+	C_2H_5	$6.75\times10^{-12}T^{0.28}e^{62./T}$		150-780	[1]
R_n125a	2	C_2H	+	CH_3CCH	→	C_5H_4	+	H	$4.64\times10^{-10}T^{-0.30}$		63-296	[61],[62]
R_n125b	2	C_2H	+	CH_3CCH	→	C_4H_2	+	CH_3	$6.96\times10^{-10}T^{-0.30}$		63-296	[61],[62]
R_n126	2	C_2H	+	CH_2CCH_2	→	C_5H_4	+	H	$1.95\times10^{-09}T^{-0.40}$		63-296	[61],[63]
R_n127	2	C_2H	+	C_3H_6	→	C_4H_4	+	CH_3	2.16×10^{-10}		103-296	[64],[65],[60]
R_n128	2	C_2H	+	C_3H_8	→	C_3H_7	+	C_2H_2	$9.80\times10^{-11}e^{-71./T}$		96-361	[66]
R_n129	2	C_2H	+	C_4H_2	→	C_6H_2	+	H	$1.62\times10^{-09}T^{-0.31}$		20-300	[67],[68]
R_n130	2	C_2H	+	C_4H_4	→	C_6H_4	+	H	$1.03\times10^{-09}T^{-0.23}e^{4./T}$		-	est.(C2H+C4H2),[69]
R_n131	2	C_2H	+	C_4H_6	→	C_6H_6	+	H	3.00×10^{-10}		104-296	[70],[71]
R_n132a	2	C_2H	+	C_4H_8	→	C_4H_4	+	C_2H_5	1.32×10^{-10}		104-296	[70],[65],[72]
R_n132b	2	C_2H	+	C_4H_8	→	C_5H_6	+	CH_3	8.80×10^{-11}		104-296	[70],[65],[72]
R_n133	2	C_2H	+	C_4H_{10}	→	C_2H_2	+	C_4H_9	1.15×10^{-10}		104-296	[70]
R_n134	2	C_2H	+	C_6H_2	→	C_8H_2	+	H	$1.03\times10^{-09}T^{-0.23}e^{4./T}$		-	est.(C2H+C4H2)
R_n135	2	C_2H	+	C_6H_6	→	C_8H_6	+	H	$9.10\times10^{-10}T^{-0.18}$		105-298	[73]
R_n136a	4	C_2H_3	+	C_2H_3	→	C_4H_5	+	H	$1.20\times10^{-11}e^{400./T}$		300-700	[74],est.(AtomNumber)
									1.00×10^{-21}	0.40		
									1.20×10^{-11}			
R_n136b	2	C_2H_3	+	C_2H_3	→	C_2H_4	+	C_2H_2	2.40×10^{-11}		298	[75]
R_n137a	4	C_2H_3	+	C_2H_5	→	C_4H_8			6.50×10^{-11}		298	[76],est.(AtomNumber)
									1.00×10^{-21}	0.40		
									2.00×10^{-11}			
R_n137b	2	C_2H_3	+	C_2H_5	→	C_2H_4	+	C_2H_4	1.50×10^{-11}		298	[76]
R_n137c	2	C_2H_3	+	C_2H_5	→	C_2H_6	+	C_2H_2	1.50×10^{-11}		298	[76]
R_n138	4	C_2H_3	+	C_3	→	C_5H_3			8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
									1.00×10^{-19}	0.40		
									8.00×10^{-11}			
R_n139	4	C_2H_3	+	C_3H	→	C_5H_4			8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
									1.00×10^{-19}	0.40		
									8.00×10^{-11}			
R_n140	4	C_2H_3	+	C_3H_2	→	C_5H_5			8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
									1.00×10^{-19}	0.40		
									8.00×10^{-11}			
R_n141	4	C_2H_3	+	C_3H_3	→	C_5H_6			8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
									1.00×10^{-19}	0.40		
									8.00×10^{-11}			
R_n142a	4	C_2H_3	+	C_3H_5	→	C_5H_8			8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
									1.00×10^{-19}	0.40		
									8.00×10^{-11}			
R_n142b	2	C_2H_3	+	C_3H_5	→	CH_2CCH_2	+	C_2H_4	4.00×10^{-12}		300-2500	[77]
R_n142c	2	C_2H_3	+	C_3H_5	→	C_3H_6	+	C_2H_2	8.00×10^{-12}		300-2500	[77]
R_n143a	4	C_2H_3	+	C_3H_7	→	C_5H_{10}			8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
									1.00×10^{-19}	0.40		
									8.00×10^{-11}			

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	Type	Reaction	k	F_c	T range	Ref.
R_n143b	2	$C_2H_3 + C_3H_7 \rightarrow C_3H_6 + C_2H_4$	$2.53\times10^{-10}T^{-0.70}$		300-2500	[78]
R_n143c	2	$C_2H_3 + C_3H_7 \rightarrow C_3H_8 + C_2H_2$	$2.53\times10^{-10}T^{-0.70}$		300-2500	[78]
R_n144	4	$C_2H_3 + C_4H_3 \rightarrow C_6H_6$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-17}	0.40		
			8.00×10^{-11}			
R_n145	4	$C_2H_3 + C_4H_5 \rightarrow C_6H_8$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-17}	0.40		
			8.00×10^{-11}			
R_n146	4	$C_2H_3 + C_4H_7 \rightarrow C_6H_{10}$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-17}	0.40		
			8.00×10^{-11}			
R_n147	4	$C_2H_3 + C_4H_9 \rightarrow C_6H_{12}$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-17}	0.40		
			8.00×10^{-11}			
R_n148	4	$C_2H_3 + C_6H_3 \rightarrow C_8H_6$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-13}	0.40		
			8.00×10^{-11}			
R_n149	4	$C_2H_3 + C_6H_5 \rightarrow C_8H_8$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-13}	0.40		
			8.00×10^{-11}			
R_n150a	4	$C_2H_5 + C_2H_5 \rightarrow C_4H_{10}$	$1.45\times10^{-09}T^{-0.70}e^{1./T}$		200-2000	[45],est.(AtomNumber)
			1.00×10^{-21}	0.40		
			2.00×10^{-11}			
R_n150b	2	$C_2H_5 + C_2H_5 \rightarrow C_2H_4 + C_2H_6$	2.40×10^{-12}		300-1200	[79]
R_n151	4	$C_2H_5 + C_3 \rightarrow C_5H_5$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-19}	0.40		
			8.00×10^{-11}			
R_n152	4	$C_2H_5 + C_3H \rightarrow C_5H_6$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-19}	0.40		
			8.00×10^{-11}			
R_n153	4	$C_2H_5 + C_3H_2 \rightarrow C_5H_7$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-19}	0.40		
			8.00×10^{-11}			
R_n154	4	$C_2H_5 + C_3H_3 \rightarrow C_5H_8$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-19}	0.40		
			8.00×10^{-11}			
R_n155a	4	$C_2H_5 + C_3H_5 \rightarrow C_5H_{10}$	$3.30\times10^{-11}e^{66./T}$		500-1200	[1],est.(AtomNumber)
			1.00×10^{-19}	0.40		
			$3.30\times10^{-11}e^{66./T}$			
R_n155b	2	$C_2H_5 + C_3H_5 \rightarrow C_3H_6 + C_2H_4$	$4.30\times10^{-12}e^{66./T}$		500-1200	[1]
R_n155c	2	$C_2H_5 + C_3H_5 \rightarrow CH_2CCH_2 + C_2H_6$	$1.60\times10^{-12}e^{66./T}$		500-1200	[1]
R_n156a	2	$C_2H_5 + C_3H_7 \rightarrow C_3H_8 + C_2H_4$	5.00×10^{-11}		-	ThisWork
R_n156b	2	$C_2H_5 + C_3H_7 \rightarrow C_3H_6 + C_2H_6$	5.00×10^{-11}		-	ThisWork
R_n156c	4	$C_2H_5 + C_3H_7 \rightarrow C_5H_{12}$	$5.37\times10^{-10}T^{-0.60}e^{161./T}$		200-2000	[45],est.(AtomNumber)
			1.00×10^{-19}	0.40		
			$5.37\times10^{-10}T^{-0.60}e^{161./T}$			
R_n157	4	$C_2H_5 + C_4H_3 \rightarrow C_6H_8$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-17}	0.40		
			8.00×10^{-11}			
R_n158	4	$C_2H_5 + C_4H_5 \rightarrow C_6H_{10}$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-17}	0.40		

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	Type	Reaction	k	F_c	T range	Ref.
R_n159	4	$C_2H_5 + C_4H_7 \rightarrow C_6H_{12}$	8.00×10^{-11} 8.00×10^{-11} 1.00×10^{-17}	 0.40	-	est.(Rad+Rad),est.(AtomNumber)
R_n160	4	$C_2H_5 + C_4H_9 \rightarrow C_6H_{14}$	8.00×10^{-11} $2.79\times10^{-09}T^{-0.89}e^{73./T}$ 1.00×10^{-17}	 0.40	200-2000	[45],est.(AtomNumber)
R_n161	4	$C_2H_5 + C_6H_3 \rightarrow C_8H_8$	$2.79\times10^{-09}T^{-0.89}e^{73./T}$ 8.00×10^{-11} 1.00×10^{-13}	 0.40	-	est.(Rad+Rad),est.(AtomNumber)
R_n162	4	$C_2H_5 + C_6H_5 \rightarrow C_8H_{10}$	8.00×10^{-11} 8.00×10^{-11} 1.00×10^{-13}	 0.40	-	est.(Rad+Rad),est.(AtomNumber)
R_n163	4	$C_3 + C_3H_3 \rightarrow C_6H_3$	8.00×10^{-11} 8.00×10^{-11} 1.00×10^{-17}	 0.40	-	est.(Rad+Rad),est.(AtomNumber)
R_n164	4	$C_3 + C_3H_5 \rightarrow C_6H_5$	8.00×10^{-11} 8.00×10^{-11} 1.00×10^{-17}	 0.40	-	est.(Rad+Rad),est.(AtomNumber)
R_n165	4	$C_3H + C_3H_3 \rightarrow C_6H_4$	8.00×10^{-11} 8.00×10^{-11} 1.00×10^{-17}	 0.40	-	est.(Rad+Rad),est.(AtomNumber)
R_n166	4	$C_3H + C_3H_5 \rightarrow C_6H_6$	8.00×10^{-11} 8.00×10^{-11} 1.00×10^{-17}	 0.40	-	est.(Rad+Rad),est.(AtomNumber)
R_n167	4	$C_3H_2 + C_3H_3 \rightarrow C_6H_5$	8.00×10^{-11} 8.00×10^{-11} 1.00×10^{-17}	 0.40	-	est.(Rad+Rad),est.(AtomNumber)
R_n168	4	$C_3H_2 + C_3H_5 \rightarrow C_6H_7$	8.00×10^{-11} 8.00×10^{-11} 1.00×10^{-17}	 0.40	-	est.(Rad+Rad),est.(AtomNumber)
R_n169	4	$C_3H_3 + C_3H_3 \rightarrow C_6H_6$	8.00×10^{-11} 6.50×10^{-11} 1.00×10^{-17}	 0.40	298-1000	[1],est.(AtomNumber)
R_n170a	4	$C_3H_3 + C_3H_5 \rightarrow C_6H_8$	6.50×10^{-11} 8.00×10^{-11} 1.00×10^{-17}	 0.40	-	est.(Rad+Rad),est.(AtomNumber)
R_n170b	2	$C_3H_3 + C_3H_5 \rightarrow CH_2CCH_2 + CH_2CCH_2$	8.00×10^{-11} 1.00×10^{-13}	 	-	est.(C3H5+C3H5)
R_n171	4	$C_3H_3 + C_3H_7 \rightarrow C_6H_{10}$	8.00×10^{-11} 1.00×10^{-17}	 0.40	-	est.(Rad+Rad),est.(AtomNumber)
R_n172	4	$C_3H_3 + C_4H_3 \rightarrow C_7H_6$	8.00×10^{-11} 8.00×10^{-11} 1.00×10^{-15}	 0.40	-	est.(Rad+Rad),est.(AtomNumber)
R_n173	4	$C_3H_3 + C_4H_5 \rightarrow C_7H_8$	8.00×10^{-11} 8.00×10^{-11} 1.00×10^{-15}	 0.40	-	est.(Rad+Rad),est.(AtomNumber)
R_n174	4	$C_3H_3 + C_4H_7 \rightarrow C_7H_{10}$	8.00×10^{-11} 8.00×10^{-11} 1.00×10^{-15}	 0.40	-	est.(Rad+Rad),est.(AtomNumber)
R_n175	4	$C_3H_3 + C_4H_9 \rightarrow C_7H_{12}$	8.00×10^{-11} 8.00×10^{-11}	 	-	est.(Rad+Rad),est.(AtomNumber)

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	Type	Reaction	k	F_c	T range	Ref.
			1.00×10^{-15}	0.40		
			8.00×10^{-11}			
R_n176	4	$C_3H_3 + C_6H_3 \rightarrow C_9H_6$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-11}	0.40		
			8.00×10^{-11}			
R_n177	4	$C_3H_3 + C_6H_5 \rightarrow C_9H_8$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-11}	0.40		
			8.00×10^{-11}			
R_n178a	4	$C_3H_5 + C_3H_5 \rightarrow C_6H_{10}$	2.30×10^{-11}		300-1000	[1],est.(AtomNumber)
			1.00×10^{-17}	0.40		
			2.30×10^{-11}			
R_n178b	2	$C_3H_5 + C_3H_5 \rightarrow C_3H_6 + CH_2CCH_2$	1.00×10^{-13}		300-1000	[1]
R_n179a	4	$C_3H_5 + C_3H_7 \rightarrow C_6H_{12}$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-17}	0.40		
			8.00×10^{-11}			
R_n179b	2	$C_3H_5 + C_3H_7 \rightarrow C_3H_8 + CH_2CCH_2$	$7.60\times10^{-12}T^{-0.35}e^{66./T}$		300-2500	[77]
R_n179c	2	$C_3H_5 + C_3H_7 \rightarrow C_3H_6 + C_3H_6$	$3.80\times10^{-11}T^{-0.35}e^{66./T}$		300-2500	[77]
R_n180	4	$C_3H_5 + C_4H_3 \rightarrow C_7H_8$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-15}	0.40		
			8.00×10^{-11}			
R_n181	4	$C_3H_5 + C_4H_5 \rightarrow C_7H_{10}$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-15}	0.40		
			8.00×10^{-11}			
R_n182	4	$C_3H_5 + C_4H_7 \rightarrow C_7H_{12}$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-15}	0.40		
			8.00×10^{-11}			
R_n183	4	$C_3H_5 + C_4H_9 \rightarrow C_7H_{14}$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-15}	0.40		
			8.00×10^{-11}			
R_n184	4	$C_3H_5 + C_6H_3 \rightarrow C_9H_8$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-11}	0.40		
			8.00×10^{-11}			
R_n185	4	$C_3H_5 + C_6H_5 \rightarrow C_9H_{10}$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-11}	0.40		
			8.00×10^{-11}			
R_n186a	4	$C_3H_7 + C_3H_7 \rightarrow C_6H_{14}$	$9.79\times10^{-10}T^{-0.86}e^{132./T}$		200-2000	[45],est.(AtomNumber)
			1.00×10^{-17}	0.40		
			$9.79\times10^{-10}T^{-0.86}e^{132./T}$			
R_n186b	2	$C_3H_7 + C_3H_7 \rightarrow C_3H_8 + C_3H_6$	4.20×10^{-12}		300-1000	[1]
R_n187	4	$C_3H_7 + C_4H_3 \rightarrow C_7H_{10}$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-15}	0.40		
			8.00×10^{-11}			
R_n188	4	$C_3H_7 + C_4H_5 \rightarrow C_7H_{12}$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-15}	0.40		
			8.00×10^{-11}			
R_n189	4	$C_3H_7 + C_4H_7 \rightarrow C_7H_{14}$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-15}	0.40		
			8.00×10^{-11}			
R_n190	4	$C_3H_7 + C_4H_9 \rightarrow C_7H_{16}$	$9.66\times10^{-09}T^{-1.17}e^{65./T}$		200-2000	[45],est.(AtomNumber)
			1.00×10^{-15}	0.40		
			$9.66\times10^{-09}T^{-1.17}e^{65./T}$			

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	Type	Reaction	k	F_c	T range	Ref.
R_n191	4	$C_3H_7 + C_6H_3 \rightarrow C_9H_{10}$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-11}	0.40		
			8.00×10^{-11}			
R_n192	4	$C_3H_7 + C_6H_5 \rightarrow C_9H_{12}$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-11}	0.40		
			8.00×10^{-11}			
R_n193	2	$C_4H + H_2 \rightarrow C_4H_2 + H$	$3.50\times10^{-18}T^{2.32}e^{-444./T}$		-	est.(C2H+H2)
R_n194	2	$C_4H + CH_4 \rightarrow C_4H_2 + CH_3$	$1.63\times10^{-11}e^{-610./T}$		200	[80],[81]
R_n195	2	$C_4H + C_2H_2 \rightarrow C_6H_2 + H$	$7.63\times10^{-08}T^{-1.06}e^{-65./T}$		39-298	[80],[82],[83]
R_n196	2	$C_4H + C_2H_4 \rightarrow C_6H_4 + H$	$1.90\times10^{-09}T^{-0.40}e^{9./T}$		39-298	[80],[82]
R_n197	2	$C_4H + C_2H_6 \rightarrow C_4H_2 + C_2H_5$	$3.19\times10^{-08}T^{-1.23}e^{-24./T}$		39-298	[80],[81]
R_n198a	2	$C_4H + CH_3CCH \rightarrow C_7H_4 + H$	$1.71\times10^{-08}T^{-0.82}e^{-47./T}$		39-298	[80],[82]
R_n198b	2	$C_4H + CH_3CCH \rightarrow C_6H_2 + CH_3$	$1.71\times10^{-08}T^{-0.82}e^{-47./T}$		39-298	[80],[82]
R_n199	2	$C_4H + CH_2CCH_2 \rightarrow C_7H_4 + H$	$3.07\times10^{-07}T^{-1.18}e^{-91./T}$		39-300	[82]
R_n200	2	$C_4H + C_3H_6 \rightarrow C_7H_6 + H$	$3.89\times10^{-08}T^{-0.84}e^{-48./T}$		39-298	[82]
R_n201	2	$C_4H + C_3H_8 \rightarrow C_4H_2 + C_3H_7$	$2.46\times10^{-07}T^{-1.36}e^{-56./T}$		39-298	[80],[81]
R_n202	2	$C_4H + C_4H_2 \rightarrow C_8H_2 + H$	$7.63\times10^{-08}T^{-1.06}e^{-65./T}$		-	est.(C4H+C2H2)
R_n203	2	$C_4H + C_4H_4 \rightarrow C_8H_4 + H$	$7.63\times10^{-08}T^{-1.06}e^{-65./T}$		-	est.(C4H+C2H2)
R_n204	2	$C_4H + C_4H_6 \rightarrow C_8H_6 + H$	$6.65\times10^{-07}T^{-1.25}e^{-116./T}$		39-300	[82]
R_n205	2	$C_4H + C_4H_8 \rightarrow C_8H_8 + H$	$2.04\times10^{-08}T^{-0.61}e^{-65./T}$		39-300	[82]
R_n206	2	$C_4H + C_4H_{10} \rightarrow C_4H_2 + C_4H_9$	$4.82\times10^{-07}T^{-1.30}e^{-90./T}$		39-300	[81]
R_n207	2	$C_4H + C_6H_2 \rightarrow C_{10}H_2 + H$	$7.63\times10^{-08}T^{-1.06}e^{-65./T}$		-	est.(C4H+C2H2)
R_n208	2	$C_4H_3 + C_2H_2 \rightarrow C_6H_4 + H$	$1.65\times10^{-27}T^{5.13}e^{-2730./T}$		50-300	ThisWork
R_n209	4	$C_4H_3 + C_4H_3 \rightarrow C_8H_6$	5.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-13}	0.40		
			5.00×10^{-11}			
R_n210	4	$C_4H_3 + C_4H_5 \rightarrow C_8H_8$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-13}	0.40		
			8.00×10^{-11}			
R_n211	4	$C_4H_3 + C_4H_7 \rightarrow C_8H_{10}$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-13}	0.40		
			8.00×10^{-11}			
R_n212	4	$C_4H_3 + C_4H_9 \rightarrow C_8H_{12}$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-13}	0.40		
			8.00×10^{-11}			
R_n213	4	$C_4H_3 + C_6H_3 \rightarrow C_{10}H_6$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-11}	0.40		
			8.00×10^{-11}			
R_n214	4	$C_4H_3 + C_6H_5 \rightarrow C_{10}H_8$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-11}	0.40		
			8.00×10^{-11}			
R_n215	4	$C_4H_5 + C_4H_5 \rightarrow C_8H_{10}$	5.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-13}	0.40		
			5.00×10^{-11}			
R_n216	4	$C_4H_5 + C_4H_7 \rightarrow C_8H_{12}$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-13}	0.40		
			8.00×10^{-11}			
R_n217	4	$C_4H_5 + C_4H_9 \rightarrow C_8H_{14}$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-13}	0.40		
			8.00×10^{-11}			

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	Type	Reaction	k	F_c	T range	Ref.
R_n218	4	$C_4H_5 + C_6H_3 \rightarrow C_{10}H_8$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-11}	0.40		
			8.00×10^{-11}			
R_n219	4	$C_4H_5 + C_6H_5 \rightarrow C_{10}H_{10}$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-11}	0.40		
			8.00×10^{-11}			
R_n220	4	$C_4H_7 + C_4H_7 \rightarrow C_8H_{14}$	5.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-13}	0.40		
			8.00×10^{-11}			
R_n221	4	$C_4H_7 + C_4H_9 \rightarrow C_8H_{16}$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-13}	0.40		
			8.00×10^{-11}			
R_n222	4	$C_4H_7 + C_6H_3 \rightarrow C_{10}H_{10}$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-11}	0.40		
			8.00×10^{-11}			
R_n223	4	$C_4H_7 + C_6H_5 \rightarrow C_{10}H_{12}$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-11}	0.40		
			8.00×10^{-11}			
R_n224	4	$C_4H_9 + C_4H_9 \rightarrow C_8H_{18}$	$2.27\times10^{-10}T^{-0.92}e^{350./T}$		200-2000	[45],est.(AtomNumber)
			1.00×10^{-13}	0.40		
			$2.27\times10^{-10}T^{-0.92}e^{350./T}$			
R_n225	4	$C_4H_9 + C_6H_3 \rightarrow C_{10}H_{12}$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-11}	0.40		
			8.00×10^{-11}			
R_n226a	4	$C_4H_9 + C_6H_5 \rightarrow C_{10}H_{14}$	$6.90\times10^{-10}T^{-0.75}e^{-28./T}$		290-972	[84],est.(AtomNumber)
			1.00×10^{-11}	0.40		
			$6.90\times10^{-10}T^{-0.75}e^{-28./T}$			
R_n226b	2	$C_4H_9 + C_6H_5 \rightarrow C_6H_6 + C_4H_8$	$2.10\times10^{-11}e^{300./T}$		290-972	[84]
R_n227	2	$C_6H + H_2 \rightarrow C_6H_2 + H$	$3.50\times10^{-18}T^{2.32}e^{-444./T}$		-	est.(C2H+H2)
R_n228	2	$C_6H + CH_4 \rightarrow C_6H_2 + CH_3$	$1.63\times10^{-11}e^{-610./T}$		-	est.(C4H+CH4)
R_n229	2	$C_6H + C_2H_2 \rightarrow C_8H_2 + H$	$7.63\times10^{-08}T^{-1.06}e^{-65./T}$		-	est.(C4H+C2H2)
R_n230	2	$C_6H + C_2H_4 \rightarrow C_8H_4 + H$	$1.90\times10^{-09}T^{-0.40}e^{9./T}$		-	est.(C4H+C2H4)
R_n231	2	$C_6H + C_2H_6 \rightarrow C_6H_2 + C_2H_5$	$3.19\times10^{-08}T^{-1.23}e^{-24./T}$		-	est.(C4H+C2H6)
R_n232a	2	$C_6H + CH_3CCH \rightarrow C_9H_4 + H$	$1.71\times10^{-08}T^{-0.82}e^{-47./T}$		-	est.(C4H+CH3CCH)
R_n232b	2	$C_6H + CH_3CCH \rightarrow C_8H_2 + CH_3$	$1.71\times10^{-08}T^{-0.82}e^{-47./T}$		-	est.(C4H+CH3CCH)
R_n233	2	$C_6H + CH_2CCH_2 \rightarrow C_9H_4 + H$	$3.07\times10^{-07}T^{-1.18}e^{-91./T}$		-	est.(C4H+CH2CCH2)
R_n234	2	$C_6H + C_3H_6 \rightarrow C_9H_6 + H$	$3.89\times10^{-08}T^{-0.84}e^{-48./T}$		-	est.(C4H+C3H6)
R_n235	2	$C_6H + C_3H_8 \rightarrow C_6H_2 + C_3H_7$	$2.46\times10^{-07}T^{-1.36}e^{-56./T}$		-	est.(C4H+C3H8)
R_n236	2	$C_6H + C_4H_2 \rightarrow C_{10}H_2 + H$	$7.63\times10^{-08}T^{-1.06}e^{-65./T}$		-	est.(C4H+C2H2)
R_n237	2	$C_6H + C_4H_4 \rightarrow C_{10}H_4 + H$	$7.63\times10^{-08}T^{-1.06}e^{-65./T}$		-	est.(C4H+C2H2)
R_n238	2	$C_6H + C_4H_6 \rightarrow C_{10}H_6 + H$	$6.65\times10^{-07}T^{-1.25}e^{-116./T}$		-	est.(C4H+C4H6)
R_n239	2	$C_6H + C_4H_8 \rightarrow C_{10}H_8 + H$	$2.04\times10^{-08}T^{-0.61}e^{-65./T}$		-	est.(C4H+C4H8)
R_n240	2	$C_6H + C_4H_{10} \rightarrow C_6H_2 + C_4H_9$	$4.82\times10^{-07}T^{-1.30}e^{-90./T}$		-	est.(C4H+C4H10)
R_n241	2	$C_6H + C_6H_2 \rightarrow C_{12}H_2 + H$	$7.63\times10^{-08}T^{-1.06}e^{-65./T}$		-	est.(C4H+C2H2)
R_n242	4	$C_6H_3 + C_6H_3 \rightarrow C_{12}H_6$	5.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-11}	0.40		
			5.00×10^{-11}			
R_n243	4	$C_6H_3 + C_6H_5 \rightarrow C_{12}H_8$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-11}	0.40		
			8.00×10^{-11}			

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	Type	Reaction	k	F_c	T range	Ref.
R_n244	4	$C_6H_3 + C_7H_7 \rightarrow C_{13}H_{10}$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-11}	0.40		
			8.00×10^{-11}			
R_n245	4	$C_6H_3 + C_8H_9 \rightarrow C_{14}H_{12}$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-11}	0.40		
			8.00×10^{-11}			
R_n246	4	$C_6H_5 + C_6H_5 \rightarrow C_{12}H_{10}$	5.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-11}	0.40		
			5.00×10^{-11}			
R_n247	4	$C_6H_5 + C_7H_7 \rightarrow C_{13}H_{12}$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-11}	0.40		
			8.00×10^{-11}			
R_n248	4	$C_6H_5 + C_8H_9 \rightarrow C_{14}H_{14}$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-11}	0.40		
			8.00×10^{-11}			
R_n249	4	$C_7H_7 + C_7H_7 \rightarrow C_{14}H_{14}$	$1.50\times10^{-10}T^{-0.23}$		250-400	[85],est.(AtomNumber)
			1.00×10^{-11}	0.40		
			$1.50\times10^{-10}T^{-0.23}$			
R_n250	4	$C_7H_7 + C_8H_9 \rightarrow C_{15}H_{16}$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-11}	0.40		
			8.00×10^{-11}			
R_n251	4	$C_8H_9 + C_8H_9 \rightarrow C_{16}H_{18}$	5.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-11}	0.40		
			5.00×10^{-11}			
R_n252	2	$H + NH_3 \rightarrow NH_2 + H_2$	$7.78\times10^{-24}T^{3.93}e^{-4060./T}$		200-2000	[86]
R_n253	2	$H + N_2H_4 \rightarrow N_2H_3 + H_2$	$1.17\times10^{-11}e^{-1260./T}$		222-657	[87]
R_n254	4	$H + HCN \rightarrow H_2CN$	5.00×10^{-11}		70-250	ThisWork
			1.00×10^{-11}	0.06		
			$1.90\times10^{-11}T^{-2.88}e^{-442./T}$			
R_n255	2	$H + HNC \rightarrow HCN + H$	$4.12\times10^{-25}T^{5.13}e^{117./T}$		50-300	ThisWork
R_n256a	2	$H + CH_2NH \rightarrow H_2CN + H_2$	$6.96\times10^{-22}T^{3.07}e^{171./T}$		50-300	ThisWork
R_n256b	4	$H + CH_2NH \rightarrow CH_2NH_2$	$2.15\times10^{-30}T^{6.55}e^{258./T}$		50-300	ThisWork
			$6.04\times10^{-24}T^{-2.03}e^{-54./T}$	0.08		
			$1.10\times10^{-13}T^{-1.32}e^{-150./T}$			
R_n256c	4	$H + CH_2NH \rightarrow CH_2NH_2$	$7.65\times10^{-31}T^{6.77}e^{271./T}$		50-300	ThisWork
			$3.45\times10^{-24}T^{-2.26}e^{-44./T}$	0.09		
			$4.38\times10^{-14}T^{-1.60}e^{-84./T}$			
R_n257	2	$H + CH_3NH_2 \rightarrow CH_2NH_2 + H_2$	$1.34\times10^{-21}T^{3.44}e^{-1223./T}$		200-3000	[88]
R_n258	4	$H + HC_3N \rightarrow C_3H_2N$	$2.02\times10^{-33}T^{7.97}e^{306./T}$		50-300	ThisWork,est.(H+C4H2)
			$5.69\times10^{-18}T^{-2.77}e^{-179./T}$	0.40		
			$4.10\times10^{-16}T^{0.38}e^{-207./T}$			
R_n259	4	$H + C_3H_3N \rightarrow C_3H_4N$	$2.02\times10^{-33}T^{7.97}e^{306./T}$		-	est.(H+HC3N)
			$5.69\times10^{-18}T^{-2.77}e^{-179./T}$	0.40		
			$4.10\times10^{-16}T^{0.38}e^{-207./T}$			
R_n260	4	$H + C_2N_2 \rightarrow HC_2N_2$	$2.02\times10^{-33}T^{7.97}e^{306./T}$		-	est.(H+HC3N)
			$5.69\times10^{-18}T^{-2.77}e^{-179./T}$	0.40		
			$4.10\times10^{-16}T^{0.38}e^{-207./T}$			
R_n261	4	$H + C_4N_2 \rightarrow HC_4N_2$	$2.02\times10^{-33}T^{7.97}e^{306./T}$		-	est.(H+HC3N)
			$5.69\times10^{-18}T^{-2.77}e^{-179./T}$	0.40		
			$4.10\times10^{-16}T^{0.38}e^{-207./T}$			

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	Type	Reaction	k	F_c	T range	Ref.
R_n262a	2	C + NH_2 → HCN + H	$9.39\times10^{-11}T^{-0.20}e^{-6./T}$		10-300	[89]
R_n262b	2	C + NH_2 → HNC + H	$9.39\times10^{-11}T^{-0.20}e^{-6./T}$		10-300	[89]
R_n263a	2	CH + NH_3 → CH_2NH + H	$2.02\times10^{-10}T^{-0.05}$		10-300	[89]
R_n263b	2	CH + NH_3 → NH + CH_3	$1.06\times10^{-11}T^{-0.05}$		10-300	[89]
R_n264a	2	CH + HCN → HC_2N + H	$3.69\times10^{-10}T^{-0.17}$		100-296	[90],[91]
R_n264b	2	CH + HCN → C_2N + H_2	$3.69\times10^{-10}T^{-0.17}$		100-296	[90],[91]
R_n265a	2	CH + HNC → HC_2N + H	$3.69\times10^{-10}T^{-0.17}$		100-296	est.(CH+HCN)
R_n265b	2	CH + HNC → C_2N + H_2	$3.69\times10^{-10}T^{-0.17}$		100-296	est.(CH+HCN)
R_n266	2	CH + CH_3NH_2 → C_2H_5N + H	$3.11\times10^{-10}e^{170./T}$		297-677	[92]
R_n267	2	CH_3 + N_2H_4 → N_2H_3 + CH_4	$1.32\times10^{-24}T^{4.00}e^{-2037./T}$		220-3000	[93]
R_n268	2	CH_3 + HNC → HCN + CH_3	$3.00\times10^{-11}e^{-3668./T}$		-	[94],[95]
R_n269	2	C_2 + HCN → C_3N + H	$1.16\times10^{-08}T^{-0.82}e^{-9./T}$		90-200	[96]
R_n270	2	C_2H + NH_3 → C_2H_2 + NH_2	$4.89\times10^{-09}T^{-0.90}$		104-294	[97]
R_n271	2	C_2H + HCN → HC_3N + H	$7.51\times10^{-17}T^{1.78}e^{-382./T}$		70-300	ThisWork
R_n272	2	C_2H + HNC → HC_3N + H	3.00×10^{-10}		-	est.(Petrie02)
R_n273	2	C_2H + CH_2NH → C_3H_3N + H	$7.80\times10^{-11}e^{134./T}$		150-359	est.(C2H+C2H4)
R_n274	2	C_2H + CH_3NH_2 → CH_3CCH + NH_2	$4.90\times10^{-09}T^{-0.90}$		-	est.(C2H+NH3)
R_n275	2	C_2H + CH_3CN → CH_2CN + C_2H_2	$1.79\times10^{-11}e^{-769./T}$		262-360	[98],[99]
R_n276	2	C_2H + HC_3N → HC_5N + H	$1.47\times10^{-08}T^{-1.04}$		20-300	[67]
R_n277	2	C_2H + C_3H_3N → C_5H_3N + H	$7.80\times10^{-11}e^{134./T}$		-	est.(C2H+C2H4)
R_n278	2	C_2H + C_3H_5N → C_5H_5N + H	$3.35\times10^{-11}e^{-297./T}$		104-298	[99]
R_n279	2	C_2H + HC_5N → HC_7N + H	$7.47\times10^{-09}T^{-0.91}e^{6./T}$		-	est.(C2H+HC3N)
R_n280	2	C_2H_3 + HCN → C_3H_3N + H	$5.69\times10^{-26}T^{4.70}e^{-2357./T}$		80-300	ThisWork
R_n281	2	C_2H_3 + HNC → HCN + C_2H_3	$3.00\times10^{-11}e^{-1996./T}$		-	[94],[95]
R_n282	2	C_2H_5 + HNC → HCN + C_2H_5	$3.00\times10^{-11}e^{-3560./T}$		-	[94],[95]
R_n283	2	C_4H + HC_3N → HC_7N + H	$7.63\times10^{-08}T^{-1.06}e^{-65./T}$		-	est.(C4H+C2H2)
R_n284	2	C_4H + HC_5N → HC_9N + H	$7.63\times10^{-08}T^{-1.06}e^{-65./T}$		-	est.(C4H+C2H2)
R_n285	2	C_6H + HC_3N → HC_9N + H	$7.63\times10^{-08}T^{-1.06}e^{-65./T}$		-	est.(C4H+C2H2)
R_n286	2	C_6H + HC_5N → $HC_{11}N$ + H	$7.63\times10^{-08}T^{-1.06}e^{-65./T}$		-	est.(C4H+C2H2)
R_n287	4	N + H → NH	5.00×10^{-16}		298	[100],est.(AtomNumber)
			5.00×10^{-32}	0.40		
			5.00×10^{-16}			
R_n288	2	N + CH → CN + H	$1.35\times10^{-11}T^{0.41}$		56-300	[89]
R_n289a	2	N + $^3CH_2$ → HCN + H	$1.90\times10^{-11}T^{0.17}$		10-300	[89]
R_n289b	2	N + $^3CH_2$ → HNC + H	$1.14\times10^{-11}T^{0.17}$		10-300	[89]
R_n290a	2	N + CH_3 → H_2CN + H	5.58×10^{-11}		150-200	[101],[102],[103]
R_n290b	2	N + CH_3 → HCN + H + H	6.20×10^{-12}		150-200	[101],[102],[103]
R_n291	2	N + C_2H → C_2N + H	$4.55\times10^{-11}T^{0.17}$		-	[104]
R_n292a	2	N + C_2H_3 → C_2H_2 + NH	1.31×10^{-11}		298	[105],[103]
R_n292b	2	N + C_2H_3 → CH_2CN + H	6.39×10^{-11}		298	[105],[103]
R_n293a	2	N + C_2H_5 → C_2H_4 + NH	7.15×10^{-11}		298	[106]
R_n293b	2	N + C_2H_5 → H_2CN + CH_3	3.85×10^{-11}		298	[106]
R_n294	4	N + N → N_2	5.00×10^{-16}		90-611	[107],est.(AtomNumber)
			$1.78\times10^{-33}e^{485./T}$	0.40		
			5.00×10^{-16}			
R_n295	2	N + NH → N_2 + H	$2.83\times10^{-11}T^{0.10}$		10-500	[89]
R_n296	2	N + NH_2 → N_2 + H + H	1.20×10^{-10}		10-500	[89]
R_n297	2	N + CN → N_2 + C	$8.02\times10^{-12}T^{0.42}$		56-296	[108]
R_n298	2	N + H_2CN → HCN + NH	$1.00\times10^{-10}e^{-200./T}$		200-363	[109],[110]
R_n299	2	N + C_2N → CN + CN	1.00×10^{-10}		10-300	[89]

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	Type	Reaction	k	F_c	T range	Ref.
R_n300	4	$N + HC_2N \rightarrow C_2N_2 + H$	8.00×10^{-11} 1.00×10^{-21} 2.00×10^{-11}	0.40	-	est.(Rad+Rad),est.(AtomNumber)
R_n301	4	$N + C_3H_2N \rightarrow C_3H_2N_2$	8.00×10^{-11} 1.00×10^{-19} 8.00×10^{-11}	0.40	-	est.(Rad+Rad),est.(AtomNumber)
R_n302	4	$N + C_3H_4N \rightarrow C_3H_4N_2$	8.00×10^{-11} 1.00×10^{-19} 8.00×10^{-11}	0.40	-	est.(Rad+Rad),est.(AtomNumber)
R_n303	1	$N(^2D) \rightarrow N + h\nu$	2.30×10^{-05}		-	[111]
R_n304	2	$N(^2D) + N_2 \rightarrow N + N_2$	1.70×10^{-14}		298	[112]
R_n305	2	$N(^2D) + {}^{15}N^{14}N \rightarrow N + {}^{15}N^{14}N$	1.70×10^{-14}		-	est.(N2D+N2)
R_n306	2	$N(^2D) + H_2 \rightarrow NH + H$	$4.20\times10^{-11}e^{-880./T}$		200-300	[112]
R_n307a	2	$N(^2D) + CH_4 \rightarrow CH_2NH + H$	$3.84\times10^{-11}e^{-750./T}$		223-292	[112]
R_n307b	2	$N(^2D) + CH_4 \rightarrow NH + CH_3$	$9.60\times10^{-12}e^{-750./T}$		223-292	[112]
R_n308	2	$N(^2D) + C_2H_2 \rightarrow HC_2N + H$	$1.60\times10^{-10}e^{-270./T}$		220-300	[112]
R_n309a	2	$N(^2D) + C_2H_4 \rightarrow CH_3CN + H$	$2.23\times10^{-10}e^{-500./T}$		230-292	[113],[114],[103]
R_n309b	2	$N(^2D) + C_2H_4 \rightarrow CH_2CN + H_2$	$1.96\times10^{-12}e^{-500./T}$		230-292	[113],[114],[103]
R_n309c	2	$N(^2D) + C_2H_4 \rightarrow H_2CN + {}^3CH_2$	$1.56\times10^{-12}e^{-500./T}$		230-292	[113],[114],[103]
R_n309d	2	$N(^2D) + C_2H_4 \rightarrow HCN + CH_3$	$2.71\times10^{-12}e^{-500./T}$		230-292	[113],[114],[103]
R_n309e	2	$N(^2D) + C_2H_4 \rightarrow HNC + CH_3$	$5.06\times10^{-13}e^{-500./T}$		230-292	[113],[114],[103]
R_n309f	2	$N(^2D) + C_2H_4 \rightarrow NH + C_2H_3$	$2.30\times10^{-14}e^{-500./T}$		230-292	[113],[114],[103]
R_n310a	2	$N(^2D) + C_2H_6 \rightarrow CH_2NH + CH_3$	1.52×10^{-11}		298,94-175	[112],[115]
R_n310b	2	$N(^2D) + C_2H_6 \rightarrow C_2H_5N + H$	2.72×10^{-12}		298,94-175	[112],[115]
R_n310c	2	$N(^2D) + C_2H_6 \rightarrow NH + C_2H_5$	1.05×10^{-12}		298,94-175	[112],[115]
R_n311	2	$N(^2D) + CH_3CCH \rightarrow C_3H_3N + H$	$1.60\times10^{-10}e^{-270./T}$		-	est.(N2D+C2H2)
R_n312	2	$N(^2D) + CH_2CCH_2 \rightarrow C_3H_3N + H$	$2.30\times10^{-10}e^{-500./T}$		-	est.(N2D+C2H4)
R_n313	2	$N(^2D) + C_3H_6 \rightarrow C_3H_5N + H$	6.60×10^{-11}		298	[112]
R_n314a	2	$N(^2D) + C_3H_8 \rightarrow CH_2NH + C_2H_5$	9.67×10^{-12}		298	[112]
R_n314b	2	$N(^2D) + C_3H_8 \rightarrow C_2H_5N + CH_3$	9.67×10^{-12}		298	[112]
R_n314c	2	$N(^2D) + C_3H_8 \rightarrow C_3H_7N + H$	9.67×10^{-12}		298	[112]
R_n315	2	$N(^2D) + C_4H_2 \rightarrow HC_4N + H$	$1.60\times10^{-10}e^{-270./T}$		-	est.(N2D+C2H2)
R_n316	2	$N(^2D) + C_4H_4 \rightarrow C_4H_3N + H$	$1.60\times10^{-10}e^{-270./T}$		-	est.(N2D+C2H2)
R_n317	2	$N(^2D) + C_4H_6 \rightarrow C_4H_5N + H$	6.60×10^{-11}		-	est.(N2D+C3H6)
R_n318	2	$N(^2D) + C_4H_8 \rightarrow C_4H_7N + H$	6.60×10^{-11}		-	est.(N2D+C3H6)
R_n319a	2	$N(^2D) + C_4H_{10} \rightarrow CH_2NH + C_3H_7$	7.75×10^{-12}		298	[112]
R_n319b	2	$N(^2D) + C_4H_{10} \rightarrow C_2H_5N + C_2H_5$	7.75×10^{-12}		298	[112]
R_n319c	2	$N(^2D) + C_4H_{10} \rightarrow C_3H_7N + CH_3$	7.75×10^{-12}		298	[112]
R_n319d	2	$N(^2D) + C_4H_{10} \rightarrow C_4H_9N + H$	7.75×10^{-12}		298	[112]
R_n320	2	$N(^2D) + C_6H_2 \rightarrow HC_6N + H$	$1.60\times10^{-10}e^{-270./T}$		-	est.(N2D+C2H2)
R_n321	2	$N(^2D) + HCN \rightarrow N_2 + CH$	$1.07\times10^{-14}T^{1.82}e^{-149./T}$		50-300	ThisWork
R_n322	2	$N(^2D) + HNC \rightarrow CN_2 + H$	$1.61\times10^{-15}T^{1.60}e^{102./T}$		50-300	ThisWork
R_n323	2	$N(^2D) + CH_2NH \rightarrow CH_2N_2 + H$	$2.30\times10^{-10}e^{-500./T}$		-	est.(N2D+C2H4)
R_n324a	2	$N(^2D) + CH_3CN \rightarrow C_2H_2N_2 + H$	$3.84\times10^{-11}e^{-750./T}$		-	est.(N2D+CH4)
R_n324b	2	$N(^2D) + CH_3CN \rightarrow CH_2CN + NH$	$9.60\times10^{-12}e^{-750./T}$		-	est.(N2D+CH4)
R_n325	2	$N(^2D) + HC_3N \rightarrow C_3N_2 + H$	$1.60\times10^{-10}e^{-270./T}$		-	est.(N2D+C2H2)
R_n326	2	$N(^2D) + C_3H_3N \rightarrow C_3H_2N_2 + H$	$2.30\times10^{-10}e^{-500./T}$		-	est.(N2D+C2H4)
R_n327a	2	$N(^2D) + C_3H_5N \rightarrow C_3H_4N_2 + H$	$3.84\times10^{-11}e^{-750./T}$		-	est.(N2D+CH4)
R_n327b	2	$N(^2D) + C_3H_5N \rightarrow C_3H_4N + NH$	$9.60\times10^{-12}e^{-750./T}$		-	est.(N2D+CH4)
R_n328	2	$N(^2D) + HC_5N \rightarrow C_5N_2 + H$	$1.60\times10^{-10}e^{-270./T}$		-	est.(N2D+C2H2)

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	Type	Reaction	k	F_c	T range	Ref.
R_n329	2	NH + H → N + H_2	$3.12\times10^{-16}T^{1.55}e^{-103./T}$		300-2000	[116]
R_n330	2	NH + CH_3 → CH_2NH + H	$3.06\times10^{-10}T^{-0.11}e^{-7./T}$		20-500	ThisWork
R_n331	2	NH + C_2H_2 → CH_2CN + H	$2.00\times10^{-09}T^{-1.07}$		53-188	[117]
R_n332	2	NH + C_2H_4 → NH_2 + C_2H_3	$1.16\times10^{-09}T^{-1.09}$		53-188	[117]
R_n333	2	NH + C_2H_6 → NH_2 + C_2H_5	6.80×10^{-12}		53-188	[117]
R_n334	2	NH + CH_3CCH → C_3H_4N + H	$2.00\times10^{-09}T^{-1.07}$		-	est.(NH+C2H2)
R_n335	2	NH + CH_2CCH_2 → NH_2 + C_3H_3	$1.16\times10^{-09}T^{-1.09}$		-	est.(NH+C2H4)
R_n336	2	NH + C_3H_6 → NH_2 + C_3H_5	$6.24\times10^{-09}T^{-1.23}$		53-188	[117]
R_n337	2	NH + C_3H_8 → NH_2 + C_3H_7	6.80×10^{-12}		-	est.(NH+C2H6)
R_n338	2	NH + C_4H_2 → C_4H_2N + H	$8.24\times10^{-09}T^{-1.23}$		53-188	[117]
R_n339	2	NH + C_4H_4 → C_4H_4N + H	$8.24\times10^{-09}T^{-1.23}$		-	est.(NH+C4H2)
R_n340	2	NH + C_4H_6 → C_4H_6N + H	$6.24\times10^{-09}T^{-1.23}$		-	est.(NH+C3H6)
R_n341	2	NH + C_4H_8 → NH_2 + C_4H_7	$6.24\times10^{-09}T^{-1.23}$		-	est.(NH+C3H6)
R_n342	2	NH + C_4H_{10} → NH_2 + C_4H_9	6.80×10^{-12}		-	est.(NH+C2H6)
R_n343	2	NH + C_6H_2 → C_6H_2N + H	$8.24\times10^{-09}T^{-1.23}$		-	est.(NH+C4H2)
R_n344a	2	NH + NH → NH_2 + N	$9.40\times10^{-25}T^{3.88}e^{-172./T}$		300-2500	[118]
R_n344b	2	NH + NH → N_2 + H + H	$1.04\times10^{-10}T^{-0.04}e^{81./T}$		200-2500	[118],est.(3CH2+3CH2)
R_n345	2	NH + NH_2 → N_2H_2 + H	$7.07\times10^{-10}T^{-0.27}e^{39./T}$		200-2500	[118]
R_n346	2	NH + NH_3 → NH_2 + NH_2	$8.53\times10^{-23}T^{3.41}e^{-7350./T}$		300-2500	[118]
R_n347	4	NH_2 + H → NH_3	$1.50\times10^{-10}T^{0.13}e^{-2./T}$		-	est.(H+CH3)
			$2.56\times10^{-24}T^{-1.80}e^{-31./T}$	0.42		
			$2.05\times10^{-13}T^{-1.29}e^{-19./T}$			
R_n348a	2	NH_2 + C → HCN + H	$9.39\times10^{-11}T^{-0.20}e^{-6./T}$		10-300	[89]
R_n348b	2	NH_2 + C → HNC + H	$9.39\times10^{-11}T^{-0.20}e^{-6./T}$		10-300	[89]
R_n349	4	NH_2 + CH_3 → CH_3NH_2	$1.20\times10^{-11}T^{0.42}$		200-400	[119],est.(CH3+CH3)
			$6.00\times10^{-18}T^{-3.85}$	0.33		
			$2.97\times10^{-06}T^{-3.23}e^{-74./T}$			
R_n350a	2	NH_2 + C_2H_3 → C_2H_4N + H	$3.30\times10^{-11}e^{236./T}$		-	est.(CH3+C2H3)
R_n350b	2	NH_2 + C_2H_3 → C_2H_2 + NH_3	$1.50\times10^{-11}e^{385./T}$		-	est.(CH3+C2H3)
R_n351a	4	NH_2 + C_2H_5 → C_2H_7N	$2.86\times10^{-09}T^{-0.61}e^{-44./T}$		-	est.(CH3+C2H5)
			$4.15\times10^{-10}T^{-5.49}e^{-441./T}$	0.41		
			$5.24\times10^{-02}T^{-4.33}e^{-193./T}$			
R_n351b	2	NH_2 + C_2H_5 → C_2H_4 + NH_3	$1.99\times10^{-08}T^{-1.58}e^{-38./T}$		-	est.(CH3+C2H5)
R_n352	4	NH_2 + C_3H_3 → C_3H_5N	$6.80\times10^{-11}e^{130./T}$		-	est.(CH3+C3H3)
			1.00×10^{-21}	0.40		
			2.00×10^{-11}			
R_n353a	4	NH_2 + C_3H_5 → C_3H_7N	$1.55\times10^{-09}T^{-0.54}e^{117./T}$		-	est.(CH3+C3H5)
			1.00×10^{-21}	0.40		
			2.00×10^{-11}			
R_n353b	2	NH_2 + C_3H_5 → CH_2CCH_2 + NH_3	6.00×10^{-13}		-	est.(CH3+C3H5)
R_n354	4	NH_2 + C_3H_7 → C_3H_9N	$5.33\times10^{-10}T^{-0.47}e^{97./T}$		-	est.(CH3+C3H7)
			1.00×10^{-21}	0.40		
			2.00×10^{-11}			
R_n355	4	NH_2 + C_4H_3 → C_4H_5N	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-19}	0.40		
			8.00×10^{-11}			
R_n356	4	NH_2 + C_4H_5 → C_4H_7N	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-19}	0.40		
			8.00×10^{-11}			
R_n357	4	NH_2 + C_4H_7 → C_4H_9N	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)

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	Type	Reaction	k	F_c	T range	Ref.
			1.00×10^{-19}	0.40		
			8.00×10^{-11}			
R_n358	4	$NH_2 + C_4H_9 \rightarrow C_4H_{11}N$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-19}	0.40		
			8.00×10^{-11}			
R_n359	4	$NH_2 + C_6H_3 \rightarrow C_6H_5N$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-15}	0.40		
			8.00×10^{-11}			
R_n360	4	$NH_2 + C_6H_5 \rightarrow C_6H_7N$	$3.62\times10^{-09}T^{-0.62}e^{-29./T}$		-	est.(CH3+C6H5)
			1.00×10^{-15}	0.40		
			$3.62\times10^{-09}T^{-0.62}e^{-29./T}$			
R_n361a	2	$NH_2 + NH_2 \rightarrow NH_3 + NH$	$9.36\times10^{-24}T^{3.53}e^{-278./T}$		300-2500	[118]
R_n361b	4	$NH_2 + NH_2 \rightarrow N_2H_4$	$9.33\times10^{-10}T^{-0.41}e^{-33./T}$		300-2500	[118],est.(CH3+CH3)
			$4.48\times10^{-14}T^{-5.49}e^{-1000./T}$	0.31		
			$2.97\times10^{-06}T^{-3.23}e^{-74./T}$			
R_n362	2	$NH_2 + H_2CN \rightarrow NH_3 + HCN$	$2.29\times10^{-08}T^{-1.06}e^{-60./T}$		50-300	[120]
R_n363	4	$NH_2 + CH_2CN \rightarrow C_2H_4N_2$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-21}	0.40		
			2.00×10^{-11}			
R_n364	4	$NH_2 + C_3H_2N \rightarrow C_3H_4N_2$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-19}	0.40		
			8.00×10^{-11}			
R_n365	4	$NH_2 + C_3H_4N \rightarrow C_3H_6N_2$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-19}	0.40		
			8.00×10^{-11}			
R_n366	2	$N_2H_3 + H \rightarrow NH_2 + NH_2$	2.66×10^{-12}		300	[121]
R_n367	4	$CN + H \rightarrow HCN$	$2.99\times10^{-09}T^{-0.50}$		500-2500	[122],est.(AtomNumber)
			$2.40\times10^{-24}T^{-2.20}e^{-567./T}$	0.40		
			1.00×10^{-13}			
R_n368	2	$CN + H_2 \rightarrow HCN + H$	$1.80\times10^{-19}T^{2.60}e^{-960./T}$		200-3500	[1]
R_n369	2	$CN + CH_4 \rightarrow HCN + CH_3$	$5.73\times10^{-12}e^{-675./T}$		160-298,195	[123],[124]
R_n370	2	$CN + C_2H_2 \rightarrow HC_3N + H$	$5.30\times10^{-09}T^{-0.52}e^{-19./T}$		25-298,195	[123],[124]
R_n371	2	$CN + C_2H_4 \rightarrow C_3H_3N + H$	$1.40\times10^{-08}T^{-0.69}e^{-31./T}$		25-298,195	[123],[124]
R_n372	2	$CN + C_2H_6 \rightarrow HCN + C_2H_5$	$5.90\times10^{-12}T^{0.22}e^{58./T}$		25-298	[123]
R_n373	2	$CN + CH_3CCH \rightarrow C_4H_3N + H$	4.10×10^{-10}		15-295	[61],[125]
R_n374	2	$CN + CH_2CCH_2 \rightarrow C_4H_3N + H$	4.10×10^{-10}		15-295	[61],[125]
R_n375a	2	$CN + C_3H_6 \rightarrow C_3H_3N + CH_3$	$2.61\times10^{-10}T^{-0.09}$		23-298	[126],[124],[127]
R_n375b	2	$CN + C_3H_6 \rightarrow C_4H_5N + H$	$2.61\times10^{-10}T^{-0.09}$		23-298	[126],[124],[127]
R_n376	2	$CN + C_3H_8 \rightarrow HCN + C_3H_7$	$2.44\times10^{-14}T^{1.19}e^{378./T}$		170-740	[128]
R_n377	2	$CN + C_4H_2 \rightarrow HC_5N + H$	$1.60\times10^{-09}T^{-0.24}e^{-11./T}$		20-300	[67],[129]
R_n378	2	$CN + C_4H_4 \rightarrow C_5H_3N + H$	$1.07\times10^{-07}T^{-0.82}e^{-228./T}$		170-740	[130]
R_n379	2	$CN + C_4H_6 \rightarrow C_5H_5N + H$	$4.80\times10^{-10}e^{-9./T}$		23-298	[131]
R_n380a	2	$CN + C_4H_8 \rightarrow C_4H_5N + CH_3$	1.58×10^{-10}		195-298	[124]
R_n380b	2	$CN + C_4H_8 \rightarrow HCN + C_4H_7$	1.58×10^{-10}		195-298	[124]
R_n381	2	$CN + C_4H_{10} \rightarrow HCN + C_4H_9$	$3.61\times10^{-14}T^{1.16}e^{392./T}$		170-740	[128]
R_n382	2	$CN + C_6H_2 \rightarrow HC_7N + H$	$1.60\times10^{-09}T^{-0.24}e^{-11./T}$		-	est.(CN+C4H2)
R_n383	2	$CN + C_6H_6 \rightarrow C_7H_5N + H$	$2.70\times10^{-09}T^{-0.39}e^{-9./T}$		10-295	Faure09
R_n384	2	$CN + NH_3 \rightarrow HCN + NH_2$	$3.57\times10^{-09}T^{-0.85}$		10-300	[89]
R_n385	4	$CN + CN \rightarrow C_2N_2$	9.40×10^{-12}		500-2500	[122],est.(AtomNumber)
			$9.44\times10^{-23}T^{-2.61}$	0.50		

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	Type	Reaction	k	F_c	T range	Ref.
			9.40×10^{-12}			
R_n386	2	CN + HCN → C_2N_2 + H	$5.99\times10^{-22}T^{3.60}e^{-933./T}$		70-300	ThisWork
R_n387	2	CN + HNC → C_2N_2 + H	3.00×10^{-11}		-	[95]
R_n388	2	CN + CH_2NH → H_2CN + HCN	$2.81\times10^{-19}T^{2.72}e^{718./T}$		-	est.(CN+H2CO)
R_n389	2	CN + CH_3NH_2 → HCN + CH_2NH_2	$3.57\times10^{-09}T^{-0.85}$		-	est.(CN+NH3)
R_n390	2	CN + CH_3CN → C_2N_2 + CH_3	$6.46\times10^{-11}e^{-1190./T}$		296-578	[132]
R_n391	2	CN + HC_3N → C_4N_2 + H	$8.18\times10^{-10}T^{-0.67}$		20-300	[133]
R_n392	2	CN + C_3H_3N → $C_4H_2N_2$ + H	$3.02\times10^{-11}e^{103./T}$		297-740	[134]
R_n393	2	CN + C_3H_5N → C_2N_2 + C_2H_5	$6.46\times10^{-11}e^{-1190./T}$		-	est.(CN+CH3CN)
R_n394	2	CN + HC_5N → C_6N_2 + H	$8.18\times10^{-10}T^{-0.67}$		-	est.(CN+HC3N)
R_n395a	2	H_2CN + H → HCN + H_2	$2.77\times10^{-10}T^{-0.03}e^{-4./T}$		50-300	ThisWork
R_n395b	2	H_2CN + H → HNC + H_2	$6.07\times10^{-10}T^{-0.49}e^{-4./T}$		50-300	ThisWork
R_n396	2	H_2CN + CH_3 → HCN + CH_4	$2.29\times10^{-08}T^{-1.06}e^{-60./T}$		-	est.(NH2+H2CN)
R_n397a	4	H_2CN + C_2H_3 → C_3H_4N + H	$1.20\times10^{-11}e^{400./T}$		300-700	est.(C2H3+C2H3)
			1.00×10^{-21}	0.40		
			1.20×10^{-11}			
R_n397b	2	H_2CN + C_2H_3 → HCN + C_2H_4	2.40×10^{-11}		298	est.(C2H3+C2H3)
R_n398a	4	H_2CN + C_2H_5 → C_3H_7N	6.50×10^{-11}		298	est.(C2H3+C2H5)
			1.00×10^{-21}	0.40		
			2.00×10^{-11}			
R_n398b	2	H_2CN + C_2H_5 → HCN + C_2H_6	1.50×10^{-11}		298	est.(C2H3+C2H5)
R_n398c	2	H_2CN + C_2H_5 → CH_2NH + C_2H_4	1.50×10^{-11}		298	est.(C2H3+C2H5)
R_n399	4	H_2CN + C_3 → C_4H_2N	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-19}	0.40		
			8.00×10^{-11}			
R_n400	4	H_2CN + C_3H → C_4H_3N	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-19}	0.40		
			8.00×10^{-11}			
R_n401	4	H_2CN + C_3H_2 → C_4H_4N	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-19}	0.40		
			8.00×10^{-11}			
R_n402	4	H_2CN + C_3H_3 → C_4H_5N	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-19}	0.40		
			8.00×10^{-11}			
R_n403a	4	H_2CN + C_3H_5 → C_4H_7N	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-19}	0.40		
			8.00×10^{-11}			
R_n403b	2	H_2CN + C_3H_5 → CH_2NH + CH_2CCH_2	4.00×10^{-12}		300-2500	est.(C2H3+C3H5)
R_n403c	2	H_2CN + C_3H_5 → HCN + C_3H_6	8.00×10^{-12}		300-2500	est.(C2H3+C3H5)
R_n404a	4	H_2CN + C_3H_7 → C_4H_9N	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-19}	0.40		
			8.00×10^{-11}			
R_n404b	2	H_2CN + C_3H_7 → HCN + C_3H_8	$2.53\times10^{-10}T^{-0.70}$		300-2500	est.(C2H3+C3H7)
R_n404c	2	H_2CN + C_3H_7 → CH_2NH + C_3H_6	$2.53\times10^{-10}T^{-0.70}$		300-2500	est.(C2H3+C3H7)
R_n405	4	H_2CN + C_4H_3 → C_5H_5N	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-17}	0.40		
			8.00×10^{-11}			
R_n406	4	H_2CN + C_4H_5 → C_5H_7N	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-17}	0.40		
			8.00×10^{-11}			

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	Type	Reaction	k	F_c	T range	Ref.
R_n407	4	$H_2CN + C_4H_7 \rightarrow C_5H_9N$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-17}	0.40		
			8.00×10^{-11}			
R_n408	4	$H_2CN + C_4H_9 \rightarrow C_5H_{11}N$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-17}	0.40		
			8.00×10^{-11}			
R_n409	4	$H_2CN + C_6H_3 \rightarrow C_7H_5N$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-13}	0.40		
			8.00×10^{-11}			
R_n410	4	$H_2CN + C_6H_5 \rightarrow C_7H_7N$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-13}	0.40		
			8.00×10^{-11}			
R_n411a	2	$H_2CN + H_2CN \rightarrow N_2 + C_2H_4$	3.85×10^{-12}		296	[135]
R_n411b	4	$H_2CN + H_2CN \rightarrow C_2H_4N_2$	3.85×10^{-12}		296	[135],est.(AtomNumber)
			1.00×10^{-21}	0.40		
			3.85×10^{-12}			
R_n412	4	$H_2CN + C_3H_2N \rightarrow C_4H_4N_2$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-17}	0.40		
			8.00×10^{-11}			
R_n413	4	$H_2CN + C_3H_4N \rightarrow C_4H_6N_2$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-17}	0.40		
			8.00×10^{-11}			
R_n414	2	$C_2N + H \rightarrow HCN + C$	$1.06\times10^{-10}T^{0.17}$		10-300	[104]
R_n415	2	$C_2N + C \rightarrow CN + C_2$	1.00×10^{-10}		10-300	[136]
R_n416	2	$C_2N + C_2H_2 \rightarrow HC_4N + H$	6.59×10^{-11}		300	[137]
R_n417	2	$C_2N + C_2H_4 \rightarrow CH_3C_3N + H$	$8.13\times10^{-04}T^{-2.55}e^{-378./T}$		300-673	[137]
R_n418	2	$C_2N + C_3H_8 \rightarrow HC_2N + C_3H_7$	$5.79\times10^{-07}T^{-1.80}e^{-32./T}$		10-298	[138],Faure(PersComm)
R_n419	2	$C_2N + C_4H_{10} \rightarrow HC_2N + C_4H_9$	$1.08\times10^{-07}T^{-1.37}e^{-25./T}$		10-298	[138],Faure(PersComm)
R_n420	2	$HC_2N + H \rightarrow C_2N + H_2$	3.00×10^{-11}		200	[139]
R_n421	2	$HC_2N + CH_3 \rightarrow C_3H_3N + H$	3.00×10^{-11}		200	[139]
R_n422	2	$HC_2N + HC_2N \rightarrow HC_4N_2 + H$	3.00×10^{-11}		-	est.(HC2N+CH3)
R_n423	4	$CH_2CN + H \rightarrow CH_3CN$	2.00×10^{-10}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-23}	0.40		
			2.00×10^{-12}			
R_n424	4	$CH_2CN + CH_3 \rightarrow C_3H_5N$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-21}	0.40		
			2.00×10^{-11}			
R_n425	4	$CH_2CN + C_2H_3 \rightarrow C_4H_5N$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-19}	0.40		
			8.00×10^{-11}			
R_n426	4	$CH_2CN + C_2H_5 \rightarrow C_4H_7N$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-19}	0.40		
			8.00×10^{-11}			
R_n427	4	$CH_2CN + C_3H_3 \rightarrow C_5H_5N$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-17}	0.40		
			8.00×10^{-11}			
R_n428	4	$CH_2CN + C_3H_5 \rightarrow C_5H_7N$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-17}	0.40		
			8.00×10^{-11}			
R_n429	4	$CH_2CN + C_3H_7 \rightarrow C_5H_9N$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-17}	0.40		

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	Type	Reaction	k	F_c	T range	Ref.
			8.00×10^{-11}			
R_n430	4	$CH_2CN + C_4H_3 \rightarrow C_6H_5N$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-15}	0.40		
			8.00×10^{-11}			
R_n431	4	$CH_2CN + C_4H_5 \rightarrow C_6H_7N$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-15}	0.40		
			8.00×10^{-11}			
R_n432	4	$CH_2CN + C_6H_3 \rightarrow C_8H_5N$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-11}	0.40		
			8.00×10^{-11}			
R_n433	4	$CH_2CN + C_6H_5 \rightarrow C_8H_7N$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-11}	0.40		
			8.00×10^{-11}			
R_n434	4	$CH_2CN + CH_2CN \rightarrow C_4H_4N_2$	5.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-17}	0.40		
			5.00×10^{-11}			
R_n435	4	$CH_2CN + C_3H_2N \rightarrow C_5H_4N_2$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			6.00×10^{-16}	0.40		
			8.00×10^{-11}			
R_n436	4	$CH_2CN + C_3H_4N \rightarrow C_5H_6N_2$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			6.00×10^{-16}	0.40		
			8.00×10^{-11}			
R_n437	2	$C_3N + H_2 \rightarrow HC_3N + H$	$2.39\times10^{-18}T^{2.35}e^{-95./T}$		24-300	[140]
R_n438	2	$C_3N + CH_4 \rightarrow HC_3N + CH_3$	$8.17\times10^{-10}T^{-0.57}e^{-3./T}$		24-300	[140]
R_n439	2	$C_3N + C_2H_2 \rightarrow HC_5N + H$	$8.31\times10^{-09}T^{-0.58}e^{-33./T}$		24-300	[140]
R_n440	2	$C_3N + C_2H_4 \rightarrow HC_3N + C_2H_3$	$3.76\times10^{-09}T^{-0.42}e^{-22./T}$		24-300	[140]
R_n441	2	$C_3N + C_2H_6 \rightarrow HC_3N + C_2H_5$	$1.25\times10^{-08}T^{-0.69}e^{-30./T}$		24-300	[140]
R_n442	2	$C_3N + CH_3CCH \rightarrow C_6H_3N + H$	$4.70\times10^{-09}T^{-0.41}e^{-32./T}$		24-300	[140]
R_n443	2	$C_3N + CH_2CCH_2 \rightarrow C_6H_3N + H$	$1.39\times10^{-08}T^{-0.57}e^{-50./T}$		24-300	[140]
R_n444	2	$C_3N + C_3H_6 \rightarrow C_6H_5N + H$	$1.84\times10^{-08}T^{-0.64}e^{-51./T}$		24-300	[140]
R_n445	2	$C_3N + C_3H_8 \rightarrow HC_3N + C_3H_7$	$8.29\times10^{-09}T^{-0.55}e^{-34./T}$		24-300	[140]
R_n446	2	$C_3N + C_4H_2 \rightarrow HC_7N + H$	$9.90\times10^{-10}T^{-0.06}e^{-9./T}$		20-400	ThisWork
R_n447	2	$C_3N + C_4H_4 \rightarrow C_7H_3N + H$	$9.90\times10^{-10}T^{-0.06}e^{-9./T}$		-	est.(C3N+C4H2)
R_n448	2	$C_3N + C_4H_6 \rightarrow C_7H_5N + H$	$6.65\times10^{-07}T^{-1.25}e^{-116./T}$		-	est.(C4H+C4H6)
R_n449	2	$C_3N + C_4H_8 \rightarrow C_7H_7N + H$	$2.04\times10^{-08}T^{-0.61}e^{-65./T}$		-	est.(C4H+C4H8)
R_n450	2	$C_3N + C_4H_{10} \rightarrow HC_3N + C_4H_9$	$4.82\times10^{-07}T^{-1.30}e^{-90./T}$		-	est.(C4H+C4H10)
R_n451	2	$C_3N + C_6H_2 \rightarrow HC_9N + H$	$9.90\times10^{-10}T^{-0.06}e^{-9./T}$		-	est.(C3N+C4H2)
R_n452	2	$C_3N + NH_3 \rightarrow HC_3N + NH_2$	$1.43\times10^{-08}T^{-0.67}e^{-28./T}$		24-300	[140]
R_n453	2	$C_3N + HCN \rightarrow C_4N_2 + H$	3.00×10^{-11}		200	[95]
R_n454	2	$C_3N + HNC \rightarrow C_4N_2 + H$	3.00×10^{-11}		-	[95]
R_n455	2	$C_3N + HC_3N \rightarrow C_6N_2 + H$	$9.90\times10^{-10}T^{-0.06}e^{-9./T}$		-	est.(C3N+C4H2)
R_n456	4	$C_3H_2N + H \rightarrow C_3H_3N$	2.00×10^{-10}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-23}	0.00		
			2.00×10^{-12}			
R_n457	4	$C_3H_2N + CH_3 \rightarrow C_4H_5N$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-19}	0.40		
			8.00×10^{-11}			
R_n458	4	$C_3H_2N + C_2H_3 \rightarrow C_5H_5N$	8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
			1.00×10^{-17}	0.40		
			8.00×10^{-11}			

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	Type	Reaction	k	F_c	T range	Ref.
R_n459	4	$C_3H_2N + C_2H_5 \rightarrow C_5H_7N$	8.00×10^{-11} 1.00×10^{-17} 8.00×10^{-11}	0.40	-	est.(Rad+Rad),est.(AtomNumber)
R_n460	4	$C_3H_2N + C_3H_3 \rightarrow C_6H_5N$	8.00×10^{-11} 1.00×10^{-15} 8.00×10^{-11}	0.40	-	est.(Rad+Rad),est.(AtomNumber)
R_n461	4	$C_3H_2N + C_3H_5 \rightarrow C_6H_7N$	8.00×10^{-11} 1.00×10^{-15} 8.00×10^{-11}	0.40	-	est.(Rad+Rad),est.(AtomNumber)
R_n462	4	$C_3H_2N + C_3H_7 \rightarrow C_6H_9N$	8.00×10^{-11} 1.00×10^{-15} 8.00×10^{-11}	0.40	-	est.(Rad+Rad),est.(AtomNumber)
R_n463	4	$C_3H_2N + C_4H_3 \rightarrow C_7H_5N$	8.00×10^{-11} 1.00×10^{-13} 8.00×10^{-11}	0.40	-	est.(Rad+Rad),est.(AtomNumber)
R_n464	4	$C_3H_2N + C_4H_5 \rightarrow C_7H_7N$	8.00×10^{-11} 1.00×10^{-13} 8.00×10^{-11}	0.40	-	est.(Rad+Rad),est.(AtomNumber)
R_n465	4	$C_3H_2N + C_4H_7 \rightarrow C_7H_9N$	8.00×10^{-11} 1.00×10^{-13} 8.00×10^{-11}	0.40	-	est.(Rad+Rad),est.(AtomNumber)
R_n466	4	$C_3H_2N + C_4H_9 \rightarrow C_7H_{11}N$	8.00×10^{-11} 1.00×10^{-13} 8.00×10^{-11}	0.40	-	est.(Rad+Rad),est.(AtomNumber)
R_n467	4	$C_3H_2N + C_6H_3 \rightarrow C_9H_5N$	8.00×10^{-11} 1.00×10^{-11} 8.00×10^{-11}	0.40	-	est.(Rad+Rad),est.(AtomNumber)
R_n468	4	$C_3H_2N + C_6H_5 \rightarrow C_9H_7N$	8.00×10^{-11} 1.00×10^{-11} 8.00×10^{-11}	0.40	-	est.(Rad+Rad),est.(AtomNumber)
R_n469	4	$C_3H_2N + C_3H_2N \rightarrow C_6H_4N_2$	5.00×10^{-11} 1.00×10^{-13} 5.00×10^{-11}	0.40	-	est.(Rad+Rad),est.(AtomNumber)
R_n470	4	$C_3H_2N + C_3H_4N \rightarrow C_6H_6N_2$	8.00×10^{-11} 1.00×10^{-13} 8.00×10^{-11}	0.40	-	est.(Rad+Rad),est.(AtomNumber)
R_n471	4	$C_3H_4N + H \rightarrow C_3H_5N$	2.00×10^{-10} 1.00×10^{-23} 2.00×10^{-12}	0.40	-	est.(Rad+Rad),est.(AtomNumber)
R_n472	4	$C_3H_4N + CH_3 \rightarrow C_4H_7N$	8.00×10^{-11} 1.00×10^{-19} 8.00×10^{-11}	0.40	-	est.(Rad+Rad),est.(AtomNumber)
R_n473	4	$C_3H_4N + C_2H_3 \rightarrow C_5H_7N$	8.00×10^{-11} 1.00×10^{-17} 8.00×10^{-11}	0.40	-	est.(Rad+Rad),est.(AtomNumber)
R_n474	4	$C_3H_4N + C_2H_5 \rightarrow C_5H_9N$	8.00×10^{-11} 1.00×10^{-17} 8.00×10^{-11}	0.40	-	est.(Rad+Rad),est.(AtomNumber)
R_n475	4	$C_3H_4N + C_3H_3 \rightarrow C_6H_7N$	8.00×10^{-11} 1.00×10^{-15} 8.00×10^{-11}	0.40	-	est.(Rad+Rad),est.(AtomNumber)

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	Type	Reaction								k	F_c	T range	Ref.
R_n476	4	C_3H_4N	+	C_3H_5	→	C_6H_9N				8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
										1.00×10^{-15}	0.40		
										8.00×10^{-11}			
R_n477	4	C_3H_4N	+	C_3H_7	→	$C_6H_{11}N$				8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
										1.00×10^{-15}	0.40		
										8.00×10^{-11}			
R_n478	4	C_3H_4N	+	C_4H_3	→	C_7H_7N				8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
										1.00×10^{-13}	0.40		
										8.00×10^{-11}			
R_n479	4	C_3H_4N	+	C_4H_5	→	C_7H_9N				8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
										1.00×10^{-13}	0.40		
										8.00×10^{-11}			
R_n480	4	C_3H_4N	+	C_4H_7	→	$C_7H_{11}N$				8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
										1.00×10^{-13}	0.40		
										8.00×10^{-11}			
R_n481	4	C_3H_4N	+	C_4H_9	→	$C_7H_{13}N$				8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
										1.00×10^{-13}	0.40		
										8.00×10^{-11}			
R_n482	4	C_3H_4N	+	C_6H_3	→	C_9H_7N				8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
										1.00×10^{-11}	0.40		
										8.00×10^{-11}			
R_n483	4	C_3H_4N	+	C_6H_5	→	C_9H_9N				8.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
										1.00×10^{-11}	0.40		
										8.00×10^{-11}			
R_n484	4	C_3H_4N	+	C_3H_4N	→	$C_6H_8N_2$				5.00×10^{-11}		-	est.(Rad+Rad),est.(AtomNumber)
										1.00×10^{-13}	0.40		
										5.00×10^{-11}			
R_n485	2	C_5N	+	H_2	→	HC_5N	+	H		$3.50\times10^{-18}T^{2.32}e^{-444./T}$		-	est.(C2H+H2)
R_n486	2	C_5N	+	CH_4	→	HC_5N	+	CH_3		$1.63\times10^{-11}e^{-610./T}$		-	est.(C4H+CH4)
R_n487	2	C_5N	+	C_2H_2	→	HC_7N	+	H		5.00×10^{-10}		20-400	ThisWork
R_n488	2	C_5N	+	C_2H_4	→	HC_5N	+	C_2H_3		$1.90\times10^{-09}T^{-0.40}e^{9./T}$		-	est.(C4H+C2H4)
R_n489	2	C_5N	+	C_2H_6	→	HC_5N	+	C_2H_5		$3.19\times10^{-08}T^{-1.23}e^{-24./T}$		-	est.(C4H+C2H6)
R_n490	2	C_5N	+	CH_3CCH	→	C_8H_3N	+	H		$3.42\times10^{-08}T^{-0.82}e^{-47./T}$		-	est.(C4H+CH3CCH)
R_n491	2	C_5N	+	CH_2CCH_2	→	C_8H_3N	+	H		$3.07\times10^{-07}T^{-1.18}e^{-91./T}$		-	est.(C4H+CH2CCH2)
R_n492	2	C_5N	+	C_3H_6	→	C_8H_5N	+	H		$3.89\times10^{-08}T^{-0.84}e^{-48./T}$		-	est.(C4H+C3H6)
R_n493	2	C_5N	+	C_3H_8	→	HC_5N	+	C_3H_7		$2.46\times10^{-07}T^{-1.36}e^{-56./T}$		-	est.(C4H+C3H8)
R_n494	2	C_5N	+	C_4H_2	→	HC_9N	+	H		$9.90\times10^{-10}T^{-0.06}e^{-9./T}$		20-400	ThisWork
R_n495	2	C_5N	+	C_4H_4	→	C_9H_3N	+	H		$9.90\times10^{-10}T^{-0.06}e^{-9./T}$		-	est.(C3N+C4H2)
R_n496	2	C_5N	+	C_4H_6	→	C_9H_5N	+	H		$6.65\times10^{-07}T^{-1.25}e^{-116./T}$		-	est.(C4H+C4H6)
R_n497	2	C_5N	+	C_4H_8	→	C_9H_7N	+	H		$2.04\times10^{-08}T^{-0.61}e^{-65./T}$		-	est.(C4H+C4H8)
R_n498	2	C_5N	+	C_4H_{10}	→	HC_5N	+	C_4H_9		$4.82\times10^{-07}T^{-1.30}e^{-90./T}$		-	est.(C4H+C4H10)
R_n499	2	C_5N	+	C_6H_2	→	$HC_{11}N$	+	H		$9.90\times10^{-10}T^{-0.06}e^{-9./T}$		-	est.(C3N+C4H2)
R_n500	2	C_5N	+	HCN	→	C_6N_2	+	H		3.00×10^{-11}		200	[95]
R_n501	2	C_5N	+	HNC	→	C_6N_2	+	H		3.00×10^{-11}		-	[95]
R_n502	2	C_5N	+	HC_3N	→	C_8N_2	+	H		$9.90\times10^{-10}T^{-0.06}e^{-9./T}$		-	est.(C3N+C4H2)
R_n503a	4	HC_2N_2	+	H	→	HCN	+	HCN		2.00×10^{-10}		-	est.(Rad+Rad),est.(AtomNumber)
										1.00×10^{-23}	0.40		
										2.00×10^{-11}			
R_n503b	2	HC_2N_2	+	H	→	C_2N_2	+	H_2		1.00×10^{-10}		-	est.(Rad+Rad)
R_n504a	4	HC_4N_2	+	H	→	HC_3N	+	HCN		2.00×10^{-10}		-	est.(Rad+Rad),est.(AtomNumber)

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	Type	Reaction	k	F_c	T range	Ref.
			1.00×10^{-23}	0.40		
			2.00×10^{-11}			
R_n504b	2	$HC_4N_2 + H \rightarrow C_4N_2 + H_2$	1.00×10^{-10}		-	est.(Rad+Rad)
R_n505	4	$O(^3P) + H \rightarrow OH$	1.00×10^{-10}		100-500	[34],[141]
			$1.30\times10^{-29}T^{-1.00}$	0.40		
			$5.17\times10^{-20}T^{0.26}e^{-4./T}$			
R_n506a	2	$O(^3P) + {}^3CH_2 \rightarrow CO + H + H$	1.00×10^{-10}		10-300	[89]
R_n506b	2	$O(^3P) + {}^3CH_2 \rightarrow CO + H_2$	4.00×10^{-11}		10-300	[89]
R_n506c	2	$O(^3P) + {}^3CH_2 \rightarrow HCO + H$	2.00×10^{-12}		10-300	[89]
R_n507a	2	$O(^3P) + CH_3 \rightarrow H_2CO + H$	1.10×10^{-10}		294-2500	[1]
R_n507b	2	$O(^3P) + CH_3 \rightarrow CO + H_2 + H$	2.80×10^{-11}		298	[1]
R_n508	2	$O(^3P) + C_2H \rightarrow CO + CH$	1.00×10^{-10}		10-298	[89]
R_n509a	2	$O(^3P) + C_2H_2 \rightarrow CO + {}^3CH_2$	$3.90\times10^{-16}T^{1.40}e^{-1110./T}$		250-2500	[1]
R_n509b	2	$O(^3P) + C_2H_2 \rightarrow HCCO + H$	$1.56\times10^{-15}T^{1.40}e^{-1110./T}$		250-2500	[1]
R_n510a	2	$O(^3P) + C_2H_4 \rightarrow HCO + CH_3$	$1.35\times10^{-17}T^{1.88}e^{-92./T}$		220-2000	[1]
R_n510b	2	$O(^3P) + C_2H_4 \rightarrow CH_2CHO + H$	$7.88\times10^{-18}T^{1.88}e^{-92./T}$		220-2000	[1]
R_n510c	2	$O(^3P) + C_2H_4 \rightarrow CH_2CO + H_2$	$1.13\times10^{-18}T^{1.88}e^{-92./T}$		220-2000	[1]
R_n511a	2	$O(^3P) + HCO \rightarrow CO_2 + H$	5.00×10^{-11}		300-2500	[1]
R_n511b	2	$O(^3P) + HCO \rightarrow CO + OH$	5.00×10^{-11}		300-2500	[1]
R_n512a	2	$O(^3P) + HCCO \rightarrow CO + CO + H$	1.60×10^{-10}		280-2500	[1]
R_n512b	2	$O(^3P) + HCCO \rightarrow CO_2 + CH$	$4.90\times10^{-11}e^{-560./T}$		280-1000	[1]
R_n513a	2	$O(^3P) + CH_2CO \rightarrow CO_2 + {}^3CH_2$	$1.80\times10^{-12}e^{-680./T}$		296-1000	[1]
R_n513b	2	$O(^3P) + CH_2CO \rightarrow HCHO + CO$	$6.00\times10^{-13}e^{-680./T}$		296-1000	[1]
R_n513c	2	$O(^3P) + CH_2CO \rightarrow HCO + CO + H$	$6.00\times10^{-13}e^{-680./T}$		296-1000	[1]
R_n514a	2	$O(^3P) + CH_3CO \rightarrow CO_2 + CH_3$	2.60×10^{-10}		298	[1]
R_n514b	2	$O(^3P) + CH_3CO \rightarrow CH_2CO + OH$	8.80×10^{-11}		298	[1]
R_n515	1	$O(^1D) \rightarrow O(^3P) + h\nu$	6.70×10^{-03}		-	[111]
R_n516	2	$O(^1D) + N_2 \rightarrow O(^3P) + N_2$	$2.15\times10^{-11}e^{110./T}$		200-300	[142]
R_n517	2	$O(^1D) + H_2 \rightarrow OH + H$	1.20×10^{-10}		200-300	[143]
R_n518a	2	$O(^1D) + CH_4 \rightarrow OH + CH_3$	1.31×10^{-10}		200-300	[143]
R_n518b	2	$O(^1D) + CH_4 \rightarrow CH_2OH + H$	3.50×10^{-11}		200-300	[143]
R_n518c	2	$O(^1D) + CH_4 \rightarrow H_2CO + H_2$	9.00×10^{-12}		200-300	[143]
R_n519	2	$O(^1D) + C_2H_4 \rightarrow CH_2CO + H_2$	2.20×10^{-10}		298	[144]
R_n520	2	$O(^1D) + H_2O \rightarrow OH + OH$	$1.63\times10^{-10}e^{60./T}$		200-300	[143]
R_n521a	2	$O(^1D) + CO \rightarrow O(^3P) + CO$	$4.70\times10^{-11}e^{63./T}$		113-333	[145]
R_n521b	4	$O(^1D) + CO \rightarrow CO_2$	8.00×10^{-11}		100-2100	[146]
			1.00×10^{-30}	0.40		
			2.00×10^{-12}			
R_n522	1	$O(^1S) \rightarrow O(^1D) + h\nu$	$1.30\times10^{+00}$		-	[147]
R_n523	4	$OH + H \rightarrow H_2O$	1.00×10^{-10}		300-3000	[1],est.(AtomNumber)
			$6.10\times10^{-26}T^{-2.00}$	0.40		
			6.00×10^{-16}			
R_n524	2	$OH + H_2 \rightarrow H_2O + H$	$2.80\times10^{-12}e^{-1800./T}$		200-300	[143]
R_n525	2	$OH + {}^3CH_2 \rightarrow H_2CO + H$	$4.74\times10^{-11}T^{0.12}e^{81./T}$		300-2500	[42]
R_n526a	2	$OH + CH_3 \rightarrow H_2O + {}^1CH_2$	$9.40\times10^{-08}T^{-1.19}e^{-435./T}$		20-300	ThisWork
R_n526b	2	$OH + CH_3 \rightarrow H_2CO + H_2$	$2.94\times10^{-09}T^{-1.58}e^{-60./T}$		20-300	ThisWork
R_n526c	2	$OH + CH_3 \rightarrow CHOH + H_2$	$2.33\times10^{-08}T^{-1.54}e^{-60./T}$		20-300	ThisWork
R_n526d	2	$OH + CH_3 \rightarrow CHOH + H_2$	$3.49\times10^{-07}T^{-1.70}e^{-72./T}$		20-300	ThisWork
R_n527	2	$OH + CH_4 \rightarrow H_2O + CH_3$	$2.45\times10^{-12}e^{-1775./T}$		200-300	[143]
R_n528a	2	$OH + C_2H \rightarrow CO + {}^3CH_2$	3.00×10^{-11}		300-2500	[34]

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	Type	Reaction								k	F_c	T range	Ref.
R_n528b	2	OH	+	C_2H	→	$O(^3P)$	+	C_2H_2		3.00×10^{-11}		300-2500	[34]
R_n529	6	OH	+	C_2H_2	→	CH_3CO				Tabulated		228-1400	[143]
R_n530	6	OH	+	C_2H_4	→	$HOCH_2CH_2$				Tabulated		200-300	[143]
R_n531	2	OH	+	C_2H_6	→	H_2O	+	C_2H_5		$7.66\times10^{-12}e^{-1020./T}$		200-300	[143]
R_n532a	5	OH	+	CO	→	CO_2	+	H		$1.63\times10^{-06}T^{6.10}$		200-300	[143]
R_n532b	6	OH	+	CO	→	HOCO				Tabulated		200-300	[143]
R_n533	2	OH	+	H_2CO	→	HCO	+	H_2O		$5.50\times10^{-12}e^{125./T}$		200-300	[143]
R_n534a	2	OH	+	CH_2CO	→	CH_2OH	+	CO		$1.68\times10^{-12}e^{510./T}$		296-1000	[1]
R_n534b	2	OH	+	CH_2CO	→	CO_2	+	CH_3		$1.04\times10^{-12}e^{510./T}$		296-1000	[1]
R_n534c	2	OH	+	CH_2CO	→	HCHO	+	HCO		$5.60\times10^{-14}e^{510./T}$		296-1000	[1]
R_n534d	2	OH	+	CH_2CO	→	HCCO	+	H_2O		$2.80\times10^{-14}e^{510./T}$		296-1000	[1]
R_n535	2	H_2O	+	CH	→	H_2CO	+	H		$7.72\times10^{-08}T^{-1.31}e^{-40./T}$		50-296	[148],[149]
R_n536a	2	H_2O	+	$^1CH_2$	→	OH	+	CH_3		$9.46\times10^{-08}T^{-1.19}e^{-67./T}$		20-300	ThisWork
R_n536b	2	H_2O	+	$^1CH_2$	→	H_2CO	+	H_2		$2.60\times10^{-08}T^{-1.91}e^{-58./T}$		20-300	ThisWork
R_n536c	2	H_2O	+	$^1CH_2$	→	CHOH	+	H_2		$2.21\times10^{-07}T^{-1.87}e^{-57./T}$		20-300	ThisWork
R_n536d	2	H_2O	+	$^1CH_2$	→	CHOH	+	H_2		$3.47\times10^{-06}T^{-2.06}e^{-69./T}$		20-300	ThisWork
R_n537	2	H_2O	+	C_2H	→	OH	+	C_2H_2		$1.90\times10^{-11}e^{-200./T}$		295-451	[1]
R_n538	4	CO	+	H	→	HCO				2.00×10^{-10}		300-800	[1],ThisWork
										$2.00\times10^{-35}T^{0.20}$	0.40		
										3.00×10^{-21}			
R_n539	4	CO	+	CH	→	HCCO				$1.70\times10^{-09}T^{-0.40}$		200-1000	[1],ThisWork
										$6.30\times10^{-24}T^{-2.50}$	0.60		
										3.75×10^{-17}			
R_n540	4	CO	+	CH_3	→	CH_3CO				$3.10\times10^{-16}T^{1.05}e^{-1300./T}$		300-350	[1],ThisWork
										5.90×10^{-36}	0.60		
										1.10×10^{-28}			
R_n541	2	HCO	+	H	→	CO	+	H_2		1.50×10^{-10}		298-2500	[1]
R_n542	2	HCO	+	$^3CH_2$	→	CO	+	CH_3		3.00×10^{-11}		300-2500	[34]
R_n543	2	HCO	+	CH_3	→	CO	+	CH_4		2.00×10^{-10}		300-2500	[34]
R_n544	2	HCO	+	C_2H	→	CO	+	C_2H_2		1.00×10^{-10}		300-2500	[34]
R_n545a	2	H_2CO	+	CH	→	CH_2CO	+	H		$6.21\times10^{-10}T^{-0.32}e^{386./T}$		300-3000	[150]
R_n545b	2	H_2CO	+	CH	→	CO	+	CH_3		$1.23\times10^{-10}T^{-0.32}e^{386./T}$		300-3000	[150]
R_n546	2	H_2CO	+	C_2H	→	CO	+	C_2H_2	+ H	1.00×10^{-10}		-	[151]
R_n547	2	CHOH	+	H	→	H_2CO	+	H		1.00×10^{-10}		20-300	ThisWork
R_n548	2	CHOH	+	CH_3	→	CH_3CHO	+	H		1.00×10^{-10}		20-300	ThisWork
R_n549a	2	CH_2OH	+	H	→	H_2CO	+	H_2		2.03×10^{-11}		298	[1]
R_n549b	2	CH_2OH	+	H	→	CHOH	+	H_2		2.03×10^{-11}		298	[1]
R_n549c	2	CH_2OH	+	H	→	OH	+	CH_3		1.74×10^{-11}		298	[1]
R_n550a	2	CH_2OH	+	$^3CH_2$	→	OH	+	C_2H_4		4.00×10^{-11}		300-2500	[152]
R_n550b	2	CH_2OH	+	$^3CH_2$	→	H_2CO	+	CH_3		2.00×10^{-12}		300-2500	[152]
R_n551	2	CH_2OH	+	CH_3	→	H_2CO	+	CH_4		4.00×10^{-12}		300-2500	[152]
R_n552a	2	CH_2OH	+	C_2H	→	H_2CO	+	C_2H_2		6.00×10^{-11}		300-2500	[152]
R_n552b	2	CH_2OH	+	C_2H	→	OH	+	C_3H_3		2.00×10^{-11}		300-2500	[152]
R_n553a	2	HCCO	+	H	→	CO	+	$^1CH_2$		2.02×10^{-10}		280-2000	[1]
R_n553b	2	HCCO	+	H	→	CO	+	$^3CH_2$		1.76×10^{-11}		280-2000	[1]
R_n554	2	HCCO	+	CH_3	→	CO	+	C_2H_4		1.00×10^{-10}		-	[153]
R_n555	2	CH_2CO	+	H	→	CO	+	CH_3		$5.40\times10^{-14}T^{0.85}e^{-1430./T}$		298-2000	[1]
R_n556a	2	CH_3CO	+	H	→	CH_2CO	+	H_2		1.90×10^{-11}		298	[154],[155]
R_n556b	2	CH_3CO	+	H	→	HCO	+	CH_3		3.60×10^{-11}		298	[154],[155]
R_n557	2	CH_3CO	+	$^3CH_2$	→	CH_2CO	+	CH_3		3.00×10^{-11}		300-2500	[34]

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	Type	Reaction	k	F_c	T range	Ref.
R_n558a	2	$CH_3CO + CH_3 \rightarrow CO + C_2H_6$	5.43×10^{-11}		298	[156]
R_n558b	2	$CH_3CO + CH_3 \rightarrow CH_2CO + CH_4$	1.01×10^{-11}		298	[157]
R_n558c	4	$CH_3CO + CH_3 \rightarrow CH_3COCH_3$	6.97×10^{-11}		298	[157]
			1.00×10^{-30}	0.40		
			2.00×10^{-11}			
R_n559	2	$CH_3CO + C_2H \rightarrow CH_2CO + C_2H_2$	3.00×10^{-11}		300-1500	[34]
R_n560	2	$HOCH_2CH_2 + H \rightarrow CH_3CHO + H_2$	8.31×10^{-11}		295	[158]
R_n561a	2	$CO_2 + CH \rightarrow HCO + CO$	$5.30\times10^{-17}T^{1.51}e^{360./T}$		296-3500	[1]
R_n561b	2	$CO_2 + CH \rightarrow CO + CO + H$	$5.30\times10^{-17}T^{1.51}e^{360./T}$		296-3500	[1]
R_n562	4	$H + NO \rightarrow HNO$	1.00×10^{-10}		230-750	[1],est.(AtomNumber)
			$4.23\times10^{-30}T^{-0.77}$	0.40		
			1.00×10^{-13}			
R_n563	2	$H + HNO \rightarrow NO + H_2$	$3.01\times10^{-11}e^{-500./T}$		298-2000	[159]
R_n564	2	$H + NCO \rightarrow CO + NH$	$1.53\times10^{-05}T^{-1.86}e^{-399./T}$		200-2500	[118]
R_n565	2	$C + NCO \rightarrow CO + CN$	1.00×10^{-10}		10-300	[89]
R_n566a	2	$CH + NO \rightarrow O(^3P) + HCN$	$2.40\times10^{-10}T^{-0.13}$		13-708	[160],[1]
R_n566b	2	$CH + NO \rightarrow NCO + H$	$5.57\times10^{-11}T^{-0.13}$		13-708	[160],[1]
R_n566c	2	$CH + NO \rightarrow CO + NH$	$2.79\times10^{-11}T^{-0.13}$		13-708	[160],[1]
R_n566d	2	$CH + NO \rightarrow HCO + N$	$2.09\times10^{-11}T^{-0.13}$		13-708	[160],[1]
R_n566e	2	$CH + NO \rightarrow OH + CN$	$3.48\times10^{-12}T^{-0.13}$		13-708	[160],[1]
R_n567a	2	$CH + HNO \rightarrow NO + {}^3CH_2$	3.80×10^{-11}		-	[153]
R_n567b	2	$CH + HNO \rightarrow HNCO + H$	1.00×10^{-10}		-	[153]
R_n568a	2	$^3CH_2 + NO \rightarrow HNCO + H$	$5.04\times10^{-12}e^{500./T}$		290-1000	[1]
R_n568b	2	$^3CH_2 + NO \rightarrow OH + HCN$	$5.60\times10^{-13}e^{500./T}$		290-1000	[1]
R_n569	2	$CH_3 + HNO \rightarrow NO + CH_4$	$2.44\times10^{-13}T^{0.76}e^{-175./T}$		298-2500	[161]
R_n570a	2	$C_2H + NO \rightarrow CO + HCN$	$7.70\times10^{-11}e^{-287./T}$		295-450	[1],[162]
R_n570b	2	$C_2H + NO \rightarrow HCO + CN$	$2.30\times10^{-11}e^{-287./T}$		295-450	[1],[162]
R_n571	4	$N + O(^3P) \rightarrow NO$	1.00×10^{-10}		196-298	[163],est.(AtomNumber)
			$5.46\times10^{-33}e^{155./T}$	0.40		
			1.00×10^{-13}			
R_n572	2	$N + OH \rightarrow NO + H$	$5.00\times10^{-11}e^{-6./T}$		10-300	[89]
R_n573	2	$N + HCO \rightarrow NCO + H$	1.00×10^{-10}		10-280	[164]
R_n574	2	$N + HCCO \rightarrow CO + HCN$	1.00×10^{-10}		-	[153]
R_n575	2	$N + NO \rightarrow O(^3P) + N_2$	$1.25\times10^{-10}T^{-0.20}e^{-20./T}$		10-300	[89]
R_n576	2	$N + NCO \rightarrow CO + N_2$	$2.30\times10^{-10}T^{-0.25}$		298-1700	[1]
R_n577a	2	$N(^2D) + O(^3P) \rightarrow N + O(^3P)$	$1.65\times10^{-12}e^{-260./T}$		300-400	[112]
R_n577b	2	$N(^2D) + O(^3P) \rightarrow N + O(^1D)$	$1.65\times10^{-12}e^{-260./T}$		300-400	[112]
R_n578	2	$N(^2D) + OH \rightarrow NO + H$	4.50×10^{-11}		-	[153]
R_n579a	2	$N(^2D) + H_2O \rightarrow OH + NH$	1.30×10^{-11}		298	[112]
R_n579b	2	$N(^2D) + H_2O \rightarrow HNO + H$	1.30×10^{-11}		298	[112]
R_n579c	2	$N(^2D) + H_2O \rightarrow NO + H_2$	1.30×10^{-11}		298	[112]
R_n580	2	$N(^2D) + CO \rightarrow N + CO$	1.90×10^{-12}		298	[112]
R_n581	2	$N(^2D) + H_2CO \rightarrow HNCO + H$	4.00×10^{-11}		-	[153]
R_n582	2	$N(^2D) + CHOH \rightarrow OH + HCN$	1.00×10^{-10}		20-300	ThisWork
R_n583	2	$N(^2D) + CO_2 \rightarrow NO + CO$	3.60×10^{-13}		298	[112]
R_n584a	2	$N(^2D) + NO \rightarrow O(^3P) + N_2$	2.00×10^{-11}		298	[112]
R_n584b	2	$N(^2D) + NO \rightarrow O(^1D) + N_2$	2.00×10^{-11}		298	[112]
R_n584c	2	$N(^2D) + NO \rightarrow O(^1S) + N_2$	2.00×10^{-11}		298	[112]
R_n585	2	$N(^2D) + HNO \rightarrow NO + NH$	5.00×10^{-11}		-	[153]
R_n586	2	$NH + O(^3P) \rightarrow NO + H$	6.60×10^{-11}		10-300	[89]

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	Type	Reaction	k	F_c	T range	Ref.
R_n587a	2	NH + OH → NO + H_2	4.00×10^{-11}		300-2000	[1]
R_n587b	2	NH + OH → HNO + H	4.00×10^{-11}		300-2000	[1]
R_n588a	2	NH + NO → OH + N_2	$4.56\times10^{-11}T^{-0.30}e^{0./T}$		53-375	[117],[1]
R_n588b	2	NH + NO → N_2O + H	$1.82\times10^{-10}T^{-0.30}e^{0./T}$		53-375	[117],[1]
R_n589a	2	NH_2 + O(^{3}P) → HNO + H	$1.11\times10^{-10}T^{-0.10}$		10-300	[89]
R_n589b	2	NH_2 + O(^{3}P) → OH + NH	$1.24\times10^{-11}T^{-0.10}$		10-300	[89]
R_n590a	4	NH_2 + OH → NH_2OH	$3.10\times10^{-11}T^{0.20}$		200-500	[1],est.(N+O3P)
			$5.46\times10^{-33}e^{155./T}$	0.40		
			1.00×10^{-13}			
R_n590b	2	NH_2 + OH → O(^{3}P) + NH_3	$4.20\times10^{-20}T^{2.30}e^{140./T}$		300-2000	[1]
R_n591a	2	NH_2 + NO → H_2O + N_2	$8.55\times10^{-09}T^{-1.20}e^{106./T}$		600-2200	[1]
R_n591b	2	NH_2 + NO → OH + N_2 + H	$1.43\times10^{-09}T^{-1.20}e^{106./T}$		600-2200	[1]
R_n591c	2	NH_2 + NO → OH + N_2H	$1.43\times10^{-09}T^{-1.20}e^{106./T}$		600-2200	[1]
R_n592	2	NH_2 + HNO → NO + NH_3	$6.02\times10^{-17}T^{1.63}e^{630./T}$		300-5000	[165]
R_n593	2	NH_3 + O(^{1}D) → OH + NH_2	2.50×10^{-10}		200-300	[143]
R_n594	2	NH_3 + OH → H_2O + NH_2	$1.70\times10^{-12}e^{-710./T}$		200-300	[143]
R_n595a	2	CN + O(^{3}P) → CO + N	7.50×10^{-12}		10-300	[89]
R_n595b	2	CN + O(^{3}P) → CO + N(^{2}D)	4.25×10^{-11}		10-300	[89]
R_n596a	2	CN + OH → NCO + H	6.70×10^{-11}		1250-3000	[1]
R_n596b	2	CN + OH → O(^{3}P) + HCN	$1.00\times10^{-11}e^{-1000./T}$		1250-3000	[1]
R_n597	2	CN + HCO → CO + HCN	1.00×10^{-10}		500-2500	[122]
R_n598	2	CN + H_2CO → HCO + HCN	$2.81\times10^{-19}T^{2.72}e^{718./T}$		297-673	[166]
R_n599	4	CN + NO → ONCN	$2.04\times10^{-10}T^{-0.30}$		99-450	[123],est.(AtomNumber)
			$4.24\times10^{-25}T^{-2.10}$	0.40		
			2.00×10^{-11}			
R_n600	2	CN + HNO → NO + HCN	3.00×10^{-11}		500-2500	[122]
R_n601	2	CN + NCO → CO + CN_2	3.01×10^{-11}		500-2500	[122]
R_n602	2	HCN + OH →	$1.20\times10^{-13}e^{-400./T}$		200-300	[143]
R_n603a	2	H_2CN + O(^{3}P) → OH + HCN	4.00×10^{-11}		-	[153]
R_n603b	2	H_2CN + O(^{3}P) → OH + HNC	1.00×10^{-11}		-	[153]
R_n603c	2	H_2CN + O(^{3}P) → HNCO + H	5.00×10^{-11}		-	[153]
R_n604	2	H_2CN + OH →	7.70×10^{-12}		296	[135]
R_n605	2	C_2N + O(^{3}P) → CO + CN	6.00×10^{-12}		298	[136]
R_n606	2	C_3N + O(^{3}P) → CO + C_2N	1.00×10^{-10}		10-300	[89]
R_n607a	2	HCCO + NO → HNCO + CO	$8.00\times10^{-11}e^{-350./T}$		300-2000	[1]
R_n607b	2	HCCO + NO → CO_2 + HCN	$2.00\times10^{-11}e^{-350./T}$		300-2000	[1]
R_n608a	2	NCO + NO → CO_2 + N_2	$1.20\times10^{-05}T^{-2.08}e^{-441./T}$		300-2700	[1]
R_n608b	2	NCO + NO → CO + N_2O	$3.30\times10^{-07}T^{-1.93}e^{-400./T}$		300-2700	[1]

Tabulated values for reaction R_n8: H + C_2H_3 → C_2H_4 / C_2H_2 + H_2.

torr	mbar	C_2H_4	$C_2H_2 + H_2$
1	1.315789474	2.298×10^{-17}	2.44×10^{-10}
2	2.631578947	2.464×10^{-17}	2.44×10^{-10}
5	6.578947368	2.797×10^{-17}	2.44×10^{-10}
10	13.15789474	3.09×10^{-17}	2.44×10^{-10}
20	26.31578947	1.084×10^{-16}	2.44×10^{-10}
50	65.78947368	5.692×10^{-14}	2.44×10^{-10}
100	131.5789474	1.50002×10^{-12}	2.43×10^{-10}
200	263.1578947	1.22×10^{-11}	2.32×10^{-10}
500	657.8947368	5.65×10^{-11}	1.88×10^{-10}
1000	1315.789474	1.01×10^{-10}	1.434×10^{-10}
$2.00\times10^{+03}$	2631.578947	1.39×10^{-10}	1.061×10^{-10}
$5.00\times10^{+03}$	6578.947368	1.69×10^{-10}	7.62×10^{-11}
$1.00\times10^{+04}$	13157.89474	1.8×10^{-10}	6.46×10^{-11}

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Table B.16: Positive ion reaction list.

	Type	Reaction									k	Ref.
$R_{cn}1$	2	CH	+	$O(^3P)$	→	HCO^+	+	e			$4.20\times10^{-13}e^{-850.0/T}$	[1]
$R_{cn}2a$	2	H^+	+	H_2	→	H_3^+	+	hv			1.30×10^{-16}	[2]
$R_{cn}2b$	3	H^+	+	H_2	→	H_3^+					1.00×10^{-10}	[2]
											3.00×10^{-25}	
$R_{cn}3a$	2	H^+	+	CH_4	→	CH_3^+	+	H_2			3.40×10^{-09}	[2]
$R_{cn}3b$	2	H^+	+	CH_4	→	CH_4^+	+	H			7.47×10^{-10}	[2]
$R_{cn}4$	2	H^+	+	C_2H_2	→	$C_2H_2^+$	+	H			5.40×10^{-10}	[2]
$R_{cn}5a$	2	H^+	+	C_2H_4	→	$C_2H_4^+$	+	H			9.80×10^{-10}	[2]
$R_{cn}5b$	2	H^+	+	C_2H_4	→	$C_2H_3^+$	+	H_2			2.94×10^{-09}	[2]
$R_{cn}5c$	2	H^+	+	C_2H_4	→	$C_2H_2^+$	+	H_2	+	H	9.80×10^{-10}	[2]
$R_{cn}6a$	2	H^+	+	C_2H_6	→	$C_2H_5^+$	+	H_2			2.35×10^{-10}	[2]
$R_{cn}6b$	2	H^+	+	C_2H_6	→	$C_2H_4^+$	+	H_2	+	H	1.41×10^{-09}	[2]
$R_{cn}6c$	2	H^+	+	C_2H_6	→	$C_2H_3^+$	+	H_2	+	H_2	2.82×10^{-09}	[2]
$R_{cn}6d$	2	H^+	+	C_2H_6	→	CH_3^+	+	CH_4			2.35×10^{-10}	[2]
$R_{cn}7a$	2	H^+	+	CH_3CCH	→	$C_3H_4^+$	+	H			$1.50\times10^{-09}(300/T)^{0.50}$	[3]
$R_{cn}7b$	2	H^+	+	CH_3CCH	→	$c-C_3H_3^+$	+	H_2			$7.50\times10^{-10}(300/T)^{0.50}$	[3]
$R_{cn}7c$	2	H^+	+	CH_3CCH	→	$l-C_3H_3^+$	+	H_2			$7.50\times10^{-10}(300/T)^{0.50}$	[3]
$R_{cn}8a$	2	H^+	+	C_4H_2	→	$C_4H_2^+$	+	H			2.00×10^{-09}	[3]
$R_{cn}8b$	2	H^+	+	C_4H_2	→	C_4H^+	+	H_2			2.00×10^{-09}	[3]
$R_{cn}9a$	2	H^+	+	C_5H_4	→	$C_5H_4^+$	+	H			$2.36\times10^{-09}(300/T)^{0.50}$	[3]
$R_{cn}9b$	2	H^+	+	C_5H_4	→	$C_5H_3^+$	+	H_2			$2.36\times10^{-09}(300/T)^{0.50}$	[3]
$R_{cn}10a$	2	H^+	+	C_6H_2	→	$C_6H_2^+$	+	H			2.00×10^{-09}	[3]
$R_{cn}10b$	2	H^+	+	C_6H_2	→	C_6H^+	+	H_2			2.00×10^{-09}	[3]
$R_{cn}11a$	2	H^+	+	C_7H_4	→	$C_7H_4^+$	+	H			$2.92\times10^{-09}(300/T)^{0.50}$	[3]
$R_{cn}11b$	2	H^+	+	C_7H_4	→	$C_7H_3^+$	+	H_2			$2.92\times10^{-09}(300/T)^{0.50}$	[3]
$R_{cn}12a$	2	H^+	+	C_8H_2	→	$C_8H_2^+$	+	H			2.00×10^{-09}	[3]
$R_{cn}12b$	2	H^+	+	C_8H_2	→	C_8H^+	+	H_2			2.00×10^{-09}	[3]
$R_{cn}13$	2	H^+	+	NH_3	→	NH_3^+	+	H			4.94×10^{-09}	[4]
$R_{cn}14$	2	H^+	+	HCN	→	HCN^+	+	H			1.10×10^{-08}	[2]
$R_{cn}15$	2	H^+	+	CH_2NH	→	$HCNH^+$	+	H_2			1.40×10^{-08}	Su-Chesnavich
$R_{cn}16a$	2	H^+	+	CH_3NH_2	→	$CH_3NH_2^+$	+	H			$2.60\times10^{-09}(300/T)^{0.50}$	[3]
$R_{cn}16b$	2	H^+	+	CH_3NH_2	→	$CH_2NH_2^+$	+	H_2			$2.60\times10^{-09}(300/T)^{0.50}$	[3]
$R_{cn}17a$	2	H^+	+	CH_3CN	→	$C_2H_3N^+$	+	H			8.40×10^{-09}	[2]
$R_{cn}17b$	2	H^+	+	CH_3CN	→	HC_2NH^+	+	H_2			6.00×10^{-10}	[2]
$R_{cn}17c$	2	H^+	+	CH_3CN	→	CH_3^+	+	HCN			3.00×10^{-09}	[2]
$R_{cn}18$	2	H^+	+	HC_3N	→	HC_3N^+	+	H			2.45×10^{-08}	Su-Chesnavich
$R_{cn}19a$	2	H^+	+	C_3H_3N	→	HC_3NH^+	+	H_2			$7.50\times10^{-09}(300/T)^{0.50}$	[3]
$R_{cn}19b$	2	H^+	+	C_3H_3N	→	$C_3H_3N^+$	+	H			$7.50\times10^{-09}(300/T)^{0.50}$	[3]
$R_{cn}20$	2	H^+	+	C_4H_3N	→	CH_3^+	+	HC_3N			$1.85\times10^{-08}(300/T)^{0.50}$	[3]
$R_{cn}21$	2	H^+	+	HC_5N	→	HC_5N^+	+	H			$4.00\times10^{-08}(300/T)^{0.50}$	[3]
$R_{cn}22$	2	H^+	+	$O(^3P)$	→	O^+	+	H			3.75×10^{-10}	[4]
$R_{cn}23$	2	H^+	+	H_2O	→	H_2O^+	+	H			6.90×10^{-09}	[2]
$R_{cn}24a$	2	H^+	+	H_2CO	→	CH_2O^+	+	H			7.86×10^{-09}	Su-Chesnavich
$R_{cn}24b$	2	H^+	+	H_2CO	→	HCO^+	+	H_2			7.86×10^{-09}	Su-Chesnavich
$R_{cn}25$	2	H^+	+	CO_2	→	HCO^+	+	$O(^3P)$			3.80×10^{-09}	[4]
$R_{cn}26$	2	H_2^+	+	H	→	H^+	+	H_2			6.40×10^{-10}	[2]
$R_{cn}27$	2	H_2^+	+	H_2	→	H_3^+	+	H			2.00×10^{-09}	[2]
$R_{cn}28a$	2	H_2^+	+	CH_4	→	CH_5^+	+	H			1.14×10^{-10}	[2]

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	Type	Reaction										k	Ref.
$R_{cn}28b$	2	H_2^+	+	CH_4	→	CH_4^+	+	H_2				1.41×10^{-09}	[2]
$R_{cn}28c$	2	H_2^+	+	CH_4	→	CH_3^+	+	H_2	+	H		2.28×10^{-09}	[2]
$R_{cn}29a$	2	H_2^+	+	C_2H_2	→	$C_2H_3^+$	+	H				4.77×10^{-10}	[2]
$R_{cn}29b$	2	H_2^+	+	C_2H_2	→	$C_2H_2^+$	+	H_2				4.82×10^{-09}	[2]
$R_{cn}30a$	2	H_2^+	+	C_2H_4	→	$C_2H_4^+$	+	H_2				2.20×10^{-09}	[2]
$R_{cn}30b$	2	H_2^+	+	C_2H_4	→	$C_2H_3^+$	+	H_2	+	H		1.81×10^{-09}	[2]
$R_{cn}30c$	2	H_2^+	+	C_2H_4	→	$C_2H_2^+$	+	H_2	+	H_2		8.82×10^{-10}	[2]
$R_{cn}31a$	2	H_2^+	+	C_2H_6	→	$C_2H_6^+$	+	H_2				2.94×10^{-10}	[2]
$R_{cn}31b$	2	H_2^+	+	C_2H_6	→	$C_2H_5^+$	+	H_2	+	H		1.37×10^{-09}	[2]
$R_{cn}31c$	2	H_2^+	+	C_2H_6	→	$C_2H_4^+$	+	H_2	+	H_2		2.35×10^{-09}	[2]
$R_{cn}31d$	2	H_2^+	+	C_2H_6	→	$C_2H_3^+$	+	H_2	+	H_3		6.86×10^{-10}	[2]
$R_{cn}31e$	2	H_2^+	+	C_2H_6	→	$C_2H_2^+$	+	H_2	+	H_4		1.96×10^{-10}	[2]
$R_{cn}32$	2	H_2^+	+	N	→	NH^+	+	H				1.90×10^{-09}	[3]
$R_{cn}33$	2	H_2^+	+	NH_3	→	NH_3^+	+	H_2				5.70×10^{-09}	[4]
$R_{cn}34$	2	H_2^+	+	HCN	→	HCN^+	+	H_2				1.38×10^{-08}	Su-Chesnavich
$R_{cn}35$	2	H_2^+	+	N_2	→	N_2H^+	+	H				2.00×10^{-09}	[2]
$R_{cn}36a$	2	H_2^+	+	H_2O	→	H_3O^+	+	H				3.43×10^{-09}	[2]
$R_{cn}36b$	2	H_2^+	+	H_2O	→	H_2O^+	+	H_2				3.87×10^{-09}	[2]
$R_{cn}37$	2	H_2^+	+	CO	→	HCO^+	+	H				2.90×10^{-09}	[2]
$R_{cn}38a$	2	H_2^+	+	H_2CO	→	CH_2O^+	+	H_2				5.65×10^{-09}	Su-Chesnavich
$R_{cn}38b$	2	H_2^+	+	H_2CO	→	HCO^+	+	H_2	+	H		5.65×10^{-09}	Su-Chesnavich
$R_{cn}39$	2	H_2^+	+	CO_2	→	$OCOH^+$	+	H				2.35×10^{-09}	[4]
$R_{cn}40$	3	H_3^+	+	H_2	→	H_5^+						1.00×10^{-10}	[2]
												9.00×10^{-30}	
$R_{cn}41$	2	H_3^+	+	CH_4	→	CH_5^+	+	H_2				2.40×10^{-09}	[2]
$R_{cn}42$	2	H_3^+	+	C_2H_2	→	$C_2H_3^+$	+	H_2				3.20×10^{-09}	[2]
$R_{cn}43a$	2	H_3^+	+	C_2H_4	→	$C_2H_3^+$	+	H_2	+	H_2		2.03×10^{-09}	[2]
$R_{cn}43b$	2	H_3^+	+	C_2H_4	→	$C_2H_5^+$	+	H_2				8.70×10^{-10}	[2]
$R_{cn}44$	2	H_3^+	+	C_2H_6	→	$C_2H_5^+$	+	H_2	+	H_2		2.90×10^{-09}	[2]
$R_{cn}45a$	2	H_3^+	+	CH_3CCH	→	$C_3H_5^+$	+	H_2				2.10×10^{-09}	[2]
$R_{cn}45b$	2	H_3^+	+	CH_3CCH	→	$C_2H_3^+$	+	CH_4				9.00×10^{-10}	[2]
$R_{cn}46$	2	H_3^+	+	CH_2CCH_2	→	$c-C_3H_3^+$	+	H_2	+	H_2		2.90×10^{-09}	[5]
$R_{cn}47a$	2	H_3^+	+	C_3H_6	→	$C_2H_3^+$	+	CH_4	+	H_2		9.30×10^{-10}	[2]
$R_{cn}47b$	2	H_3^+	+	C_3H_6	→	$C_3H_5^+$	+	H_2	+	H_2		2.17×10^{-09}	[2]
$R_{cn}48$	2	H_3^+	+	C_3H_8	→	$C_3H_9^+$	+	H_2				3.00×10^{-09}	[2]
$R_{cn}49$	2	H_3^+	+	C_4H_2	→	$C_4H_3^+$	+	H_2				2.60×10^{-09}	[2]
$R_{cn}50$	2	H_3^+	+	C_5H_4	→	$C_5H_5^+$	+	H_2				$2.76\times10^{-09}(300/T)^{0.50}$	[3]
$R_{cn}51$	2	H_3^+	+	C_6H_2	→	$C_6H_3^+$	+	H_2				2.00×10^{-09}	[3]
$R_{cn}52$	2	H_3^+	+	C_6H_6	→	$C_6H_7^+$	+	H_2				3.90×10^{-09}	[3]
$R_{cn}53$	2	H_3^+	+	C_7H_4	→	$C_7H_5^+$	+	H_2				$3.40\times10^{-09}(300/T)^{0.50}$	[3]
$R_{cn}54a$	2	H_3^+	+	C_7H_8	→	$C_7H_9^+$	+	H_2				2.93×10^{-09}	[5]
$R_{cn}54b$	2	H_3^+	+	C_7H_8	→	$C_7H_7^+$	+	H_2	+	H_2		7.80×10^{-10}	[5]
$R_{cn}54c$	2	H_3^+	+	C_7H_8	→	$C_6H_5^+$	+	CH_4	+	H_2		1.95×10^{-10}	[5]
$R_{cn}55$	2	H_3^+	+	C_8H_2	→	$C_8H_3^+$	+	H_2				2.00×10^{-09}	[3]
$R_{cn}56$	2	H_3^+	+	NH_3	→	NH_4^+	+	H_2				4.40×10^{-09}	[4]
$R_{cn}57$	2	H_3^+	+	HCN	→	$HCNH^+$	+	H_2				7.50×10^{-09}	[2]
$R_{cn}58a$	2	H_3^+	+	CH_3NH_2	→	$CH_3NH_3^+$	+	H_2				1.60×10^{-10}	[4]
$R_{cn}58b$	2	H_3^+	+	CH_3NH_2	→	$CH_3NH_2^+$	+	H_2	+	H		7.00×10^{-11}	[4]
$R_{cn}58c$	2	H_3^+	+	CH_3NH_2	→	$CH_2NH_2^+$	+	H_2	+	H_2		7.60×10^{-10}	[4]
$R_{cn}58d$	2	H_3^+	+	CH_3NH_2	→	CH_3^+	+	NH_3	+	H_2		1.00×10^{-11}	[4]

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	Type	Reaction	k	Ref.
$R_{cn}59$	2	$H_3^+ + CH_3CN \rightarrow C_2H_3NH^+ + H_2$	8.90×10^{-09}	[2]
$R_{cn}60$	2	$H_3^+ + HC_3N \rightarrow HC_3NH^+ + H_2$	9.80×10^{-09}	[2]
$R_{cn}61a$	2	$H_3^+ + C_3H_3N \rightarrow C_3H_3NH^+ + H_2$	8.19×10^{-09}	[5]
$R_{cn}61b$	2	$H_3^+ + C_3H_3N \rightarrow HCNH^+ + C_2H_2 + H_2$	9.10×10^{-10}	[5]
$R_{cn}62$	2	$H_3^+ + C_3H_5N \rightarrow C_3H_5NH^+ + H_2$	1.00×10^{-09}	[6]
$R_{cn}63$	2	$H_3^+ + C_4H_3N \rightarrow C_4H_3NH^+ + H_2$	$1.08\times10^{-08}(300/T)^{0.50}$	[3]
$R_{cn}64$	2	$H_3^+ + HC_5N \rightarrow HC_5NH^+ + H_2$	$2.30\times10^{-08}(300/T)^{0.50}$	[3]
$R_{cn}65$	2	$H_3^+ + N_2 \rightarrow N_2H^+ + H_2$	1.86×10^{-09}	[2]
$R_{cn}66$	2	$H_3^+ + C_2N_2 \rightarrow C_2N_2H^+ + H_2$	2.80×10^{-09}	[2]
$R_{cn}67a$	2	$H_3^+ + O(^3P) \rightarrow OH^+ + H_2$	8.40×10^{-10}	[7]
$R_{cn}67b$	2	$H_3^+ + O(^3P) \rightarrow H_2O^+ + H$	3.60×10^{-10}	[7]
$R_{cn}68$	2	$H_3^+ + H_2O \rightarrow H_3O^+ + H_2$	5.30×10^{-09}	[2]
$R_{cn}69$	2	$H_3^+ + CO \rightarrow HCO^+ + H_2$	1.74×10^{-09}	[2]
$R_{cn}70$	2	$H_3^+ + H_2CO \rightarrow CH_2OH^+ + H_2$	6.24×10^{-09}	[4]
$R_{cn}71$	2	$H_3^+ + CO_2 \rightarrow OCOH^+ + H_2$	2.50×10^{-09}	[4]
$R_{cn}72$	2	$H_5^+ + CH_4 \rightarrow CH_5^+ + H_2 + H_2$	2.00×10^{-09}	[8]
$R_{cn}73a$	2	$C^+ + H_2 \rightarrow CH^+ + H$	1.20×10^{-16}	[2]
$R_{cn}73b$	3	$C^+ + H_2 \rightarrow CH_2^+$	1.00×10^{-10} 2.10×10^{-29}	[2]
$R_{cn}74a$	2	$C^+ + CH_4 \rightarrow C_2H_2^+ + H_2$	3.64×10^{-10}	[2]
$R_{cn}74b$	2	$C^+ + CH_4 \rightarrow C_2H_3^+ + H$	9.36×10^{-10}	[2]
$R_{cn}75$	2	$C^+ + C_2H_2 \rightarrow C_3H^+ + H$	2.63×10^{-09}	[2]
$R_{cn}76a$	2	$C^+ + C_2H_4 \rightarrow C_2H_3^+ + CH$	1.20×10^{-10}	[2]
$R_{cn}76b$	2	$C^+ + C_2H_4 \rightarrow C_2H_4^+ + C$	2.25×10^{-10}	[2]
$R_{cn}76c$	2	$C^+ + C_2H_4 \rightarrow C_3H^+ + H_2 + H$	7.50×10^{-11}	[2]
$R_{cn}76d$	2	$C^+ + C_2H_4 \rightarrow C_3H_2^+ + H_2$	4.35×10^{-10}	[2]
$R_{cn}76e$	2	$C^+ + C_2H_4 \rightarrow c-C_3H_3^+ + H$	6.30×10^{-10}	[2]
$R_{cn}77a$	2	$C^+ + C_2H_6 \rightarrow C_2H_2^+ + CH_4$	8.25×10^{-11}	[2]
$R_{cn}77b$	2	$C^+ + C_2H_6 \rightarrow C_2H_3^+ + CH_3$	4.95×10^{-10}	[2]
$R_{cn}77c$	2	$C^+ + C_2H_6 \rightarrow C_2H_4^+ + {}^3CH_2$	1.16×10^{-10}	[2]
$R_{cn}77d$	2	$C^+ + C_2H_6 \rightarrow C_2H_5^+ + CH$	2.31×10^{-10}	[2]
$R_{cn}77e$	2	$C^+ + C_2H_6 \rightarrow C_3H_2^+ + H_2 + H_2$	8.25×10^{-12}	[2]
$R_{cn}77f$	2	$C^+ + C_2H_6 \rightarrow c-C_3H_3^+ + H_2 + H$	7.10×10^{-10}	[2]
$R_{cn}78a$	2	$C^+ + CH_3CCH \rightarrow C_4H_2^+ + H_2$	5.70×10^{-10}	[2]
$R_{cn}78b$	2	$C^+ + CH_3CCH \rightarrow C_3H_4^+ + C$	5.70×10^{-10}	[2]
$R_{cn}78c$	2	$C^+ + CH_3CCH \rightarrow c-C_3H_3^+ + CH$	3.80×10^{-10}	[2]
$R_{cn}78d$	2	$C^+ + CH_3CCH \rightarrow C_2H_2^+ + C_2H_2$	1.90×10^{-10}	[2]
$R_{cn}78e$	2	$C^+ + CH_3CCH \rightarrow C_2H_3^+ + C_2H$	1.90×10^{-10}	[2]
$R_{cn}79a$	2	$C^+ + CH_2CCH_2 \rightarrow C_4H_2^+ + H_2$	5.60×10^{-10}	[9]
$R_{cn}79b$	2	$C^+ + CH_2CCH_2 \rightarrow c-C_3H_3^+ + CH$	1.75×10^{-10}	[9]
$R_{cn}79c$	2	$C^+ + CH_2CCH_2 \rightarrow l-C_3H_3^+ + CH$	1.75×10^{-10}	[9]
$R_{cn}79d$	2	$C^+ + CH_2CCH_2 \rightarrow C_2H_2^+ + C_2H_2$	2.80×10^{-10}	[9]
$R_{cn}79e$	2	$C^+ + CH_2CCH_2 \rightarrow C_3H_4^+ + C$	2.10×10^{-10}	[9]
$R_{cn}80a$	2	$C^+ + C_3H_6 \rightarrow C_2H_3^+ + C_2H_3$	6.00×10^{-10}	[2]
$R_{cn}80b$	2	$C^+ + C_3H_6 \rightarrow C_3H_5^+ + CH$	4.00×10^{-10}	[2]
$R_{cn}80c$	2	$C^+ + C_3H_6 \rightarrow c-C_3H_3^+ + CH_3$	3.00×10^{-10}	[2]
$R_{cn}80d$	2	$C^+ + C_3H_6 \rightarrow C_2H_2^+ + C_2H_4$	3.00×10^{-10}	[2]
$R_{cn}80e$	2	$C^+ + C_3H_6 \rightarrow C_3H_6^+ + C$	2.00×10^{-10}	[2]
$R_{cn}80f$	2	$C^+ + C_3H_6 \rightarrow C_4H_3^+ + H_2 + H$	2.00×10^{-10}	[2]
$R_{cn}81a$	2	$C^+ + C_3H_8 \rightarrow C_2H_3^+ + C_2H_5$	6.30×10^{-10}	[2]

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	Type	Reaction	k	Ref.
$R_{cn}81b$	2	$C^+ + C_3H_8 \rightarrow {C_3H_7}^+ + CH$	5.40×10^{-10}	[2]
$R_{cn}81c$	2	$C^+ + C_3H_8 \rightarrow c{-}{C_3H_3}^+ + CH_4 + H$	3.60×10^{-10}	[2]
$R_{cn}81d$	2	$C^+ + C_3H_8 \rightarrow {C_3H_8}^+ + C$	1.80×10^{-10}	[2]
$R_{cn}81e$	2	$C^+ + C_3H_8 \rightarrow {C_4H_5}^+ + H_2 + H$	9.00×10^{-11}	[2]
$R_{cn}82a$	2	$C^+ + C_4H_2 \rightarrow C_5H^+ + H$	1.45×10^{-09}	[2]
$R_{cn}82b$	2	$C^+ + C_4H_2 \rightarrow {C_4H_2}^+ + C$	1.30×10^{-09}	[2]
$R_{cn}82c$	2	$C^+ + C_4H_2 \rightarrow C_3H^+ + C_2H$	1.45×10^{-10}	[2]
$R_{cn}83a$	2	$C^+ + C_5H_4 \rightarrow {C_5H_3}^+ + CH$	$4.93\times10^{-10}(300/T)^{0.50}$	[3]
$R_{cn}83b$	2	$C^+ + C_5H_4 \rightarrow {C_6H_2}^+ + H_2$	$4.93\times10^{-10}(300/T)^{0.50}$	[3]
$R_{cn}83c$	2	$C^+ + C_5H_4 \rightarrow {C_6H_3}^+ + H$	$4.93\times10^{-10}(300/T)^{0.50}$	[3]
$R_{cn}84a$	2	$C^+ + C_6H_2 \rightarrow {C_7}^+ + H_2$	1.20×10^{-09}	[3]
$R_{cn}84b$	2	$C^+ + C_6H_2 \rightarrow C_7H^+ + H$	1.20×10^{-09}	[3]
$R_{cn}85a$	2	$C^+ + C_7H_4 \rightarrow {C_7H_3}^+ + CH$	$9.00\times10^{-10}(300/T)^{0.50}$	[3]
$R_{cn}85b$	2	$C^+ + C_7H_4 \rightarrow {C_8H_2}^+ + H_2$	$9.00\times10^{-10}(300/T)^{0.50}$	[3]
$R_{cn}86a$	2	$C^+ + C_6H_6 \rightarrow {C_6H_6}^+ + C$	1.61×10^{-09}	[9]
$R_{cn}86b$	2	$C^+ + C_6H_6 \rightarrow {C_5H_3}^+ + C_2H_3$	4.08×10^{-10}	[9]
$R_{cn}86c$	2	$C^+ + C_6H_6 \rightarrow {C_7H_5}^+ + H$	2.40×10^{-10}	[9]
$R_{cn}86d$	2	$C^+ + C_6H_6 \rightarrow c{-}{C_3H_3}^+ + C_4H_3$	1.44×10^{-10}	[9]
$R_{cn}87a$	2	$C^+ + C_8H_2 \rightarrow CXHYNZ^+ + H_2$	1.20×10^{-09}	[3]
$R_{cn}87b$	2	$C^+ + C_8H_2 \rightarrow CXHYNZ^+ + H$	1.20×10^{-09}	[3]
$R_{cn}88a$	2	$C^+ + NH_3 \rightarrow {NH_3}^+ + C$	7.36×10^{-10}	[4]
$R_{cn}88b$	2	$C^+ + NH_3 \rightarrow HCN^+ + H_2$	1.15×10^{-10}	[4]
$R_{cn}88c$	2	$C^+ + NH_3 \rightarrow HCNH^+ + H$	1.45×10^{-09}	[4]
$R_{cn}89$	2	$C^+ + HCN \rightarrow C_2N^+ + H$	2.95×10^{-09}	[2]
$R_{cn}90a$	2	$C^+ + CH_3NH_2 \rightarrow {CH_3}^+ + HCN + H$	3.20×10^{-11}	[4]
$R_{cn}90b$	2	$C^+ + CH_3NH_2 \rightarrow HCNH^+ + CH_3$	9.60×10^{-11}	[4]
$R_{cn}90c$	2	$C^+ + CH_3NH_2 \rightarrow {CH_2NH_2}^+ + CH$	8.64×10^{-10}	[4]
$R_{cn}90d$	2	$C^+ + CH_3NH_2 \rightarrow {CH_3NH_2}^+ + C$	2.21×10^{-09}	[4]
$R_{cn}91$	2	$C^+ + CH_3CN \rightarrow HC_3NH^+ + H$	5.60×10^{-09}	[2]
$R_{cn}92a$	2	$C^+ + HC_3N \rightarrow {C_3}^+ + HCN$	2.75×10^{-10}	[2]
$R_{cn}92b$	2	$C^+ + HC_3N \rightarrow C_3H^+ + CN$	3.85×10^{-09}	[2]
$R_{cn}92c$	2	$C^+ + HC_3N \rightarrow C_2N^+ + C_2H$	1.10×10^{-10}	[2]
$R_{cn}92d$	2	$C^+ + HC_3N \rightarrow C_4N^+ + H$	1.26×10^{-09}	[2]
$R_{cn}93a$	2	$C^+ + C_3H_3N \rightarrow {C_3H_2}^+ + HCN$	9.84×10^{-10}	[10],[11]
$R_{cn}93b$	2	$C^+ + C_3H_3N \rightarrow c{-}{C_3H_3}^+ + CN$	1.80×10^{-09}	[10],[11]
$R_{cn}93c$	2	$C^+ + C_3H_3N \rightarrow HC_4NH^+ + H$	1.19×10^{-09}	[10],[11]
$R_{cn}93d$	2	$C^+ + C_3H_3N \rightarrow C_4H_3N^+ + hv$	1.23×10^{-10}	[10],[11]
$R_{cn}94a$	2	$C^+ + C_4H_3N \rightarrow {C_2H_3}^+ + C_3N$	$2.90\times10^{-09}(300/T)^{0.50}$	[3]
$R_{cn}94b$	2	$C^+ + C_4H_3N \rightarrow {C_4H_3}^+ + CN$	$2.90\times10^{-09}(300/T)^{0.50}$	[3]
$R_{cn}95a$	2	$C^+ + HC_5N \rightarrow HC_5N^+ + C$	4.36×10^{-09}	[12]
$R_{cn}95b$	2	$C^+ + HC_5N \rightarrow C_6N^+ + H$	2.35×10^{-09}	[12]
$R_{cn}96a$	2	$C^+ + C_2N_2 \rightarrow CNC^+ + CN$	2.09×10^{-10}	[2]
$R_{cn}96b$	2	$C^+ + C_2N_2 \rightarrow C_2N^+ + CN$	1.69×10^{-09}	[2]
$R_{cn}97a$	2	$C^+ + H_2O \rightarrow H_2O^+ + C$	2.40×10^{-10}	[2]
$R_{cn}97b$	2	$C^+ + H_2O \rightarrow HCO^+ + H$	2.16×10^{-09}	[2]
$R_{cn}98a$	2	$C^+ + H_2CO \rightarrow {CH_2}^+ + CO$	2.27×10^{-09}	[4]
$R_{cn}98b$	2	$C^+ + H_2CO \rightarrow HCO^+ + CH$	8.40×10^{-10}	[4]
$R_{cn}98c$	2	$C^+ + H_2CO \rightarrow CH_2O^+ + C$	1.09×10^{-09}	[4]
$R_{cn}99a$	2	$C^+ + CO_2 \rightarrow CO^+ + CO$	9.90×10^{-10}	[4]
$R_{cn}99b$	2	$C^+ + CO_2 \rightarrow {CO_2}^+ + C$	1.10×10^{-10}	[4]

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	Type	Reaction									k	Ref.
$R_{cn}100$	2	CH^+	+	H	→	C^+	+	H_2			$7.84\times10^{-10}(300/T)^{0.22}$	[13],[14]
$R_{cn}101$	2	CH^+	+	H_2	→	$CH_2{}^+$	+	H			1.20×10^{-09}	[2],[13]
$R_{cn}102a$	2	CH^+	+	CH_4	→	$C_2H_2{}^+$	+	H_2	+	H	1.43×10^{-10}	[2]
$R_{cn}102b$	2	CH^+	+	CH_4	→	$C_2H_3{}^+$	+	H_2			1.09×10^{-09}	[2]
$R_{cn}102c$	2	CH^+	+	CH_4	→	$C_2H_4{}^+$	+	H			6.50×10^{-11}	[2]
$R_{cn}103$	2	CH^+	+	C_2H_2	→	$C_3H_2{}^+$	+	H			2.40×10^{-09}	[2]
$R_{cn}104$	2	CH^+	+	C_2H_6	→	$CXHYNZ^+$					2.60×10^{-09}	[2]
$R_{cn}105$	2	CH^+	+	N	→	CN^+	+	H			1.90×10^{-10}	[2]
$R_{cn}106a$	2	CH^+	+	NH_3	→	$HCNH^+$	+	H_2			1.84×10^{-09}	[4]
$R_{cn}106b$	2	CH^+	+	NH_3	→	$NH_3{}^+$	+	CH			4.59×10^{-10}	[4]
$R_{cn}106c$	2	CH^+	+	NH_3	→	$NH_4{}^+$	+	C			4.05×10^{-10}	[4]
$R_{cn}107a$	2	CH^+	+	HCN	→	$HCNH^+$	+	C			2.10×10^{-09}	[2]
$R_{cn}107b$	2	CH^+	+	HCN	→	C_2N^+	+	H_2			4.20×10^{-10}	[2]
$R_{cn}107c$	2	CH^+	+	HCN	→	HC_2N^+	+	H			2.80×10^{-10}	[2]
$R_{cn}108a$	2	CH^+	+	CH_3NH_2	→	$CH_2NH_2{}^+$	+	$^3CH_2$			1.15×10^{-09}	[4]
$R_{cn}108b$	2	CH^+	+	CH_3NH_2	→	$CH_3NH_2{}^+$	+	CH			2.30×10^{-10}	[4]
$R_{cn}108c$	2	CH^+	+	CH_3NH_2	→	$CH_3NH_3{}^+$	+	C			9.20×10^{-10}	[4]
$R_{cn}109$	3	CH^+	+	N_2	→	$AdductN^+$					1.00×10^{-10}	[2]
											5.30×10^{-29}	
$R_{cn}110a$	2	CH^+	+	$O(^3P)$	→	CO^+	+	H			1.75×10^{-10}	[4]
$R_{cn}110b$	2	CH^+	+	$O(^3P)$	→	H^+	+	CO			1.75×10^{-10}	[4]
$R_{cn}111a$	2	CH^+	+	H_2O	→	HCO^+	+	H_2			1.45×10^{-09}	[2]
$R_{cn}111b$	2	CH^+	+	H_2O	→	CH_2O^+	+	H			7.25×10^{-10}	[2]
$R_{cn}111c$	2	CH^+	+	H_2O	→	H_3O^+	+	C			7.25×10^{-10}	[2]
$R_{cn}112$	2	CH^+	+	CO	→	HCO^+	+	C			7.00×10^{-12}	[2]
$R_{cn}113a$	2	CH^+	+	H_2CO	→	$CH_3{}^+$	+	CO			9.60×10^{-10}	[4]
$R_{cn}113b$	2	CH^+	+	H_2CO	→	HCO^+	+	$^3CH_2$			9.60×10^{-10}	[4]
$R_{cn}113c$	2	CH^+	+	H_2CO	→	CH_2OH^+	+	C			9.60×10^{-10}	[4]
$R_{cn}113d$	2	CH^+	+	H_2CO	→	CH_2CO^+	+	H			3.20×10^{-10}	[4]
$R_{cn}114$	2	CH^+	+	CO_2	→	HCO^+	+	CO			1.27×10^{-09}	[15]
$R_{cn}115$	2	$CH_2{}^+$	+	H_2	→	$CH_3{}^+$	+	H			1.16×10^{-09}	[2]
$R_{cn}116a$	2	$CH_2{}^+$	+	CH_4	→	$C_2H_4{}^+$	+	H_2			9.10×10^{-10}	[2]
$R_{cn}116b$	2	$CH_2{}^+$	+	CH_4	→	$C_2H_5{}^+$	+	H			3.90×10^{-10}	[2]
$R_{cn}117$	2	$CH_2{}^+$	+	C_2H_2	→	$c-C_3H_3{}^+$	+	H			2.50×10^{-09}	[2]
$R_{cn}118$	2	$CH_2{}^+$	+	C_2H_6	→	$CXHYNZ^+$					2.60×10^{-09}	[2]
$R_{cn}119a$	2	$CH_2{}^+$	+	N	→	CN^+	+	H_2			1.10×10^{-10}	[2]
$R_{cn}119b$	2	$CH_2{}^+$	+	N	→	HCN^+	+	H			1.10×10^{-10}	[2]
$R_{cn}120a$	2	$CH_2{}^+$	+	NH_3	→	$NH_4{}^+$	+	CH			8.78×10^{-10}	[4]
$R_{cn}120b$	2	$CH_2{}^+$	+	NH_3	→	$CH_2NH_2{}^+$	+	H			1.78×10^{-09}	[4]
$R_{cn}121$	2	$CH_2{}^+$	+	HCN	→	HC_2NH^+	+	H			1.80×10^{-09}	[2]
$R_{cn}122a$	2	$CH_2{}^+$	+	CH_3NH_2	→	$CH_2NH_2{}^+$	+	CH_3			1.15×10^{-09}	[4]
$R_{cn}122b$	2	$CH_2{}^+$	+	CH_3NH_2	→	$CH_3NH_2{}^+$	+	$^3CH_2$			7.35×10^{-10}	[4]
$R_{cn}122c$	2	$CH_2{}^+$	+	CH_3NH_2	→	$CH_3NH_3{}^+$	+	CH			2.10×10^{-10}	[4]
$R_{cn}123$	2	$CH_2{}^+$	+	CH_3CN	→	$C_3H_3NH^+$	+	H			2.58×10^{-09}	[16]
$R_{cn}124$	2	$CH_2{}^+$	+	HC_3N	→	HC_3NH^+	+	CH			4.10×10^{-09}	[2]
$R_{cn}125$	2	$CH_2{}^+$	+	C_3H_5N	→	$C_4H_5NH^+$	+	H			3.12×10^{-09}	[16]
$R_{cn}126$	3	$CH_2{}^+$	+	N_2	→	$CH_2{}^+N_2$					1.00×10^{-10}	[2]
											1.40×10^{-28}	
$R_{cn}127$	2	$CH_2{}^+$	+	H_2O	→	CH_2OH^+	+	H			2.05×10^{-09}	[2]
$R_{cn}128$	3	$CH_2{}^+$	+	CO	→	CH_2CO^+					1.00×10^{-10}	[2]

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	Type	Reaction	k	Ref.
			2.00×10^{-27}	
$R_{cn}129a$	2	$CH_2^+ + H_2CO \rightarrow HCO^+ + CH_3$	2.81×10^{-09}	[4]
$R_{cn}129b$	2	$CH_2^+ + H_2CO \rightarrow CH_2CO^+ + H_2$	1.65×10^{-10}	[4]
$R_{cn}129c$	2	$CH_2^+ + H_2CO \rightarrow CH_3CO^+ + H$	3.30×10^{-10}	[4]
$R_{cn}130$	2	$CH_2^+ + CO_2 \rightarrow CH_2O^+ + CO$	1.24×10^{-09}	[15]
$R_{cn}131a$	2	$CH_3^+ + H_2 \rightarrow CH_5^+ + hv$	$4.04\times10^{-16}(300/\mathrm{T})^{2.30}\mathrm{e}^{-30.0/T}$	[3]
$R_{cn}131b$	3	$CH_3^+ + H_2 \rightarrow CH_5^+$	1.00×10^{-10}	[2]
			1.10×10^{-28}	
$R_{cn}132$	2	$CH_3^+ + CH_4 \rightarrow C_2H_5^+ + H_2$	1.10×10^{-09}	[2]
$R_{cn}133a$	2	$CH_3^+ + C_2H_2 \rightarrow c{-}C_3H_3^+ + H_2$	2.88×10^{-10}	[2]
$R_{cn}133b$	2	$CH_3^+ + C_2H_2 \rightarrow l{-}C_3H_3^+ + H_2$	8.63×10^{-10}	[2]
$R_{cn}134a$	2	$CH_3^+ + C_2H_4 \rightarrow C_2H_3^+ + CH_4$	4.88×10^{-10}	[2]
$R_{cn}134b$	2	$CH_3^+ + C_2H_4 \rightarrow c{-}C_3H_3^+ + H_2 + H_2$	4.24×10^{-11}	[2]
$R_{cn}134c$	2	$CH_3^+ + C_2H_4 \rightarrow C_3H_5^+ + H_2$	5.41×10^{-10}	[2]
$R_{cn}135a$	2	$CH_3^+ + C_2H_6 \rightarrow C_2H_5^+ + CH_4$	1.48×10^{-09}	[2]
$R_{cn}135b$	2	$CH_3^+ + C_2H_6 \rightarrow C_3H_5^+ + H_2 + H_2$	1.57×10^{-10}	[2]
$R_{cn}135c$	2	$CH_3^+ + C_2H_6 \rightarrow C_3H_7^+ + H_2$	1.04×10^{-10}	[2]
$R_{cn}136a$	2	$CH_3^+ + CH_3CCH \rightarrow C_2H_3^+ + C_2H_4$	2.85×10^{-10}	[2]
$R_{cn}136b$	2	$CH_3^+ + CH_3CCH \rightarrow C_2H_5^+ + C_2H_2$	1.14×10^{-09}	[2]
$R_{cn}136c$	2	$CH_3^+ + CH_3CCH \rightarrow c{-}C_3H_3^+ + CH_4$	2.85×10^{-10}	[2]
$R_{cn}136d$	2	$CH_3^+ + CH_3CCH \rightarrow C_4H_5^+ + H_2$	1.90×10^{-10}	[2]
$R_{cn}137$	2	$CH_3^+ + C_3H_8 \rightarrow C_3H_7^+ + CH_4$	1.00×10^{-09}	[2]
$R_{cn}138a$	2	$CH_3^+ + C_4H_2 \rightarrow c{-}C_3H_3^+ + C_2H_2$	1.17×10^{-09}	[2]
$R_{cn}138b$	2	$CH_3^+ + C_4H_2 \rightarrow C_5H_3^+ + H_2$	1.30×10^{-10}	[2]
$R_{cn}139$	2	$CH_3^+ + C_6H_2 \rightarrow C_7H_3^+ + H_2$	1.20×10^{-09}	[17]
$R_{cn}140a$	2	$CH_3^+ + C_6H_6 \rightarrow C_5H_5^+ + C_2H_4$	9.40×10^{-11}	[17]
$R_{cn}140b$	2	$CH_3^+ + C_6H_6 \rightarrow C_6H_5^+ + CH_4$	5.83×10^{-10}	[17]
$R_{cn}140c$	2	$CH_3^+ + C_6H_6 \rightarrow C_6H_6^+ + CH_3$	3.20×10^{-10}	[17]
$R_{cn}140d$	2	$CH_3^+ + C_6H_6 \rightarrow C_7H_7^+ + H_2$	7.33×10^{-10}	[17]
$R_{cn}140e$	2	$CH_3^+ + C_6H_6 \rightarrow C_7H_9^+ + hv$	1.50×10^{-10}	[17]
$R_{cn}141$	2	$CH_3^+ + C_8H_2 \rightarrow CXHYNZ^+ + H_2$	1.20×10^{-09}	[3]
$R_{cn}142a$	2	$CH_3^+ + N \rightarrow HCN^+ + H_2$	3.35×10^{-11}	[2]
$R_{cn}142b$	2	$CH_3^+ + N \rightarrow HCNH^+ + H$	3.35×10^{-11}	[2]
$R_{cn}143a$	2	$CH_3^+ + NH_3 \rightarrow NH_4^+ + {}^3CH_2$	2.63×10^{-10}	[4]
$R_{cn}143b$	2	$CH_3^+ + NH_3 \rightarrow CH_2NH_2^+ + H_2$	1.49×10^{-09}	[4]
$R_{cn}143c$	2	$CH_3^+ + NH_3 \rightarrow CH_3NH_3^+ + hv$	$9.40\times10^{-10}(300/\mathrm{T})^{0.90}$	[3]
$R_{cn}144a$	2	$CH_3^+ + HCN \rightarrow C_2H_3NH^+ + hv$	2.00×10^{-10}	[2]
$R_{cn}144b$	3	$CH_3^+ + HCN \rightarrow C_2H_3NH^+$	1.00×10^{-10}	[2]
			1.07×10^{-23}	
$R_{cn}145a$	2	$CH_3^+ + CH_3NH_2 \rightarrow CH_2NH_2^+ + CH_4$	1.44×10^{-09}	[4]
$R_{cn}145b$	2	$CH_3^+ + CH_3NH_2 \rightarrow CH_3NH_2^+ + CH_3$	1.76×10^{-09}	[4]
$R_{cn}146a$	2	$CH_3^+ + CH_3CN \rightarrow C_2H_5^+ + HCN$	6.66×10^{-10}	[2]
$R_{cn}146b$	2	$CH_3^+ + CH_3CN \rightarrow HCNH^+ + C_2H_4$	1.04×10^{-09}	[2]
$R_{cn}146c$	2	$CH_3^+ + CH_3CN \rightarrow C_3H_5NH^+ + hv$	9.00×10^{-11}	[2]
$R_{cn}146d$	3	$CH_3^+ + CH_3CN \rightarrow C_3H_5NH^+$	1.00×10^{-10}	[2]
			1.90×10^{-22}	
$R_{cn}147a$	2	$CH_3^+ + HC_3N \rightarrow c{-}C_3H_3^+ + HCN$	1.43×10^{-09}	[2]
$R_{cn}147b$	2	$CH_3^+ + HC_3N \rightarrow C_4H_3NH^+ + hv$	2.19×10^{-09}	[2]
$R_{cn}147c$	3	$CH_3^+ + HC_3N \rightarrow c{-}C_3H_3^+ + HCN$	1.00×10^{-10}	[2]
			1.52×10^{-23}	

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	Type	Reaction	k	Ref.
$R_{cn}147d$	3	$CH_3^+ + HC_3N \rightarrow C_4H_3NH^+$	1.00×10^{-10}	[2]
			2.28×10^{-23}	
$R_{cn}148a$	2	$CH_3^+ + C_3H_3N \rightarrow C_2H_3NH^+ + C_2H_2$	4.32×10^{-09}	[18]
$R_{cn}148b$	2	$CH_3^+ + C_3H_3N \rightarrow C_2H_3^+ + CH_3CN$	5.40×10^{-10}	[18]
$R_{cn}148c$	2	$CH_3^+ + C_3H_3N \rightarrow C_3H_5^+ + HCN$	2.70×10^{-10}	[18]
$R_{cn}148d$	2	$CH_3^+ + C_3H_3N \rightarrow C_3H_3NH^+ + {}^3CH_2$	2.70×10^{-10}	[18]
$R_{cn}148e$	3	$CH_3^+ + C_3H_3N \rightarrow c{-}C_3H_3^+ + HCN + H_2$	1.00×10^{-10}	[18]
			1.50×10^{-24}	
$R_{cn}148f$	3	$CH_3^+ + C_3H_3N \rightarrow HC_3NH^+ + CH_4$	1.00×10^{-10}	[18]
			2.75×10^{-24}	
$R_{cn}148g$	3	$CH_3^+ + C_3H_3N \rightarrow C_4H_5NH^+$	1.00×10^{-10}	[18]
			7.50×10^{-25}	
$R_{cn}149$	2	$CH_3^+ + C_3H_5N \rightarrow CXHYNZ^+$	2.55×10^{-09}	[18]
$R_{cn}150a$	2	$CH_3^+ + C_4H_5N \rightarrow C_3H_5^+ + CH_3CN$	3.35×10^{-11}	[17]
$R_{cn}150b$	2	$CH_3^+ + C_4H_5N \rightarrow C_2H_3N^+ + C_3H_5$	3.35×10^{-11}	[17]
$R_{cn}150c$	2	$CH_3^+ + C_4H_5N \rightarrow C_2H_3NH^+ + CH_3CCH$	1.12×10^{-10}	[17]
$R_{cn}150d$	2	$CH_3^+ + C_4H_5N \rightarrow C_3H_5N^+ + C_2H_3$	2.90×10^{-10}	[17]
$R_{cn}150e$	2	$CH_3^+ + C_4H_5N \rightarrow C_4H_5N^+ + CH_3$	1.43×10^{-09}	[17]
$R_{cn}150f$	2	$CH_3^+ + C_4H_5N \rightarrow C_4H_5NH^+ + {}^3CH_2$	1.56×10^{-10}	[17]
$R_{cn}150g$	2	$CH_3^+ + C_4H_5N \rightarrow C_5H_7NH^+ + hv$	1.78×10^{-10}	[17]
$R_{cn}151$	2	$CH_3^+ + HC_5N \rightarrow C_6H_3NH^+ + hv$	$8.60\times10^{-11}(300/T)^{1.40}$	[3]
$R_{cn}152a$	2	$CH_3^+ + C_5H_5N \rightarrow C_5H_3NH^+ + CH_4$	5.42×10^{-10}	[17]
$R_{cn}152b$	2	$CH_3^+ + C_5H_5N \rightarrow C_5H_5N^+ + CH_3$	5.69×10^{-10}	[17]
$R_{cn}152c$	2	$CH_3^+ + C_5H_5N \rightarrow C_5H_5NH^+ + {}^3CH_2$	2.44×10^{-10}	[17]
$R_{cn}152d$	2	$CH_3^+ + C_5H_5N \rightarrow C_6H_7NH^+ + hv$	1.36×10^{-09}	[17]
$R_{cn}153$	3	$CH_3^+ + N_2 \rightarrow CH_3^+N_2$	1.00×10^{-10}	[2]
			5.40×10^{-29}	
$R_{cn}154a$	2	$CH_3^+ + C_2N_2 \rightarrow HC_2NH^+ + HCN$	7.20×10^{-11}	[2]
$R_{cn}154b$	2	$CH_3^+ + C_2N_2 \rightarrow C_3H_3N_2^+ + hv$	1.80×10^{-11}	[2]
$R_{cn}154c$	3	$CH_3^+ + C_2N_2 \rightarrow AdductN^+$	1.00×10^{-10}	[2]
			8.00×10^{-24}	
$R_{cn}155$	2	$CH_3^+ + O({}^3P) \rightarrow HCO^+ + H_2$	4.10×10^{-10}	[19]
$R_{cn}156a$	2	$CH_3^+ + H_2O \rightarrow CH_3OH_2^+ + hv$	2.00×10^{-12}	[3]
$R_{cn}156b$	3	$CH_3^+ + H_2O \rightarrow Adduct^+$	1.00×10^{-10}	[2]
			6.00×10^{-25}	
$R_{cn}157a$	2	$CH_3^+ + CO \rightarrow CH_3CO^+ + hv$	$1.20\times10^{-13}(300/T)^{1.30}$	[3]
$R_{cn}157b$	3	$CH_3^+ + CO \rightarrow CH_3CO^+$	1.00×10^{-10}	[2]
			2.30×10^{-27}	
$R_{cn}158$	2	$CH_3^+ + H_2CO \rightarrow HCO^+ + CH_4$	1.30×10^{-09}	[4]
$R_{cn}159$	2	$CH_3^+N_2 + H_2 \rightarrow CH_5^+ + N_2$	7.00×10^{-14}	[20]
$R_{cn}160$	2	$CH_4^+ + H \rightarrow CH_3^+ + H_2$	5.00×10^{-10}	[21],[13]
$R_{cn}161$	2	$CH_4^+ + H_2 \rightarrow CH_5^+ + H$	$3.30\times10^{-11}(300/T)^{1.12}$	[22],[13]
$R_{cn}162$	2	$CH_4^+ + CH_4 \rightarrow CH_5^+ + CH_3$	1.14×10^{-09}	[2]
$R_{cn}163a$	2	$CH_4^+ + C_2H_2 \rightarrow C_2H_2^+ + CH_4$	1.44×10^{-09}	[2]
$R_{cn}163b$	2	$CH_4^+ + C_2H_2 \rightarrow C_2H_3^+ + CH_3$	1.12×10^{-09}	[2]
$R_{cn}163c$	2	$CH_4^+ + C_2H_2 \rightarrow c{-}C_3H_3^+ + H_2 + H$	1.63×10^{-10}	[2]
$R_{cn}164a$	2	$CH_4^+ + C_2H_4 \rightarrow C_2H_4^+ + CH_4$	1.70×10^{-09}	[2]
$R_{cn}164b$	2	$CH_4^+ + C_2H_4 \rightarrow C_2H_5^+ + CH_3$	2.60×10^{-10}	[2]
$R_{cn}164c$	2	$CH_4^+ + C_2H_4 \rightarrow C_3H_5^+ + H_2 + H$	6.00×10^{-11}	[2]
$R_{cn}165$	2	$CH_4^+ + C_2H_6 \rightarrow C_2H_4^+ + CH_4 + H_2$	1.91×10^{-09}	[2]

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	Type	Reaction	k	Ref.
$R_{cn}166$	2	$CH_4^+ + C_3H_6 \rightarrow CH_5^+ + C_3H_5$	1.00×10^{-09}	[2]
$R_{cn}167a$	2	$CH_4^+ + NH_3 \rightarrow CH_5^+ + NH_2$	6.00×10^{-11}	[4]
$R_{cn}167b$	2	$CH_4^+ + NH_3 \rightarrow NH_4^+ + CH_3$	1.35×10^{-09}	[4]
$R_{cn}167c$	2	$CH_4^+ + NH_3 \rightarrow NH_3^+ + CH_4$	1.59×10^{-09}	[4]
$R_{cn}168a$	2	$CH_4^+ + HCN \rightarrow HCNH^+ + CH_3$	3.23×10^{-09}	[2]
$R_{cn}168b$	2	$CH_4^+ + HCN \rightarrow C_2H_3NH^+ + H$	6.60×10^{-11}	[2]
$R_{cn}169a$	2	$CH_4^+ + CH_3NH_2 \rightarrow CH_3NH_2^+ + CH_4$	1.32×10^{-09}	[23],[24],[25]
$R_{cn}169b$	2	$CH_4^+ + CH_3NH_2 \rightarrow CH_2NH_2^+ + CH_4 + H$	8.80×10^{-10}	[23],[24],[25]
$R_{cn}170$	2	$CH_4^+ + CH_3CN \rightarrow C_2H_3NH^+ + CH_3$	3.92×10^{-09}	[26]
$R_{cn}171$	2	$CH_4^+ + HC_3N \rightarrow HC_3NH^+ + CH_3$	2.50×10^{-09}	[2]
$R_{cn}172$	2	$CH_4^+ + H_2O \rightarrow H_3O^+ + CH_3$	2.50×10^{-09}	[2]
$R_{cn}173a$	2	$CH_4^+ + CO \rightarrow HCO^+ + CH_3$	1.04×10^{-09}	[2]
$R_{cn}173b$	2	$CH_4^+ + CO \rightarrow CH_3CO^+ + H$	4.32×10^{-11}	[2]
$R_{cn}174a$	2	$CH_4^+ + H_2CO \rightarrow CH_2O^+ + CH_4$	1.62×10^{-09}	[4]
$R_{cn}174b$	2	$CH_4^+ + H_2CO \rightarrow CH_2OH^+ + CH_3$	1.98×10^{-09}	[4]
$R_{cn}175a$	2	$CH_4^+ + CO_2 \rightarrow OCOH^+ + CH_3$	9.90×10^{-10}	[4]
$R_{cn}175b$	2	$CH_4^+ + CO_2 \rightarrow CH_3CO^+ + OH$	1.00×10^{-11}	[4]
$R_{cn}176$	2	$CH_5^+ + H \rightarrow CH_4^+ + H_2$	2.30×10^{-11}	[27],[13]
$R_{cn}177$	2	$CH_5^+ + CH_3 \rightarrow C_2H_6^+ + H_2$	5.00×10^{-10}	[8]
$R_{cn}178$	3	$CH_5^+ + CH_4 \rightarrow CH_5^+CH_4$	1.00×10^{-10}	[28]
			$8.00\times10^{-30}(300/T)^{3.50}$	
$R_{cn}179$	2	$CH_5^+ + C_2H_2 \rightarrow C_2H_3^+ + CH_4$	1.48×10^{-09}	[2]
$R_{cn}180$	2	$CH_5^+ + C_2H_4 \rightarrow C_2H_5^+ + CH_4$	1.50×10^{-09}	[2]
$R_{cn}181a$	2	$CH_5^+ + C_2H_6 \rightarrow C_2H_5^+ + CH_4 + H_2$	2.03×10^{-10}	[2]
$R_{cn}181b$	2	$CH_5^+ + C_2H_6 \rightarrow C_2H_7^+ + CH_4$	1.15×10^{-09}	[2]
$R_{cn}182$	2	$CH_5^+ + CH_3CCH \rightarrow CXHYNZ^+$	2.00×10^{-09}	[2]
$R_{cn}183$	2	$CH_5^+ + CH_2CCH_2 \rightarrow C_3H_5^+ + CH_4$	1.60×10^{-09}	Langevin
$R_{cn}184$	2	$CH_5^+ + C_3H_6 \rightarrow CXHYNZ^+$	2.00×10^{-09}	[2]
$R_{cn}185$	2	$CH_5^+ + C_3H_8 \rightarrow C_3H_9^+ + CH_4$	1.00×10^{-09}	[2]
$R_{cn}186$	2	$CH_5^+ + C_4H_2 \rightarrow C_4H_3^+ + CH_4$	1.70×10^{-09}	Langevin
$R_{cn}187$	2	$CH_5^+ + C_5H_4 \rightarrow C_5H_5^+ + CH_4$	3.00×10^{-09}	Su-Chesnavich
$R_{cn}188$	2	$CH_5^+ + C_6H_2 \rightarrow C_6H_3^+ + CH_4$	2.20×10^{-09}	Langevin
$R_{cn}189$	2	$CH_5^+ + C_6H_6 \rightarrow C_6H_7^+ + CH_4$	2.00×10^{-09}	[29]
$R_{cn}190$	2	$CH_5^+ + C_7H_4 \rightarrow C_7H_5^+ + CH_4$	3.60×10^{-09}	Su-Chesnavich
$R_{cn}191$	2	$CH_5^+ + C_7H_8 \rightarrow C_7H_9^+ + CH_4$	2.30×10^{-09}	Su-Chesnavich
$R_{cn}192$	2	$CH_5^+ + C_8H_2 \rightarrow C_8H_3^+ + CH_4$	2.60×10^{-09}	Langevin
$R_{cn}193$	2	$CH_5^+ + NH_3 \rightarrow NH_4^+ + CH_4$	2.40×10^{-09}	[4]
$R_{cn}194$	2	$CH_5^+ + HCN \rightarrow HCNH^+ + CH_4$	5.80×10^{-09}	Su-Chesnavich
$R_{cn}195$	2	$CH_5^+ + HNC \rightarrow HCNH^+ + CH_4$	6.00×10^{-09}	Su-Chesnavich
$R_{cn}196$	2	$CH_5^+ + CH_2NH \rightarrow CH_2NH_2^+ + CH_4$	4.20×10^{-09}	Su-Chesnavich
$R_{cn}197$	2	$CH_5^+ + CH_3NH_2 \rightarrow CH_3NH_3^+ + CH_4$	2.25×10^{-09}	[30]
$R_{cn}198$	2	$CH_5^+ + CH_3CN \rightarrow C_2H_3NH^+ + CH_4$	4.90×10^{-09}	[26]
$R_{cn}199$	2	$CH_5^+ + HC_3N \rightarrow HC_3NH^+ + CH_4$	4.50×10^{-09}	[2]
$R_{cn}200$	2	$CH_5^+ + C_3H_3N \rightarrow C_3H_3NH^+ + CH_4$	7.00×10^{-09}	Su-Chesnavich
$R_{cn}201$	2	$CH_5^+ + C_3H_5N \rightarrow C_3H_5NH^+ + CH_4$	7.20×10^{-09}	Su-Chesnavich
$R_{cn}202$	2	$CH_5^+ + C_4H_3N \rightarrow C_4H_3NH^+ + CH_4$	8.20×10^{-09}	Su-Chesnavich
$R_{cn}203$	2	$CH_5^+ + C_4H_5N \rightarrow C_4H_5NH^+ + CH_4$	6.60×10^{-09}	Su-Chesnavich
$R_{cn}204$	2	$CH_5^+ + HC_5N \rightarrow HC_5NH^+ + CH_4$	7.60×10^{-09}	Su-Chesnavich
$R_{cn}205$	2	$CH_5^+ + C_5H_5N \rightarrow C_5H_5NH^+ + CH_4$	4.40×10^{-09}	Su-Chesnavich
$R_{cn}206$	2	$CH_5^+ + C_6H_3N \rightarrow C_6H_3NH^+ + CH_4$	1.00×10^{-08}	Su-Chesnavich

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	Type	Reaction									k	Ref.
$R_{cn}207$	2	CH_5^+	+	C_6H_7N	→	$C_6H_7NH^+$	+	CH_4			3.00×10^{-09}	Su-Chesnavich
$R_{cn}208$	3	CH_5^+	+	N_2	→	$CH_5^+N_2$					1.00×10^{-10}	[31]
											1.00×10^{-27}	
$R_{cn}209$	2	CH_5^+	+	N_2H_4	→	$N_2H_5^+$	+	CH_4			1.40×10^{-09}	Su-Chesnavich
$R_{cn}210a$	2	CH_5^+	+	$O(^3P)$	→	H_3O^+	+	$^3CH_2$			2.35×10^{-10}	[4]
$R_{cn}210b$	2	CH_5^+	+	$O(^3P)$	→	CH_2OH^+	+	H_2			4.80×10^{-12}	[4]
$R_{cn}211$	2	CH_5^+	+	H_2O	→	H_3O^+	+	CH_4			3.70×10^{-09}	[2]
$R_{cn}212$	2	CH_5^+	+	CO	→	HCO^+	+	CH_4			9.90×10^{-10}	[2]
$R_{cn}213$	2	CH_5^+	+	H_2CO	→	CH_2OH^+	+	CH_4			4.50×10^{-09}	[4]
$R_{cn}214$	2	CH_5^+	+	CO_2	→	$OCOH^+$	+	CH_4			3.25×10^{-11}	[4]
$R_{cn}215$	2	$CH_5^+CH_4$	+	N_2	→	CH_5^+	+	CH_4	+	N_2	$1.40\times10^{-08}(300/\mathrm{T})^{3.50}\mathrm{e}^{-2230.0/T}$	[28]
$R_{cn}216$	2	$CH_5^+N_2$	+	N_2	→	CH_5^+	+	N_2	+	N_2	3.00×10^{-14}	[31]
$R_{cn}217$	2	C_2H^+	+	H_2	→	$C_2H_2^+$	+	H			1.24×10^{-09}	[2]
$R_{cn}218a$	2	C_2H^+	+	CH_4	→	$C_2H_2^+$	+	CH_3			3.74×10^{-10}	[2]
$R_{cn}218b$	2	C_2H^+	+	CH_4	→	$c-C_3H_3^+$	+	H_2			3.74×10^{-10}	[2]
$R_{cn}218c$	2	C_2H^+	+	CH_4	→	$C_3H_4^+$	+	H			1.32×10^{-10}	[2]
$R_{cn}218d$	2	C_2H^+	+	CH_4	→	$C_3H_5^+$					2.20×10^{-10}	[2]
$R_{cn}219$	2	C_2H^+	+	C_2H_2	→	$C_4H_2^+$	+	H			1.85×10^{-09}	[2]
$R_{cn}220a$	2	C_2H^+	+	C_2H_4	→	$C_4H_3^+$	+	H_2			8.30×10^{-10}	[2]
$R_{cn}220b$	2	C_2H^+	+	C_2H_4	→	$C_4H_2^+$	+	H_2	+	H	1.70×10^{-10}	[2]
$R_{cn}221a$	2	C_2H^+	+	C_2H_6	→	$c-C_3H_3^+$	+	CH_4			9.10×10^{-10}	[2]
$R_{cn}221b$	2	C_2H^+	+	C_2H_6	→	$C_4H_4^+$	+	H_2	+	H	3.00×10^{-11}	[2]
$R_{cn}221c$	2	C_2H^+	+	C_2H_6	→	$C_4H_5^+$	+	H_2			6.00×10^{-11}	[2]
$R_{cn}222$	2	C_2H^+	+	C_3H_8	→	$CXHYNZ^+$					4.00×10^{-09}	[2]
$R_{cn}223$	2	C_2H^+	+	N	→	CH^+	+	CN			9.50×10^{-11}	[2]
$R_{cn}224a$	2	C_2H^+	+	NH_3	→	NH_4^+	+	C_2			1.63×10^{-09}	Su-Chesnavich
$R_{cn}224b$	2	C_2H^+	+	NH_3	→	HC_2NH^+	+	H_2			1.63×10^{-09}	Su-Chesnavich
$R_{cn}225a$	2	C_2H^+	+	HCN	→	$C_2H_2^+$	+	CN			5.40×10^{-10}	[2]
$R_{cn}225b$	2	C_2H^+	+	HCN	→	$HCNH^+$	+	C_2			9.45×10^{-10}	[2]
$R_{cn}225c$	2	C_2H^+	+	HCN	→	HC_3N^+	+	H			1.21×10^{-09}	[2]
$R_{cn}226$	2	C_2H^+	+	CH_3CN	→	$C_4H_3N^+$	+	H			3.64×10^{-09}	[16]
$R_{cn}227a$	2	C_2H^+	+	HC_3N	→	C_4H^+	+	HCN			7.60×10^{-10}	[2]
$R_{cn}227b$	2	C_2H^+	+	HC_3N	→	$C_4H_2^+$	+	CN			4.56×10^{-10}	[2]
$R_{cn}227c$	2	C_2H^+	+	HC_3N	→	HC_3NH^+	+	C_2			1.41×10^{-09}	[2]
$R_{cn}227d$	2	C_2H^+	+	HC_3N	→	HC_5N^+	+	H			1.18×10^{-09}	[2]
$R_{cn}228$	2	C_2H^+	+	C_3H_3N	→	HC_3NH^+	+	C_2H_2			4.80×10^{-09}	[10],[11]
$R_{cn}229a$	2	C_2H^+	+	$O(^3P)$	→	C^+	+	HCO			8.25×10^{-11}	[4]
$R_{cn}229b$	2	C_2H^+	+	$O(^3P)$	→	CH^+	+	CO			8.25×10^{-11}	[4]
$R_{cn}229c$	2	C_2H^+	+	$O(^3P)$	→	HCO^+	+	C			8.25×10^{-11}	[4]
$R_{cn}229d$	2	C_2H^+	+	$O(^3P)$	→	CO^+	+	CH			8.25×10^{-11}	[4]
$R_{cn}230$	2	C_2H^+	+	H_2O	→	CH_2CO^+	+	H			3.66×10^{-09}	Su-Chesnavich
$R_{cn}231$	2	C_2H^+	+	H_2CO	→	CH_2OH^+	+	C_2			4.17×10^{-09}	Su-Chesnavich
$R_{cn}232a$	2	$C_2H_2^+$	+	H_2	→	$C_2H_3^+$	+	H			1.00×10^{-11}	[2]
$R_{cn}232b$	3	$C_2H_2^+$	+	H_2	→	$C_2H_4^+$					1.00×10^{-10}	[2]
											1.30×10^{-27}	
$R_{cn}233a$	2	$C_2H_2^+$	+	CH_4	→	$C_3H_4^+$	+	H_2			1.87×10^{-10}	[2]
$R_{cn}233b$	2	$C_2H_2^+$	+	CH_4	→	$C_3H_5^+$	+	H			7.03×10^{-10}	[2]
$R_{cn}234a$	2	$C_2H_2^+$	+	C_2H_2	→	$C_4H_2^+$	+	H_2			4.48×10^{-10}	[2]
$R_{cn}234b$	2	$C_2H_2^+$	+	C_2H_2	→	$C_4H_3^+$	+	H			9.52×10^{-10}	[2]
$R_{cn}234c$	3	$C_2H_2^+$	+	C_2H_2	→	$C_4H_4^+$					1.00×10^{-10}	[2]

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	Type	Reaction										k	Ref.
												1.60×10^{-26}	
$R_{cn}235a$	2	$C_2H_2^+$	+	C_2H_4	→	$C_2H_4^+$	+	C_2H_2				4.14×10^{-10}	[2]
$R_{cn}235b$	2	$C_2H_2^+$	+	C_2H_4	→	$c-C_3H_3^+$	+	CH_3				6.49×10^{-10}	[2]
$R_{cn}235c$	2	$C_2H_2^+$	+	C_2H_4	→	$C_4H_5^+$	+	H				3.17×10^{-10}	[2]
$R_{cn}236a$	2	$C_2H_2^+$	+	C_2H_6	→	$C_2H_4^+$	+	C_2H_4				2.48×10^{-10}	[2]
$R_{cn}236b$	2	$C_2H_2^+$	+	C_2H_6	→	$C_2H_5^+$	+	C_2H_3				1.24×10^{-10}	[2]
$R_{cn}236c$	2	$C_2H_2^+$	+	C_2H_6	→	$c-C_3H_3^+$	+	CH_3	+	H_2		8.28×10^{-11}	[2]
$R_{cn}236d$	2	$C_2H_2^+$	+	C_2H_6	→	$C_3H_4^+$	+	CH_4				1.38×10^{-11}	[2]
$R_{cn}236e$	2	$C_2H_2^+$	+	C_2H_6	→	$C_3H_5^+$	+	CH_3				7.45×10^{-10}	[2]
$R_{cn}236f$	2	$C_2H_2^+$	+	C_2H_6	→	$C_4H_5^+$	+	H_2	+	H		6.90×10^{-11}	[2]
$R_{cn}236g$	2	$C_2H_2^+$	+	C_2H_6	→	$C_4H_7^+$	+	H				1.24×10^{-10}	[2]
$R_{cn}237a$	2	$C_2H_2^+$	+	CH_3CCH	→	$C_3H_4^+$	+	C_2H_2				7.50×10^{-10}	[2]
$R_{cn}237b$	2	$C_2H_2^+$	+	CH_3CCH	→	$C_3H_5^+$	+	C_2H				7.50×10^{-11}	[2]
$R_{cn}237c$	2	$C_2H_2^+$	+	CH_3CCH	→	$C_5H_5^+$	+	H				6.75×10^{-10}	[2]
$R_{cn}238$	2	$C_2H_2^+$	+	C_3H_6	→	$C_3H_6^+$	+	C_2H_2				1.30×10^{-09}	[2]
$R_{cn}239a$	2	$C_2H_2^+$	+	C_3H_8	→	$C_3H_6^+$	+	C_2H_4				2.10×10^{-10}	[2]
$R_{cn}239b$	2	$C_2H_2^+$	+	C_3H_8	→	$C_3H_7^+$	+	C_2H_3				7.00×10^{-10}	[2]
$R_{cn}239c$	2	$C_2H_2^+$	+	C_3H_8	→	$C_3H_8^+$	+	C_2H_2				4.20×10^{-10}	[2]
$R_{cn}239d$	2	$C_2H_2^+$	+	C_3H_8	→	$C_4H_7^+$	+	CH_3				7.00×10^{-11}	[2]
$R_{cn}240a$	2	$C_2H_2^+$	+	C_4H_2	→	$C_4H_2^+$	+	C_2H_2				1.53×10^{-09}	[2]
$R_{cn}240b$	2	$C_2H_2^+$	+	C_4H_2	→	$C_6H_2^+$	+	H_2				1.70×10^{-10}	[2]
$R_{cn}241a$	2	$C_2H_2^+$	+	C_6H_2	→	$C_6H_2^+$	+	C_2H_2				5.00×10^{-10}	[3]
$R_{cn}241b$	2	$C_2H_2^+$	+	C_6H_2	→	$C_8H_2^+$	+	H_2				5.00×10^{-10}	[3]
$R_{cn}241c$	2	$C_2H_2^+$	+	C_6H_2	→	$C_8H_3^+$	+	H				5.00×10^{-10}	[3]
$R_{cn}242$	2	$C_2H_2^+$	+	C_6H_6	→	$C_6H_6^+$	+	C_2H_2				1.00×10^{-09}	[32]
$R_{cn}243a$	2	$C_2H_2^+$	+	C_8H_2	→	$CXHYNZ^+$	+	H				1.00×10^{-09}	[3]
$R_{cn}243b$	2	$C_2H_2^+$	+	C_8H_2	→	$CXHYNZ^+$	+	H_2				1.00×10^{-09}	[3]
$R_{cn}244a$	2	$C_2H_2^+$	+	N	→	CH^+	+	HCN				2.50×10^{-11}	[2]
$R_{cn}244b$	2	$C_2H_2^+$	+	N	→	C_2N^+	+	H_2				7.50×10^{-11}	[2]
$R_{cn}244c$	2	$C_2H_2^+$	+	N	→	HC_2N^+	+	H				1.50×10^{-10}	[2]
$R_{cn}245a$	2	$C_2H_2^+$	+	NH_3	→	NH_3^+	+	C_2H_2				2.14×10^{-09}	[4]
$R_{cn}245b$	2	$C_2H_2^+$	+	NH_3	→	NH_4^+	+	C_2H				9.61×10^{-10}	[4]
$R_{cn}246a$	2	$C_2H_2^+$	+	HCN	→	$HCNH^+$	+	C_2H				2.38×10^{-10}	[2]
$R_{cn}246b$	2	$C_2H_2^+$	+	HCN	→	HC_3NH^+	+	H				1.22×10^{-10}	[2]
$R_{cn}247a$	2	$C_2H_2^+$	+	CH_3NH_2	→	$CH_3NH_3^+$	+	C_2H				1.30×10^{-09}	[4]
$R_{cn}247b$	2	$C_2H_2^+$	+	CH_3NH_2	→	$CH_3NH_2^+$	+	C_2H_2				7.56×10^{-10}	[4]
$R_{cn}247c$	2	$C_2H_2^+$	+	CH_3NH_2	→	$CH_2NH_2^+$	+	C_2H_3				6.48×10^{-10}	[4]
$R_{cn}248a$	2	$C_2H_2^+$	+	CH_3CN	→	$C_2H_3NH^+$	+	C_2H				8.36×10^{-10}	[2]
$R_{cn}248b$	2	$C_2H_2^+$	+	CH_3CN	→	$C_3H_5^+$	+	CN				1.06×10^{-09}	[2]
$R_{cn}248c$	2	$C_2H_2^+$	+	CH_3CN	→	$C_3H_4^+$	+	HCN				1.06×10^{-09}	[2]
$R_{cn}248d$	2	$C_2H_2^+$	+	CH_3CN	→	$C_4H_5N^+$	+	hv				8.74×10^{-10}	[2]
$R_{cn}249a$	2	$C_2H_2^+$	+	HC_3N	→	$C_4H_2^+$	+	HCN				3.70×10^{-10}	[2]
$R_{cn}249b$	3	$C_2H_2^+$	+	HC_3N	→	$C_5H_3N^+$						1.00×10^{-10}	[2]
												2.30×10^{-26}	
$R_{cn}250a$	2	$C_2H_2^+$	+	C_3H_3N	→	$c-C_3H_3^+$	+	CH_2CN				6.45×10^{-10}	[10],[11]
$R_{cn}250b$	2	$C_2H_2^+$	+	C_3H_3N	→	$C_3H_3N^+$	+	C_2H_2				2.36×10^{-09}	[10],[11]
$R_{cn}250c$	2	$C_2H_2^+$	+	C_3H_3N	→	$C_3H_3NH^+$	+	C_2H				6.45×10^{-10}	[10],[11]
$R_{cn}250d$	2	$C_2H_2^+$	+	C_3H_3N	→	$C_5H_5N^+$	+	hv				6.45×10^{-10}	[10],[11]
$R_{cn}251$	2	$C_2H_2^+$	+	C_3H_5N	→	$C_3H_5^+$	+	CH_2CN				4.20×10^{-09}	[33]
$R_{cn}252a$	2	$C_2H_2^+$	+	$O(^3P)$	→	HCO^+	+	CH				1.00×10^{-10}	[19]

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	Type	Reaction							k	Ref.
$R_{cn}252b$	2	$C_2H_2^+$	+	$O(^3P)$	→	HC_2O^+	+	H	1.00×10^{-10}	[19]
$R_{cn}253$	2	$C_2H_2^+$	+	H_2O	→	H_3O^+	+	C_2H	2.20×10^{-10}	[2]
$R_{cn}254$	2	$C_2H_2^+$	+	CO	→	$C_2H_2CO^+$	+	hv	2.30×10^{-14}	[2]
$R_{cn}255$	2	$C_2H_2^+$	+	H_2CO	→	CH_2O^+	+	C_2H_2	4.13×10^{-09}	Su-Chesnavich
$R_{cn}256$	2	$C_2H_3^+$	+	H	→	$C_2H_2^+$	+	H_2	6.80×10^{-11}	[2]
$R_{cn}257$	3	$C_2H_3^+$	+	H_2	→	$C_2H_5^+$			1.00×10^{-10}	[2]
									2.00×10^{-29}	
$R_{cn}258a$	2	$C_2H_3^+$	+	CH_4	→	$C_3H_5^+$	+	H_2	1.90×10^{-10}	[2]
$R_{cn}258b$	3	$C_2H_3^+$	+	CH_4	→	$C_3H_7^+$			1.00×10^{-10}	[2]
									3.00×10^{-28}	
$R_{cn}259a$	2	$C_2H_3^+$	+	C_2H_2	→	$C_4H_3^+$	+	H_2	2.40×10^{-10}	[2]
$R_{cn}259b$	3	$C_2H_3^+$	+	C_2H_2	→	$C_4H_5^+$			1.00×10^{-10}	[2]
									2.98×10^{-25}	
$R_{cn}260a$	2	$C_2H_3^+$	+	C_2H_4	→	$C_2H_5^+$	+	C_2H_2	8.20×10^{-10}	[2]
$R_{cn}260b$	3	$C_2H_3^+$	+	C_2H_4	→	$C_4H_7^+$			1.00×10^{-10}	[2]
									9.00×10^{-27}	
$R_{cn}261a$	2	$C_2H_3^+$	+	C_2H_6	→	$C_2H_5^+$	+	C_2H_4	2.91×10^{-10}	[2]
$R_{cn}261b$	2	$C_2H_3^+$	+	C_2H_6	→	$C_3H_5^+$	+	CH_4	2.48×10^{-10}	[2]
$R_{cn}261c$	2	$C_2H_3^+$	+	C_2H_6	→	$C_4H_7^+$	+	H_2	8.06×10^{-11}	[2]
$R_{cn}262$	2	$C_2H_3^+$	+	CH_3CCH	→	$C_3H_5^+$	+	C_2H_2	1.50×10^{-09}	[2]
$R_{cn}263$	2	$C_2H_3^+$	+	C_3H_6	→	$C_4H_5^+$	+	CH_4	8.70×10^{-10}	[2]
$R_{cn}264a$	2	$C_2H_3^+$	+	C_3H_8	→	$C_3H_7^+$	+	C_2H_4	9.50×10^{-10}	[2]
$R_{cn}264b$	2	$C_2H_3^+$	+	C_3H_8	→	$C_4H_7^+$	+	CH_4	5.00×10^{-11}	[2]
$R_{cn}265a$	2	$C_2H_3^+$	+	C_4H_2	→	$C_4H_3^+$	+	C_2H_2	3.00×10^{-10}	[3]
$R_{cn}265b$	2	$C_2H_3^+$	+	C_4H_2	→	$C_6H_3^+$	+	H_2	3.00×10^{-10}	[3]
$R_{cn}265c$	2	$C_2H_3^+$	+	C_4H_2	→	$C_6H_4^+$	+	H	3.00×10^{-10}	[3]
$R_{cn}266a$	2	$C_2H_3^+$	+	C_6H_2	→	$C_6H_3^+$	+	C_2H_2	3.00×10^{-10}	[3]
$R_{cn}266b$	2	$C_2H_3^+$	+	C_6H_2	→	$C_8H_3^+$	+	H_2	3.00×10^{-10}	[3]
$R_{cn}266c$	2	$C_2H_3^+$	+	C_6H_2	→	$CXHYNZ^+$	+	H	3.00×10^{-10}	[3]
$R_{cn}267$	2	$C_2H_3^+$	+	C_6H_6	→	$C_6H_7^+$	+	C_2H_2	1.60×10^{-09}	[29]
$R_{cn}268a$	2	$C_2H_3^+$	+	N	→	HC_2N^+	+	H_2	1.98×10^{-11}	[2]
$R_{cn}268b$	2	$C_2H_3^+$	+	N	→	HC_2NH^+	+	H	2.20×10^{-12}	[2]
$R_{cn}269$	2	$C_2H_3^+$	+	NH_3	→	NH_4^+	+	C_2H_2	2.48×10^{-09}	[4]
$R_{cn}270$	2	$C_2H_3^+$	+	HCN	→	$HCNH^+$	+	C_2H_2	2.30×10^{-09}	[2]
$R_{cn}271$	2	$C_2H_3^+$	+	HC_3N	→	HC_3NH^+	+	C_2H_2	3.80×10^{-09}	[2]
$R_{cn}272a$	2	$C_2H_3^+$	+	C_3H_3N	→	$C_3H_3NH^+$	+	C_2H_2	3.52×10^{-09}	[10],[11]
$R_{cn}272b$	2	$C_2H_3^+$	+	C_3H_3N	→	$C_5H_5NH^+$	+	hv	8.80×10^{-10}	[10],[11]
$R_{cn}273$	2	$C_2H_3^+$	+	C_3H_5N	→	$C_3H_5NH^+$	+	C_2H_2	1.60×10^{-09}	[16]
$R_{cn}274a$	2	$C_2H_3^+$	+	C_2N_2	→	$C_2N_2H^+$	+	C_2H_2	5.50×10^{-10}	[2]
$R_{cn}274b$	3	$C_2H_3^+$	+	C_2N_2	→	$AdductN^+$			1.00×10^{-10}	[2]
									1.30×10^{-26}	
$R_{cn}275a$	2	$C_2H_3^+$	+	$O(^3P)$	→	CH_3^+	+	CO	5.00×10^{-12}	[19]
$R_{cn}275b$	2	$C_2H_3^+$	+	$O(^3P)$	→	CH_2CO^+	+	H	8.50×10^{-11}	[19]
$R_{cn}275c$	2	$C_2H_3^+$	+	$O(^3P)$	→	CH_3CO^+	+	hv	1.00×10^{-11}	[19]
$R_{cn}276$	2	$C_2H_3^+$	+	H_2O	→	H_3O^+	+	C_2H_2	1.11×10^{-09}	[2]
$R_{cn}277$	2	$C_2H_3^+$	+	CO	→	$C_2H_3CO^+$			5.00×10^{-10}	[2]
$R_{cn}278$	2	$C_2H_4^+$	+	H	→	$C_2H_3^+$	+	H_2	3.00×10^{-10}	[2]
$R_{cn}279$	2	$C_2H_4^+$	+	CH_3	→	CH_3^+	+	C_2H_4	1.00×10^{-09}	[8]
$R_{cn}280$	3	$C_2H_4^+$	+	CH_4	→	$Adduct^+$			1.00×10^{-10}	[8]
									1.00×10^{-29}	

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	Type	Reaction									k	Ref.
$R_{cn}281a$	2	$C_2H_4^+$	+	C_2H_2	→	$c-C_3H_3^+$	+	CH_3			6.47×10^{-10}	[2]
$R_{cn}281b$	2	$C_2H_4^+$	+	C_2H_2	→	$C_4H_5^+$	+	H			1.93×10^{-10}	[2]
$R_{cn}281c$	3	$C_2H_4^+$	+	C_2H_2	→	$C_4H_6^+$					1.00×10^{-10}	[2]
											3.10×10^{-27}	
$R_{cn}282a$	2	$C_2H_4^+$	+	C_2H_4	→	$C_3H_4^+$	+	CH_4			4.74×10^{-11}	[2]
$R_{cn}282b$	2	$C_2H_4^+$	+	C_2H_4	→	$C_3H_5^+$	+	CH_3			7.03×10^{-10}	[2]
$R_{cn}282c$	2	$C_2H_4^+$	+	C_2H_4	→	$C_4H_7^+$	+	H			4.74×10^{-11}	[2]
$R_{cn}282d$	3	$C_2H_4^+$	+	C_2H_4	→	$C_4H_8^+$					1.00×10^{-10}	[2]
											6.30×10^{-26}	
$R_{cn}283a$	2	$C_2H_4^+$	+	C_2H_6	→	$C_3H_6^+$	+	CH_4			3.60×10^{-13}	[2]
$R_{cn}283b$	2	$C_2H_4^+$	+	C_2H_6	→	$C_3H_7^+$	+	CH_3			4.79×10^{-12}	[2]
$R_{cn}284a$	2	$C_2H_4^+$	+	CH_3CCH	→	$C_3H_4^+$	+	C_2H_4			2.20×10^{-10}	[2]
$R_{cn}284b$	2	$C_2H_4^+$	+	CH_3CCH	→	$C_4H_5^+$	+	CH_3			3.30×10^{-10}	[2]
$R_{cn}284c$	2	$C_2H_4^+$	+	CH_3CCH	→	$C_5H_7^+$	+	H			5.50×10^{-10}	[2]
$R_{cn}285a$	2	$C_2H_4^+$	+	C_3H_6	→	$C_3H_6^+$	+	C_2H_4			1.17×10^{-10}	[2]
$R_{cn}285b$	2	$C_2H_4^+$	+	C_3H_6	→	$C_4H_7^+$	+	C_2H_3			1.30×10^{-11}	[2]
$R_{cn}286a$	2	$C_2H_4^+$	+	C_3H_8	→	$C_3H_6^+$	+	C_2H_6			6.60×10^{-10}	[2]
$R_{cn}286b$	2	$C_2H_4^+$	+	C_3H_8	→	$C_3H_7^+$	+	C_2H_5			5.40×10^{-10}	[2]
$R_{cn}287a$	2	$C_2H_4^+$	+	C_4H_2	→	$C_5H_3^+$	+	CH_3			5.00×10^{-10}	[3]
$R_{cn}287b$	2	$C_2H_4^+$	+	C_4H_2	→	$C_6H_4^+$	+	H_2			5.00×10^{-10}	[3]
$R_{cn}287c$	3	$C_2H_4^+$	+	C_4H_2	→	$C_6H_6^+$					1.00×10^{-10}	[2]
											6.80×10^{-26}	
$R_{cn}288a$	2	$C_2H_4^+$	+	C_6H_2	→	$C_7H_3^+$	+	CH_3			5.00×10^{-10}	[3]
$R_{cn}288b$	2	$C_2H_4^+$	+	C_6H_2	→	$CXHYNZ^+$	+	H_2			5.00×10^{-10}	[3]
$R_{cn}289$	2	$C_2H_4^+$	+	N	→	$C_2H_3N^+$	+	H			3.00×10^{-10}	[2]
$R_{cn}290a$	2	$C_2H_4^+$	+	NH_3	→	NH_3^+	+	C_2H_4			1.24×10^{-10}	[4]
$R_{cn}290b$	2	$C_2H_4^+$	+	NH_3	→	NH_4^+	+	C_2H_3			1.94×10^{-09}	[4]
$R_{cn}291$	3	$C_2H_4^+$	+	HCN	→	$C_3H_5N^+$					1.00×10^{-10}	[2]
											1.90×10^{-27}	
$R_{cn}292$	2	$C_2H_4^+$	+	CH_3NH_2	→	$CH_3NH_3^+$	+	C_2H_3			6.46×10^{-10}	[34]
$R_{cn}293$	2	$C_2H_4^+$	+	CH_3CN	→	$C_2H_3NH^+$	+	C_2H_3			2.85×10^{-09}	[34]
$R_{cn}294a$	2	$C_2H_4^+$	+	HC_3N	→	HC_3NH^+	+	C_2H_3			1.27×10^{-09}	[2]
$R_{cn}294b$	2	$C_2H_4^+$	+	HC_3N	→	$C_5H_3NH^+$	+	H			2.25×10^{-10}	[2]
$R_{cn}295$	2	$C_2H_4^+$	+	C_3H_5N	→	$C_3H_5NH^+$	+	C_2H_3			4.50×10^{-09}	[33]
$R_{cn}296a$	2	$C_2H_4^+$	+	$O(^3P)$	→	CH_3^+	+	HCO			1.08×10^{-10}	[19]
$R_{cn}296b$	2	$C_2H_4^+$	+	$O(^3P)$	→	HCO^+	+	CH_3			8.40×10^{-11}	[19]
$R_{cn}296c$	2	$C_2H_4^+$	+	$O(^3P)$	→	CH_2O^+	+	H_2	+	H	2.40×10^{-11}	[19]
$R_{cn}296d$	2	$C_2H_4^+$	+	$O(^3P)$	→	CH_2CO^+	+	H_2			1.20×10^{-11}	[19]
$R_{cn}296e$	2	$C_2H_4^+$	+	$O(^3P)$	→	CH_3CO^+	+	H			1.20×10^{-11}	[19]
$R_{cn}297$	2	$C_2H_5^+$	+	H	→	$C_2H_4^+$	+	H_2			1.00×10^{-11}	[2]
$R_{cn}298$	3	$C_2H_5^+$	+	H_2	→	$C_2H_7^+$					1.00×10^{-10}	[2]
											1.00×10^{-30}	
$R_{cn}299$	2	$C_2H_5^+$	+	CH_3	→	$C_2H_4^+$	+	CH_4			5.00×10^{-10}	[8]
$R_{cn}300a$	2	$C_2H_5^+$	+	CH_4	→	$C_3H_7^+$	+	H_2			9.00×10^{-14}	[2]
$R_{cn}300b$	3	$C_2H_5^+$	+	CH_4	→	$C_2H_5^+CH_4$					1.00×10^{-10}	[28]
											$1.40\times10^{-30}(300/T)^{3.70}$	
$R_{cn}301a$	2	$C_2H_5^+$	+	C_2H_2	→	$c-C_3H_3^+$	+	CH_4			6.84×10^{-11}	[2]
$R_{cn}301b$	2	$C_2H_5^+$	+	C_2H_2	→	$C_4H_5^+$	+	H_2			1.22×10^{-10}	[2]
$R_{cn}301c$	3	$C_2H_5^+$	+	C_2H_2	→	$C_4H_7^+$					1.00×10^{-10}	[2]
											2.50×10^{-24}	

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	Type	Reaction									k	Ref.
$R_{cn}302a$	2	$C_2H_5^+$	+	C_2H_4	→	$C_3H_5^+$	+	CH_4			3.55×10^{-10}	[2]
$R_{cn}302b$	3	$C_2H_5^+$	+	C_2H_4	→	$C_4H_9^+$					1.00×10^{-10}	[2]
											1.34×10^{-25}	
$R_{cn}303a$	2	$C_2H_5^+$	+	C_2H_6	→	$C_3H_7^+$	+	CH_4			5.46×10^{-12}	[2]
$R_{cn}303b$	2	$C_2H_5^+$	+	C_2H_6	→	$C_4H_9^+$	+	H_2			3.35×10^{-11}	[2]
$R_{cn}304a$	2	$C_2H_5^+$	+	CH_3CCH	→	$C_3H_5^+$	+	C_2H_4			1.26×10^{-09}	[2]
$R_{cn}304b$	2	$C_2H_5^+$	+	CH_3CCH	→	$C_4H_5^+$	+	CH_4			1.40×10^{-10}	[2]
$R_{cn}305$	2	$C_2H_5^+$	+	CH_2CCH_2	→	$C_3H_5^+$	+	C_2H_4			1.40×10^{-09}	Langevin
$R_{cn}306$	2	$C_2H_5^+$	+	C_3H_6	→	$C_3H_7^+$	+	C_2H_4			1.60×10^{-09}	Su-Chesnavich
$R_{cn}307$	2	$C_2H_5^+$	+	C_3H_8	→	$C_3H_7^+$	+	C_2H_6			6.30×10^{-10}	[2]
$R_{cn}308$	2	$C_2H_5^+$	+	C_4H_2	→	$C_4H_3^+$	+	C_2H_4			1.50×10^{-09}	Langevin
$R_{cn}309$	2	$C_2H_5^+$	+	C_5H_4	→	$C_5H_5^+$	+	C_2H_4			2.50×10^{-09}	Su-Chesnavich
$R_{cn}310$	2	$C_2H_5^+$	+	C_6H_2	→	$C_6H_3^+$	+	C_2H_4			1.80×10^{-09}	Langevin
$R_{cn}311$	2	$C_2H_5^+$	+	C_6H_6	→	$C_6H_7^+$	+	C_2H_4			2.90×10^{-10}	[35]
$R_{cn}312$	2	$C_2H_5^+$	+	C_7H_4	→	$C_7H_5^+$	+	C_2H_4			2.90×10^{-09}	Su-Chesnavich
$R_{cn}313$	2	$C_2H_5^+$	+	C_7H_8	→	$C_7H_9^+$	+	C_2H_4			1.90×10^{-09}	Su-Chesnavich
$R_{cn}314$	2	$C_2H_5^+$	+	C_8H_2	→	$C_8H_3^+$	+	C_2H_4			2.10×10^{-09}	Langevin
$R_{cn}315$	2	$C_2H_5^+$	+	NH_3	→	NH_4^+	+	C_2H_4			2.09×10^{-09}	[4]
$R_{cn}316$	2	$C_2H_5^+$	+	HCN	→	$HCNH^+$	+	C_2H_4			2.70×10^{-09}	[2]
$R_{cn}317$	2	$C_2H_5^+$	+	HNC	→	$HCNH^+$	+	C_2H_4			5.20×10^{-09}	Su-Chesnavich
$R_{cn}318a$	2	$C_2H_5^+$	+	CH_2NH	→	$CH_2NH_2^+$	+	C_2H_4			2.57×10^{-09}	[33]
$R_{cn}318b$	2	$C_2H_5^+$	+	CH_2NH	→	$C_3H_7NH^+$	+	hv			1.35×10^{-10}	[33]
$R_{cn}319a$	2	$C_2H_5^+$	+	CH_3NH_2	→	$CH_3NH_3^+$	+	C_2H_4			1.52×10^{-09}	[33]
$R_{cn}319b$	2	$C_2H_5^+$	+	CH_3NH_2	→	$C_3H_9NH^+$	+	hv			3.80×10^{-10}	[33]
$R_{cn}320$	2	$C_2H_5^+$	+	CH_3CN	→	$C_2H_3NH^+$	+	C_2H_4			3.80×10^{-09}	[2]
$R_{cn}321$	2	$C_2H_5^+$	+	HC_3N	→	HC_3NH^+	+	C_2H_4			3.55×10^{-09}	[2]
$R_{cn}322$	2	$C_2H_5^+$	+	C_3H_3N	→	$C_3H_3NH^+$	+	C_2H_4			5.80×10^{-09}	Su-Chesnavich
$R_{cn}323$	2	$C_2H_5^+$	+	C_3H_5N	→	$C_3H_5NH^+$	+	C_2H_4			6.00×10^{-09}	Su-Chesnavich
$R_{cn}324$	2	$C_2H_5^+$	+	C_4H_3N	→	$C_4H_3NH^+$	+	C_2H_4			6.70×10^{-09}	Su-Chesnavich
$R_{cn}325$	2	$C_2H_5^+$	+	C_4H_5N	→	$C_4H_5NH^+$	+	C_2H_4			5.40×10^{-09}	Su-Chesnavich
$R_{cn}326$	2	$C_2H_5^+$	+	HC_5N	→	HC_5NH^+	+	C_2H_4			4.70×10^{-09}	[12]
$R_{cn}327$	2	$C_2H_5^+$	+	C_5H_5N	→	$C_5H_5NH^+$	+	C_2H_4			3.60×10^{-09}	Su-Chesnavich
$R_{cn}328$	2	$C_2H_5^+$	+	C_6H_3N	→	$C_6H_3NH^+$	+	C_2H_4			8.10×10^{-09}	Su-Chesnavich
$R_{cn}329$	2	$C_2H_5^+$	+	C_6H_7N	→	$C_6H_7NH^+$	+	C_2H_4			2.40×10^{-09}	Su-Chesnavich
$R_{cn}330$	3	$C_2H_5^+$	+	N_2	→	$C_2H_5^+N_2$					1.00×10^{-10}	[31]
											1.00×10^{-27}	
$R_{cn}331$	2	$C_2H_5^+$	+	N_2H_4	→	$N_2H_5^+$	+	C_2H_4			1.20×10^{-09}	Su-Chesnavich
$R_{cn}332a$	2	$C_2H_5^+$	+	C_2N_2	→	$C_2N_2H^+$	+	C_2H_4			8.00×10^{-11}	[2]
$R_{cn}332b$	3	$C_2H_5^+$	+	C_2N_2	→	$AdductN^+$					1.00×10^{-10}	[2]
											2.00×10^{-24}	
$R_{cn}333$	2	$C_2H_5^+$	+	H_2O	→	H_3O^+	+	C_2H_4			1.86×10^{-09}	[2]
$R_{cn}334$	2	$C_2H_5^+$	+	H_2CO	→	CH_2OH^+	+	C_2H_4			3.10×10^{-09}	[4]
$R_{cn}335$	3	$C_2H_5^+$	+	CO_2	→	$Adduct^+$					1.00×10^{-10}	[36]
											1.00×10^{-25}	
$R_{cn}336$	2	$C_2H_5^+CH_4$	+	N_2	→	$C_2H_5^+$	+	CH_4	+	N_2	$1.00\times10^{-09}(300/\mathrm{T})^{3.70}\mathrm{e}^{-1650.0/T}$	[28]
$R_{cn}337$	2	$C_2H_5^+N_2$	+	N_2	→	$C_2H_5^+$	+	N_2	+	N_2	4.00×10^{-14}	[31]
$R_{cn}338$	2	$C_2H_6^+$	+	H	→	$C_2H_5^+$	+	H_2			1.00×10^{-10}	[2]
$R_{cn}339$	2	$C_2H_6^+$	+	CH_3	→	CH_3^+	+	C_2H_6			1.00×10^{-09}	[8]
$R_{cn}340$	3	$C_2H_6^+$	+	CH_4	→	$Adduct^+$					1.00×10^{-10}	[8]
											1.00×10^{-29}	

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	Type	Reaction										k	Ref.
$R_{cn}341a$	2	$C_2H_6^+$	+	C_2H_2	→	$C_2H_5^+$	+	C_2H_3				2.47×10^{-10}	[2]
$R_{cn}341b$	2	$C_2H_6^+$	+	C_2H_2	→	$C_3H_5^+$	+	CH_3				9.10×10^{-10}	[2]
$R_{cn}341c$	2	$C_2H_6^+$	+	C_2H_2	→	$C_4H_7^+$	+	H				1.43×10^{-10}	[2]
$R_{cn}342$	2	$C_2H_6^+$	+	C_2H_4	→	$C_2H_4^+$	+	C_2H_6				1.15×10^{-09}	[2]
$R_{cn}343a$	2	$C_2H_6^+$	+	C_2H_6	→	$C_3H_8^+$	+	CH_4				7.98×10^{-12}	[2]
$R_{cn}343b$	2	$C_2H_6^+$	+	C_2H_6	→	$C_3H_9^+$	+	CH_3				1.10×10^{-11}	[2]
$R_{cn}344a$	2	$C_2H_6^+$	+	NH_3	→	NH_3^+	+	C_2H_6				6.24×10^{-10}	[37]
$R_{cn}344b$	2	$C_2H_6^+$	+	NH_3	→	NH_4^+	+	C_2H_5				1.61×10^{-09}	[37]
$R_{cn}345a$	2	$C_2H_6^+$	+	HCN	→	$HCNH^+$	+	C_2H_5				1.14×10^{-09}	[2]
$R_{cn}345b$	2	$C_2H_6^+$	+	HCN	→	$C_3H_5NH^+$	+	H				6.00×10^{-11}	[2]
$R_{cn}346$	2	$C_2H_6^+$	+	H_2O	→	H_3O^+	+	C_2H_5				2.95×10^{-09}	[2]
$R_{cn}347$	2	$C_2H_7^+$	+	H	→	$C_2H_6^+$	+	H_2				1.00×10^{-10}	[8]
$R_{cn}348$	2	$C_2H_7^+$	+	CH_3	→	$C_2H_6^+$	+	CH_4				5.00×10^{-10}	[8]
$R_{cn}349$	3	$C_2H_7^+$	+	CH_4	→	$C_2H_7^+CH_4$						1.00×10^{-10}	[38]
												1.00×10^{-29}	
$R_{cn}350$	2	$C_2H_7^+$	+	NH_2	→	$C_2H_6^+$	+	NH_3				1.00×10^{-10}	[39]
$R_{cn}351$	2	$C_2H_7^+$	+	NH_3	→	NH_4^+	+	C_2H_6				1.80×10^{-09}	[40]
$R_{cn}352a$	2	$C_2H_7^+$	+	HCN	→	$HCNH^+$	+	C_2H_6				1.98×10^{-09}	[41]
$R_{cn}352b$	2	$C_2H_7^+$	+	HCN	→	$C_2H_3NH^+$	+	CH_4				2.20×10^{-10}	[41]
$R_{cn}353$	2	$C_2H_7^+CH_4$	+	N_2	→	$C_2H_7^+$	+	CH_4	+	N_2		9.00×10^{-11}	[31]
$R_{cn}354a$	2	C_3H^+	+	H_2	→	$C_3H_2^+$	+	H				$1.40\times10^{-11}(300/T)^{1.05}$	[42]
$R_{cn}354b$	2	C_3H^+	+	H_2	→	$c-C_3H_3^+$	+	hv				$1.15\times10^{-11}(300/T)^{1.10}$	[42]
$R_{cn}354c$	2	C_3H^+	+	H_2	→	$l-C_3H_3^+$	+	hv				$1.15\times10^{-11}(300/T)^{1.10}$	[42]
$R_{cn}354d$	3	C_3H^+	+	H_2	→	$c-C_3H_3^+$						1.00×10^{-10}	[2]
												2.30×10^{-27}	
$R_{cn}355a$	2	C_3H^+	+	CH_4	→	$C_2H_3^+$	+	C_2H_2				7.83×10^{-10}	[2]
$R_{cn}355b$	2	C_3H^+	+	CH_4	→	$C_4H_3^+$	+	H_2				8.70×10^{-11}	[2]
$R_{cn}355c$	3	C_3H^+	+	CH_4	→	$C_4H_5^+$						1.00×10^{-10}	[2]
												3.70×10^{-26}	
$R_{cn}356$	2	C_3H^+	+	C_2H_2	→	$C_5H_2^+$	+	H				8.40×10^{-10}	[2]
$R_{cn}357a$	2	C_3H^+	+	C_2H_4	→	$c-C_3H_3^+$	+	C_2H_2				9.02×10^{-10}	[2]
$R_{cn}357b$	2	C_3H^+	+	C_2H_4	→	$C_5H_3^+$	+	H_2				4.75×10^{-11}	[2]
$R_{cn}357c$	3	C_3H^+	+	C_2H_4	→	$C_5H_5^+$						1.00×10^{-10}	[2]
												6.80×10^{-26}	
$R_{cn}358$	2	C_3H^+	+	CH_3CCH	→	$C_4H_3^+$	+	C_2H_2				1.40×10^{-09}	[2]
$R_{cn}359$	2	C_3H^+	+	CH_2CCH_2	→	$C_4H_3^+$	+	C_2H_2				1.40×10^{-09}	[4]
$R_{cn}360a$	2	C_3H^+	+	C_3H_6	→	$C_4H_4^+$	+	C_2H_3				1.20×10^{-10}	[2]
$R_{cn}360b$	2	C_3H^+	+	C_3H_6	→	$C_4H_3^+$	+	C_2H_4				8.80×10^{-10}	[2]
$R_{cn}361$	2	C_3H^+	+	C_3H_8	→	$CXHYNZ^+$						1.60×10^{-09}	[2]
$R_{cn}362a$	2	C_3H^+	+	C_4H_2	→	$C_5H_2^+$	+	C_2H				1.02×10^{-09}	[2]
$R_{cn}362b$	2	C_3H^+	+	C_4H_2	→	C_5H^+	+	C_2H_2				1.20×10^{-10}	[2]
$R_{cn}362c$	2	C_3H^+	+	C_4H_2	→	$C_4H_2^+$	+	C_3H				6.00×10^{-11}	[2]
$R_{cn}363a$	2	C_3H^+	+	N	→	C_3N^+	+	H				2.43×10^{-10}	[2]
$R_{cn}363b$	2	C_3H^+	+	N	→	HC_3N^+						2.70×10^{-11}	[2]
$R_{cn}364a$	2	C_3H^+	+	NH_3	→	NH_3^+	+	C_3H				3.30×10^{-10}	[18]
$R_{cn}364b$	2	C_3H^+	+	NH_3	→	NH_4^+	+	C_3				7.43×10^{-10}	[18]
$R_{cn}364c$	2	C_3H^+	+	NH_3	→	$HCNH^+$	+	C_2H_2				4.13×10^{-10}	[18]
$R_{cn}364d$	2	C_3H^+	+	NH_3	→	$C_3H_3N^+$	+	H				1.65×10^{-10}	[18]
$R_{cn}365a$	2	C_3H^+	+	HCN	→	$HCNH^+$	+	C_3				3.60×10^{-12}	[2]
$R_{cn}365b$	2	C_3H^+	+	HCN	→	HC_4NH^+	+	hv				3.64×10^{-11}	[2]

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	Type	Reaction								k	Ref.
$R_{cn}365c$	3	C_3H^+	+	HCN	→	HC_4NH^+				1.00×10^{-10} 8.80×10^{-26}	[2]
$R_{cn}366a$	2	C_3H^+	+	CH_3CN	→	$C_2H_3^+$	+	HC_3N		6.00×10^{-10}	[2]
$R_{cn}366b$	2	C_3H^+	+	CH_3CN	→	$C_2H_3NH^+$	+	C_3		4.50×10^{-10}	[2]
$R_{cn}366c$	2	C_3H^+	+	CH_3CN	→	HC_3NH^+	+	C_2H_2		9.90×10^{-10}	[2]
$R_{cn}366d$	2	C_3H^+	+	CH_3CN	→	$C_5H_3NH^+$				9.00×10^{-10}	[2]
$R_{cn}367$	2	C_3H^+	+	HC_3N	→	HC_6NH^+	+	hv		1.25×10^{-09}	[2]
$R_{cn}368$	2	C_3H^+	+	C_3H_3N	→	$C_6H_3NH^+$	+	hv		4.50×10^{-09}	[10],[11]
$R_{cn}369$	2	C_3H^+	+	C_2N_2	→	$HC_5N_2^+$	+	hv		4.40×10^{-10}	[2]
$R_{cn}370a$	2	C_3H^+	+	H_2O	→	HCO^+	+	C_2H_2		4.50×10^{-10}	[2]
$R_{cn}370b$	2	C_3H^+	+	H_2O	→	$C_2H_3^+$	+	CO		4.50×10^{-10}	[2]
$R_{cn}371$	3	C_3H^+	+	CO	→	$Adduct^+$				1.00×10^{-10} 2.90×10^{-27}	[2]
$R_{cn}372a$	2	C_3H^+	+	H_2CO	→	$c-C_3H_3^+$	+	CO		5.00×10^{-10}	[43]
$R_{cn}372b$	2	C_3H^+	+	H_2CO	→	$l-C_3H_3^+$	+	CO		5.00×10^{-10}	[43]
$R_{cn}373$	2	$C_3H_2^+$	+	CH_4	→	$c-C_3H_3^+$	+	CH_3		5.50×10^{-10}	[2]
$R_{cn}374$	2	$C_3H_2^+$	+	C_2H_2	→	$C_5H_3^+$	+	H		9.00×10^{-10}	[2]
$R_{cn}375a$	2	$C_3H_2^+$	+	C_2H_4	→	$c-C_3H_3^+$	+	C_2H_3		2.75×10^{-10}	[2]
$R_{cn}375b$	2	$C_3H_2^+$	+	C_2H_4	→	$C_3H_4^+$	+	C_2H_2		6.60×10^{-10}	[2]
$R_{cn}375c$	2	$C_3H_2^+$	+	C_2H_4	→	$C_5H_5^+$	+	H		2.75×10^{-10}	[2]
$R_{cn}376a$	2	$C_3H_2^+$	+	CH_3CCH	→	$C_4H_2^+$	+	C_2H_4		1.17×10^{-10}	[2]
$R_{cn}376b$	2	$C_3H_2^+$	+	CH_3CCH	→	$C_4H_3^+$	+	C_2H_3		1.56×10^{-10}	[2]
$R_{cn}376c$	2	$C_3H_2^+$	+	CH_3CCH	→	$C_4H_4^+$	+	C_2H_2		5.33×10^{-10}	[2]
$R_{cn}376d$	2	$C_3H_2^+$	+	CH_3CCH	→	$C_5H_3^+$	+	CH_3		2.34×10^{-10}	[2]
$R_{cn}376e$	2	$C_3H_2^+$	+	CH_3CCH	→	$C_6H_5^+$	+	H		2.60×10^{-10}	[2]
$R_{cn}377a$	2	$C_3H_2^+$	+	CH_2CCH_2	→	$C_4H_2^+$	+	C_2H_4		5.60×10^{-11}	[4]
$R_{cn}377b$	2	$C_3H_2^+$	+	CH_2CCH_2	→	$C_4H_3^+$	+	C_2H_3		1.96×10^{-10}	[4]
$R_{cn}377c$	2	$C_3H_2^+$	+	CH_2CCH_2	→	$C_4H_4^+$	+	C_2H_2		7.00×10^{-10}	[4]
$R_{cn}377d$	2	$C_3H_2^+$	+	CH_2CCH_2	→	$C_5H_3^+$	+	CH_3		1.26×10^{-10}	[4]
$R_{cn}377e$	2	$C_3H_2^+$	+	CH_2CCH_2	→	$C_6H_5^+$	+	H		2.94×10^{-10}	[4]
$R_{cn}378a$	2	$C_3H_2^+$	+	C_3H_6	→	$c-C_3H_3^+$	+	C_3H_5		1.50×10^{-10}	[2]
$R_{cn}378b$	2	$C_3H_2^+$	+	C_3H_6	→	$C_4H_4^+$	+	C_2H_4		1.50×10^{-10}	[2]
$R_{cn}378c$	2	$C_3H_2^+$	+	C_3H_6	→	$C_5H_5^+$	+	CH_3		2.50×10^{-10}	[2]
$R_{cn}378d$	2	$C_3H_2^+$	+	C_3H_6	→	$C_6H_7^+$	+	H		4.50×10^{-10}	[2]
$R_{cn}379a$	2	$C_3H_2^+$	+	C_3H_8	→	$c-C_3H_3^+$	+	C_3H_7		3.60×10^{-10}	[2]
$R_{cn}379b$	2	$C_3H_2^+$	+	C_3H_8	→	$C_3H_7^+$	+	C_3H_3		5.40×10^{-10}	[2]
$R_{cn}379c$	2	$C_3H_2^+$	+	C_3H_8	→	$C_4H_6^+$	+	C_2H_4		1.20×10^{-10}	[2]
$R_{cn}379d$	2	$C_3H_2^+$	+	C_3H_8	→	$C_4H_8^+$	+	C_2H_2		6.00×10^{-11}	[2]
$R_{cn}379e$	2	$C_3H_2^+$	+	C_3H_8	→	$C_5H_7^+$	+	CH_3		1.20×10^{-10}	[2]
$R_{cn}380a$	2	$C_3H_2^+$	+	C_4H_2	→	$C_7H_3^+$	+	H		3.00×10^{-10}	[3]
$R_{cn}380b$	2	$C_3H_2^+$	+	C_4H_2	→	$C_7H_2^+$	+	H_2		3.00×10^{-10}	[3]
$R_{cn}381a$	2	$C_3H_2^+$	+	C_6H_2	→	$CXHYNZ^+$	+	H		3.00×10^{-10}	[3]
$R_{cn}381b$	2	$C_3H_2^+$	+	C_6H_2	→	$CXHYNZ^+$	+	H_2		3.00×10^{-10}	[3]
$R_{cn}382a$	2	$C_3H_2^+$	+	N	→	$C_2H_2^+$	+	CN		3.74×10^{-11}	[2]
$R_{cn}382b$	2	$C_3H_2^+$	+	N	→	$HCNH^+$	+	C_2		6.60×10^{-12}	[2]
$R_{cn}383a$	2	$C_3H_2^+$	+	NH_3	→	NH_4^+	+	C_3H		4.60×10^{-10}	[43]
$R_{cn}383b$	2	$C_3H_2^+$	+	NH_3	→	CH_2NH^+	+	C_2H_2		1.15×10^{-10}	[43]
$R_{cn}383c$	2	$C_3H_2^+$	+	NH_3	→	$C_2H_5^+$	+	CN		1.15×10^{-10}	[43]
$R_{cn}383d$	2	$C_3H_2^+$	+	NH_3	→	$C_3H_3NH^+$	+	H		1.38×10^{-09}	[43]
$R_{cn}383e$	2	$C_3H_2^+$	+	NH_3	→	$C_3H_5N^+$	+	hv		2.30×10^{-10}	[43]

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	Type	Reaction										k	Ref.
$R_{cn}384$	2	$C_3H_2^+$	+	HCN	→	$CXHYNZ^+$						1.60×10^{-10}	[2]
$R_{cn}385a$	2	$C_3H_2^+$	+	C_3H_3N	→	HC_4NH^+	+	C_2H_3				5.00×10^{-11}	[43]
$R_{cn}385b$	2	$C_3H_2^+$	+	C_3H_3N	→	$C_5H_4^+$	+	HCN				5.00×10^{-11}	[43]
$R_{cn}385c$	2	$C_3H_2^+$	+	C_3H_3N	→	$C_6H_5N^+$	+	hv				9.00×10^{-10}	[43]
$R_{cn}386a$	2	$C_3H_2^+$	+	H_2CO	→	$c-C_3H_3^+$	+	HCO				3.00×10^{-10}	[43]
$R_{cn}386b$	2	$C_3H_2^+$	+	H_2CO	→	$l-C_3H_3^+$	+	HCO				3.00×10^{-10}	[43]
$R_{cn}386c$	2	$C_3H_2^+$	+	H_2CO	→	CH_2CO^+	+	C_2H_2				4.00×10^{-10}	[43]
$R_{cn}387$	2	$c-C_3H_3^+$	+	C_7H_8	→	$CXHYNZ^+$						3.80×10^{-11}	[44]
$R_{cn}388$	2	$c-C_3H_3^+$	+	C_3H_3N	→	$C_6H_5NH^+$	+	hv				5.00×10^{-11}	[10],[11]
$R_{cn}389a$	2	$l-C_3H_3^+$	+	C_2H_2	→	$c-C_3H_3^+$	+	C_2H_2				2.10×10^{-10}	[2]
$R_{cn}389b$	3	$l-C_3H_3^+$	+	C_2H_2	→	$C_5H_5^+$						1.00×10^{-10}	[2]
												2.50×10^{-24}	
$R_{cn}390a$	2	$l-C_3H_3^+$	+	C_2H_4	→	$C_5H_5^+$	+	H_2				5.50×10^{-10}	[18]
$R_{cn}390b$	2	$l-C_3H_3^+$	+	C_2H_4	→	$C_5H_7^+$	+	hv				5.50×10^{-10}	[18]
$R_{cn}391$	3	$l-C_3H_3^+$	+	CH_3CCH	→	$C_6H_7^+$						1.00×10^{-10}	[2]
												2.20×10^{-26}	
$R_{cn}392a$	2	$l-C_3H_3^+$	+	C_3H_8	→	$C_3H_7^+$	+	CH_3CCH				8.04×10^{-10}	[2]
$R_{cn}392b$	2	$l-C_3H_3^+$	+	C_3H_8	→	$C_4H_7^+$	+	C_2H_4				3.96×10^{-10}	[2]
$R_{cn}393a$	2	$l-C_3H_3^+$	+	C_4H_2	→	$c-C_3H_3^+$	+	C_4H_2				3.36×10^{-10}	[2]
$R_{cn}393b$	2	$l-C_3H_3^+$	+	C_4H_2	→	$C_5H_3^+$	+	C_2H_2				1.06×10^{-09}	[2]
$R_{cn}393c$	3	$l-C_3H_3^+$	+	C_4H_2	→	$C_7H_5^+$						1.00×10^{-10}	[2]
												6.20×10^{-26}	
$R_{cn}394a$	2	$l-C_3H_3^+$	+	C_6H_6	→	$C_7H_7^+$	+	C_2H_2				7.00×10^{-10}	[45],[46]
$R_{cn}394b$	2	$l-C_3H_3^+$	+	C_6H_6	→	$CXHYNZ^+$	+	H_2				7.00×10^{-10}	[45],[46]
$R_{cn}395a$	2	$l-C_3H_3^+$	+	C_7H_8	→	$Adduct^+$	+	hv				8.17×10^{-10}	[44]
$R_{cn}395b$	2	$l-C_3H_3^+$	+	C_7H_8	→	$C_7H_7^+$	+	CH_3CCH				5.32×10^{-10}	[44]
$R_{cn}395c$	2	$l-C_3H_3^+$	+	C_7H_8	→	$CXHYNZ^+$	+	H_2				3.23×10^{-10}	[44]
$R_{cn}395d$	2	$l-C_3H_3^+$	+	C_7H_8	→	$CXHYNZ^+$	+	H_2	+	H		2.28×10^{-10}	[44]
$R_{cn}396$	2	$l-C_3H_3^+$	+	N	→	HC_3N^+	+	H_2				5.80×10^{-11}	[2]
$R_{cn}397a$	2	$l-C_3H_3^+$	+	NH_3	→	NH_4^+	+	C_3H_2				1.80×10^{-10}	[18]
$R_{cn}397b$	2	$l-C_3H_3^+$	+	NH_3	→	$HCNH^+$	+	C_2H_4				1.20×10^{-10}	[18]
$R_{cn}397c$	3	$l-C_3H_3^+$	+	NH_3	→	$C_3H_5NH^+$						1.00×10^{-10}	[18]
												5.00×10^{-24}	
$R_{cn}398$	3	$l-C_3H_3^+$	+	HCN	→	$C_4H_3NH^+$						1.00×10^{-10}	[2]
												4.90×10^{-26}	
$R_{cn}399a$	2	$l-C_3H_3^+$	+	CH_3CN	→	$CXHYNZ^+$						1.60×10^{-10}	[18]
$R_{cn}399b$	3	$l-C_3H_3^+$	+	CH_3CN	→	$C_5H_5NH^+$						1.00×10^{-10}	[2]
												3.40×10^{-25}	
$R_{cn}400a$	2	$l-C_3H_3^+$	+	HC_3N	→	$CXHYNZ^+$						9.00×10^{-10}	[2]
$R_{cn}400b$	2	$l-C_3H_3^+$	+	HC_3N	→	$C_6H_3NH^+$	+	hv				3.50×10^{-12}	[2]
$R_{cn}401$	2	$l-C_3H_3^+$	+	C_3H_3N	→	$C_6H_5NH^+$	+	hv				2.00×10^{-09}	[10],[11]
$R_{cn}402$	2	$l-C_3H_3^+$	+	C_3H_5N	→	$C_6H_7NH^+$	+	hv				3.00×10^{-10}	[33]
$R_{cn}403a$	2	$l-C_3H_3^+$	+	C_4H_5N	→	$C_7H_7NH^+$	+	hv				1.18×10^{-10}	[47]
$R_{cn}403b$	2	$l-C_3H_3^+$	+	C_4H_5N	→	$C_4H_5N^+$	+	C_3H_3				2.24×10^{-11}	[47]
$R_{cn}404a$	2	$l-C_3H_3^+$	+	C_5H_5N	→	$AdductN^+$	+	hv				1.76×10^{-09}	[44]
$R_{cn}404b$	2	$l-C_3H_3^+$	+	C_5H_5N	→	$C_5H_5NH^+$	+	C_3H_2				4.40×10^{-10}	[44]
$R_{cn}405a$	2	$l-C_3H_3^+$	+	$O(^3P)$	→	$C_2H_2CO^+$	+	H				4.50×10^{-11}	[19]
$R_{cn}405b$	2	$l-C_3H_3^+$	+	$O(^3P)$	→	HC_3O^+	+	H_2				2.25×10^{-11}	[19]
$R_{cn}405c$	2	$l-C_3H_3^+$	+	$O(^3P)$	→	$C_2H_3^+$	+	CO				4.50×10^{-11}	[19]
$R_{cn}405d$	2	$l-C_3H_3^+$	+	$O(^3P)$	→	$C_2H_2^+$	+	HCO				3.75×10^{-11}	[19]

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	Type	Reaction									k	Ref.
$R_{cn}406a$	2	$l-C_3H_3^+$	+	H_2O	→	H_3O^+	+	C_3H_2			3.20×10^{-12}	[2]
$R_{cn}406b$	2	$l-C_3H_3^+$	+	H_2O	→	$C_2H_3CO^+$	+	H_2			2.40×10^{-12}	[2]
$R_{cn}406c$	2	$l-C_3H_3^+$	+	H_2O	→	$C_2H_5CO^+$	+	hv			2.40×10^{-12}	[2]
$R_{cn}407$	2	$l-C_3H_3^+$	+	H_2CO	→	$C_3H_5^+$	+	CO			1.00×10^{-09}	[43]
$R_{cn}408$	2	$C_3H_4^+$	+	H	→	$c-C_3H_3^+$	+	H_2			3.00×10^{-11}	[2]
$R_{cn}409a$	2	$C_3H_4^+$	+	C_2H_2	→	$C_5H_5^+$	+	H			4.20×10^{-10}	[2]
$R_{cn}409b$	3	$C_3H_4^+$	+	C_2H_2	→	$C_5H_6^+$					1.00×10^{-10}	[2]
											3.30×10^{-26}	
$R_{cn}410a$	2	$C_3H_4^+$	+	C_2H_4	→	$C_4H_5^+$	+	CH_3			9.13×10^{-11}	[2]
$R_{cn}410b$	2	$C_3H_4^+$	+	C_2H_4	→	$C_5H_7^+$	+	H			7.39×10^{-10}	[2]
$R_{cn}410c$	3	$C_3H_4^+$	+	C_2H_4	→	$C_5H_8^+$					1.00×10^{-10}	[2]
											8.40×10^{-27}	
$R_{cn}411a$	2	$C_3H_4^+$	+	CH_3CCH	→	$C_3H_5^+$	+	C_3H_3			1.98×10^{-10}	[2]
$R_{cn}411b$	2	$C_3H_4^+$	+	CH_3CCH	→	$C_4H_4^+$	+	C_2H_4			2.20×10^{-11}	[2]
$R_{cn}411c$	2	$C_3H_4^+$	+	CH_3CCH	→	$C_4H_6^+$	+	C_2H_2			2.20×10^{-11}	[2]
$R_{cn}411d$	2	$C_3H_4^+$	+	CH_3CCH	→	$C_5H_5^+$	+	CH_3			2.20×10^{-11}	[2]
$R_{cn}411e$	2	$C_3H_4^+$	+	CH_3CCH	→	$C_6H_5^+$	+	H_2	+	H	8.80×10^{-11}	[2]
$R_{cn}411f$	2	$C_3H_4^+$	+	CH_3CCH	→	$C_6H_7^+$	+	H			7.48×10^{-10}	[2]
$R_{cn}412a$	2	$C_3H_4^+$	+	CH_2CCH_2	→	$C_4H_4^+$	+	C_2H_4			5.50×10^{-11}	[4]
$R_{cn}412b$	2	$C_3H_4^+$	+	CH_2CCH_2	→	$C_4H_6^+$	+	C_2H_2			1.10×10^{-11}	[4]
$R_{cn}412c$	2	$C_3H_4^+$	+	CH_2CCH_2	→	$C_5H_5^+$	+	CH_3			1.10×10^{-11}	[4]
$R_{cn}412d$	2	$C_3H_4^+$	+	CH_2CCH_2	→	$C_6H_5^+$	+	H_2	+	H	7.70×10^{-11}	[4]
$R_{cn}412e$	2	$C_3H_4^+$	+	CH_2CCH_2	→	$C_6H_7^+$	+	H			9.57×10^{-10}	[4]
$R_{cn}413$	2	$C_3H_4^+$	+	C_3H_6	→	$C_4H_6^+$	+	C_2H_4			1.00×10^{-09}	[2]
$R_{cn}414$	2	$C_3H_4^+$	+	C_3H_8	→	$CXHYNZ^+$					1.20×10^{-10}	[2]
$R_{cn}415a$	2	$C_3H_4^+$	+	C_4H_2	→	$C_5H_4^+$	+	C_2H_2			1.26×10^{-10}	[2]
$R_{cn}415b$	2	$C_3H_4^+$	+	C_4H_2	→	$C_7H_5^+$	+	H			1.67×10^{-09}	[2]
$R_{cn}415c$	3	$C_3H_4^+$	+	C_4H_2	→	$C_7H_6^+$					1.00×10^{-10}	[2]
											1.00×10^{-26}	
$R_{cn}416a$	2	$C_3H_4^+$	+	N	→	$C_3H_3N^+$	+	H			1.00×10^{-10}	[3]
$R_{cn}416b$	2	$C_3H_4^+$	+	N	→	HC_3NH^+	+	H_2			1.00×10^{-10}	[3]
$R_{cn}417a$	2	$C_3H_4^+$	+	NH_3	→	NH_3^+	+	CH_3CCH			2.10×10^{-10}	[48]
$R_{cn}417b$	2	$C_3H_4^+$	+	NH_3	→	NH_4^+	+	C_3H_3			1.29×10^{-09}	[48]
$R_{cn}418a$	2	$C_3H_4^+$	+	HC_3N	→	HC_3NH^+	+	C_3H_3			1.80×10^{-10}	[2]
$R_{cn}418b$	3	$C_3H_4^+$	+	HC_3N	→	$C_6H_5N^+$					1.00×10^{-10}	[2]
											4.30×10^{-26}	
$R_{cn}419a$	2	$C_3H_4^+$	+	C_3H_5N	→	$C_3H_5NH^+$	+	C_3H_3			3.71×10^{-09}	[33]
$R_{cn}419b$	2	$C_3H_4^+$	+	C_3H_5N	→	$C_6H_9N^+$	+	hv			1.95×10^{-10}	[33]
$R_{cn}420a$	2	$C_3H_5^+$	+	H	→	$C_2H_2^+$	+	CH_4			5.00×10^{-13}	[2]
$R_{cn}420b$	2	$C_3H_5^+$	+	H	→	$C_2H_3^+$	+	CH_3			9.50×10^{-12}	[2]
$R_{cn}421$	2	$C_3H_5^+$	+	H_2	→	$C_3H_7^+$	+	hv			1.00×10^{-13}	[49]
$R_{cn}422a$	2	$C_3H_5^+$	+	C_2H_2	→	$C_5H_5^+$	+	H_2			3.80×10^{-10}	[2]
$R_{cn}422b$	3	$C_3H_5^+$	+	C_2H_2	→	$C_5H_7^+$					1.00×10^{-10}	[2]
											3.20×10^{-26}	
$R_{cn}423a$	2	$C_3H_5^+$	+	C_2H_4	→	$C_5H_7^+$	+	H_2			8.90×10^{-11}	[2]
$R_{cn}423b$	3	$C_3H_5^+$	+	C_2H_4	→	$C_5H_9^+$					1.00×10^{-10}	[2]
											1.80×10^{-23}	
$R_{cn}424a$	2	$C_3H_5^+$	+	CH_3CCH	→	$C_6H_7^+$	+	H_2			3.50×10^{-10}	[2]
$R_{cn}424b$	3	$C_3H_5^+$	+	CH_3CCH	→	$C_6H_9^+$					1.00×10^{-10}	[2]
											6.80×10^{-26}	

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	Type	Reaction								k	Ref.
$R_{cn}425a$	2	$C_3H_5^+$	+	C_3H_6	→	$C_4H_7^+$	+	C_2H_4		1.00×10^{-09}	[2]
$R_{cn}425b$	3	$C_3H_5^+$	+	C_3H_6	→	$C_6H_{11}^+$				1.00×10^{-10}	[2]
										6.40×10^{-26}	
$R_{cn}426a$	2	$C_3H_5^+$	+	C_3H_8	→	$C_3H_7^+$	+	C_3H_6		3.90×10^{-10}	[2]
$R_{cn}426b$	2	$C_3H_5^+$	+	C_3H_8	→	$C_4H_7^+$	+	C_2H_6		2.82×10^{-11}	[2]
$R_{cn}426c$	2	$C_3H_5^+$	+	C_3H_8	→	$C_4H_9^+$	+	C_2H_4		5.17×10^{-11}	[2]
$R_{cn}426d$	3	$C_3H_5^+$	+	C_3H_8	→	$C_6H_{13}^+$				1.00×10^{-10}	[2]
										3.20×10^{-27}	
$R_{cn}427a$	2	$C_3H_5^+$	+	C_4H_2	→	$C_5H_5^+$	+	C_2H_2		1.50×10^{-10}	[2]
$R_{cn}427b$	3	$C_3H_5^+$	+	C_4H_2	→	$C_7H_7^+$				1.00×10^{-10}	[2]
										8.30×10^{-26}	
$R_{cn}428a$	2	$C_3H_5^+$	+	C_6H_6	→	$C_7H_7^+$	+	C_2H_4		1.03×10^{-09}	[50]
$R_{cn}428b$	2	$C_3H_5^+$	+	C_6H_6	→	$C_6H_7^+$	+	CH_3CCH		1.15×10^{-10}	[50]
$R_{cn}429a$	2	$C_3H_5^+$	+	C_7H_8	→	$CXHYNZ^+$	+	C_2H_4		1.04×10^{-09}	[50]
$R_{cn}429b$	2	$C_3H_5^+$	+	C_7H_8	→	$C_7H_9^+$	+	CH_3CCH		2.18×10^{-10}	[50]
$R_{cn}429c$	2	$C_3H_5^+$	+	C_7H_8	→	$C_7H_7^+$	+	C_3H_6		1.88×10^{-10}	[50]
$R_{cn}430$	2	$C_3H_5^+$	+	NH_3	→	NH_4^+	+	CH_3CCH		9.00×10^{-10}	[48]
$R_{cn}431a$	2	$C_3H_5^+$	+	HCN	→	$C_4H_5NH^+$	+	hv		5.00×10^{-12}	[2]
$R_{cn}431b$	3	$C_3H_5^+$	+	HCN	→	$C_4H_5NH^+$				1.00×10^{-10}	[2]
										9.30×10^{-27}	
$R_{cn}432a$	2	$C_3H_5^+$	+	CH_2NH	→	$CH_2NH_2^+$	+	CH_3CCH		1.75×10^{-09}	[33]
$R_{cn}432b$	2	$C_3H_5^+$	+	CH_2NH	→	$C_4H_7NH^+$	+	hv		7.50×10^{-10}	[33]
$R_{cn}433a$	2	$C_3H_5^+$	+	CH_3NH_2	→	$CH_3NH_3^+$	+	CH_3CCH		7.60×10^{-10}	[33]
$R_{cn}433b$	2	$C_3H_5^+$	+	CH_3NH_2	→	$CH_2NH_2^+$	+	C_3H_6		4.75×10^{-10}	[33]
$R_{cn}433c$	2	$C_3H_5^+$	+	CH_3NH_2	→	$C_4H_9NH^+$	+	hv		6.65×10^{-10}	[33]
$R_{cn}434a$	2	$C_3H_5^+$	+	HC_3N	→	HC_3NH^+	+	CH_3CCH		3.80×10^{-10}	[2]
$R_{cn}434b$	3	$C_3H_5^+$	+	HC_3N	→	$C_6H_5NH^+$				1.00×10^{-10}	[2]
										9.50×10^{-26}	
$R_{cn}435a$	2	$C_3H_5^+$	+	C_3H_3N	→	$C_3H_3NH^+$	+	CH_3CCH		1.00×10^{-09}	[51]
$R_{cn}435b$	3	$C_3H_5^+$	+	C_3H_3N	→	$C_6H_7NH^+$				1.00×10^{-10}	[51]
										1.00×10^{-25}	
$R_{cn}436a$	2	$C_3H_5^+$	+	C_3H_5N	→	$C_3H_5NH^+$	+	CH_3CCH		2.68×10^{-09}	[33]
$R_{cn}436b$	2	$C_3H_5^+$	+	C_3H_5N	→	$C_6H_9NH^+$	+	hv		1.44×10^{-09}	[33]
$R_{cn}437a$	2	$C_3H_6^+$	+	C_2H_2	→	$C_4H_5^+$	+	CH_3		8.04×10^{-11}	[2]
$R_{cn}437b$	2	$C_3H_6^+$	+	C_2H_2	→	$C_5H_7^+$	+	H		5.90×10^{-10}	[2]
$R_{cn}437c$	3	$C_3H_6^+$	+	C_2H_2	→	$C_5H_8^+$				1.00×10^{-10}	[2]
										7.30×10^{-27}	
$R_{cn}438a$	2	$C_3H_6^+$	+	C_2H_4	→	$C_4H_7^+$	+	CH_3		1.80×10^{-10}	[2]
$R_{cn}438b$	3	$C_3H_6^+$	+	C_2H_4	→	$C_5H_{10}^+$				1.00×10^{-10}	[2]
										4.40×10^{-26}	
$R_{cn}439a$	2	$C_3H_6^+$	+	C_3H_6	→	$C_3H_7^+$	+	C_3H_5		2.10×10^{-10}	[2]
$R_{cn}439b$	2	$C_3H_6^+$	+	C_3H_6	→	$C_4H_7^+$	+	C_2H_5		2.80×10^{-10}	[2]
$R_{cn}439c$	2	$C_3H_6^+$	+	C_3H_6	→	$C_4H_8^+$	+	C_2H_4		4.90×10^{-10}	[2]
$R_{cn}439d$	2	$C_3H_6^+$	+	C_3H_6	→	$C_5H_9^+$	+	CH_3		4.20×10^{-10}	[2]
$R_{cn}440a$	2	$C_3H_6^+$	+	NH_3	→	$CH_2NH_2^+$	+	C_2H_5		5.70×10^{-10}	[52]
$R_{cn}440b$	2	$C_3H_6^+$	+	NH_3	→	$CH_3NH_2^+$	+	C_2H_4		1.30×10^{-10}	[52]
$R_{cn}440c$	2	$C_3H_6^+$	+	NH_3	→	NH_4^+	+	C_3H_5		3.00×10^{-10}	[52]
$R_{cn}441a$	2	$C_3H_6^+$	+	HCN	→	$C_2H_3N^+$	+	C_2H_4		1.60×10^{-10}	[2]
$R_{cn}441b$	2	$C_3H_6^+$	+	HCN	→	$C_4H_5NH^+$	+	H		2.40×10^{-10}	[2]
$R_{cn}442$	2	$C_3H_7^+$	+	H	→	$C_3H_6^+$	+	H_2		3.70×10^{-11}	[2]

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	Type	Reaction	k	Ref.
$R_{cn}443$	3	$C_3H_7^+ + CH_4 \rightarrow C_3H_7^+CH_4$	1.00×10^{-10}	[53]
			1.00×10^{-27}	
$R_{cn}444$	2	$C_3H_7^+ + C_2H_6 \rightarrow C_4H_9^+ + CH_4$	1.00×10^{-09}	[2]
$R_{cn}445$	2	$C_3H_7^+ + C_3H_6 \rightarrow C_4H_9^+ + C_2H_4$	4.50×10^{-10}	[2]
$R_{cn}446$	2	$C_3H_7^+ + C_3H_8 \rightarrow C_3H_7^+ + C_3H_8$	1.20×10^{-10}	[2]
$R_{cn}447$	2	$C_3H_7^+ + NH_3 \rightarrow NH_4^+ + C_3H_6$	1.71×10^{-09}	[40]
$R_{cn}448$	3	$C_3H_7^+ + HCN \rightarrow C_4H_7NH^+$	1.00×10^{-10}	[2]
			6.20×10^{-27}	
$R_{cn}449$	2	$C_3H_7^+ + CH_3NH_2 \rightarrow CH_3NH_3^+ + C_3H_6$	1.65×10^{-09}	[30]
$R_{cn}450$	3	$C_3H_7^+ + N_2 \rightarrow C_3H_7^+N_2$	1.00×10^{-10}	[31]
			1.00×10^{-27}	
$R_{cn}451$	2	$C_3H_7^+CH_4 + N_2 \rightarrow C_3H_7^+ + CH_4 + N_2$	4.00×10^{-09}	[53]
$R_{cn}452$	2	$C_3H_7^+N_2 + N_2 \rightarrow C_3H_7^+ + N_2 + N_2$	6.00×10^{-11}	[31]
$R_{cn}453$	2	$C_3H_9^+ + NH_2 \rightarrow C_3H_8^+ + NH_3$	1.00×10^{-10}	[39]
$R_{cn}454$	2	$C_3H_9^+ + NH_3 \rightarrow NH_4^+ + C_3H_8$	5.00×10^{-10}	[54]
$R_{cn}455$	2	$C_4H^+ + H \rightarrow C_4H_2^+ + hv$	$6.00\times10^{-14}(300/T)^{1.50}$	[3]
$R_{cn}456$	2	$C_4H^+ + H_2 \rightarrow C_4H_2^+ + H$	1.65×10^{-10}	[3]
$R_{cn}457$	2	$C_4H^+ + CH_4 \rightarrow C_5H_3^+ + H_2$	1.10×10^{-09}	[3]
$R_{cn}458$	2	$C_4H^+ + C_2H_2 \rightarrow C_6H_2^+ + H$	1.50×10^{-09}	[3]
$R_{cn}459a$	2	$C_4H^+ + C_2H_4 \rightarrow C_4H_3^+ + C_2H_2$	7.50×10^{-10}	[3]
$R_{cn}459b$	2	$C_4H^+ + C_2H_4 \rightarrow C_6H_4^+ + H$	7.50×10^{-10}	[3]
$R_{cn}460$	2	$C_4H^+ + CH_3CCH \rightarrow C_7H_4^+ + H$	$6.45\times10^{-10}(300/T)^{0.50}$	[3]
$R_{cn}461$	2	$C_4H^+ + C_4H_2 \rightarrow C_8H_2^+ + H$	1.60×10^{-09}	[3]
$R_{cn}462$	2	$C_4H_2^+ + H \rightarrow C_4H_3^+ + hv$	7.00×10^{-11}	[2]
$R_{cn}463$	2	$C_4H_2^+ + H_2 \rightarrow C_4H_4^+ + hv$	5.00×10^{-13}	[2]
$R_{cn}464a$	2	$C_4H_2^+ + C_2H_2 \rightarrow C_6H_3^+ + H$	1.40×10^{-11}	[2]
$R_{cn}464b$	2	$C_4H_2^+ + C_2H_2 \rightarrow C_6H_4^+ + hv$	2.66×10^{-10}	[2]
$R_{cn}464c$	3	$C_4H_2^+ + C_2H_2 \rightarrow C_6H_4^+$	1.00×10^{-10}	[2]
			2.30×10^{-23}	
$R_{cn}465a$	2	$C_4H_2^+ + C_2H_4 \rightarrow C_4H_4^+ + C_2H_2$	7.05×10^{-10}	[2]
$R_{cn}465b$	2	$C_4H_2^+ + C_2H_4 \rightarrow C_6H_4^+ + H_2$	7.50×10^{-11}	[2]
$R_{cn}465c$	2	$C_4H_2^+ + C_2H_4 \rightarrow C_6H_5^+ + H$	7.20×10^{-10}	[2]
$R_{cn}465d$	3	$C_4H_2^+ + C_2H_4 \rightarrow C_6H_6^+$	1.00×10^{-10}	[2]
			3.40×10^{-26}	
$R_{cn}466a$	2	$C_4H_2^+ + CH_3CCH \rightarrow C_5H_4^+ + C_2H_2$	1.30×10^{-10}	[2]
$R_{cn}466b$	2	$C_4H_2^+ + CH_3CCH \rightarrow C_7H_5^+ + H$	1.17×10^{-09}	[2]
$R_{cn}467a$	2	$C_4H_2^+ + C_4H_2 \rightarrow C_6H_2^+ + C_2H_2$	1.40×10^{-09}	[2]
$R_{cn}467b$	3	$C_4H_2^+ + C_4H_2 \rightarrow Adduct^+$	1.00×10^{-10}	[2]
			3.00×10^{-26}	
$R_{cn}468$	2	$C_4H_2^+ + C_6H_6 \rightarrow C_6H_6^+ + C_4H_2$	1.46×10^{-09}	[55]
$R_{cn}469a$	2	$C_4H_2^+ + N \rightarrow C_3H^+ + HCN$	1.71×10^{-10}	[2]
$R_{cn}469b$	2	$C_4H_2^+ + N \rightarrow HC_4N^+ + H$	9.50×10^{-12}	[2]
$R_{cn}469c$	2	$C_4H_2^+ + N \rightarrow HCNH^+ + C_3$	9.50×10^{-12}	[2]
$R_{cn}470$	3	$C_4H_2^+ + HCN \rightarrow C_5H_3N^+$	1.00×10^{-10}	[2]
			2.00×10^{-26}	
$R_{cn}471a$	2	$C_4H_2^+ + HC_3N \rightarrow C_7H_3N^+ + hv$	1.70×10^{-09}	[2]
$R_{cn}471b$	3	$C_4H_2^+ + HC_3N \rightarrow C_7H_3N^+$	1.00×10^{-10}	[2]
			3.30×10^{-26}	
$R_{cn}472$	2	$C_4H_2^+ + C_3H_5N \rightarrow C_7H_7N^+ + hv$	3.60×10^{-09}	[33]
$R_{cn}473$	2	$C_4H_2^+ + HC_5N \rightarrow AdductN^+ + hv$	$2.00\times10^{-12}(300/T)^{2.50}$	[3]

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	Type	Reaction									k	Ref.
$R_{cn}474a$	2	$C_4H_2^+$	+	C_5H_5N	→	$C_5H_5N^+$	+	C_4H_2			1.26×10^{-09}	[56]
$R_{cn}474b$	2	$C_4H_2^+$	+	C_5H_5N	→	$C_5H_5NH^+$	+	C_4H			4.42×10^{-10}	[56]
$R_{cn}475$	2	$C_4H_2^+$	+	C_2N_2	→	$CXHYNZ^+$					2.00×10^{-10}	[2]
$R_{cn}476$	3	$C_4H_2^+$	+	CO	→	$Adduct^+$					1.00×10^{-10}	[18]
											2.30×10^{-27}	
$R_{cn}477$	2	$C_4H_3^+$	+	H	→	$C_4H_4^+$	+	hv			6.00×10^{-14}	[2]
$R_{cn}478a$	2	$C_4H_3^+$	+	C_2H_2	→	$C_6H_5^+$	+	hv			2.20×10^{-10}	[2]
$R_{cn}478b$	3	$C_4H_3^+$	+	C_2H_2	→	$C_6H_5^+$					1.00×10^{-10}	[2]
											9.50×10^{-24}	
$R_{cn}479a$	2	$C_4H_3^+$	+	C_2H_4	→	$C_6H_5^+$	+	H_2			1.20×10^{-10}	[2]
$R_{cn}479b$	3	$C_4H_3^+$	+	C_2H_4	→	$C_6H_7^+$					1.00×10^{-10}	[2]
											4.30×10^{-26}	
$R_{cn}480$	2	$C_4H_3^+$	+	CH_3CCH	→	$C_5H_5^+$	+	C_2H_2			1.40×10^{-09}	[2]
$R_{cn}481a$	2	$C_4H_3^+$	+	C_4H_2	→	$C_6H_3^+$	+	C_2H_2			7.40×10^{-10}	[2]
$R_{cn}481b$	3	$C_4H_3^+$	+	C_4H_2	→	$Adduct^+$					1.00×10^{-10}	[2]
											8.70×10^{-26}	
$R_{cn}482$	2	$C_4H_3^+$	+	C_6H_6	→	$C_6H_7^+$	+	C_4H_2			1.30×10^{-09}	[55],[57]
$R_{cn}483$	2	$C_4H_3^+$	+	NH_3	→	NH_4^+	+	C_4H_2			9.90×10^{-10}	[48]
$R_{cn}484a$	2	$C_4H_3^+$	+	CH_2NH	→	$CH_2NH_2^+$	+	C_4H_2			1.92×10^{-09}	[33]
$R_{cn}484b$	2	$C_4H_3^+$	+	CH_2NH	→	$C_5H_5NH^+$	+	hv			4.80×10^{-10}	[33]
$R_{cn}485a$	2	$C_4H_3^+$	+	CH_3NH_2	→	$CH_3NH_3^+$	+	C_4H_2			1.30×10^{-09}	[33]
$R_{cn}485b$	2	$C_4H_3^+$	+	CH_3NH_2	→	$CH_2NH_2^+$	+	C_4H_2	+	H_2	5.00×10^{-10}	[33]
$R_{cn}485c$	2	$C_4H_3^+$	+	CH_3NH_2	→	$C_5H_7NH^+$	+	hv			2.00×10^{-10}	[33]
$R_{cn}486$	3	$C_4H_3^+$	+	HC_3N	→	$C_7H_3NH^+$					1.00×10^{-10}	[2]
											1.90×10^{-26}	
$R_{cn}487a$	2	$C_4H_3^+$	+	C_5H_5N	→	$C_5H_5NH^+$	+	C_4H_2			1.53×10^{-09}	[56]
$R_{cn}487b$	2	$C_4H_3^+$	+	C_5H_5N	→	$C_5H_5N^+$	+	C_4H_3			1.55×10^{-11}	[56]
$R_{cn}488$	2	$C_4H_3^+$	+	C_2N_2	→	$CXHYNZ^+$					1.90×10^{-10}	[2]
$R_{cn}489$	3	$C_4H_3^+$	+	CO	→	$C_4H_3^+CO$					1.00×10^{-10}	[2]
											1.00×10^{-28}	
$R_{cn}490a$	2	$C_4H_4^+$	+	C_2H_2	→	$C_6H_4^+$	+	H_2			1.20×10^{-11}	[4]
$R_{cn}490b$	2	$C_4H_4^+$	+	C_2H_2	→	$C_6H_5^+$	+	H			9.00×10^{-11}	[4]
$R_{cn}490c$	2	$C_4H_4^+$	+	C_2H_2	→	$C_6H_6^+$	+	hv			1.80×10^{-11}	[4]
$R_{cn}491a$	2	$C_4H_4^+$	+	CH_3CCH	→	$C_5H_6^+$	+	C_2H_2			5.00×10^{-11}	[4]
$R_{cn}491b$	2	$C_4H_4^+$	+	CH_3CCH	→	$C_7H_7^+$	+	H			9.50×10^{-10}	[4]
$R_{cn}492a$	2	$C_4H_4^+$	+	C_4H_2	→	$C_6H_4^+$	+	C_2H_2			6.96×10^{-10}	[4]
$R_{cn}492b$	2	$C_4H_4^+$	+	C_4H_2	→	$CXHYNZ^+$					1.04×10^{-10}	[4]
$R_{cn}493$	2	$C_4H_4^+$	+	C_6H_6	→	$C_6H_6^+$	+	C_4H_4			6.60×10^{-10}	[58]
$R_{cn}494a$	2	$C_4H_4^+$	+	NH_3	→	NH_4^+	+	C_4H_3			3.20×10^{-10}	[48]
$R_{cn}494b$	2	$C_4H_4^+$	+	NH_3	→	$CH_2NH_2^+$	+	C_3H_3			4.37×10^{-11}	[48]
$R_{cn}495a$	2	$C_4H_4^+$	+	C_5H_5N	→	$CXHYNZ^+$	+	H			7.88×10^{-10}	[56]
$R_{cn}495b$	2	$C_4H_4^+$	+	C_5H_5N	→	$C_5H_5NH^+$	+	C_4H_3			4.96×10^{-10}	[56]
$R_{cn}495c$	2	$C_4H_4^+$	+	C_5H_5N	→	$C_5H_5N^+$	+	C_4H_4			1.75×10^{-10}	[56]
$R_{cn}496a$	2	$C_4H_5^+$	+	C_2H_2	→	$C_6H_5^+$	+	H_2			1.60×10^{-10}	[2]
$R_{cn}496b$	3	$C_4H_5^+$	+	C_2H_2	→	$C_6H_7^+$					1.00×10^{-10}	[2]
											1.50×10^{-26}	
$R_{cn}497$	2	$C_4H_5^+$	+	C_2H_4	→	$C_6H_7^+$	+	H_2			7.30×10^{-11}	[2]
$R_{cn}498a$	2	$C_4H_5^+$	+	CH_3CCH	→	$C_6H_5^+$	+	CH_4			5.00×10^{-11}	[2]
$R_{cn}498b$	2	$C_4H_5^+$	+	CH_3CCH	→	$C_7H_7^+$	+	H_2			1.50×10^{-10}	[2]
$R_{cn}499$	2	$C_4H_5^+$	+	C_4H_2	→	$C_6H_5^+$	+	C_2H_2			1.00×10^{-09}	[2]

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	Type	Reaction										k	Ref.
$R_{cn}500$	2	$C_4H_5^+$	+	N	→	$C_4H_3NH^+$	+	H				1.00×10^{-10}	[3]
$R_{cn}501$	2	$C_4H_5^+$	+	NH_3	→	NH_4^+	+	C_4H_4				4.70×10^{-10}	[48]
$R_{cn}502a$	2	$C_4H_6^+$	+	CH_3CCH	→	$C_6H_7^+$	+	CH_3				8.50×10^{-10}	[4]
$R_{cn}502b$	2	$C_4H_6^+$	+	CH_3CCH	→	$C_7H_9^+$	+	H				1.50×10^{-10}	[4]
$R_{cn}503$	3	$C_4H_7^+$	+	C_2H_4	→	$C_6H_{11}^+$						1.00×10^{-10}	[2]
												1.40×10^{-24}	
$R_{cn}504$	2	$C_4H_7^+$	+	CH_3CCH	→	$C_7H_9^+$	+	H_2				1.50×10^{-10}	[2]
$R_{cn}505$	2	$C_4H_7^+$	+	CH_3CN	→	$C_2H_3NH^+$	+	C_4H_6				5.20×10^{-11}	[2]
$R_{cn}506a$	2	$C_4H_9^+$	+	C_2H_4	→	$C_6H_9^+$	+	H_2	+	H_2		2.00×10^{-10}	[59]
$R_{cn}506b$	2	$C_4H_9^+$	+	C_2H_4	→	$C_6H_{11}^+$	+	H_2				2.00×10^{-10}	[59]
$R_{cn}507a$	2	$C_4H_9^+$	+	NH_3	→	NH_4^+	+	C_4H_8				1.57×10^{-09}	[4]
$R_{cn}507b$	2	$C_4H_9^+$	+	NH_3	→	$C_4H_{11}NH^+$	+	hv				3.20×10^{-11}	[4]
$R_{cn}508$	2	$C_4H_9^+$	+	CH_3NH_2	→	$CH_3NH_3^+$	+	C_4H_8				1.31×10^{-09}	[4]
$R_{cn}509$	2	$C_4H_9^+$	+	HNC	→	$HCNH^+$	+	C_4H_8				4.53×10^{-09}	Su-Chesnavich
$R_{cn}510$	2	C_5H^+	+	H_2	→	$C_5H_2^+$	+	H				1.00×10^{-17}	[3]
$R_{cn}511a$	2	C_5H^+	+	C_2H_2	→	$C_7H_2^+$	+	H				1.50×10^{-10}	[4]
$R_{cn}511b$	2	C_5H^+	+	C_2H_2	→	$C_7H_3^+$	+	hv				3.50×10^{-10}	[4]
$R_{cn}512$	2	C_5H^+	+	C_4H_2	→	$Adduct^+$	+	hv				$1.00\times10^{-13}(300/T)^{2.00}$	[3]
$R_{cn}513$	2	C_5H^+	+	N	→	C_5N^+	+	H				2.00×10^{-10}	[3]
$R_{cn}514$	2	C_5H^+	+	HCN	→	HC_6NH^+	+	hv				9.10×10^{-11}	[4]
$R_{cn}515$	2	C_5H^+	+	CO	→	HC_6O^+	+	hv				2.30×10^{-10}	[4]
$R_{cn}516a$	2	$C_5H_2^+$	+	CH_4	→	$C_6H_5^+$	+	H				8.00×10^{-10}	[3]
$R_{cn}516b$	2	$C_5H_2^+$	+	CH_4	→	$C_6H_4^+$	+	H_2				2.00×10^{-10}	[3]
$R_{cn}517a$	2	$C_5H_2^+$	+	C_2H_2	→	$C_7H_3^+$	+	H				7.00×10^{-10}	[3]
$R_{cn}517b$	2	$C_5H_2^+$	+	C_2H_2	→	$C_7H_2^+$	+	H_2				3.00×10^{-10}	[3]
$R_{cn}518a$	2	$C_5H_2^+$	+	C_2H_4	→	$C_7H_5^+$	+	H				5.00×10^{-10}	[3]
$R_{cn}518b$	2	$C_5H_2^+$	+	C_2H_4	→	$C_7H_4^+$	+	H_2				5.00×10^{-10}	[3]
$R_{cn}519$	2	$C_5H_2^+$	+	CH_3CCH	→	$CXHYNZ^+$	+	H_2				$6.14\times10^{-10}(300/T)^{0.50}$	[3]
$R_{cn}520a$	2	$C_5H_2^+$	+	C_4H_2	→	$C_7H_3^+$	+	C_2H				6.00×10^{-10}	[3]
$R_{cn}520b$	2	$C_5H_2^+$	+	C_4H_2	→	$CXHYNZ^+$	+	H				1.00×10^{-09}	[3]
$R_{cn}520c$	2	$C_5H_2^+$	+	C_4H_2	→	$Adduct^+$	+	hv				$1.00\times10^{-13}(300/T)^{2.00}$	[3]
$R_{cn}521$	2	$C_5H_2^+$	+	N	→	HC_5N^+	+	H				2.00×10^{-10}	[3]
$R_{cn}522a$	2	$C_5H_3^+$	+	CH_3CCH	→	$C_6H_5^+$	+	C_2H_2				8.10×10^{-10}	[4]
$R_{cn}522b$	2	$C_5H_3^+$	+	CH_3CCH	→	$CXHYNZ^+$	+	H				1.90×10^{-10}	[4]
$R_{cn}523a$	2	$C_5H_3^+$	+	C_4H_2	→	$C_7H_3^+$	+	C_2H_2				2.41×10^{-10}	[4]
$R_{cn}523b$	2	$C_5H_3^+$	+	C_4H_2	→	$Adduct^+$	+	hv				3.19×10^{-10}	[4]
$R_{cn}524a$	2	$C_5H_3^+$	+	C_6H_6	→	$C_6H_5^+$	+	C_5H_4				4.80×10^{-11}	[55],[60],[61]
$R_{cn}524b$	2	$C_5H_3^+$	+	C_6H_6	→	$C_6H_6^+$	+	C_5H_3				4.80×10^{-11}	[55],[60],[61]
$R_{cn}524c$	2	$C_5H_3^+$	+	C_6H_6	→	$C_7H_7^+$	+	C_4H_2				4.80×10^{-11}	[55],[60],[61]
$R_{cn}524d$	2	$C_5H_3^+$	+	C_6H_6	→	$CXHYNZ^+$	+	C_2H_2				4.80×10^{-11}	[55],[60],[61]
$R_{cn}524e$	2	$C_5H_3^+$	+	C_6H_6	→	$Adduct^+$						4.80×10^{-11}	[55],[60],[61]
$R_{cn}525$	2	$C_5H_3^+$	+	N	→	HC_5NH^+	+	H				2.00×10^{-10}	[3]
$R_{cn}526a$	2	$C_5H_4^+$	+	CH_3CCH	→	$C_6H_6^+$	+	C_2H_2				5.70×10^{-10}	[4]
$R_{cn}526b$	2	$C_5H_4^+$	+	CH_3CCH	→	$CXHYNZ^+$	+	H				4.30×10^{-10}	[4]
$R_{cn}527$	2	$C_5H_4^+$	+	N	→	$C_5H_3N^+$	+	H				1.00×10^{-10}	[3]
$R_{cn}528$	3	$C_5H_5^+$	+	C_2H_4	→	$C_7H_9^+$						1.00×10^{-10}	[2]
												6.00×10^{-27}	
$R_{cn}529a$	2	$C_5H_5^+$	+	C_4H_2	→	$Adduct^+$	+	hv				7.33×10^{-11}	[2]
$R_{cn}529b$	2	$C_5H_5^+$	+	C_4H_2	→	$C_7H_5^+$	+	C_2H_2				7.33×10^{-11}	[2]
$R_{cn}529c$	2	$C_5H_5^+$	+	C_4H_2	→	$C_7H_7^+$	+	C_2				7.33×10^{-11}	[2]

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	Type	Reaction										k	Ref.
$R_{cn}530$	2	$C_5H_5^+$	+	N	→	$C_5H_3N^+$	+	H_2				1.00×10^{-10}	[3]
$R_{cn}531$	2	$C_5H_5^+$	+	NH_3	→	NH_4^+	+	C_5H_4				3.50×10^{-11}	[48]
$R_{cn}532$	2	$C_5H_5^+$	+	HCN	→	$C_6H_5NH^+$	+	hv				9.00×10^{-12}	[2]
$R_{cn}533$	2	$C_5H_5^+$	+	CH_2NH	→	$CH_2NH_2^+$	+	C_5H_4				3.20×10^{-10}	[33]
$R_{cn}534a$	2	$C_5H_5^+$	+	CH_3NH_2	→	$CH_3NH_3^+$	+	C_5H_4				2.00×10^{-10}	[33]
$R_{cn}534b$	2	$C_5H_5^+$	+	CH_3NH_2	→	$CH_3NH_2^+$	+	C_5H_4	+	H_2		2.50×10^{-11}	[33]
$R_{cn}534c$	2	$C_5H_5^+$	+	CH_3NH_2	→	$C_6H_9NH^+$	+	hv				2.50×10^{-11}	[33]
$R_{cn}535a$	2	$C_5H_7^+$	+	CH_3CCH	→	$Adduct^+$	+	hv				7.00×10^{-10}	[2]
$R_{cn}535b$	3	$C_5H_7^+$	+	CH_3CCH	→	$Adduct^+$						1.00×10^{-10} 3.10×10^{-27}	[2]
$R_{cn}536$	2	$C_5H_{11}^+$	+	NH_3	→	NH_4^+	+	C_5H_{10}				6.50×10^{-10}	[30]
$R_{cn}537$	2	$C_5H_{11}^+$	+	CH_3NH_2	→	$CH_3NH_3^+$	+	C_5H_{10}				9.10×10^{-10}	[30]
$R_{cn}538$	2	C_6H^+	+	H_2	→	$C_6H_2^+$	+	H				1.30×10^{-12}	[3]
$R_{cn}539a$	2	$C_6H_2^+$	+	CH_4	→	$C_7H_5^+$	+	H				8.00×10^{-10}	[3]
$R_{cn}539b$	2	$C_6H_2^+$	+	CH_4	→	$C_7H_4^+$	+	H_2				2.00×10^{-10}	[3]
$R_{cn}540$	2	$C_6H_2^+$	+	C_2H_2	→	$Adduct^+$	+	hv				1.00×10^{-09}	[3]
$R_{cn}541$	2	$C_6H_2^+$	+	C_2H_4	→	$CXHYNZ^+$	+	H_2				1.00×10^{-09}	[3]
$R_{cn}542$	2	$C_6H_2^+$	+	CH_3CCH	→	$CXHYNZ^+$	+	H_2				$5.94\times10^{-10}(300/T)^{0.50}$	[3]
$R_{cn}543$	2	$C_6H_2^+$	+	C_6H_6	→	$C_6H_6^+$	+	C_6H_2				1.26×10^{-09}	[62]
$R_{cn}544$	2	$C_6H_2^+$	+	N	→	C_5H^+	+	HCN				1.90×10^{-10}	[63]
$R_{cn}545$	2	$C_6H_3^+$	+	C_2H_2	→	$Adduct^+$	+	hv				2.30×10^{-10}	[2]
$R_{cn}546$	3	$C_6H_3^+$	+	C_4H_2	→	$Adduct^+$						1.00×10^{-10} 5.30×10^{-26}	[2]
$R_{cn}547$	2	$C_6H_3^+$	+	C_6H_6	→	$CXHYNZ^+$						4.20×10^{-10}	[62]
$R_{cn}548$	3	$C_6H_3^+$	+	HCN	→	$AdductN^+$						1.00×10^{-10} 6.80×10^{-27}	[2]
$R_{cn}549$	2	$C_6H_4^+$	+	H	→	$C_6H_5^+$	+	hv				3.30×10^{-11}	[2]
$R_{cn}550$	2	$C_6H_4^+$	+	C_2H_2	→	$Adduct^+$	+	hv				2.90×10^{-10}	[2]
$R_{cn}551a$	2	$C_6H_4^+$	+	C_6H_6	→	$Adduct^+$	+	hv				1.27×10^{-10}	[64]
$R_{cn}551b$	2	$C_6H_4^+$	+	C_6H_6	→	$CXHYNZ^+$	+	H_2				1.41×10^{-11}	[64]
$R_{cn}552$	2	$C_6H_5^+$	+	H_2	→	$C_6H_7^+$	+	hv				6.00×10^{-11}	[2]
$R_{cn}553$	2	$C_6H_5^+$	+	CH_4	→	$C_7H_7^+$	+	H_2				7.50×10^{-11}	[2]
$R_{cn}554a$	2	$C_6H_5^+$	+	C_2H_2	→	$CXHYNZ^+$	+	H				7.80×10^{-11}	[2]
$R_{cn}554b$	2	$C_6H_5^+$	+	C_2H_2	→	$Adduct^+$	+	hv				5.20×10^{-11}	[2]
$R_{cn}555a$	2	$C_6H_5^+$	+	C_2H_4	→	$C_6H_7^+$	+	C_2H_2				1.02×10^{-10}	[2]
$R_{cn}555b$	2	$C_6H_5^+$	+	C_2H_4	→	$CXHYNZ^+$	+	H_2				6.80×10^{-11}	[2]
$R_{cn}555c$	3	$C_6H_5^+$	+	C_2H_4	→	$Adduct^+$						1.00×10^{-10} 3.40×10^{-26}	[2]
$R_{cn}556a$	2	$C_6H_5^+$	+	C_2H_6	→	$C_7H_7^+$	+	CH_4				3.90×10^{-12}	[2]
$R_{cn}556b$	2	$C_6H_5^+$	+	C_2H_6	→	$C_6H_7^+$	+	C_2H_4				1.26×10^{-10}	[2]
$R_{cn}557a$	2	$C_6H_5^+$	+	CH_3CCH	→	$C_7H_7^+$	+	C_2H_2				4.14×10^{-11}	[2]
$R_{cn}557b$	2	$C_6H_5^+$	+	CH_3CCH	→	$CXHYNZ^+$	+	H_2				1.79×10^{-10}	[2]
$R_{cn}557c$	2	$C_6H_5^+$	+	CH_3CCH	→	$CXHYNZ^+$	+	H				1.15×10^{-11}	[2]
$R_{cn}557d$	3	$C_6H_5^+$	+	CH_3CCH	→	$Adduct^+$						1.00×10^{-10} 5.20×10^{-24}	[2]
$R_{cn}558a$	2	$C_6H_5^+$	+	CH_2CCH_2	→	$C_7H_7^+$	+	C_2H_2				1.56×10^{-10}	[4]
$R_{cn}558b$	2	$C_6H_5^+$	+	CH_2CCH_2	→	$CXHYNZ^+$	+	H_2				3.64×10^{-10}	[4]
$R_{cn}559a$	2	$C_6H_5^+$	+	C_4H_2	→	$CXHYNZ^+$	+	C_2H_2				1.00×10^{-09}	[2]
$R_{cn}559b$	3	$C_6H_5^+$	+	C_4H_2	→	$Adduct^+$						1.00×10^{-10} 5.60×10^{-26}	[2]

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	Type	Reaction								k	Ref.
$R_{cn}560a$	2	$C_6H_5^+$	+	C_6H_6	→	$Adduct^+$	+	hv		8.46×10^{-11}	[65]
$R_{cn}560b$	2	$C_6H_5^+$	+	C_6H_6	→	$CXHYNZ^+$	+	H		5.17×10^{-11}	[65]
$R_{cn}560c$	2	$C_6H_5^+$	+	C_6H_6	→	$CXHYNZ^+$	+	H_2		2.30×10^{-10}	[65]
$R_{cn}560d$	2	$C_6H_5^+$	+	C_6H_6	→	$CXHYNZ^+$	+	C_2H_2		2.35×10^{-11}	[65]
$R_{cn}560e$	2	$C_6H_5^+$	+	C_6H_6	→	$CXHYNZ^+$	+	C_2H_3		1.41×10^{-11}	[65]
$R_{cn}560f$	2	$C_6H_5^+$	+	C_6H_6	→	$CXHYNZ^+$	+	CH_3CCH		2.82×10^{-11}	[65]
$R_{cn}561$	2	$C_6H_5^+$	+	N	→	$C_5H_4^+$	+	HCN		3.70×10^{-11}	[2]
$R_{cn}562a$	2	$C_6H_5^+$	+	NH_3	→	NH_4^+	+	C_6H_4		7.49×10^{-11}	[48]
$R_{cn}562b$	2	$C_6H_5^+$	+	NH_3	→	$C_6H_7N^+$	+	H		4.78×10^{-11}	[48]
$R_{cn}562c$	2	$C_6H_5^+$	+	NH_3	→	$C_6H_7NH^+$	+	hv		8.53×10^{-11}	[48]
$R_{cn}563$	3	$C_6H_5^+$	+	HCN	→	$AdductN^+$				1.00×10^{-10}	[2]
										9.60×10^{-26}	
$R_{cn}564a$	2	$C_6H_5^+$	+	$O(^3P)$	→	$C_5H_5^+$	+	CO		6.00×10^{-11}	[19]
$R_{cn}564b$	2	$C_6H_5^+$	+	$O(^3P)$	→	$c-C_3H_3^+$	+	C_3H_2O		4.00×10^{-11}	[19]
$R_{cn}565$	3	$C_6H_5^+$	+	H_2O	→	$Adduct^+$				1.00×10^{-10}	[2]
										6.20×10^{-26}	
$R_{cn}566$	2	$C_6H_6^+$	+	H	→	$C_6H_7^+$	+	hv		2.50×10^{-10}	[2]
$R_{cn}567$	2	$C_6H_6^+$	+	C_4H_2	→	$Adduct^+$	+	hv		5.00×10^{-10}	[2]
$R_{cn}568a$	2	$C_6H_6^+$	+	N	→	$C_5H_5^+$	+	HCN		1.33×10^{-10}	[2]
$R_{cn}568b$	2	$C_6H_6^+$	+	N	→	$c-C_3H_3^+$	+	C_3H_3N		7.00×10^{-12}	[2]
$R_{cn}569a$	2	$C_6H_7^+$	+	CH_3CCH	→	$C_7H_7^+$	+	C_2H_4		9.70×10^{-11}	[2]
$R_{cn}569b$	3	$C_6H_7^+$	+	CH_3CCH	→	$Adduct^+$				1.00×10^{-10}	[2]
										3.00×10^{-25}	
$R_{cn}570$	2	$C_6H_7^+$	+	CH_2CCH_2	→	$C_3H_5^+$	+	C_6H_6		4.70×10^{-11}	[66]
$R_{cn}571$	2	$C_6H_7^+$	+	NH_3	→	NH_4^+	+	C_6H_6		2.20×10^{-10}	[48]
$R_{cn}572$	2	C_7^+	+	H_2	→	C_7H^+	+	H		1.90×10^{-10}	[3]
$R_{cn}573$	2	C_7H^+	+	H_2	→	$C_7H_2^+$	+	H		1.00×10^{-17}	[3]
$R_{cn}574$	2	C_7H^+	+	N	→	C_7N^+	+	H		2.00×10^{-10}	[3]
$R_{cn}575$	2	$C_7H_2^+$	+	CH_4	→	$CXHYNZ^+$	+	H_2		1.00×10^{-09}	[3]
$R_{cn}576a$	2	$C_7H_2^+$	+	C_2H_2	→	$CXHYNZ^+$	+	H		7.00×10^{-10}	[3]
$R_{cn}576b$	2	$C_7H_2^+$	+	C_2H_2	→	$CXHYNZ^+$	+	H_2		3.00×10^{-10}	[3]
$R_{cn}577$	2	$C_7H_2^+$	+	C_2H_4	→	$CXHYNZ^+$	+	H_2		1.00×10^{-09}	[3]
$R_{cn}578$	2	$C_7H_2^+$	+	N	→	HC_7N^+	+	H		2.00×10^{-10}	[3]
$R_{cn}579$	2	$C_7H_3^+$	+	N	→	HC_7NH^+	+	H		2.00×10^{-10}	[3]
$R_{cn}580$	2	$C_7H_4^+$	+	N	→	$C_7H_3N^+$	+	H		1.00×10^{-10}	[3]
$R_{cn}581$	2	$C_7H_5^+$	+	N	→	$C_7H_3N^+$	+	H_2		1.00×10^{-10}	[3]
$R_{cn}582$	2	$C_7H_7^+$	+	C_2H_4	→	$Adduct^+$	+	hv		2.00×10^{-10}	[2]
$R_{cn}583a$	2	$C_7H_7^+$	+	CH_3CCH	→	$Adduct^+$	+	hv		1.40×10^{-10}	[2]
$R_{cn}583b$	3	$C_7H_7^+$	+	CH_3CCH	→	$Adduct^+$				1.00×10^{-10}	[2]
										7.90×10^{-24}	
$R_{cn}584$	2	$C_7H_7^+$	+	C_3H_6	→	$CXHYNZ^+$				7.00×10^{-11}	[67]
$R_{cn}585$	2	$C_7H_7^+$	+	C_4H_2	→	$Adduct^+$	+	hv		1.00×10^{-09}	[2]
$R_{cn}586$	2	$C_7H_7^+$	+	C_7H_8	→	$CXHYNZ^+$	+	C_6H_6		1.60×10^{-10}	[68]
$R_{cn}587$	2	$C_7H_7^+$	+	CH_2NH	→	$CH_2NH_2^+$	+	C_7H_6		3.40×10^{-11}	[33]
$R_{cn}588a$	2	$C_7H_7^+$	+	CH_3NH_2	→	$CH_3NH_3^+$	+	C_7H_6		1.62×10^{-11}	[33]
$R_{cn}588b$	2	$C_7H_7^+$	+	CH_3NH_2	→	$Adduct^+$	+	hv		1.80×10^{-12}	[33]
$R_{cn}589$	2	$C_7H_8^+$	+	C_3H_6	→	$CXHYNZ^+$	+	H		1.70×10^{-10}	[69]
$R_{cn}590$	2	C_8H^+	+	H_2	→	$C_8H_2^+$	+	H		1.00×10^{-09}	[3]
$R_{cn}591$	2	$C_8H_2^+$	+	CH_4	→	$CXHYNZ^+$	+	H_2		1.00×10^{-09}	[3]
$R_{cn}592$	2	N^+	+	H_2	→	NH^+	+	H		$4.16\times10^{-10}e^{-41.9/T}$	[70]

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	Type	Reaction										k	Ref.
$R_{cn}593a$	2	N^+	+	CH_4	→	CH_3^+	+	NH				5.00×10^{-10}	[71]
$R_{cn}593b$	2	N^+	+	CH_4	→	$HCNH^+$	+	H_2				3.50×10^{-10}	[71]
$R_{cn}593c$	2	N^+	+	CH_4	→	HCN^+	+	H_2	+	H		1.00×10^{-10}	[71]
$R_{cn}593d$	2	N^+	+	CH_4	→	CH_4^+	+	N				5.00×10^{-11}	[71]
$R_{cn}594a$	2	N^+	+	C_2H_2	→	$C_2H_2^+$	+	N				9.94×10^{-10}	[71]
$R_{cn}594b$	2	N^+	+	C_2H_2	→	CNC^+	+	H_2				2.13×10^{-10}	[71]
$R_{cn}594c$	2	N^+	+	C_2H_2	→	HC_2N^+	+	H				2.13×10^{-10}	[71]
$R_{cn}595a$	2	N^+	+	C_2H_4	→	$C_2H_2^+$	+	NH_2				1.90×10^{-10}	[71]
$R_{cn}595b$	2	N^+	+	C_2H_4	→	$C_2H_3^+$	+	NH				5.06×10^{-10}	[71]
$R_{cn}595c$	2	N^+	+	C_2H_4	→	$C_2H_4^+$	+	N				6.00×10^{-10}	[71]
$R_{cn}595d$	2	N^+	+	C_2H_4	→	HCN^+	+	CH_3				3.16×10^{-11}	[71]
$R_{cn}595e$	2	N^+	+	C_2H_4	→	$HCNH^+$	+	$^3CH_2$				1.58×10^{-10}	[71]
$R_{cn}595f$	2	N^+	+	C_2H_4	→	HC_2N^+	+	H_2	+	H		1.58×10^{-11}	[71]
$R_{cn}595g$	2	N^+	+	C_2H_4	→	HC_2NH^+	+	H_2				7.90×10^{-11}	[71]
$R_{cn}596a$	2	N^+	+	C_2H_6	→	$C_2H_5^+$	+	NH				1.60×10^{-10}	[71]
$R_{cn}596b$	2	N^+	+	C_2H_6	→	$C_2H_4^+$	+	NH_2				8.80×10^{-10}	[71]
$R_{cn}596c$	2	N^+	+	C_2H_6	→	$C_2H_3^+$	+	NH_3				4.00×10^{-10}	[71]
$R_{cn}596d$	2	N^+	+	C_2H_6	→	$HCNH^+$	+	CH_4				1.60×10^{-10}	[71]
$R_{cn}597a$	2	N^+	+	CH_3CCH	→	$C_2H_2^+$	+	H_2CN				1.20×10^{-10}	[72]
$R_{cn}597b$	2	N^+	+	CH_3CCH	→	$C_2H_4^+$	+	CN				1.40×10^{-10}	[72]
$R_{cn}597c$	2	N^+	+	CH_3CCH	→	$C_3H_2^+$	+	NH_2				6.00×10^{-11}	[72]
$R_{cn}597d$	2	N^+	+	CH_3CCH	→	$l-C_3H_3^+$	+	N	+	H		4.35×10^{-10}	[72]
$R_{cn}597e$	2	N^+	+	CH_3CCH	→	$c-C_3H_3^+$	+	N	+	H		4.35×10^{-10}	[72]
$R_{cn}597f$	2	N^+	+	CH_3CCH	→	$l-C_3H_3^+$	+	NH				1.15×10^{-10}	[72]
$R_{cn}597g$	2	N^+	+	CH_3CCH	→	$c-C_3H_3^+$	+	NH				1.15×10^{-10}	[72]
$R_{cn}597h$	2	N^+	+	CH_3CCH	→	$C_3H_4^+$	+	N				7.00×10^{-11}	[72]
$R_{cn}597i$	2	N^+	+	CH_3CCH	→	$C_3H_4^+$	+	$N(^2D)$				2.10×10^{-10}	[72]
$R_{cn}597j$	2	N^+	+	CH_3CCH	→	HC_2NH^+	+	$^3CH_2$				1.00×10^{-10}	[72]
$R_{cn}597k$	2	N^+	+	CH_3CCH	→	$C_2H_3N^+$	+	CH				4.00×10^{-11}	[72]
$R_{cn}597l$	2	N^+	+	CH_3CCH	→	$C_2H_3NH^+$	+	C				1.00×10^{-10}	[72]
$R_{cn}597m$	2	N^+	+	CH_3CCH	→	HC_3NH^+	+	H_2				6.00×10^{-11}	[72]
$R_{cn}598a$	2	N^+	+	C_3H_6	→	$C_2H_2^+$	+	NH	+	CH_3		8.00×10^{-11}	[72]
$R_{cn}598b$	2	N^+	+	C_3H_6	→	$C_2H_3^+$	+	N	+	CH_3		2.00×10^{-10}	[72]
$R_{cn}598c$	2	N^+	+	C_3H_6	→	$C_2H_4^+$	+	H_2CN				1.60×10^{-10}	[72]
$R_{cn}598d$	2	N^+	+	C_3H_6	→	$C_2H_5^+$	+	HCN				4.00×10^{-11}	[72]
$R_{cn}598e$	2	N^+	+	C_3H_6	→	$l-C_3H_3^+$	+	N	+	H_3		2.00×10^{-11}	[72]
$R_{cn}598f$	2	N^+	+	C_3H_6	→	$c-C_3H_3^+$	+	N	+	H_3		2.00×10^{-11}	[72]
$R_{cn}598g$	2	N^+	+	C_3H_6	→	$l-C_3H_3^+$	+	NH	+	H_2		1.40×10^{-10}	[72]
$R_{cn}598h$	2	N^+	+	C_3H_6	→	$c-C_3H_3^+$	+	NH	+	H_2		1.40×10^{-10}	[72]
$R_{cn}598i$	2	N^+	+	C_3H_6	→	$C_3H_4^+$	+	N	+	H_2		8.00×10^{-11}	[72]
$R_{cn}598j$	2	N^+	+	C_3H_6	→	$C_3H_5^+$	+	N	+	H		2.60×10^{-10}	[72]
$R_{cn}598k$	2	N^+	+	C_3H_6	→	$C_3H_5^+$	+	$N(^2D)$	+	H		1.60×10^{-10}	[72]
$R_{cn}598l$	2	N^+	+	C_3H_6	→	$C_3H_5^+$	+	NH				6.00×10^{-11}	[72]
$R_{cn}598m$	2	N^+	+	C_3H_6	→	$C_3H_6^+$	+	N				4.00×10^{-11}	[72]
$R_{cn}598n$	2	N^+	+	C_3H_6	→	$C_3H_6^+$	+	$N(^2D)$				6.00×10^{-10}	[72]
$R_{cn}599a$	2	N^+	+	C_3H_8	→	$C_2H_3^+$	+	NH	+	CH_4		2.40×10^{-10}	[72]
$R_{cn}599b$	2	N^+	+	C_3H_8	→	$C_2H_4^+$	+	N	+	CH_4		1.80×10^{-10}	[72]
$R_{cn}599c$	2	N^+	+	C_3H_8	→	$C_2H_4^+$	+	$N(^2D)$	+	CH_4		3.00×10^{-10}	[72]
$R_{cn}599d$	2	N^+	+	C_3H_8	→	$C_2H_4^+$	+	NH	+	CH_3		2.00×10^{-11}	[72]
$R_{cn}599e$	2	N^+	+	C_3H_8	→	$C_2H_5^+$	+	N	+	CH_3		7.20×10^{-10}	[72]

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	Type	Reaction										k	Ref.
$R_{cn}599f$	2	N^+	+	C_3H_8	→	$C_3H_5^+$	+	N	+	H_2		6.00×10^{-11}	[72]
$R_{cn}599g$	2	N^+	+	C_3H_8	→	$C_3H_5^+$	+	NH	+	H_2		1.60×10^{-10}	[72]
$R_{cn}599h$	2	N^+	+	C_3H_8	→	$C_3H_6^+$	+	N	+	H_2		6.00×10^{-11}	[72]
$R_{cn}599i$	2	N^+	+	C_3H_8	→	$C_3H_6^+$	+	$N(^2D)$	+	H_2		4.00×10^{-11}	[72]
$R_{cn}599j$	2	N^+	+	C_3H_8	→	$C_3H_7^+$	+	N	+	H		1.00×10^{-10}	[72]
$R_{cn}599k$	2	N^+	+	C_3H_8	→	$C_3H_7^+$	+	$N(^2D)$	+	H		4.00×10^{-11}	[72]
$R_{cn}599l$	2	N^+	+	C_3H_8	→	$C_3H_7^+$	+	NH				4.00×10^{-11}	[72]
$R_{cn}599m$	2	N^+	+	C_3H_8	→	$C_3H_8^+$	+	$N(^2D)$				4.00×10^{-11}	[72]
$R_{cn}600a$	2	N^+	+	C_6H_6	→	$C_6H_6^+$	+	N				1.85×10^{-09}	[73]
$R_{cn}600b$	2	N^+	+	C_6H_6	→	$C_5H_4^+$	+	HCN	+	H		1.82×10^{-10}	[73]
$R_{cn}600c$	2	N^+	+	C_6H_6	→	$c-C_3H_3^+$	+	C_3H_3N				5.72×10^{-10}	[73]
$R_{cn}601a$	2	N^+	+	C_7H_8	→	$C_7H_7^+$	+	NH				1.80×10^{-09}	[74]
$R_{cn}601b$	2	N^+	+	C_7H_8	→	$C_6H_6^+$	+	H_2CN				1.54×10^{-10}	[74]
$R_{cn}601c$	2	N^+	+	C_7H_8	→	$C_5H_5^+$	+	CH_3CN				1.10×10^{-10}	[74]
$R_{cn}601d$	2	N^+	+	C_7H_8	→	$C_4H_4^+$	+	C_3H_4N				4.40×10^{-11}	[74]
$R_{cn}601e$	2	N^+	+	C_7H_8	→	$c-C_3H_3^+$	+	C_4H_5N				8.80×10^{-11}	[74]
$R_{cn}602a$	2	N^+	+	NH_3	→	NH_2^+	+	NH				4.70×10^{-10}	[4]
$R_{cn}602b$	2	N^+	+	NH_3	→	NH_3^+	+	N				1.67×10^{-09}	[4]
$R_{cn}602c$	2	N^+	+	NH_3	→	N_2H^+	+	H_2				2.12×10^{-10}	[4]
$R_{cn}603a$	2	N^+	+	HCN	→	HCN^+	+	N				2.40×10^{-09}	[2]
$R_{cn}603b$	2	N^+	+	HCN	→	CH^+	+	N_2				1.29×10^{-09}	[2]
$R_{cn}604a$	2	N^+	+	CH_3NH_2	→	$CH_3NH_2^+$	+	N				1.54×10^{-10}	[75]
$R_{cn}604b$	2	N^+	+	CH_3NH_2	→	$CH_2NH_2^+$	+	N	+	H		1.59×10^{-09}	[75]
$R_{cn}604c$	2	N^+	+	CH_3NH_2	→	CH_2NH^+	+	N	+	H_2		1.79×10^{-10}	[75]
$R_{cn}604d$	2	N^+	+	CH_3NH_2	→	$HCNH^+$	+	N	+	H_3		4.61×10^{-10}	[75]
$R_{cn}604e$	2	N^+	+	CH_3NH_2	→	CH_3^+	+	NH_2	+	N		1.79×10^{-10}	[75]
$R_{cn}605a$	2	N^+	+	CH_3CN	→	$C_2H_3N^+$	+	N				5.00×10^{-10}	[2]
$R_{cn}605b$	2	N^+	+	CH_3CN	→	HC_2NH^+	+	NH				3.00×10^{-10}	[2]
$R_{cn}605c$	2	N^+	+	CH_3CN	→	$C_2H_2^+$	+	N_2	+	H		1.00×10^{-10}	[2]
$R_{cn}605d$	2	N^+	+	CH_3CN	→	CN^+	+	CH_2NH				1.00×10^{-10}	[2]
$R_{cn}606a$	2	N^+	+	HC_3N	→	C_3H^+	+	N_2				1.60×10^{-09}	[2]
$R_{cn}606b$	2	N^+	+	HC_3N	→	HC_3N^+	+	N				2.65×10^{-09}	[2]
$R_{cn}607a$	2	N^+	+	C_3H_3N	→	$C_3H_3N^+$	+	N				3.50×10^{-10}	[2]
$R_{cn}607b$	2	N^+	+	C_3H_3N	→	HC_3NH^+	+	NH				1.50×10^{-10}	[2]
$R_{cn}607c$	2	N^+	+	C_3H_3N	→	HC_2N^+	+	H_2CN				1.30×10^{-10}	[2]
$R_{cn}607d$	2	N^+	+	C_3H_3N	→	$c-C_3H_3^+$	+	N_2				1.20×10^{-10}	[2]
$R_{cn}607e$	2	N^+	+	C_3H_3N	→	CN^+	+	CH_3CN				1.30×10^{-10}	[2]
$R_{cn}607f$	2	N^+	+	C_3H_3N	→	$C_2H_2^+$	+	N_2	+	CH		1.20×10^{-10}	[2]
$R_{cn}608a$	2	N^+	+	C_3H_5N	→	N_2^+	+	C_3H_5				2.31×10^{-09}	[33]
$R_{cn}608b$	2	N^+	+	C_3H_5N	→	$l-C_3H_3^+$	+	N_2	+	H_2		4.20×10^{-10}	[33]
$R_{cn}608c$	2	N^+	+	C_3H_5N	→	$c-C_3H_3^+$	+	N_2	+	H_2		4.20×10^{-10}	[33]
$R_{cn}608d$	2	N^+	+	C_3H_5N	→	$C_3H_3NH^+$	+	NH				1.05×10^{-09}	[33]
$R_{cn}609a$	2	N^+	+	C_4H_5N	→	$l-C_3H_3^+$	+	H_2CN	+	N		1.23×10^{-10}	[73]
$R_{cn}609b$	2	N^+	+	C_4H_5N	→	$c-C_3H_3^+$	+	H_2CN	+	N		1.23×10^{-10}	[73]
$R_{cn}609c$	2	N^+	+	C_4H_5N	→	HC_2N^+	+	N	+	C_2H_4		2.45×10^{-10}	[73]
$R_{cn}609d$	2	N^+	+	C_4H_5N	→	$C_3H_4^+$	+	HCN	+	N		2.10×10^{-10}	[73]
$R_{cn}609e$	2	N^+	+	C_4H_5N	→	HC_2NH^+	+	CH_3CN				2.10×10^{-10}	[73]
$R_{cn}609f$	2	N^+	+	C_4H_5N	→	$C_3H_5^+$	+	CN	+	N		1.40×10^{-10}	[73]
$R_{cn}609g$	2	N^+	+	C_4H_5N	→	$C_2H_3N^+$	+	C_2H_2	+	N		1.40×10^{-10}	[73]
$R_{cn}609h$	2	N^+	+	C_4H_5N	→	$C_4H_4^+$	+	NH	+	N		2.63×10^{-10}	[73]

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	Type	Reaction	k	Ref.
$R_{cn}609i$	2	$N^+ + C_4H_5N \rightarrow HC_3NH^+ + CH_2NH$	2.63×10^{-10}	[73]
$R_{cn}609j$	2	$N^+ + C_4H_5N \rightarrow C_4H_5^+ + N_2$	2.63×10^{-10}	[73]
$R_{cn}609k$	2	$N^+ + C_4H_5N \rightarrow C_3H_3N^+ + H_2CN$	2.63×10^{-10}	[73]
$R_{cn}609l$	2	$N^+ + C_4H_5N \rightarrow C_3H_3NH^+ + HCN$	5.60×10^{-10}	[73]
$R_{cn}609m$	2	$N^+ + C_4H_5N \rightarrow C_4H_3NH^+ + NH$	2.80×10^{-10}	[73]
$R_{cn}609n$	2	$N^+ + C_4H_5N \rightarrow C_4H_5N^+ + N$	4.20×10^{-10}	[73]
$R_{cn}610a$	2	$N^+ + HC_5N \rightarrow HC_5N^+ + N$	3.15×10^{-09}	[12]
$R_{cn}610b$	2	$N^+ + HC_5N \rightarrow C_5H^+ + N_2$	3.15×10^{-09}	[12]
$R_{cn}611a$	2	$N^+ + C_5H_5N \rightarrow C_4H_4^+ + HCN + N$	1.84×10^{-09}	[76]
$R_{cn}611b$	2	$N^+ + C_5H_5N \rightarrow C_5H_5N^+ + N$	1.56×10^{-09}	[76]
$R_{cn}612$	3	$N^+ + N_2 \rightarrow N_3^+$	1.00×10^{-10}	[77],[2]
			$4.00\times10^{-29}(300/T)^{1.84}$	
$R_{cn}613a$	2	$N^+ + C_2N_2 \rightarrow C_2N_2^+ + N$	3.40×10^{-10}	[2]
$R_{cn}613b$	2	$N^+ + C_2N_2 \rightarrow C_2N^+ + N_2$	1.36×10^{-09}	[2]
$R_{cn}614$	2	$N^+ + O(^3P) \rightarrow O^+ + N$	4.50×10^{-12}	[78]
$R_{cn}615$	2	$N^+ + H_2O \rightarrow H_2O^+ + N$	2.70×10^{-09}	[2]
$R_{cn}616a$	2	$N^+ + CO \rightarrow C^+ + NO$	5.60×10^{-12}	[2]
$R_{cn}616b$	2	$N^+ + CO \rightarrow CO^+ + N$	4.93×10^{-10}	[2]
$R_{cn}616c$	2	$N^+ + CO \rightarrow NO^+ + C$	6.16×10^{-11}	[2]
$R_{cn}617a$	2	$N^+ + H_2CO \rightarrow HCO^+ + NH$	7.25×10^{-10}	[4]
$R_{cn}617b$	2	$N^+ + H_2CO \rightarrow CH_2O^+ + N$	1.89×10^{-09}	[4]
$R_{cn}617c$	2	$N^+ + H_2CO \rightarrow NO^+ + {}^3CH_2$	2.90×10^{-10}	[4]
$R_{cn}618a$	2	$N^+ + CO_2 \rightarrow CO^+ + NO$	2.02×10^{-10}	[4]
$R_{cn}618b$	2	$N^+ + CO_2 \rightarrow CO_2^+ + N$	9.18×10^{-10}	[4]
$R_{cn}619a$	2	$NH^+ + H_2 \rightarrow H_3^+ + N$	1.85×10^{-10}	[2]
$R_{cn}619b$	2	$NH^+ + H_2 \rightarrow NH_2^+ + H$	1.05×10^{-09}	[2]
$R_{cn}620a$	2	$NH^+ + CH_4 \rightarrow CH_5^+ + N$	9.60×10^{-11}	[2]
$R_{cn}620b$	2	$NH^+ + CH_4 \rightarrow NH_2^+ + CH_3$	1.92×10^{-10}	[2]
$R_{cn}620c$	2	$NH^+ + CH_4 \rightarrow HCNH^+ + H_2 + H$	6.72×10^{-10}	[2]
$R_{cn}621a$	2	$NH^+ + C_2H_4 \rightarrow C_2H_2^+ + NH_3$	1.50×10^{-10}	[2]
$R_{cn}621b$	2	$NH^+ + C_2H_4 \rightarrow C_2H_3^+ + NH_2$	3.75×10^{-10}	[2]
$R_{cn}621c$	2	$NH^+ + C_2H_4 \rightarrow C_2H_4^+ + NH$	3.75×10^{-10}	[2]
$R_{cn}621d$	2	$NH^+ + C_2H_4 \rightarrow HCNH^+ + CH_3$	3.00×10^{-10}	[2]
$R_{cn}621e$	2	$NH^+ + C_2H_4 \rightarrow CH_2NH^+ + {}^3CH_2$	1.50×10^{-10}	[2]
$R_{cn}621f$	2	$NH^+ + C_2H_4 \rightarrow C_2H_3N^+ + H_2$	1.50×10^{-10}	[2]
$R_{cn}622a$	2	$NH^+ + CH_3CCH \rightarrow CH_2NH^+ + C_2H_2$	1.09×10^{-10}	[48]
$R_{cn}622b$	2	$NH^+ + CH_3CCH \rightarrow CH_2NH_2^+ + C_2H$	9.07×10^{-11}	[48]
$R_{cn}622c$	2	$NH^+ + CH_3CCH \rightarrow c{-}C_3H_3^+ + NH_2$	1.59×10^{-10}	[48]
$R_{cn}622d$	2	$NH^+ + CH_3CCH \rightarrow HC_2N^+ + CH_4$	1.59×10^{-10}	[48]
$R_{cn}622e$	2	$NH^+ + CH_3CCH \rightarrow C_3H_4^+ + NH$	1.27×10^{-10}	[48]
$R_{cn}622f$	2	$NH^+ + CH_3CCH \rightarrow HC_2NH^+ + CH_3$	1.27×10^{-10}	[48]
$R_{cn}622g$	2	$NH^+ + CH_3CCH \rightarrow C_3H_5^+ + N$	6.35×10^{-11}	[48]
$R_{cn}622h$	2	$NH^+ + CH_3CCH \rightarrow C_2H_3N^+ + {}^3CH_2$	6.35×10^{-11}	[48]
$R_{cn}623$	2	$NH^+ + N \rightarrow N_2^+ + H$	1.30×10^{-09}	[3]
$R_{cn}624a$	2	$NH^+ + NH_3 \rightarrow NH_3^+ + NH$	1.80×10^{-09}	[4]
$R_{cn}624b$	2	$NH^+ + NH_3 \rightarrow NH_4^+ + N$	6.00×10^{-10}	[4]
$R_{cn}625$	2	$NH^+ + HCN \rightarrow HCNH^+ + N$	6.04×10^{-09}	Su-Chesnavich
$R_{cn}626a$	2	$NH^+ + CH_3NH_2 \rightarrow HCNH^+ + NH_3 + H$	4.20×10^{-10}	[4]
$R_{cn}626b$	2	$NH^+ + CH_3NH_2 \rightarrow CH_2NH^+ + NH_3$	1.05×10^{-10}	[4]
$R_{cn}626c$	2	$NH^+ + CH_3NH_2 \rightarrow CH_2NH_2^+ + NH_2$	9.45×10^{-10}	[4]

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	Type	Reaction	k	Ref.
$R_{cn}626d$	2	$NH^+ + CH_3NH_2 \rightarrow CH_3NH_2^+ + NH$	4.20×10^{-10}	[4]
$R_{cn}626e$	2	$NH^+ + CH_3NH_2 \rightarrow CH_3NH_3^+ + N$	4.20×10^{-10}	[4]
$R_{cn}627$	2	$NH^+ + N_2 \rightarrow N_2H^+ + N$	6.50×10^{-10}	[2]
$R_{cn}628a$	2	$NH^+ + H_2O \rightarrow H_3O^+ + N$	1.05×10^{-09}	[2]
$R_{cn}628b$	2	$NH^+ + H_2O \rightarrow H_2O^+ + NH$	1.05×10^{-09}	[2]
$R_{cn}628c$	2	$NH^+ + H_2O \rightarrow NH_2^+ + OH$	8.75×10^{-10}	[2]
$R_{cn}628d$	2	$NH^+ + H_2O \rightarrow NH_3^+ + O(^3P)$	1.75×10^{-10}	[2]
$R_{cn}628e$	2	$NH^+ + H_2O \rightarrow HNO^+ + H_2$	3.50×10^{-10}	[2]
$R_{cn}629a$	2	$NH^+ + CO \rightarrow NCO^+ + H$	5.39×10^{-10}	[2]
$R_{cn}629b$	2	$NH^+ + CO \rightarrow HCO^+ + N$	4.41×10^{-10}	[2]
$R_{cn}630a$	2	$NH^+ + H_2CO \rightarrow HCO^+ + NH_2$	1.82×10^{-09}	[4]
$R_{cn}630b$	2	$NH^+ + H_2CO \rightarrow CH_2O^+ + NH$	9.90×10^{-10}	[4]
$R_{cn}630c$	2	$NH^+ + H_2CO \rightarrow CH_2OH^+ + N$	4.95×10^{-10}	[4]
$R_{cn}631a$	2	$NH^+ + CO_2 \rightarrow OCOH^+ + N$	3.85×10^{-10}	[79],[80]
$R_{cn}631b$	2	$NH^+ + CO_2 \rightarrow NO^+ + HCO$	3.30×10^{-10}	[79],[80]
$R_{cn}631c$	2	$NH^+ + CO_2 \rightarrow HNO^+ + CO$	3.85×10^{-10}	[79],[80]
$R_{cn}632$	2	$NH_2^+ + H_2 \rightarrow NH_3^+ + H$	1.95×10^{-10}	[2]
$R_{cn}633$	2	$NH_2^+ + CH_4 \rightarrow NH_3^+ + CH_3$	9.20×10^{-10}	[2]
$R_{cn}634a$	2	$NH_2^+ + C_2H_4 \rightarrow C_2H_4^+ + NH_2$	4.50×10^{-10}	[2]
$R_{cn}634b$	2	$NH_2^+ + C_2H_4 \rightarrow C_2H_5^+ + NH$	3.00×10^{-10}	[2]
$R_{cn}634c$	2	$NH_2^+ + C_2H_4 \rightarrow CH_2NH_2^+ + {}^3CH_2$	4.50×10^{-10}	[2]
$R_{cn}634d$	2	$NH_2^+ + C_2H_4 \rightarrow C_2H_5N^+ + H$	3.00×10^{-10}	[2]
$R_{cn}635a$	2	$NH_2^+ + CH_3CCH \rightarrow C_3H_4^+ + NH_2$	1.44×10^{-10}	[48]
$R_{cn}635b$	2	$NH_2^+ + CH_3CCH \rightarrow HC_2NH^+ + CH_4$	1.44×10^{-10}	[48]
$R_{cn}635c$	2	$NH_2^+ + CH_3CCH \rightarrow C_3H_5^+ + NH$	1.44×10^{-10}	[48]
$R_{cn}635d$	2	$NH_2^+ + CH_3CCH \rightarrow C_2H_3N^+ + {}^3CH_2 + H$	1.44×10^{-10}	[48]
$R_{cn}635e$	2	$NH_2^+ + CH_3CCH \rightarrow C_3H_3NH^+ + H_2$	2.03×10^{-10}	[48]
$R_{cn}636$	2	$NH_2^+ + N \rightarrow N_2H^+ + H$	9.10×10^{-11}	[3]
$R_{cn}637a$	2	$NH_2^+ + NH_3 \rightarrow NH_3^+ + NH_2$	1.15×10^{-09}	[4]
$R_{cn}637b$	2	$NH_2^+ + NH_3 \rightarrow NH_4^+ + NH$	1.15×10^{-09}	[4]
$R_{cn}638$	2	$NH_2^+ + HCN \rightarrow HCNH^+ + NH$	5.94×10^{-09}	Su-Chesnavich
$R_{cn}639a$	2	$NH_2^+ + CH_3NH_2 \rightarrow NH_4^+ + CH_2NH$	1.52×10^{-10}	[4]
$R_{cn}639b$	2	$NH_2^+ + CH_3NH_2 \rightarrow CH_2NH_2^+ + NH_3$	3.80×10^{-10}	[4]
$R_{cn}639c$	2	$NH_2^+ + CH_3NH_2 \rightarrow CH_3NH_2^+ + NH_2$	1.01×10^{-09}	[4]
$R_{cn}639d$	2	$NH_2^+ + CH_3NH_2 \rightarrow CH_3NH_3^+ + NH$	3.80×10^{-10}	[4]
$R_{cn}640a$	2	$NH_2^+ + H_2O \rightarrow NH_3^+ + OH$	8.70×10^{-11}	[2]
$R_{cn}640b$	2	$NH_2^+ + H_2O \rightarrow NH_4^+ + O(^3P)$	1.16×10^{-10}	[2]
$R_{cn}640c$	2	$NH_2^+ + H_2O \rightarrow H_3O^+ + NH$	2.73×10^{-09}	[2]
$R_{cn}641a$	2	$NH_2^+ + H_2CO \rightarrow NH_3^+ + HCO$	5.60×10^{-10}	[4]
$R_{cn}641b$	2	$NH_2^+ + H_2CO \rightarrow CH_2OH^+ + NH$	2.24×10^{-09}	[4]
$R_{cn}642$	2	$NH_3^+ + H_2 \rightarrow NH_4^+ + H$	2.00×10^{-13}	[3]
$R_{cn}643$	2	$NH_3^+ + CH_4 \rightarrow NH_4^+ + CH_3$	4.80×10^{-10}	[2]
$R_{cn}644$	2	$NH_3^+ + C_2H_4 \rightarrow NH_4^+ + C_2H_3$	1.40×10^{-09}	[2]
$R_{cn}645$	2	$NH_3^+ + NH_3 \rightarrow NH_4^+ + NH_2$	2.10×10^{-09}	[2]
$R_{cn}646a$	2	$NH_3^+ + CH_3NH_2 \rightarrow CH_3NH_2^+ + NH_3$	9.00×10^{-10}	[4]
$R_{cn}646b$	2	$NH_3^+ + CH_3NH_2 \rightarrow CH_3NH_3^+ + NH_2$	6.30×10^{-10}	[4]
$R_{cn}646c$	2	$NH_3^+ + CH_3NH_2 \rightarrow NH_4^+ + CH_2NH_2$	2.70×10^{-10}	[4]
$R_{cn}647$	2	$NH_3^+ + C_5H_5N \rightarrow C_5H_5N^+ + NH_3$	3.60×10^{-09}	[76]
$R_{cn}648$	2	$NH_3^+ + H_2O \rightarrow NH_4^+ + OH$	2.50×10^{-10}	[2]
$R_{cn}649$	2	$NH_3^+ + H_2CO \rightarrow NH_4^+ + HCO$	8.00×10^{-10}	[4]

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	Type	Reaction										k	Ref.
$R_{cn}650$	2	NH_4^+	+	NH_3	→	AdductN$^+$	+	hv				3.00×10^{-10}	[2]
$R_{cn}651$	2	NH_4^+	+	CH_3NH_2	→	$CH_3NH_3^+$	+	NH_3				2.00×10^{-09}	[4]
$R_{cn}652$	2	NH_4^+	+	C_5H_5N	→	$C_5H_5NH^+$	+	NH_3				3.50×10^{-09}	[76]
$R_{cn}653$	2	CN^+	+	H	→	H^+	+	CN				6.40×10^{-10}	[2]
$R_{cn}654a$	2	CN^+	+	H_2	→	HCN^+	+	H				8.00×10^{-10}	[2]
$R_{cn}654b$	2	CN^+	+	H_2	→	HNC^+	+	H				8.00×10^{-10}	[2]
$R_{cn}655a$	2	CN^+	+	CH_4	→	CH_3^+	+	HCN				5.00×10^{-10}	[2]
$R_{cn}655b$	2	CN^+	+	CH_4	→	CH_4^+	+	CN				1.50×10^{-10}	[2]
$R_{cn}655c$	2	CN^+	+	CH_4	→	HCN^+	+	CH_3				1.50×10^{-10}	[2]
$R_{cn}655d$	2	CN^+	+	CH_4	→	$HCNH^+$	+	$^3CH_2$				1.00×10^{-10}	[2]
$R_{cn}655e$	2	CN^+	+	CH_4	→	HC_2NH^+	+	H_2				1.00×10^{-10}	[2]
$R_{cn}656a$	2	CN^+	+	C_2H_2	→	$C_2H_2^+$	+	CN				8.00×10^{-10}	[2]
$R_{cn}656b$	2	CN^+	+	C_2H_2	→	HC_3N^+	+	H				2.00×10^{-10}	[2]
$R_{cn}657a$	2	CN^+	+	C_2H_4	→	$C_2H_4^+$	+	CN				9.10×10^{-10}	[2]
$R_{cn}657b$	2	CN^+	+	C_2H_4	→	HCN^+	+	C_2H_3				3.25×10^{-10}	[2]
$R_{cn}657c$	2	CN^+	+	C_2H_4	→	HC_3NH^+	+	H_2				6.50×10^{-11}	[2]
$R_{cn}658a$	2	CN^+	+	C_2H_6	→	$C_2H_3^+$	+	HCN	+	H_2		2.85×10^{-10}	[2]
$R_{cn}658b$	2	CN^+	+	C_2H_6	→	$C_2H_4^+$	+	HCN	+	H		1.23×10^{-09}	[2]
$R_{cn}658c$	2	CN^+	+	C_2H_6	→	$C_2H_5^+$	+	HCN				3.80×10^{-10}	[2]
$R_{cn}659a$	2	CN^+	+	C_4H_2	→	$C_4H_2^+$	+	CN				7.27×10^{-10}	[2]
$R_{cn}659b$	2	CN^+	+	C_4H_2	→	HC_5N^+	+	H				2.42×10^{-10}	[2]
$R_{cn}660$	2	CN^+	+	N	→	N_2^+	+	C				6.10×10^{-10}	[2]
$R_{cn}661a$	2	CN^+	+	NH_3	→	NH_2^+	+	HCN				1.00×10^{-10}	[4]
$R_{cn}661b$	2	CN^+	+	NH_3	→	NH_3^+	+	CN				1.20×10^{-09}	[4]
$R_{cn}661c$	2	CN^+	+	NH_3	→	HCN^+	+	NH_2				4.00×10^{-10}	[4]
$R_{cn}661d$	2	CN^+	+	NH_3	→	$HCNH^+$	+	NH				3.00×10^{-10}	[4]
$R_{cn}662a$	2	CN^+	+	HCN	→	HCN^+	+	CN				2.24×10^{-09}	[2]
$R_{cn}662b$	2	CN^+	+	HCN	→	$C_2N_2^+$	+	H				4.59×10^{-10}	[2]
$R_{cn}663a$	2	CN^+	+	CH_3CN	→	$C_2H_3N^+$	+	CN				1.70×10^{-09}	[2]
$R_{cn}663b$	2	CN^+	+	CH_3CN	→	HC_2NH^+	+	HCN				6.80×10^{-10}	[2]
$R_{cn}663c$	2	CN^+	+	CH_3CN	→	CH_3^+	+	C_2N_2				6.80×10^{-10}	[2]
$R_{cn}663d$	2	CN^+	+	CH_3CN	→	$C_2H_3^+$	+	CN_2				3.40×10^{-10}	[2]
$R_{cn}664a$	2	CN^+	+	HC_3N	→	C_3N^+	+	HCN				9.20×10^{-10}	[2]
$R_{cn}664b$	2	CN^+	+	HC_3N	→	HC_3N^+	+	CN				3.68×10^{-09}	[2]
$R_{cn}665a$	2	CN^+	+	C_3H_3N	→	c$-C_3H_3^+$	+	N_2	+	C		7.20×10^{-10}	[10],[11]
$R_{cn}665b$	2	CN^+	+	C_3H_3N	→	$C_3H_3N^+$	+	CN				1.69×10^{-09}	[10],[11]
$R_{cn}665c$	2	CN^+	+	C_3H_3N	→	$C_2N_2H^+$	+	C_2H_2				1.69×10^{-09}	[10],[11]
$R_{cn}665d$	2	CN^+	+	C_3H_3N	→	AdductN$^+$	+	hv				4.05×10^{-10}	[10],[11]
$R_{cn}666a$	2	CN^+	+	C_2N_2	→	C_2N^+	+	CN_2				5.25×10^{-11}	[2]
$R_{cn}666b$	2	CN^+	+	C_2N_2	→	$C_2N_2^+$	+	CN				1.63×10^{-09}	[2]
$R_{cn}666c$	2	CN^+	+	C_2N_2	→	C_3N^+	+	N_2				8.75×10^{-11}	[2]
$R_{cn}667a$	2	CN^+	+	H_2O	→	H_2O^+	+	CN				3.20×10^{-10}	[2]
$R_{cn}667b$	2	CN^+	+	H_2O	→	HCN^+	+	OH				1.60×10^{-09}	[2]
$R_{cn}667c$	2	CN^+	+	H_2O	→	$HCNH^+$	+	O(^{3}P)				4.80×10^{-10}	[2]
$R_{cn}667d$	2	CN^+	+	H_2O	→	HCO^+	+	NH				1.60×10^{-10}	[2]
$R_{cn}667e$	2	CN^+	+	H_2O	→	$HNCO^+$	+	H				6.40×10^{-10}	[2]
$R_{cn}668$	2	CN^+	+	CO	→	CO^+	+	CN				4.40×10^{-10}	[2]
$R_{cn}669a$	2	CN^+	+	H_2CO	→	CH_2O^+	+	CN				2.07×10^{-09}	Su-Chesnavich
$R_{cn}669b$	2	CN^+	+	H_2CO	→	HCO^+	+	HCN				2.07×10^{-09}	Su-Chesnavich
$R_{cn}670$	2	HCN^+	+	H	→	H^+	+	HCN				3.70×10^{-11}	[2]

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	Type	Reaction								k	Ref.
$R_{cn}671$	2	HCN^+	+	H_2	→	$HCNH^+$	+	H		8.80×10^{-10}	[2]
$R_{cn}672a$	2	HCN^+	+	CH_4	→	$C_2H_3{}^+$	+	NH_2		1.27×10^{-10}	[2]
$R_{cn}672b$	2	HCN^+	+	CH_4	→	$HCNH^+$	+	CH_3		1.14×10^{-09}	[2]
$R_{cn}673a$	2	HCN^+	+	C_2H_2	→	$C_2H_2{}^+$	+	HCN		1.15×10^{-09}	[2]
$R_{cn}673b$	2	HCN^+	+	C_2H_2	→	$C_2H_3{}^+$	+	CN		2.03×10^{-10}	[2]
$R_{cn}673c$	2	HCN^+	+	C_2H_2	→	HC_3NH^+	+	H		1.35×10^{-10}	[2]
$R_{cn}674$	2	HCN^+	+	N	→	CH^+	+	N_2		2.20×10^{-10}	[2]
$R_{cn}675a$	2	HCN^+	+	NH_3	→	$NH_3{}^+$	+	HCN		1.68×10^{-09}	[4]
$R_{cn}675b$	2	HCN^+	+	NH_3	→	$NH_4{}^+$	+	CN		1.40×10^{-10}	[4]
$R_{cn}675c$	2	HCN^+	+	NH_3	→	$HCNH^+$	+	NH_2		8.40×10^{-10}	[4]
$R_{cn}676$	2	HCN^+	+	HCN	→	$HCNH^+$	+	CN		1.45×10^{-09}	[2]
$R_{cn}677a$	2	HCN^+	+	HC_3N	→	HC_3N^+	+	HCN		2.39×10^{-09}	[2]
$R_{cn}677b$	2	HCN^+	+	HC_3N	→	HC_3NH^+	+	CN		2.21×10^{-09}	[2]
$R_{cn}678a$	2	HCN^+	+	C_3H_3N	→	$C_3H_3N^+$	+	HCN		2.76×10^{-09}	[10],[11]
$R_{cn}678b$	2	HCN^+	+	C_3H_3N	→	$C_3H_3NH^+$	+	CN		1.84×10^{-09}	[10],[11]
$R_{cn}679$	2	HCN^+	+	C_2N_2	→	$C_2N_2H^+$	+	CN		1.10×10^{-09}	[2]
$R_{cn}680a$	2	HCN^+	+	H_2O	→	H_3O^+	+	CN		1.80×10^{-09}	[2]
$R_{cn}680b$	2	HCN^+	+	H_2O	→	H_2O^+	+	HCN		1.80×10^{-09}	[2]
$R_{cn}680c$	2	HCN^+	+	H_2O	→	$HCNH^+$	+	OH		1.80×10^{-10}	[2]
$R_{cn}681a$	2	HCN^+	+	CO	→	HCO^+	+	CN		1.38×10^{-10}	[2]
$R_{cn}681b$	2	HCN^+	+	CO	→	HNC^+	+	CO		3.22×10^{-10}	[2]
$R_{cn}682$	2	HCN^+	+	H_2CO	→	CH_2OH^+	+	CN		4.09×10^{-09}	Su-Chesnavich
$R_{cn}683a$	2	HCN^+	+	CO_2	→	$OCOH^+$	+	CN		2.10×10^{-10}	[4]
$R_{cn}683b$	2	HCN^+	+	CO_2	→	HNC^+	+	CO_2		2.90×10^{-10}	[4]
$R_{cn}684$	2	HNC^+	+	H_2	→	$HCNH^+$	+	H		7.00×10^{-10}	[2]
$R_{cn}685$	2	HNC^+	+	CH_4	→	$HCNH^+$	+	CH_3		1.10×10^{-09}	[2]
$R_{cn}686a$	2	HNC^+	+	C_2H_2	→	$C_2H_2{}^+$	+	HCN		6.00×10^{-10}	[2]
$R_{cn}686b$	2	HNC^+	+	C_2H_2	→	HC_3NH^+	+	H		9.00×10^{-10}	[2]
$R_{cn}687$	2	HNC^+	+	NH_3	→	$NH_3{}^+$	+	HNC		3.23×10^{-09}	Su-Chesnavich
$R_{cn}688$	2	HNC^+	+	HCN	→	$HCNH^+$	+	CN		5.13×10^{-09}	Su-Chesnavich
$R_{cn}689a$	2	HNC^+	+	C_3H_3N	→	$C_3H_3N^+$	+	HCN		2.76×10^{-09}	[10],[11]
$R_{cn}689b$	2	HNC^+	+	C_3H_3N	→	$C_3H_3NH^+$	+	CN		1.84×10^{-09}	[10],[11]
$R_{cn}690$	2	HNC^+	+	H_2O	→	H_3O^+	+	CN		3.61×10^{-09}	Su-Chesnavich
$R_{cn}691$	2	HNC^+	+	H_2CO	→	CH_2OH^+	+	CN		4.09×10^{-09}	Su-Chesnavich
$R_{cn}692$	2	$HCNH^+$	+	CH_3	→	$C_2H_3NH^+$	+	H		$1.05\times10^{-10}(300/\mathrm{T})^{2.02}\mathrm{e}^{-84.3/T}$	ThisWork
$R_{cn}693$	3	$HCNH^+$	+	CH_4	→	$HCNH^+CH_4$				1.00×10^{-10} $1.00\times10^{-27}(300/\mathrm{T})^{3.00}$	[81]
$R_{cn}694a$	2	$HCNH^+$	+	C_2H_2	→	$C_3H_3NH^+$	+	hv		1.50×10^{-15}	[82],[83]
$R_{cn}694b$	3	$HCNH^+$	+	C_2H_2	→	$C_3H_3NH^+$				1.00×10^{-10} $4.00\times10^{-28}(300/\mathrm{T})^{3.00}$	[77],[84]
$R_{cn}695b$	3	$HCNH^+$	+	C_2H_4	→	$C_3H_5NH^+$				1.00×10^{-10} 7.00×10^{-27}	[2]
$R_{cn}696$	3	$HCNH^+$	+	C_2H_6	→	$AdductN^+$				1.00×10^{-10} $5.00\times10^{-29}(300/\mathrm{T})^{3.00}$	[85]
$R_{cn}697$	2	$HCNH^+$	+	CH_3CCH	→	$C_3H_5{}^+$	+	HCN		1.90×10^{-09}	Su-Chesnavich
$R_{cn}698$	2	$HCNH^+$	+	CH_2CCH_2	→	$C_3H_5{}^+$	+	HCN		1.40×10^{-09}	Langevin
$R_{cn}699$	2	$HCNH^+$	+	C_3H_6	→	$C_3H_7{}^+$	+	HCN		1.60×10^{-09}	Su-Chesnavich
$R_{cn}700$	2	$HCNH^+$	+	C_4H_2	→	$C_4H_3{}^+$	+	HCN		1.80×10^{-09}	[2]
$R_{cn}701$	2	$HCNH^+$	+	C_5H_4	→	$C_5H_5{}^+$	+	HCN		2.50×10^{-09}	Su-Chesnavich
$R_{cn}702$	2	$HCNH^+$	+	C_6H_2	→	$C_6H_3{}^+$	+	HCN		1.80×10^{-09}	Langevin

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	Type	Reaction	k	Ref.
$R_{cn}703$	2	$HCNH^+ + C_6H_6 \rightarrow C_6H_7^+ + HCN$	1.70×10^{-09}	Langevin
$R_{cn}704$	2	$HCNH^+ + C_7H_4 \rightarrow C_7H_5^+ + HCN$	2.90×10^{-09}	Su-Chesnavich
$R_{cn}705$	2	$HCNH^+ + C_7H_8 \rightarrow C_7H_9^+ + HCN$	1.90×10^{-09}	Su-Chesnavich
$R_{cn}706$	2	$HCNH^+ + C_8H_2 \rightarrow C_8H_3^+ + HCN$	2.20×10^{-09}	Langevin
$R_{cn}707$	2	$HCNH^+ + NH_3 \rightarrow NH_4^+ + HCN$	2.30×10^{-09}	[4]
$R_{cn}708$	2	$HCNH^+ + N_2H_4 \rightarrow N_2H_5^+ + HCN$	1.20×10^{-09}	Su-Chesnavich
$R_{cn}709$	2	$HCNH^+ + CH_2NH \rightarrow CH_2NH_2^+ + HCN$	2.70×10^{-09}	[33]
$R_{cn}710$	2	$HCNH^+ + CH_3NH_2 \rightarrow CH_3NH_3^+ + HCN$	2.00×10^{-09}	[33]
$R_{cn}711$	3	$HCNH^+ + HCN \rightarrow AdductN^+$	1.00×10^{-10} 1.00×10^{-25}	[2]
$R_{cn}712$	2	$HCNH^+ + HNC \rightarrow HCNH^+ + HCN$	5.20×10^{-09}	Su-Chesnavich
$R_{cn}713$	2	$HCNH^+ + CH_3CN \rightarrow C_2H_3NH^+ + HCN$	3.80×10^{-09}	[2]
$R_{cn}714$	2	$HCNH^+ + HC_3N \rightarrow HC_3NH^+ + HCN$	3.40×10^{-09}	[2]
$R_{cn}715$	2	$HCNH^+ + C_3H_3N \rightarrow C_3H_3NH^+ + HCN$	4.50×10^{-09}	[10],[11]
$R_{cn}716$	2	$HCNH^+ + C_3H_5N \rightarrow C_3H_5NH^+ + HCN$	4.20×10^{-09}	[33]
$R_{cn}717$	2	$HCNH^+ + C_4H_3N \rightarrow C_4H_3NH^+ + HCN$	6.80×10^{-09}	Su-Chesnavich
$R_{cn}718$	2	$HCNH^+ + C_4H_5N \rightarrow C_4H_5NH^+ + HCN$	5.50×10^{-09}	Su-Chesnavich
$R_{cn}719$	2	$HCNH^+ + HC_5N \rightarrow HC_5NH^+ + HCN$	4.80×10^{-09}	[12]
$R_{cn}720$	2	$HCNH^+ + C_5H_5N \rightarrow C_5H_5NH^+ + HCN$	3.60×10^{-09}	Su-Chesnavich
$R_{cn}721$	2	$HCNH^+ + C_6H_3N \rightarrow C_6H_3NH^+ + HCN$	8.20×10^{-09}	Su-Chesnavich
$R_{cn}722$	2	$HCNH^+ + C_6H_7N \rightarrow C_6H_7NH^+ + HCN$	2.40×10^{-09}	Su-Chesnavich
$R_{cn}723$	3	$HCNH^+ + N_2 \rightarrow HCNH^+N_2$	1.00×10^{-10} $1.00\times10^{-27}(300/T)^{3.00}$	[81]
$R_{cn}724$	2	$HCNH^+ + H_2O \rightarrow H_3O^+ + HCN$	8.80×10^{-13}	[2]
$R_{cn}725$	2	$HCNH^+ + H_2CO \rightarrow CH_2OH^+ + HCN$	2.10×10^{-09}	[4]
$R_{cn}726$	2	$HCNH^+CH_4 + C_2H_2 \rightarrow C_3H_3NH^+ + CH_4$	1.00×10^{-09}	[81]
$R_{cn}727$	2	$HCNH^+CH_4 + N_2 \rightarrow HCNH^+ + CH_4 + N_2$	9.10×10^{-14}	[86]
$R_{cn}728$	2	$HCNH^+N_2 + C_2H_2 \rightarrow C_3H_3NH^+ + N_2$	1.00×10^{-09}	[81]
$R_{cn}729$	2	$HCNH^+N_2 + C_2H_6 \rightarrow C_3H_7NH^+ + N_2$	1.00×10^{-09}	[87]
$R_{cn}730$	2	$HCNH^+N_2 + N_2 \rightarrow HCNH^+ + N_2 + N_2$	2.80×10^{-14}	[86]
$R_{cn}731a$	2	$CH_2NH^+ + C_2H_4 \rightarrow HCNH^+ + C_2H_5$	2.40×10^{-10}	[88]
$R_{cn}731b$	2	$CH_2NH^+ + C_2H_4 \rightarrow C_3H_5^+ + NH_2$	2.40×10^{-10}	[88]
$R_{cn}731c$	2	$CH_2NH^+ + C_2H_4 \rightarrow C_3H_5NH^+ + H$	7.20×10^{-10}	[88]
$R_{cn}732$	2	$CH_2NH^+ + C_3H_6 \rightarrow C_3H_5NH^+ + CH_3$	1.20×10^{-09}	[88]
$R_{cn}733a$	2	$CH_2NH^+ + C_6H_6 \rightarrow C_6H_7^+ + H_2CN$	4.80×10^{-10}	[88]
$R_{cn}733b$	2	$CH_2NH^+ + C_6H_6 \rightarrow CXHYNZ^+ + H$	7.20×10^{-10}	[88]
$R_{cn}734$	2	$CH_2NH^+ + NH_3 \rightarrow CXHYNZ^+$	1.20×10^{-09}	[89]
$R_{cn}735$	2	$CH_2NH^+ + CH_3NH_2 \rightarrow CH_3NH_3^+ + H_2CN$	1.20×10^{-09}	[89]
$R_{cn}736$	2	$CH_2NH^+ + H_2CO \rightarrow HCNH^+ + CH_3O$	1.00×10^{-09}	[88]
$R_{cn}737$	2	$CH_2NH_2^+ + NH_3 \rightarrow NH_4^+ + CH_2NH$	1.10×10^{-10}	[48]
$R_{cn}738$	2	$CH_2NH_2^+ + CH_3NH_2 \rightarrow CH_3NH_3^+ + HCN + H_2$	1.80×10^{-09}	[4]
$R_{cn}739$	2	$CH_3NH_2^+ + NH_3 \rightarrow NH_4^+ + CH_2NH_2$	2.30×10^{-09}	[90]
$R_{cn}740$	2	$CH_3NH_2^+ + CH_3NH_2 \rightarrow CH_3NH_3^+ + CH_2NH_2$	1.90×10^{-09}	[4]
$R_{cn}741a$	2	$C_2N^+ + H_2 \rightarrow HCNH^+ + C$	8.10×10^{-10}	[2]
$R_{cn}741b$	2	$C_2N^+ + H_2 \rightarrow HC_2NH^+ + hv$	9.00×10^{-11}	[2]
$R_{cn}742a$	2	$C_2N^+ + CH_4 \rightarrow C_2H_3^+ + HCN$	4.20×10^{-10}	[2]
$R_{cn}742b$	2	$C_2N^+ + CH_4 \rightarrow HCNH^+ + C_2H_2$	7.00×10^{-11}	[2]
$R_{cn}742c$	2	$C_2N^+ + CH_4 \rightarrow HC_3NH^+ + H_2$	2.10×10^{-10}	[2]
$R_{cn}743a$	2	$C_2N^+ + C_2H_2 \rightarrow C_3H^+ + HCN$	1.47×10^{-09}	[2]
$R_{cn}743b$	2	$C_2N^+ + C_2H_2 \rightarrow HCNH^+ + C_3$	1.28×10^{-10}	[2]

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	Type	Reaction									k	Ref.
$R_{cn}744a$	2	C_2N^+	+	C_2H_4	→	$C_2H_4^+$	+	C_2N			1.30×10^{-10}	[2]
$R_{cn}744b$	2	C_2N^+	+	C_2H_4	→	HC_2NH^+	+	C_2H_2			6.50×10^{-10}	[2]
$R_{cn}744c$	2	C_2N^+	+	C_2H_4	→	$c-C_3H_3^+$	+	HCN			3.90×10^{-10}	[2]
$R_{cn}744d$	2	C_2N^+	+	C_2H_4	→	HC_4NH^+	+	H_2			1.30×10^{-10}	[2]
$R_{cn}745a$	2	C_2N^+	+	C_2H_6	→	$C_2H_3^+$	+	CH_3CN			1.20×10^{-10}	[2]
$R_{cn}745b$	2	C_2N^+	+	C_2H_6	→	$C_2H_5^+$	+	HC_2N			3.00×10^{-10}	[2]
$R_{cn}745c$	2	C_2N^+	+	C_2H_6	→	$c-C_3H_3^+$	+	HCN	+	H_2	3.60×10^{-10}	[2]
$R_{cn}745d$	2	C_2N^+	+	C_2H_6	→	$C_3H_5^+$	+	HCN			1.20×10^{-10}	[2]
$R_{cn}745e$	2	C_2N^+	+	C_2H_6	→	HC_2NH^+	+	C_2H_4			3.00×10^{-10}	[2]
$R_{cn}746a$	2	C_2N^+	+	C_4H_2	→	C_5H^+	+	HCN			7.80×10^{-10}	[2]
$R_{cn}746b$	2	C_2N^+	+	C_4H_2	→	$C_4H_2^+$	+	C_2N			2.60×10^{-10}	[2]
$R_{cn}746c$	2	C_2N^+	+	C_4H_2	→	C_2N^+	+	C_4H_2			2.60×10^{-10}	[2]
$R_{cn}747$	2	C_2N^+	+	NH_3	→	$HCNH^+$	+	HCN			1.90×10^{-09}	[4]
$R_{cn}748$	3	C_2N^+	+	HCN	→	$AdductN^+$					1.00×10^{-10}	[2]
											4.30×10^{-26}	
$R_{cn}749$	2	C_2N^+	+	CH_3CN	→	$C_2H_3^+$	+	C_2N_2			4.10×10^{-09}	[2]
$R_{cn}750a$	2	C_2N^+	+	C_3H_3N	→	$c-C_3H_3^+$	+	C_2N_2			1.80×10^{-09}	[10],[11]
$R_{cn}750b$	2	C_2N^+	+	C_3H_3N	→	$l-C_3H_3^+$	+	C_2N_2			1.80×10^{-09}	[10],[11]
$R_{cn}751$	2	C_2N^+	+	C_3H_5N	→	$CXHYNZ^+$					2.05×10^{-09}	[16]
$R_{cn}752a$	2	C_2N^+	+	H_2O	→	$HCNH^+$	+	CO			1.30×10^{-10}	[2]
$R_{cn}752b$	2	C_2N^+	+	H_2O	→	HCO^+	+	HCN			1.50×10^{-09}	[2]
$R_{cn}753a$	2	CNC^+	+	CH_4	→	$C_2H_3^+$	+	HCN			2.10×10^{-12}	[4]
$R_{cn}753b$	2	CNC^+	+	CH_4	→	HC_3NH^+	+	H_2			2.10×10^{-12}	[4]
$R_{cn}754a$	2	CNC^+	+	C_2H_2	→	C_3H^+	+	HCN			7.36×10^{-10}	[4]
$R_{cn}754b$	2	CNC^+	+	C_2H_2	→	$HCNH^+$	+	C_3			6.40×10^{-11}	[4]
$R_{cn}755a$	2	CNC^+	+	C_2H_4	→	$C_2H_4^+$	+	C_2N			1.30×10^{-10}	[4]
$R_{cn}755b$	2	CNC^+	+	C_2H_4	→	$c-C_3H_3^+$	+	HCN			1.95×10^{-10}	[4]
$R_{cn}755c$	2	CNC^+	+	C_2H_4	→	$l-C_3H_3^+$	+	HCN			1.95×10^{-10}	[4]
$R_{cn}755d$	2	CNC^+	+	C_2H_4	→	HC_2NH^+	+	C_2H_2			6.50×10^{-10}	[4]
$R_{cn}755e$	2	CNC^+	+	C_2H_4	→	HC_4NH^+	+	H_2			1.30×10^{-10}	[4]
$R_{cn}756a$	2	CNC^+	+	C_2H_6	→	$C_2H_3^+$	+	CH_3CN			1.20×10^{-10}	[4]
$R_{cn}756b$	2	CNC^+	+	C_2H_6	→	$C_2H_5^+$	+	HC_2N			3.00×10^{-10}	[4]
$R_{cn}756c$	2	CNC^+	+	C_2H_6	→	$c-C_3H_3^+$	+	HCN	+	H_2	1.80×10^{-10}	[4]
$R_{cn}756d$	2	CNC^+	+	C_2H_6	→	$l-C_3H_3^+$	+	HCN	+	H_2	1.80×10^{-10}	[4]
$R_{cn}756e$	2	CNC^+	+	C_2H_6	→	$C_3H_5^+$	+	HCN			1.20×10^{-10}	[4]
$R_{cn}756f$	2	CNC^+	+	C_2H_6	→	HC_2NH^+	+	C_2H_4			3.00×10^{-10}	[4]
$R_{cn}757a$	2	CNC^+	+	C_4H_2	→	C_5H^+	+	HCN			7.80×10^{-10}	[91]
$R_{cn}757b$	2	CNC^+	+	C_4H_2	→	$C_4H_2^+$	+	C_2N			2.60×10^{-10}	[91]
$R_{cn}757c$	2	CNC^+	+	C_4H_2	→	$CXHYNZ^+$					2.60×10^{-10}	[91]
$R_{cn}758a$	2	CNC^+	+	NH_3	→	$HCNH^+$	+	HCN			1.76×10^{-09}	[4]
$R_{cn}758b$	2	CNC^+	+	NH_3	→	N_2H^+	+	C_2H_2			9.25×10^{-11}	[4]
$R_{cn}759$	3	CNC^+	+	HCN	→	$AdductN^+$					1.00×10^{-10}	[2]
											4.30×10^{-26}	
$R_{cn}760$	2	CNC^+	+	CH_3CN	→	$C_2H_3^+$	+	C_2N_2			4.10×10^{-09}	[4]
$R_{cn}761$	2	CNC^+	+	HC_3N	→	C_3H^+	+	C_2N_2			3.30×10^{-09}	[2]
$R_{cn}762a$	2	CNC^+	+	C_3H_3N	→	$c-C_3H_3^+$	+	C_2N_2			1.80×10^{-09}	[10],[11]
$R_{cn}762b$	2	CNC^+	+	C_3H_3N	→	$l-C_3H_3^+$	+	C_2N_2			1.80×10^{-09}	[10],[11]
$R_{cn}763a$	2	CNC^+	+	H_2O	→	HC_2N^+	+	OH			1.75×10^{-11}	[2]
$R_{cn}763b$	2	CNC^+	+	H_2O	→	HCO^+	+	HCN			5.25×10^{-11}	[2]
$R_{cn}764a$	2	HC_2N^+	+	C_3H_3N	→	$C_3H_3NH^+$	+	C_2N			2.03×10^{-09}	[10],[11]

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	Type	Reaction							k	Ref.
$R_{cn}764b$	2	HC_2N^+	+	C_3H_3N	→	$C_4H_3N^+$	+	HCN	2.18×10^{-10}	[10],[11]
$R_{cn}764c$	2	HC_2N^+	+	C_3H_3N	→	$CXHYNZ^+$	+	C_2H_3	2.18×10^{-10}	[10],[11]
$R_{cn}764d$	2	HC_2N^+	+	C_3H_3N	→	$AdductN^+$	+	hv	4.35×10^{-10}	[10],[11]
$R_{cn}765$	2	HC_2NH^+	+	CH_3CN	→	$CXHYNZ^+$			1.78×10^{-09}	[16]
$R_{cn}766$	2	HC_2NH^+	+	C_3H_5N	→	$CXHYNZ^+$			9.50×10^{-10}	[16]
$R_{cn}767$	2	$C_2H_3N^+$	+	H_2	→	$C_2H_3NH^+$	+	H	5.70×10^{-10}	[92]
$R_{cn}768$	2	$C_2H_3N^+$	+	CH_4	→	$C_2H_3NH^+$	+	CH_3	1.70×10^{-09}	[92]
$R_{cn}769a$	2	$C_2H_3N^+$	+	CH_3CN	→	$CXHYNZ^+$	+	hv	8.00×10^{-13}	[93]
$R_{cn}769b$	2	$C_2H_3N^+$	+	CH_3CN	→	$C_2H_3NH^+$	+	CH_2CN	1.96×10^{-09}	[94]
$R_{cn}770a$	2	$C_2H_3N^+$	+	CO	→	$C_3H_3NO^+$	+	hv	8.40×10^{-14}	[95]
$R_{cn}770b$	2	$C_2H_3N^+$	+	CO	→	CH_3CO^+	+	CN	1.26×10^{-13}	[95]
$R_{cn}771$	2	$C_2H_3NH^+$	+	NH_3	→	$NH_4{}^+$	+	CH_3CN	2.90×10^{-09}	Su-Chesnavich
$R_{cn}772$	2	$C_2H_3NH^+$	+	CH_2NH	→	$CH_2NH_2{}^+$	+	CH_3CN	2.50×10^{-09}	[33]
$R_{cn}773$	2	$C_2H_3NH^+$	+	CH_3NH_2	→	$CH_3NH_3{}^+$	+	CH_3CN	1.80×10^{-09}	[33]
$R_{cn}774$	2	$C_2H_3NH^+$	+	CH_3CN	→	$AdductN^+$	+	hv	8.00×10^{-13}	[4]
$R_{cn}775$	2	$C_2H_3NH^+$	+	C_3H_3N	→	$C_3H_3NH^+$	+	CH_3CN	5.20×10^{-09}	Su-Chesnavich
$R_{cn}776a$	2	$C_2H_3NH^+$	+	C_3H_5N	→	$C_3H_5NH^+$	+	CH_3CN	4.09×10^{-09}	[33]
$R_{cn}776b$	2	$C_2H_3NH^+$	+	C_3H_5N	→	$AdductN^+$	+	hv	2.15×10^{-10}	[33]
$R_{cn}777a$	2	C_3N^+	+	H_2	→	HC_3N^+	+	H	8.19×10^{-10}	[2]
$R_{cn}777b$	2	C_3N^+	+	H_2	→	HC_3NH^+	+	hv	9.10×10^{-11}	[2]
$R_{cn}778a$	2	HC_3N^+	+	H_2	→	$C_2H_2{}^+$	+	HCN	1.65×10^{-12}	[2]
$R_{cn}778b$	2	HC_3N^+	+	H_2	→	HC_3NH^+	+	H	2.80×10^{-12}	[2]
$R_{cn}779a$	2	HC_3N^+	+	CH_4	→	$C_2H_3N^+$	+	C_2H_2	2.28×10^{-10}	[2]
$R_{cn}779b$	2	HC_3N^+	+	CH_4	→	$C_3H_5{}^+$	+	CN	2.28×10^{-10}	[2]
$R_{cn}779c$	2	HC_3N^+	+	CH_4	→	HC_3NH^+	+	CH_3	2.91×10^{-10}	[2]
$R_{cn}779d$	2	HC_3N^+	+	CH_4	→	$C_3H_4{}^+$	+	HCN	8.30×10^{-11}	[2]
$R_{cn}780a$	2	HC_3N^+	+	C_2H_2	→	$C_4H_2{}^+$	+	HCN	5.12×10^{-10}	[2]
$R_{cn}780b$	2	HC_3N^+	+	C_2H_2	→	$C_2H_2{}^+$	+	HC_3N	1.28×10^{-10}	[2]
$R_{cn}781a$	2	HC_3N^+	+	C_2H_4	→	$C_2H_4{}^+$	+	HC_3N	5.36×10^{-10}	[2]
$R_{cn}781b$	2	HC_3N^+	+	C_2H_4	→	HC_3NH^+	+	C_2H_3	1.34×10^{-10}	[2]
$R_{cn}782$	2	HC_3N^+	+	C_4H_2	→	$C_4H_2{}^+$	+	HC_3N	8.90×10^{-10}	[2]
$R_{cn}783a$	2	HC_3N^+	+	N	→	C_2N^+	+	HCN	1.44×10^{-10}	[2]
$R_{cn}783b$	2	HC_3N^+	+	N	→	C_3H^+	+	N_2	9.60×10^{-11}	[2]
$R_{cn}784$	2	HC_3N^+	+	NH_3	→	$NH_3{}^+$	+	HC_3N	1.70×10^{-09}	[11]
$R_{cn}785a$	2	HC_3N^+	+	HCN	→	$HCNH^+$	+	C_3N	3.90×10^{-10}	[2]
$R_{cn}785b$	2	HC_3N^+	+	HCN	→	$C_4N_2H^+$	+	H	2.60×10^{-10}	[2]
$R_{cn}785c$	2	HC_3N^+	+	HCN	→	$AdductN^+$	+	hv	6.50×10^{-10}	[2]
$R_{cn}786a$	2	HC_3N^+	+	HC_3N	→	HC_5N^+	+	HCN	1.17×10^{-09}	[2]
$R_{cn}786b$	2	HC_3N^+	+	HC_3N	→	$CXHYNZ^+$	+	H	6.50×10^{-11}	[2]
$R_{cn}786c$	2	HC_3N^+	+	HC_3N	→	$AdductN^+$	+	hv	6.50×10^{-11}	[2]
$R_{cn}786d$	3	HC_3N^+	+	HC_3N	→	$AdductN^+$			1.00×10^{-10} 1.20×10^{-22}	[2]
$R_{cn}787$	2	HC_3N^+	+	C_3H_5N	→	$CXHYNZ^+$			3.70×10^{-09}	[16]
$R_{cn}788$	2	HC_3N^+	+	H_2O	→	HC_3NH^+	+	OH	6.70×10^{-10}	[2]
$R_{cn}789$	3	HC_3N^+	+	CO	→	$AdductN^+$			1.00×10^{-10} 5.50×10^{-27}	[2]
$R_{cn}790$	2	HC_3NH^+	+	C_2H_4	→	$C_5H_5N^+$	+	H	1.00×10^{-10}	[2],[38]
$R_{cn}791$	2	HC_3NH^+	+	C_4H_2	→	$C_7H_3NH^+$	+	hv	8.70×10^{-10}	[2]
$R_{cn}792$	2	HC_3NH^+	+	NH_3	→	$NH_4{}^+$	+	HC_3N	2.00×10^{-09}	[10],[11]
$R_{cn}793$	2	HC_3NH^+	+	HCN	→	$AdductN^+$	+	hv	6.00×10^{-11}	[2]
$R_{cn}794$	2	HC_3NH^+	+	HNC	→	$HCNH^+$	+	HC_3N	4.60×10^{-09}	Su-Chesnavich

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	Type	Reaction	k	Ref.
$R_{cn}795$	2	$HC_3NH^+ + CH_2NH \rightarrow CH_2NH_2^+ + HC_3N$	2.40×10^{-09}	[33]
$R_{cn}796$	2	$HC_3NH^+ + CH_3NH_2 \rightarrow CH_3NH_3^+ + HC_3N$	1.60×10^{-09}	[33]
$R_{cn}797$	2	$HC_3NH^+ + CH_3CN \rightarrow C_2H_3NH^+ + HC_3N$	5.10×10^{-09}	Su-Chesnavich
$R_{cn}798a$	2	$HC_3NH^+ + C_3H_3N \rightarrow C_3H_3NH^+ + HC_3N$	1.28×10^{-09}	[2]
$R_{cn}798b$	2	$HC_3NH^+ + C_3H_3N \rightarrow C_5H_3NH^+ + HCN$	3.20×10^{-10}	[2]
$R_{cn}799a$	2	$HC_3NH^+ + C_3H_5N \rightarrow C_3H_5NH^+ + HC_3N$	5.00×10^{-09}	Su-Chesnavich
$R_{cn}799b$	2	$HC_3NH^+ + C_3H_5N \rightarrow CXHYNZ^+$	1.90×10^{-09}	[16]
$R_{cn}800$	2	$HC_3NH^+ + HC_5N \rightarrow HC_5NH^+ + HC_3N$	3.90×10^{-09}	[12]
$R_{cn}801$	2	$C_3H_3N^+ + H_2 \rightarrow C_3H_3NH^+ + H$	1.20×10^{-12}	[2]
$R_{cn}802a$	2	$C_3H_3N^+ + CH_4 \rightarrow C_2H_3N^+ + C_2H_4$	1.82×10^{-11}	[2]
$R_{cn}802b$	2	$C_3H_3N^+ + CH_4 \rightarrow C_3H_3NH^+ + CH_3$	6.50×10^{-12}	[2]
$R_{cn}802c$	2	$C_3H_3N^+ + CH_4 \rightarrow C_4H_5NH^+ + H$	1.30×10^{-12}	[2]
$R_{cn}803a$	2	$C_3H_3N^+ + C_2H_2 \rightarrow c{-}C_3H_3^+ + CH_2CN$	7.44×10^{-11}	[2]
$R_{cn}803b$	2	$C_3H_3N^+ + C_2H_2 \rightarrow C_4H_4^+ + HCN$	2.56×10^{-10}	[2]
$R_{cn}803c$	2	$C_3H_3N^+ + C_2H_2 \rightarrow HC_3NH^+ + C_2H_3$	2.56×10^{-10}	[2]
$R_{cn}803d$	2	$C_3H_3N^+ + C_2H_2 \rightarrow HC_5NH^+ + H_2 + H$	1.95×10^{-10}	[2]
$R_{cn}803e$	2	$C_3H_3N^+ + C_2H_2 \rightarrow C_5H_3NH^+ + H$	1.49×10^{-10}	[2]
$R_{cn}804a$	2	$C_3H_3N^+ + NH_3 \rightarrow NH_3^+ + C_3H_3N$	1.25×10^{-10}	[4]
$R_{cn}804b$	2	$C_3H_3N^+ + NH_3 \rightarrow NH_4^+ + C_3H_2N$	6.46×10^{-11}	[4]
$R_{cn}805a$	2	$C_3H_3N^+ + HCN \rightarrow C_4N_2H^+ + H_2 + H$	1.71×10^{-11}	[2]
$R_{cn}805b$	2	$C_3H_3N^+ + HCN \rightarrow CXHYNZ^+ + H_2$	7.22×10^{-11}	[2]
$R_{cn}805c$	2	$C_3H_3N^+ + HCN \rightarrow CXHYNZ^+ + H$	3.80×10^{-11}	[2]
$R_{cn}805d$	2	$C_3H_3N^+ + HCN \rightarrow AdductN^+ + hv$	6.27×10^{-11}	[2]
$R_{cn}806a$	2	$C_3H_3N^+ + C_3H_3N \rightarrow C_3H_3NH^+ + C_3H_2N$	1.81×10^{-09}	[18]
$R_{cn}806b$	2	$C_3H_3N^+ + C_3H_3N \rightarrow C_5H_5N^+ + HCN$	9.50×10^{-11}	[18]
$R_{cn}807a$	2	$C_3H_3N^+ + H_2O \rightarrow CH_3COH^+ + HCN$	1.43×10^{-10}	[2]
$R_{cn}807b$	2	$C_3H_3N^+ + H_2O \rightarrow C_3H_4NO^+ + H$	6.51×10^{-11}	[2]
$R_{cn}807c$	2	$C_3H_3N^+ + H_2O \rightarrow C_3H_5NO^+ + hv$	2.10×10^{-12}	[2]
$R_{cn}808$	2	$C_3H_3N^+ + CO \rightarrow CO^+ + C_3H_3N$	7.00×10^{-12}	[10],[11]
$R_{cn}809a$	2	$C_3H_3NH^+ + C_7H_8 \rightarrow C_7H_9^+ + C_3H_3N$	1.10×10^{-10}	[10],[11]
$R_{cn}809b$	2	$C_3H_3NH^+ + C_7H_8 \rightarrow AdductN^+$	9.90×10^{-11}	[10],[11]
$R_{cn}810$	2	$C_3H_3NH^+ + NH_3 \rightarrow NH_4^+ + C_3H_3N$	1.70×10^{-09}	[10],[11]
$R_{cn}811$	2	$C_3H_3NH^+ + HCN \rightarrow AdductN^+ + hv$	3.40×10^{-11}	[10],[11]
$R_{cn}812$	2	$C_3H_3NH^+ + CH_2NH \rightarrow CH_2NH_2^+ + C_3H_3N$	2.40×10^{-09}	[33]
$R_{cn}813$	2	$C_3H_3NH^+ + CH_3NH_2 \rightarrow CH_3NH_3^+ + C_3H_3N$	1.70×10^{-09}	[33]
$R_{cn}814a$	2	$C_3H_3NH^+ + CH_3CN \rightarrow C_2H_3NH^+ + C_3H_3N$	1.00×10^{-10}	[10],[11]
$R_{cn}814b$	2	$C_3H_3NH^+ + CH_3CN \rightarrow AdductN^+ + hv$	9.00×10^{-11}	[10],[11]
$R_{cn}815$	3	$C_3H_3NH^+ + C_3H_3N \rightarrow AdductN^+$	1.00×10^{-10} 1.25×10^{-23}	[18]
$R_{cn}816a$	2	$C_3H_3NH^+ + C_3H_5N \rightarrow C_3H_5NH^+ + C_3H_3N$	5.00×10^{-09}	Su-Chesnavich
$R_{cn}816b$	2	$C_3H_3NH^+ + C_3H_5N \rightarrow AdductN^+ + hv$	1.20×10^{-09}	[16]
$R_{cn}817$	2	$C_3H_3NH^+ + H_2O \rightarrow CXHYNZ^+ + H$	1.80×10^{-11}	[10],[11]
$R_{cn}818$	2	$C_3H_5NH^+ + NH_3 \rightarrow NH_4^+ + C_3H_5N$	3.10×10^{-09}	Su-Chesnavich
$R_{cn}819$	2	$C_3H_5NH^+ + CH_2NH \rightarrow CH_2NH_2^+ + C_3H_5N$	2.80×10^{-09}	Su-Chesnavich
$R_{cn}820$	2	$HC_4N^+ + H_2 \rightarrow HC_4NH^+ + H$	1.00×10^{-09}	[3]
$R_{cn}821$	2	$HC_4NH^+ + H_2 \rightarrow C_4H_3N^+ + H$	1.00×10^{-09}	[3]
$R_{cn}822$	2	$C_4H_3N^+ + H_2 \rightarrow C_4H_3NH^+ + H$	1.00×10^{-09}	[3]
$R_{cn}823$	2	$C_5N^+ + H_2 \rightarrow HC_5N^+ + H$	1.50×10^{-09}	[3]
$R_{cn}824a$	2	$C_5N^+ + CH_4 \rightarrow HC_6NH^+ + H_2$	3.00×10^{-11}	[96],[97]
$R_{cn}824b$	2	$C_5N^+ + CH_4 \rightarrow HC_4NH^+ + C_2H_2$	6.75×10^{-11}	[96],[97]
$R_{cn}824c$	2	$C_5N^+ + CH_4 \rightarrow HCNH^+ + C_5H_2$	6.00×10^{-11}	[96],[97]

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	Type	Reaction	k	Ref.
$R_{cn}824d$	2	$C_5N^+ + CH_4 \rightarrow HC_5N^+ + CH_3$	2.77×10^{-10}	[96],[97]
$R_{cn}824e$	2	$C_5N^+ + CH_4 \rightarrow C_5H_3^+ + HCN$	3.75×10^{-11}	[96],[97]
$R_{cn}824f$	2	$C_5N^+ + CH_4 \rightarrow c{-}C_3H_3^+ + HC_3N$	5.25×10^{-11}	[96],[97]
$R_{cn}824g$	2	$C_5N^+ + CH_4 \rightarrow CH_3^+ + HC_5N$	1.73×10^{-10}	[96],[97]
$R_{cn}824h$	2	$C_5N^+ + CH_4 \rightarrow C_2H_3^+ + HC_4N$	5.25×10^{-11}	[96],[97]
$R_{cn}825a$	2	$C_5N^+ + HCN \rightarrow HC_5N^+ + CN$	2.54×10^{-10}	[98]
$R_{cn}825b$	2	$C_5N^+ + HCN \rightarrow C_6N_2^+ + H$	5.36×10^{-10}	[98]
$R_{cn}825c$	2	$C_5N^+ + HCN \rightarrow C_6N_2H^+ + hv$	1.50×10^{-10}	[98]
$R_{cn}826$	2	$HC_5N^+ + H_2 \rightarrow HC_5NH^+ + H$	5.00×10^{-12}	[3]
$R_{cn}827a$	2	$HC_5N^+ + C_2H_4 \rightarrow HC_5NH^+ + C_2H_3$	9.00×10^{-10}	[2]
$R_{cn}827b$	2	$HC_5N^+ + C_2H_4 \rightarrow C_7H_3N^+ + H_2$	6.00×10^{-11}	[2]
$R_{cn}827c$	2	$HC_5N^+ + C_2H_4 \rightarrow AdductN^+ + hv$	2.40×10^{-10}	[2]
$R_{cn}828$	2	$HC_5N^+ + C_4H_2 \rightarrow AdductN^+ + hv$	1.00×10^{-09}	[2]
$R_{cn}829$	2	$HC_5N^+ + HC_3N \rightarrow AdductN^+ + hv$	5.00×10^{-10}	[2]
$R_{cn}830$	2	$C_5H_5N^+ + H \rightarrow C_5H_5NH^+ + hv$	2.50×10^{-10}	est.(C6H6P+H)
$R_{cn}831$	2	$C_5H_5N^+ + N \rightarrow C_4H_3NH^+ + HCN$	1.33×10^{-10}	est.(C6H6P+N)
$R_{cn}832$	2	$C_7N^+ + H_2 \rightarrow HC_7N^+ + H$	1.50×10^{-09}	[3]
$R_{cn}833$	2	$HC_7N^+ + H_2 \rightarrow HC_7NH^+ + H$	5.00×10^{-12}	[3]
$R_{cn}834$	2	$N_2^+ + H \rightarrow H^+ + N_2$	1.00×10^{-11}	[2]
$R_{cn}835a$	2	$N_2^+ + H_2 \rightarrow N_2H^+ + H$	1.29×10^{-09}	[71]
$R_{cn}835b$	2	$N_2^+ + H_2 \rightarrow H_2^+ + N_2$	1.30×10^{-11}	[71]
$R_{cn}836a$	2	$N_2^+ + CH_4 \rightarrow CH_3^+ + N_2 + H$	8.16×10^{-10}	[71],[99]
$R_{cn}836b$	2	$N_2^+ + CH_4 \rightarrow CH_2^+ + N_2 + H_2$	3.12×10^{-10}	[71],[99]
$R_{cn}836c$	2	$N_2^+ + CH_4 \rightarrow N_2H^+ + CH_3$	7.20×10^{-11}	[71],[99]
$R_{cn}837a$	2	$N_2^+ + C_2H_2 \rightarrow C_2H_2^+ + N_2$	9.40×10^{-10}	[71]
$R_{cn}837b$	2	$N_2^+ + C_2H_2 \rightarrow N_2H^+ + C_2H$	6.00×10^{-11}	[71]
$R_{cn}838a$	2	$N_2^+ + C_2H_4 \rightarrow C_2H_3^+ + N_2 + H$	8.71×10^{-10}	[71]
$R_{cn}838b$	2	$N_2^+ + C_2H_4 \rightarrow C_2H_2^+ + N_2 + H_2$	2.99×10^{-10}	[71]
$R_{cn}838c$	2	$N_2^+ + C_2H_4 \rightarrow N_2H^+ + C_2H_3$	1.30×10^{-10}	[71]
$R_{cn}839a$	2	$N_2^+ + C_2H_6 \rightarrow C_2H_5^+ + N_2 + H$	1.82×10^{-10}	[71]
$R_{cn}839b$	2	$N_2^+ + C_2H_6 \rightarrow C_2H_4^+ + N_2 + H_2$	3.51×10^{-10}	[71]
$R_{cn}839c$	2	$N_2^+ + C_2H_6 \rightarrow C_2H_3^+ + N_2 + H_3$	4.16×10^{-10}	[71]
$R_{cn}839d$	2	$N_2^+ + C_2H_6 \rightarrow C_2H_2^+ + N_2 + H_4$	2.34×10^{-10}	[71]
$R_{cn}839e$	2	$N_2^+ + C_2H_6 \rightarrow CH_3^+ + N_2 + CH_3$	1.04×10^{-10}	[71]
$R_{cn}839f$	2	$N_2^+ + C_2H_6 \rightarrow CH_4^+ + N_2 + {}^3CH_2$	1.30×10^{-11}	[71]
$R_{cn}840a$	2	$N_2^+ + C_3H_8 \rightarrow C_3H_5^+ + N_2 + H_3$	1.69×10^{-10}	[71]
$R_{cn}840b$	2	$N_2^+ + C_3H_8 \rightarrow C_2H_5^+ + N_2 + CH_3$	3.90×10^{-10}	[71]
$R_{cn}840c$	2	$N_2^+ + C_3H_8 \rightarrow C_2H_4^+ + N_2 + CH_4$	2.21×10^{-10}	[71]
$R_{cn}840d$	2	$N_2^+ + C_3H_8 \rightarrow C_2H_3^+ + N_2 + CH_5$	5.20×10^{-10}	[71]
$R_{cn}841a$	2	$N_2^+ + C_6H_6 \rightarrow C_6H_6^+ + N_2$	1.92×10^{-10}	[100]
$R_{cn}841b$	2	$N_2^+ + C_6H_6 \rightarrow C_6H_5^+ + N_2 + H$	3.84×10^{-10}	[100]
$R_{cn}841c$	2	$N_2^+ + C_6H_6 \rightarrow C_6H_4^+ + N_2 + H_2$	6.40×10^{-11}	[100]
$R_{cn}841d$	2	$N_2^+ + C_6H_6 \rightarrow C_5H_3^+ + N_2 + CH_3$	3.20×10^{-11}	[100]
$R_{cn}841e$	2	$N_2^+ + C_6H_6 \rightarrow C_4H_4^+ + N_2 + C_2H_2$	6.56×10^{-10}	[100]
$R_{cn}841f$	2	$N_2^+ + C_6H_6 \rightarrow c{-}C_3H_3^+ + N_2 + C_3H_3$	2.72×10^{-10}	[100]
$R_{cn}842a$	2	$N_2^+ + C_7H_8 \rightarrow C_7H_7^+ + N_2 + H$	1.62×10^{-09}	[74]
$R_{cn}842b$	2	$N_2^+ + C_7H_8 \rightarrow C_6H_5^+ + N_2 + CH_3$	9.50×10^{-11}	[74]
$R_{cn}842c$	2	$N_2^+ + C_7H_8 \rightarrow C_5H_6^+ + N_2 + C_2H_2$	3.80×10^{-11}	[74]
$R_{cn}842d$	2	$N_2^+ + C_7H_8 \rightarrow C_4H_4^+ + N_2 + CH_3CCH$	9.50×10^{-11}	[74]
$R_{cn}842e$	2	$N_2^+ + C_7H_8 \rightarrow c{-}C_3H_3^+ + N_2 + C_4H_5$	5.70×10^{-11}	[74]

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	Type	Reaction	k	Ref.
$R_{cn}843$	2	$N_2^+ + N \rightarrow N^+ + N_2$	1.00×10^{-11}	[2]
$R_{cn}844$	2	$N_2^+ + NH_3 \rightarrow NH_3^+ + N_2$	1.95×10^{-09}	[4]
$R_{cn}845$	2	$N_2^+ + HCN \rightarrow HCN^+ + N_2$	3.90×10^{-10}	[2]
$R_{cn}846a$	2	$N_2^+ + CH_3NH_2 \rightarrow CH_3NH_2^+ + N_2$	6.10×10^{-11}	[75]
$R_{cn}846b$	2	$N_2^+ + CH_3NH_2 \rightarrow CH_2NH_2^+ + N_2 + H$	8.17×10^{-10}	[75]
$R_{cn}846c$	2	$N_2^+ + CH_3NH_2 \rightarrow CH_2NH^+ + N_2 + H_2$	2.56×10^{-10}	[75]
$R_{cn}846d$	2	$N_2^+ + CH_3NH_2 \rightarrow CH_3^+ + N_2 + NH_2$	8.54×10^{-11}	[75]
$R_{cn}847a$	2	$N_2^+ + CH_3CN \rightarrow C_2H_3N^+ + N_2$	3.15×10^{-10}	[2]
$R_{cn}847b$	2	$N_2^+ + CH_3CN \rightarrow HC_2NH^+ + N_2 + H$	1.36×10^{-09}	[2]
$R_{cn}847c$	2	$N_2^+ + CH_3CN \rightarrow HC_2N^+ + N_2 + H_2$	4.20×10^{-10}	[2]
$R_{cn}848$	2	$N_2^+ + HC_3N \rightarrow HC_3N^+ + N_2$	3.50×10^{-09}	[2]
$R_{cn}849a$	2	$N_2^+ + C_3H_3N \rightarrow C_2H_3^+ + N_2 + CN$	1.00×10^{-10}	[51]
$R_{cn}849b$	2	$N_2^+ + C_3H_3N \rightarrow C_2H_2^+ + N_2 + HCN$	3.00×10^{-10}	[51]
$R_{cn}849c$	2	$N_2^+ + C_3H_3N \rightarrow HC_3NH^+ + N_2 + H$	3.50×10^{-10}	[51]
$R_{cn}849d$	2	$N_2^+ + C_3H_3N \rightarrow HC_3N^+ + N_2 + H_2$	5.00×10^{-11}	[51]
$R_{cn}849e$	2	$N_2^+ + C_3H_3N \rightarrow N_2H^+ + C_3H_2N$	2.00×10^{-10}	[51]
$R_{cn}850a$	2	$N_2^+ + C_3H_5N \rightarrow C_3H_3NH^+ + N_2 + H$	2.21×10^{-09}	[33]
$R_{cn}850b$	2	$N_2^+ + C_3H_5N \rightarrow CH_3^+ + CH_2CN + N_2$	6.80×10^{-10}	[33]
$R_{cn}850c$	2	$N_2^+ + C_3H_5N \rightarrow C_2H_2^+ + CH_2NH + N_2$	5.10×10^{-10}	[33]
$R_{cn}851a$	2	$N_2^+ + C_4H_5N \rightarrow l{-}C_3H_3^+ + N_2 + H_2CN$	2.85×10^{-10}	[73]
$R_{cn}851b$	2	$N_2^+ + C_4H_5N \rightarrow c{-}C_3H_3^+ + N_2 + H_2CN$	2.85×10^{-10}	[73]
$R_{cn}851c$	2	$N_2^+ + C_4H_5N \rightarrow HC_2N^+ + N_2 + C_2H_4$	5.70×10^{-10}	[73]
$R_{cn}851d$	2	$N_2^+ + C_4H_5N \rightarrow C_3H_4^+ + N_2 + HCN$	1.95×10^{-10}	[73]
$R_{cn}851e$	2	$N_2^+ + C_4H_5N \rightarrow HC_2NH^+ + N_2 + C_2H_3$	1.95×10^{-10}	[73]
$R_{cn}851f$	2	$N_2^+ + C_4H_5N \rightarrow C_3H_5^+ + N_2 + CN$	4.05×10^{-10}	[73]
$R_{cn}851g$	2	$N_2^+ + C_4H_5N \rightarrow C_2H_3N^+ + N_2 + C_2H_2$	4.05×10^{-10}	[73]
$R_{cn}851h$	2	$N_2^+ + C_4H_5N \rightarrow C_4H_3NH^+ + N_2 + H$	3.75×10^{-11}	[73]
$R_{cn}851i$	2	$N_2^+ + C_4H_5N \rightarrow C_4H_5N^+ + N_2$	1.28×10^{-10}	[73]
$R_{cn}852$	2	$N_2^+ + HC_5N \rightarrow HC_5N^+ + N_2$	4.80×10^{-09}	[12]
$R_{cn}853a$	2	$N_2^+ + C_5H_5N \rightarrow C_4H_4^+ + HCN + N_2$	2.35×10^{-09}	[76]
$R_{cn}853b$	2	$N_2^+ + C_5H_5N \rightarrow C_4H_5^+ + CN + N_2$	1.76×10^{-10}	[76]
$R_{cn}853c$	2	$N_2^+ + C_5H_5N \rightarrow C_3H_3N^+ + C_2H_2 + N_2$	1.76×10^{-10}	[76]
$R_{cn}854$	3	$N_2^+ + N_2 \rightarrow N_4^+$	1.00×10^{-10}	[77],[2]
			$8.00\times10^{-29}(300/\mathrm{T})^{1.84}$	
$R_{cn}855$	2	$N_2^+ + C_2N_2 \rightarrow C_2N_2^+ + N_2$	9.30×10^{-10}	[2]
$R_{cn}856a$	2	$N_2^+ + O(^3P) \rightarrow O^+ + N_2$	9.80×10^{-12}	[4]
$R_{cn}856b$	2	$N_2^+ + O(^3P) \rightarrow NO^+ + N$	1.30×10^{-10}	[4]
$R_{cn}857a$	2	$N_2^+ + H_2O \rightarrow H_2O^+ + N_2$	1.90×10^{-09}	[2]
$R_{cn}857b$	2	$N_2^+ + H_2O \rightarrow N_2H^+ + OH$	5.04×10^{-10}	[2]
$R_{cn}858$	2	$N_2^+ + CO \rightarrow CO^+ + N_2$	7.30×10^{-11}	[2]
$R_{cn}859a$	2	$N_2^+ + H_2CO \rightarrow HCO^+ + N_2H$	2.52×10^{-09}	[4]
$R_{cn}859b$	2	$N_2^+ + H_2CO \rightarrow CH_2O^+ + N_2$	3.77×10^{-10}	[4]
$R_{cn}860$	2	$N_2^+ + CO_2 \rightarrow CO_2^+ + N_2$	8.00×10^{-10}	[4]
$R_{cn}861a$	2	$N_2H^+ + H_2 \rightarrow H_3^+ + N_2$	5.10×10^{-18}	[2]
$R_{cn}861b$	3	$N_2H^+ + H_2 \rightarrow AdductN^+$	1.00×10^{-10}	[18]
			4.00×10^{-30}	
$R_{cn}862$	2	$N_2H^+ + CH_4 \rightarrow CH_5^+ + N_2$	8.90×10^{-10}	[2]
$R_{cn}863$	2	$N_2H^+ + C_2H_2 \rightarrow C_2H_3^+ + N_2$	1.40×10^{-09}	[2]
$R_{cn}864$	2	$N_2H^+ + C_2H_4 \rightarrow C_2H_5^+ + N_2$	1.00×10^{-09}	[2]
$R_{cn}865a$	2	$N_2H^+ + C_2H_6 \rightarrow C_2H_5^+ + N_2 + H_2$	1.13×10^{-09}	[2]

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	Type	Reaction									k	Ref.
$R_{cn}865b$	2	N_2H^+	+	C_2H_6	→	$C_2H_7^+$	+	N_2			1.69×10^{-10}	[2]
$R_{cn}866$	2	N_2H^+	+	CH_3CCH	→	$C_3H_5^+$	+	N_2			1.50×10^{-09}	[2]
$R_{cn}867$	2	N_2H^+	+	CH_2CCH_2	→	$C_3H_5^+$	+	N_2			1.40×10^{-09}	[5]
$R_{cn}868a$	2	N_2H^+	+	C_3H_6	→	$C_3H_5^+$	+	N_2	+	H_2	7.70×10^{-10}	[5]
$R_{cn}868b$	2	N_2H^+	+	C_3H_6	→	$C_3H_7^+$	+	N_2			6.30×10^{-10}	[5]
$R_{cn}869$	2	N_2H^+	+	C_4H_2	→	$C_4H_3^+$	+	N_2			1.10×10^{-09}	[2]
$R_{cn}870$	2	N_2H^+	+	C_6H_6	→	$C_6H_7^+$	+	N_2			1.50×10^{-09}	[5]
$R_{cn}871$	2	N_2H^+	+	C_7H_8	→	$C_7H_9^+$	+	N_2			1.30×10^{-09}	[5]
$R_{cn}872$	2	N_2H^+	+	NH_3	→	NH_4^+	+	N_2			2.30×10^{-09}	[4]
$R_{cn}873$	2	N_2H^+	+	HCN	→	$HCNH^+$	+	N_2			3.20×10^{-09}	[2]
$R_{cn}874$	2	N_2H^+	+	CH_3CN	→	$C_2H_3NH^+$	+	N_2			4.10×10^{-09}	[2]
$R_{cn}875$	2	N_2H^+	+	HC_3N	→	HC_3NH^+	+	N_2			4.20×10^{-09}	[2]
$R_{cn}876$	2	N_2H^+	+	C_3H_3N	→	$C_3H_3NH^+$	+	N_2			1.50×10^{-09}	[5]
$R_{cn}877$	3	N_2H^+	+	N_2	→	AdductN$^+$					1.00×10^{-10} 4.00×10^{-30}	[2]
$R_{cn}878$	2	N_2H^+	+	C_2N_2	→	$C_2N_2H^+$	+	N_2			1.20×10^{-09}	[2]
$R_{cn}879$	2	N_2H^+	+	$O(^3P)$	→	OH^+	+	N_2			1.40×10^{-10}	[4]
$R_{cn}880$	2	N_2H^+	+	H_2O	→	H_3O^+	+	N_2			2.60×10^{-09}	[2]
$R_{cn}881$	2	N_2H^+	+	CO	→	HCO^+	+	N_2			8.80×10^{-10}	[2]
$R_{cn}882$	2	N_2H^+	+	H_2CO	→	CH_2OH^+	+	N_2			3.30×10^{-09}	[4]
$R_{cn}883$	2	N_2H^+	+	CO_2	→	$OCOH^+$	+	N_2			1.07×10^{-09}	[4]
$R_{cn}884a$	2	$C_2N_2^+$	+	H	→	HNC^+	+	CN			4.96×10^{-10}	[2]
$R_{cn}884b$	2	$C_2N_2^+$	+	H	→	C_2H^+	+	N_2			1.24×10^{-10}	[2]
$R_{cn}885$	2	$C_2N_2^+$	+	H_2	→	$C_2N_2H^+$	+	H			8.80×10^{-10}	[2]
$R_{cn}886a$	2	$C_2N_2^+$	+	C_2H_2	→	$C_2H_2^+$	+	C_2N_2			1.00×10^{-10}	[2]
$R_{cn}886b$	2	$C_2N_2^+$	+	C_2H_2	→	$C_4N_2H^+$	+	H			7.00×10^{-11}	[2]
$R_{cn}886c$	2	$C_2N_2^+$	+	C_2H_2	→	$C_4N_2^+$	+	H_2			3.00×10^{-11}	[2]
$R_{cn}887a$	2	$C_2N_2^+$	+	C_4H_2	→	$C_4H_2^+$	+	C_2N_2			1.08×10^{-09}	[2]
$R_{cn}887b$	2	$C_2N_2^+$	+	C_4H_2	→	HC_5N^+	+	HCN			1.20×10^{-10}	[2]
$R_{cn}888a$	2	$C_2N_2^+$	+	HCN	→	HNC^+	+	C_2N_2			5.40×10^{-10}	[2]
$R_{cn}888b$	2	$C_2N_2^+$	+	HCN	→	$C_2N_2H^+$	+	CN			2.02×10^{-09}	[2]
$R_{cn}888c$	2	$C_2N_2^+$	+	HCN	→	$HC_3N_3^+$	+	hv			1.35×10^{-10}	[2]
$R_{cn}889$	2	$C_2N_2^+$	+	HC_3N	→	HC_3N^+	+	C_2N_2			1.60×10^{-09}	[2]
$R_{cn}890$	3	$C_2N_2^+$	+	C_2N_2	→	AdductN$^+$					1.00×10^{-10} 2.20×10^{-24}	[101]
$R_{cn}891a$	2	$C_2N_2^+$	+	H_2O	→	H_2O^+	+	C_2N_2			2.34×10^{-10}	[2]
$R_{cn}891b$	2	$C_2N_2^+$	+	H_2O	→	$C_2N_2H^+$	+	OH			2.37×10^{-09}	[2]
$R_{cn}892a$	2	$C_2N_2H^+$	+	C_2H_2	→	$C_2H_3^+$	+	C_2N_2			7.20×10^{-11}	[102]
$R_{cn}892b$	2	$C_2N_2H^+$	+	C_2H_2	→	AdductN$^+$	+	hv			4.08×10^{-10}	[102]
$R_{cn}893$	2	$C_2N_2H^+$	+	C_2H_4	→	$C_2H_5^+$	+	C_2N_2			8.00×10^{-10}	[4]
$R_{cn}894$	2	$C_2N_2H^+$	+	H_2O	→	H_3O^+	+	C_2N_2			5.10×10^{-10}	[4]
$R_{cn}895a$	2	N_3^+	+	CH_4	→	$HCNH^+$	+	N_2	+	H_2	5.51×10^{-11}	[77]
$R_{cn}895b$	2	N_3^+	+	CH_4	→	$CH_2NH_2^+$	+	N_2			2.90×10^{-12}	[77]
$R_{cn}896a$	2	N_3^+	+	C_2H_2	→	CH_2CN^+	+	N_2			1.08×10^{-09}	[77]
$R_{cn}896b$	2	N_3^+	+	C_2H_2	→	C_2N^+	+	N_2	+	H_2	6.00×10^{-11}	[77]
$R_{cn}896c$	2	N_3^+	+	C_2H_2	→	$HCNH^+$	+	N_2	+	C	6.00×10^{-11}	[77]
$R_{cn}897$	2	N_3^+	+	C_2H_4	→	$C_2H_4^+$	+	N_2	+	N	1.10×10^{-09}	[77]
$R_{cn}898$	2	N_3^+	+	HCN	→	$CXHYNZ^+$	+	N_2			6.70×10^{-10}	[77]
$R_{cn}899$	3	N_3^+	+	CO	→	AdductN$^+$					1.00×10^{-10} 7.00×10^{-29}	[80]

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	Type	Reaction										k	Ref.
$R_{cn}900$	2	N_4^+	+	H_2	→	N_2H^+	+	N_2	+	H		1.00×10^{-12}	[2]
$R_{cn}901$	2	N_4^+	+	CH_4	→	CH_4^+	+	N_2	+	N_2		1.10×10^{-09}	[2]
$R_{cn}902$	2	N_4^+	+	C_2H_2	→	$C_2H_2^+$	+	N_2	+	N_2		9.20×10^{-10}	[2]
$R_{cn}903$	2	N_4^+	+	C_2H_4	→	$C_2H_4^+$	+	N_2	+	N_2		1.10×10^{-09}	[2]
$R_{cn}904a$	2	N_4^+	+	C_2H_6	→	$C_2H_5^+$	+	$N_2^+N_2$	+	H		1.74×10^{-10}	[2]
$R_{cn}904b$	2	N_4^+	+	C_2H_6	→	$C_2H_4^+$	+	$N_2^+N_2$	+	H_2		1.07×10^{-09}	[2]
$R_{cn}905a$	2	N_4^+	+	C_3H_8	→	$C_3H_7^+$	+	$N_2^+N_2$	+	H		1.22×10^{-10}	[2]
$R_{cn}905b$	2	N_4^+	+	C_3H_8	→	$C_2H_5^+$	+	$N_2^+N_2$	+	CH_3		6.71×10^{-10}	[2]
$R_{cn}905c$	2	N_4^+	+	C_3H_8	→	$C_2H_4^+$	+	$N_2^+N_2$	+	CH_4		4.27×10^{-10}	[2]
$R_{cn}906$	2	N_4^+	+	HCN	→	HCN^+	+	N_2	+	N_2		2.60×10^{-09}	[2]
$R_{cn}907$	2	N_4^+	+	CO	→	CO^+	+	N_2	+	N_2		5.00×10^{-10}	[80]
$R_{cn}908$	2	O^+	+	H	→	H^+	+	$O(^3P)$				6.40×10^{-10}	[4]
$R_{cn}909$	2	O^+	+	H_2	→	OH^+	+	H				1.62×10^{-09}	[4]
$R_{cn}910a$	2	O^+	+	CH_4	→	CH_4^+	+	$O(^3P)$				8.80×10^{-10}	[103]
$R_{cn}910b$	2	O^+	+	CH_4	→	CH_3^+	+	OH				2.20×10^{-10}	[103]
$R_{cn}911a$	2	O^+	+	C_2H_4	→	$C_2H_4^+$	+	$O(^3P)$				7.00×10^{-11}	[103]
$R_{cn}911b$	2	O^+	+	C_2H_4	→	$C_2H_3^+$	+	OH				2.10×10^{-10}	[103]
$R_{cn}911c$	2	O^+	+	C_2H_4	→	$C_2H_2^+$	+	H_2O				1.12×10^{-09}	[103]
$R_{cn}912$	2	O^+	+	C_2H_2	→	$C_2H_2^+$	+	$O(^3P)$				6.20×10^{-11}	[104]
$R_{cn}913a$	2	O^+	+	C_2H_6	→	$C_2H_4^+$	+	H_2O				1.19×10^{-09}	[103]
$R_{cn}913b$	2	O^+	+	C_2H_6	→	$C_2H_5^+$	+	OH				5.10×10^{-10}	[103]
$R_{cn}914$	2	O^+	+	C_6H_6	→	$C_6H_6^+$	+	$O(^3P)$				1.90×10^{-09}	[100]
$R_{cn}915a$	2	O^+	+	C_7H_8	→	$C_7H_8^+$	+	$O(^3P)$				1.10×10^{-10}	[74]
$R_{cn}915b$	2	O^+	+	C_7H_8	→	$C_7H_7^+$	+	OH				2.05×10^{-09}	[74]
$R_{cn}915c$	2	O^+	+	C_7H_8	→	$C_6H_6^+$	+	H_2CO				4.40×10^{-11}	[74]
$R_{cn}916$	2	O^+	+	NH_3	→	NH_3^+	+	$O(^3P)$				1.10×10^{-09}	[103]
$R_{cn}917a$	2	O^+	+	HCN	→	HCN^+	+	$O(^3P)$				5.00×10^{-11}	[105]
$R_{cn}917b$	2	O^+	+	HCN	→	HCO^+	+	N				1.13×10^{-09}	[105]
$R_{cn}917c$	2	O^+	+	HCN	→	NO^+	+	CH				1.33×10^{-09}	[105]
$R_{cn}918a$	2	O^+	+	CH_3NH_2	→	$CH_3NH_2^+$	+	$O(^3P)$				1.26×10^{-10}	[80]
$R_{cn}918b$	2	O^+	+	CH_3NH_2	→	$CH_2NH_2^+$	+	OH				1.66×10^{-09}	[80]
$R_{cn}918c$	2	O^+	+	CH_3NH_2	→	CH_2NH^+	+	H_2O				3.15×10^{-10}	[80]
$R_{cn}919a$	2	O^+	+	CH_3CN	→	$C_2H_3N^+$	+	$O(^3P)$				2.94×10^{-09}	[103]
$R_{cn}919b$	2	O^+	+	CH_3CN	→	$C_2H_3^+$	+	NO				1.26×10^{-09}	[103]
$R_{cn}920$	2	O^+	+	N_2	→	NO^+	+	N				$1.85\times10^{-12}(300/\mathrm{T})^{1.37}\mathrm{e}^{-28.6/T}$	[106],[4]
$R_{cn}921$	2	O^+	+	H_2O	→	H_2O^+	+	$O(^3P)$				2.60×10^{-09}	[4]
$R_{cn}922a$	2	O^+	+	H_2CO	→	CH_2O^+	+	$O(^3P)$				2.10×10^{-09}	[80]
$R_{cn}922b$	2	O^+	+	H_2CO	→	HCO^+	+	OH				1.40×10^{-09}	[80]
$R_{cn}923$	2	O^+	+	NO	→	NO^+	+	$O(^3P)$				$1.65\times10^{-12}(300/\mathrm{T})^{1.37}\mathrm{e}^{-12.1/T}$	[107],[4]
$R_{cn}924$	2	OH^+	+	H_2	→	H_2O^+	+	H				9.70×10^{-10}	[4]
$R_{cn}925a$	2	OH^+	+	CH_4	→	CH_5^+	+	$O(^3P)$				1.89×10^{-10}	[4]
$R_{cn}925b$	2	OH^+	+	CH_4	→	H_3O^+	+	$^3CH_2$				1.26×10^{-09}	[4]
$R_{cn}926a$	2	OH^+	+	C_2H_6	→	H_3O^+	+	C_2H_4				1.60×10^{-10}	[108]
$R_{cn}926b$	2	OH^+	+	C_2H_6	→	$C_2H_4^+$	+	OH	+	H_2		1.04×10^{-09}	[108]
$R_{cn}926c$	2	OH^+	+	C_2H_6	→	$C_2H_5^+$	+	H_2O				3.20×10^{-10}	[108]
$R_{cn}926d$	2	OH^+	+	C_2H_6	→	$C_2H_6^+$	+	OH				4.80×10^{-11}	[108]
$R_{cn}926e$	2	OH^+	+	C_2H_6	→	$C_2H_7^+$	+	$O(^3P)$				3.20×10^{-11}	[108]
$R_{cn}927a$	2	OH^+	+	NH_3	→	NH_3^+	+	OH				9.20×10^{-10}	[4]
$R_{cn}927b$	2	OH^+	+	NH_3	→	NH_4^+	+	$O(^3P)$				9.20×10^{-10}	[4]
$R_{cn}928$	2	OH^+	+	N_2	→	N_2H^+	+	$O(^3P)$				2.40×10^{-10}	[4]

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	Type	Reaction	k	Ref.
$R_{cn}929a$	2	$OH^+ + H_2O \rightarrow H_2O^+ + OH$	1.59×10^{-09}	[109]
$R_{cn}929b$	2	$OH^+ + H_2O \rightarrow H_3O^+ + O(^3P)$	1.30×10^{-09}	[109]
$R_{cn}930$	2	$OH^+ + CO \rightarrow HCO^+ + O(^3P)$	8.40×10^{-10}	[4]
$R_{cn}931a$	2	$OH^+ + H_2CO \rightarrow CH_2O^+ + OH$	7.44×10^{-10}	[110]
$R_{cn}931b$	2	$OH^+ + H_2CO \rightarrow CH_2OH^+ + O(^3P)$	1.12×10^{-09}	[110]
$R_{cn}932$	2	$OH^+ + NO \rightarrow NO^+ + OH$	8.15×10^{-10}	[4]
$R_{cn}933$	2	$H_2O^+ + H_2 \rightarrow H_3O^+ + H$	7.60×10^{-10}	[2]
$R_{cn}934$	2	$H_2O^+ + CH_4 \rightarrow H_3O^+ + CH_3$	1.12×10^{-09}	[2]
$R_{cn}935$	2	$H_2O^+ + C_2H_2 \rightarrow {C_2H_2}^+ + H_2O$	1.90×10^{-09}	[2]
$R_{cn}936$	2	$H_2O^+ + C_2H_4 \rightarrow {C_2H_4}^+ + H_2O$	1.50×10^{-09}	[2]
$R_{cn}937a$	2	$H_2O^+ + C_2H_6 \rightarrow H_3O^+ + C_2H_5$	1.33×10^{-09}	[2]
$R_{cn}937b$	2	$H_2O^+ + C_2H_6 \rightarrow {C_2H_4}^+ + H_2O + H_2$	1.92×10^{-10}	[2]
$R_{cn}937c$	2	$H_2O^+ + C_2H_6 \rightarrow {C_2H_5}^+ + H_2O + H$	1.60×10^{-11}	[2]
$R_{cn}937d$	2	$H_2O^+ + C_2H_6 \rightarrow {C_2H_6}^+ + H_2O$	6.40×10^{-11}	[2]
$R_{cn}938a$	2	$H_2O^+ + N \rightarrow HNO^+ + H$	1.12×10^{-10}	[2]
$R_{cn}938b$	2	$H_2O^+ + N \rightarrow NO^+ + H_2$	2.80×10^{-11}	[2]
$R_{cn}939a$	2	$H_2O^+ + NH_3 \rightarrow {NH_3}^+ + H_2O$	2.21×10^{-09}	[4]
$R_{cn}939b$	2	$H_2O^+ + NH_3 \rightarrow {NH_4}^+ + OH$	9.45×10^{-10}	[4]
$R_{cn}940a$	2	$H_2O^+ + HCN \rightarrow HCNH^+ + OH$	1.05×10^{-09}	[2]
$R_{cn}940b$	2	$H_2O^+ + HCN \rightarrow H_3O^+ + CN$	1.05×10^{-09}	[2]
$R_{cn}941$	3	$H_2O^+ + N_2 \rightarrow AdductN^+$	1.00×10^{-10} 1.13×10^{-28}	[2]
$R_{cn}942$	2	$H_2O^+ + C_2N_2 \rightarrow C_2N_2H^+ + OH$	1.00×10^{-09}	[2]
$R_{cn}943$	2	$H_2O^+ + H_2O \rightarrow H_3O^+ + OH$	1.85×10^{-09}	[2]
$R_{cn}944$	2	$H_2O^+ + CO \rightarrow HCO^+ + OH$	4.25×10^{-10}	[2]
$R_{cn}945a$	2	$H_2O^+ + H_2CO \rightarrow CH_2O^+ + H_2O$	1.41×10^{-09}	[4]
$R_{cn}945b$	2	$H_2O^+ + H_2CO \rightarrow CH_2OH^+ + OH$	6.62×10^{-10}	[4]
$R_{cn}946$	3	$H_3O^+ + C_2H_2 \rightarrow CH_3CHOH^+$	1.00×10^{-10} 8.00×10^{-28}	[2]
$R_{cn}947$	3	$H_3O^+ + C_2H_4 \rightarrow Adduct^+$	1.00×10^{-10} 2.00×10^{-27}	[2]
$R_{cn}948$	2	$H_3O^+ + CH_3CCH \rightarrow {C_3H_5}^+ + H_2O$	1.80×10^{-09}	[2]
$R_{cn}949$	2	$H_3O^+ + CH_2CCH_2 \rightarrow {C_3H_5}^+ + H_2O$	1.40×10^{-09}	[5]
$R_{cn}950$	2	$H_3O^+ + C_3H_6 \rightarrow {C_3H_7}^+ + H_2O$	1.70×10^{-09}	[5]
$R_{cn}951$	2	$H_3O^+ + C_4H_2 \rightarrow {C_4H_3}^+ + H_2O$	1.10×10^{-09}	[2]
$R_{cn}952$	2	$H_3O^+ + NH_3 \rightarrow {NH_4}^+ + H_2O$	2.23×10^{-09}	[4]
$R_{cn}953$	2	$H_3O^+ + CH_2NH \rightarrow {CH_2NH_2}^+ + H_2O$	3.00×10^{-09}	[33]
$R_{cn}954$	2	$H_3O^+ + CH_3NH_2 \rightarrow {CH_3NH_3}^+ + H_2O$	2.10×10^{-09}	[33]
$R_{cn}955$	2	$H_3O^+ + HCN \rightarrow HCNH^+ + H_2O$	3.80×10^{-09}	[2]
$R_{cn}956$	2	$H_3O^+ + CH_3CN \rightarrow C_2H_3NH^+ + H_2O$	4.50×10^{-09}	[2]
$R_{cn}957$	2	$H_3O^+ + HC_3N \rightarrow HC_3NH^+ + H_2O$	3.90×10^{-09}	[2]
$R_{cn}958$	2	$H_3O^+ + C_3H_3N \rightarrow C_3H_3NH^+ + H_2O$	5.10×10^{-09}	[5]
$R_{cn}959$	2	$H_3O^+ + C_3H_5N \rightarrow C_3H_5NH^+ + H_2O$	4.60×10^{-09}	[33]
$R_{cn}960$	2	$H_3O^+ + HC_5N \rightarrow HC_5NH^+ + H_2O$	5.60×10^{-09}	[12]
$R_{cn}961$	3	$H_3O^+ + H_2O \rightarrow Adduct^+$	1.00×10^{-10} 3.40×10^{-27}	[2]
$R_{cn}962$	2	$H_3O^+ + H_2CO \rightarrow CH_2OH^+ + H_2O$	3.00×10^{-09}	[4]
$R_{cn}963$	2	$CO^+ + H \rightarrow H^+ + CO$	4.00×10^{-10}	[2]
$R_{cn}964a$	2	$CO^+ + H_2 \rightarrow HCO^+ + H$	7.28×10^{-10}	[2]
$R_{cn}964b$	2	$CO^+ + H_2 \rightarrow HOC^+ + H$	6.72×10^{-10}	[2]

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	Type	Reaction	k	Ref.
$R_{cn}965a$	2	$CO^+ + CH_4 \rightarrow HCO^+ + CH_3$	6.36×10^{-10}	[111]
$R_{cn}965b$	2	$CO^+ + CH_4 \rightarrow CH_4^+ + CO$	5.16×10^{-10}	[111]
$R_{cn}965c$	2	$CO^+ + CH_4 \rightarrow CH_3CO^+ + H$	4.80×10^{-11}	[111]
$R_{cn}966$	2	$CO^+ + C_2H_2 \rightarrow C_2H_2^+ + CO$	4.10×10^{-10}	[2]
$R_{cn}967a$	2	$CO^+ + C_2H_6 \rightarrow C_2H_5^+ + HCO$	5.00×10^{-10}	[2]
$R_{cn}967b$	2	$CO^+ + C_2H_6 \rightarrow C_2H_4^+ + H_2CO$	8.62×10^{-10}	[2]
$R_{cn}967c$	2	$CO^+ + C_2H_6 \rightarrow CH_3^+ + CO + CH_3$	2.78×10^{-11}	[2]
$R_{cn}968a$	2	$CO^+ + C_3H_8 \rightarrow C_3H_7^+ + HCO$	1.30×10^{-10}	[2]
$R_{cn}968b$	2	$CO^+ + C_3H_8 \rightarrow C_3H_6^+ + H_2CO$	3.00×10^{-11}	[2]
$R_{cn}968c$	2	$CO^+ + C_3H_8 \rightarrow C_2H_5^+ + CO + CH_3$	6.60×10^{-10}	[2]
$R_{cn}968d$	2	$CO^+ + C_3H_8 \rightarrow C_2H_4^+ + CO + CH_4$	1.80×10^{-10}	[2]
$R_{cn}969$	2	$CO^+ + N \rightarrow NO^+ + C$	8.20×10^{-11}	[2]
$R_{cn}970$	2	$CO^+ + NH_3 \rightarrow NH_3^+ + CO$	1.85×10^{-09}	[4]
$R_{cn}971a$	2	$CO^+ + HCN \rightarrow HCN^+ + CO$	3.06×10^{-09}	[2]
$R_{cn}971b$	2	$CO^+ + HCN \rightarrow HCO^+ + CN$	3.40×10^{-10}	[2]
$R_{cn}972a$	2	$CO^+ + CH_3CN \rightarrow C_2H_3N^+ + CO$	2.25×10^{-09}	[2]
$R_{cn}972b$	2	$CO^+ + CH_3CN \rightarrow HC_2NH^+ + HCO$	7.50×10^{-10}	[2]
$R_{cn}973$	2	$CO^+ + HC_3N \rightarrow HC_3N^+ + CO$	3.10×10^{-09}	[2]
$R_{cn}974a$	2	$CO^+ + C_3H_3N \rightarrow C_2H_2^+ + HCN + CO$	2.86×10^{-09}	[10],[11]
$R_{cn}974b$	2	$CO^+ + C_3H_3N \rightarrow C_3H_3N^+ + CO$	1.54×10^{-09}	[10],[11]
$R_{cn}975$	3	$CO^+ + N_2 \rightarrow CO^+N_2$	1.00×10^{-10}	[2],[38]
			2.10×10^{-29}	
$R_{cn}976a$	2	$CO^+ + H_2O \rightarrow H_2O^+ + CO$	1.56×10^{-09}	[2]
$R_{cn}976b$	2	$CO^+ + H_2O \rightarrow HCO^+ + OH$	8.40×10^{-10}	[2]
$R_{cn}977$	3	$CO^+ + CO \rightarrow Adduct^+$	1.00×10^{-10}	[2]
			1.40×10^{-28}	
$R_{cn}978a$	2	$CO^+ + H_2CO \rightarrow HCO^+ + HCO$	1.65×10^{-09}	[4]
$R_{cn}978b$	2	$CO^+ + H_2CO \rightarrow CH_2O^+ + CO$	1.35×10^{-09}	[4]
$R_{cn}979$	3	$HCO^+ + H_2 \rightarrow HCO^+H_2$	1.00×10^{-10}	[2],[38]
			8.30×10^{-31}	
$R_{cn}980$	2	$HCO^+ + C_2H_2 \rightarrow C_2H_3^+ + CO$	1.36×10^{-09}	[2]
$R_{cn}981$	2	$HCO^+ + C_2H_6 \rightarrow C_2H_7^+ + CO$	1.20×10^{-10}	[2]
$R_{cn}982$	2	$HCO^+ + NH_3 \rightarrow NH_4^+ + CO$	2.25×10^{-09}	[4]
$R_{cn}983$	2	$HCO^+ + HCN \rightarrow HCNH^+ + CO$	3.50×10^{-09}	[2]
$R_{cn}984$	2	$HCO^+ + CH_3CN \rightarrow C_2H_3NH^+ + CO$	4.10×10^{-09}	[2]
$R_{cn}985$	2	$HCO^+ + HC_3N \rightarrow HC_3NH^+ + CO$	3.80×10^{-09}	[2]
$R_{cn}986a$	2	$HCO^+ + OH \rightarrow H_2O^+ + CO$	1.61×10^{-09}	Su-Chesnavich
$R_{cn}986b$	2	$HCO^+ + OH \rightarrow OCOH^+ + H$	1.61×10^{-09}	Su-Chesnavich
$R_{cn}987$	2	$HCO^+ + H_2O \rightarrow H_3O^+ + CO$	2.60×10^{-09}	[2]
$R_{cn}988$	3	$HCO^+ + CO \rightarrow HCO^+CO$	1.00×10^{-10}	[2]
			2.40×10^{-30}	
$R_{cn}989$	2	$HCO^+ + H_2CO \rightarrow CH_2OH^+ + CO$	3.30×10^{-09}	[4]
$R_{cn}990a$	2	$HOC^+ + H_2 \rightarrow H_3^+ + CO$	2.68×10^{-10}	[2]
$R_{cn}990b$	2	$HOC^+ + H_2 \rightarrow HCO^+ + H_2$	2.02×10^{-10}	[2]
$R_{cn}991$	2	$HOC^+ + CH_4 \rightarrow CH_5^+ + CO$	1.10×10^{-09}	[2]
$R_{cn}992$	2	$HOC^+ + N_2 \rightarrow N_2H^+ + CO$	6.70×10^{-10}	[4]
$R_{cn}993$	2	$HOC^+ + CO \rightarrow HCO^+ + CO$	6.00×10^{-10}	[2]
$R_{cn}994a$	2	$CH_2O^+ + CH_4 \rightarrow CH_2OH^+ + CH_3$	9.35×10^{-11}	[4]
$R_{cn}994b$	2	$CH_2O^+ + CH_4 \rightarrow CH_3CHOH^+ + H$	1.65×10^{-11}	[4]
$R_{cn}995a$	2	$CH_2O^+ + NH_3 \rightarrow NH_3^+ + H_2CO$	7.40×10^{-10}	[4]

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	Type	Reaction	k	Ref.
$R_{cn}995b$	2	$CH_2O^+ + NH_3 \rightarrow NH_4^+ + HCO$	1.26×10^{-09}	[4]
$R_{cn}996$	2	$CH_2O^+ + HCN \rightarrow HCNH^+ + HCO$	1.40×10^{-09}	[4]
$R_{cn}997$	2	$CH_2O^+ + H_2O \rightarrow H_3O^+ + HCO$	2.10×10^{-09}	[4]
$R_{cn}998$	2	$CH_2O^+ + H_2CO \rightarrow CH_2OH^+ + HCO$	3.20×10^{-09}	[4]
$R_{cn}999$	2	$CH_2OH^+ + C_4H_2 \rightarrow C_4H_3^+ + H_2CO$	9.30×10^{-10}	[2]
$R_{cn}1000$	2	$CH_2OH^+ + NH_3 \rightarrow NH_4^+ + H_2CO$	2.05×10^{-09}	[4]
$R_{cn}1001$	2	$CH_2OH^+ + HCN \rightarrow HCNH^+ + H_2CO$	1.30×10^{-09}	[2]
$R_{cn}1002$	2	$CH_2OH^+ + H_2O \rightarrow H_3O^+ + H_2CO$	2.30×10^{-10}	[2]
$R_{cn}1003a$	2	$CH_2CO^+ + NH_3 \rightarrow CH_3NH_2^+ + CO$	4.40×10^{-10}	[90]
$R_{cn}1003b$	2	$CH_2CO^+ + NH_3 \rightarrow NH_4^+ + ONEUT$	4.40×10^{-10}	[90]
$R_{cn}1004$	2	$CH_3CHOH^+ + NH_3 \rightarrow NH_4^+ + CH_3CHO$	1.80×10^{-09}	[112]
$R_{cn}1005a$	2	$CH_3CHOH^+ + CH_3CN \rightarrow C_2H_3NH^+ + CH_3CHO$	3.01×10^{-09}	[112]
$R_{cn}1005b$	2	$CH_3CHOH^+ + CH_3CN \rightarrow C_4H_8NO^+ + hv$	1.92×10^{-10}	[112]
$R_{cn}1006a$	2	$CO_2^+ + H \rightarrow H^+ + CO_2$	5.53×10^{-11}	[4]
$R_{cn}1006b$	2	$CO_2^+ + H \rightarrow HCO^+ + O$	2.70×10^{-10}	[4]
$R_{cn}1007$	2	$CO_2^+ + H_2 \rightarrow OCOH^+ + H$	6.20×10^{-10}	[4]
$R_{cn}1008a$	2	$CO_2^+ + CH_4 \rightarrow CH_4^+ + CO_2$	2.63×10^{-10}	[4]
$R_{cn}1008b$	2	$CO_2^+ + CH_4 \rightarrow OCOH^+ + CH_3$	7.88×10^{-10}	[4]
$R_{cn}1009$	2	$CO_2^+ + C_2H_2 \rightarrow C_2H_2^+ + CO_2$	5.60×10^{-10}	[113]
$R_{cn}1010a$	2	$CO_2^+ + C_2H_4 \rightarrow C_2H_4^+ + CO_2$	3.07×10^{-10}	[113]
$R_{cn}1010b$	2	$CO_2^+ + C_2H_4 \rightarrow C_2H_3^+ + CO_2 + H$	1.88×10^{-10}	[113]
$R_{cn}1010c$	2	$CO_2^+ + C_2H_4 \rightarrow C_2H_2^+ + CO_2 + H_2$	4.95×10^{-10}	[113]
$R_{cn}1011a$	2	$CO_2^+ + C_2H_6 \rightarrow C_2H_5^+ + CO_2 + H$	2.50×10^{-10}	[113]
$R_{cn}1011b$	2	$CO_2^+ + C_2H_6 \rightarrow C_2H_4^+ + CO_2 + H_2$	5.30×10^{-10}	[113]
$R_{cn}1012a$	2	$CO_2^+ + C_3H_6 \rightarrow C_3H_6^+ + CO_2$	6.51×10^{-11}	[113]
$R_{cn}1012b$	2	$CO_2^+ + C_3H_6 \rightarrow C_3H_5^+ + CO_2 + H$	6.32×10^{-10}	[113]
$R_{cn}1012c$	2	$CO_2^+ + C_3H_6 \rightarrow C_3H_4^+ + CO_2 + H_2$	1.77×10^{-10}	[113]
$R_{cn}1012d$	2	$CO_2^+ + C_3H_6 \rightarrow c{-}C_3H_3^+ + CO_2 + H_2 + H$	2.79×10^{-11}	[113]
$R_{cn}1012e$	2	$CO_2^+ + C_3H_6 \rightarrow l{-}C_3H_3^+ + CO_2 + H_2 + H$	2.79×10^{-11}	[113]
$R_{cn}1013a$	2	$CO_2^+ + C_3H_8 \rightarrow C_3H_7^+ + CO_2 + H$	9.36×10^{-11}	[113]
$R_{cn}1013b$	2	$CO_2^+ + C_3H_8 \rightarrow C_3H_6^+ + CO_2 + H_2$	2.34×10^{-11}	[113]
$R_{cn}1013c$	2	$CO_2^+ + C_3H_8 \rightarrow C_3H_5^+ + CO_2 + H_2 + H$	2.34×10^{-11}	[113]
$R_{cn}1013d$	2	$CO_2^+ + C_3H_8 \rightarrow C_2H_5^+ + CO_2 + CH_3$	5.46×10^{-10}	[113]
$R_{cn}1013e$	2	$CO_2^+ + C_3H_8 \rightarrow C_2H_4^+ + CO_2 + CH_4$	9.36×10^{-11}	[113]
$R_{cn}1014a$	2	$CO_2^+ + C_4H_{10} \rightarrow C_4H_9^+ + CO_2 + H$	7.00×10^{-11}	[114]
$R_{cn}1014b$	2	$CO_2^+ + C_4H_{10} \rightarrow C_3H_7^+ + CO_2 + CH_3$	5.30×10^{-10}	[114]
$R_{cn}1014c$	2	$CO_2^+ + C_4H_{10} \rightarrow C_3H_6^+ + CO_2 + CH_4$	9.00×10^{-11}	[114]
$R_{cn}1014d$	2	$CO_2^+ + C_4H_{10} \rightarrow C_3H_5^+ + CO_2 + CH_4 + H$	3.10×10^{-10}	[114]
$R_{cn}1015$	2	$CO_2^+ + N \rightarrow CO^+ + NO$	3.40×10^{-10}	[115]
$R_{cn}1016$	2	$CO_2^+ + NH_3 \rightarrow NH_3^+ + CO_2$	1.90×10^{-09}	[4]
$R_{cn}1017a$	2	$CO_2^+ + HCN \rightarrow HCN^+ + CO_2$	8.10×10^{-10}	[116]
$R_{cn}1017b$	2	$CO_2^+ + HCN \rightarrow OCOH^+ + CN$	9.00×10^{-11}	[116]
$R_{cn}1018$	2	$CO_2^+ + CO \rightarrow CO^+ + CO_2$	1.90×10^{-12}	[117]
$R_{cn}1019$	2	$CO_2^+ + NO \rightarrow NO^+ + CO_2$	1.23×10^{-10}	[4]
$R_{cn}1020$	2	$OCOH^+ + CH_4 \rightarrow CH_5^+ + CO_2$	7.20×10^{-10}	[4]
$R_{cn}1021$	2	$OCOH^+ + C_2H_2 \rightarrow C_2H_3^+ + CO_2$	1.37×10^{-09}	[118]
$R_{cn}1022$	2	$OCOH^+ + CH_3CN \rightarrow C_2H_3NH^+ + CO_2$	4.10×10^{-09}	[119]
$R_{cn}1023$	2	$OCOH^+ + H_2O \rightarrow H_3O^+ + CO_2$	2.65×10^{-09}	[4]
$R_{cn}1024$	2	$OCOH^+ + NO \rightarrow HNO^+ + CO_2$	1.00×10^{-10}	[120]
$R_{cn}1025$	2	$NO^+ + C_6H_6 \rightarrow C_6H_6^+ + NO$	1.43×10^{-09}	[4]

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	Type	Reaction	k	Ref.
$R_{cn}1026$	2	$NO^+ + CH_3NH_2 \rightarrow CH_3NH_2{}^+ + NO$	8.20×10^{-10}	[4]

References

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Table B.17: Thermal electron reaction list (electron recombination)

	Type	Reaction	k	Ref.
$R_{er}1$	4	$H^+ + e \rightarrow H$	$3.50\times10^{-12}(300/T)^{0.70}$	[1]
$R_{er}2$	4	$C^+ + e \rightarrow C$	$4.67\times10^{-12}(300/T)^{0.60}$	[2]
$R_{er}3$	4	$N^+ + e \rightarrow N$	$3.50\times10^{-12}(300/T)^{0.70}$	[3]
$R_{er}4$	4	$O^+ + e \rightarrow O(^3P)$	$3.40\times10^{-12}(300/T)^{0.63}$	[1]
$R_{er}5$	4	$H_2^+ + e \rightarrow H + H$	$1.60\times10^{-08}(300/T)^{0.43}$	[4]
$R_{er}6a$	4	$H_3^+ + e \rightarrow H + H + H$	$4.36\times10^{-08}(300/T)^{0.52}$	[1]
$R_{er}6b$	4	$H_3^+ + e \rightarrow H_2 + H$	$2.34\times10^{-08}(300/T)^{0.52}$	[1]
$R_{er}7$	4	$H_5^+ + e \rightarrow H_2 + H_2 + H$	$4.00\times10^{-06}(300/T)^{0.70}$	[5]
$R_{er}8$	4	$CH^+ + e \rightarrow H + C$	$1.00\times10^{-07}(300/T)^{0.37}$	[6]
$R_{er}9a$	4	$CH_2^+ + e \rightarrow C + H + H$	$4.03\times10^{-07}(300/T)^{0.60}$	[7]
$R_{er}9b$	4	$CH_2^+ + e \rightarrow CH + H$	$1.60\times10^{-07}(300/T)^{0.60}$	[7]
$R_{er}9c$	4	$CH_2^+ + e \rightarrow C + H_2$	$7.68\times10^{-08}(300/T)^{0.60}$	[7]
$R_{er}10$	4	$CH_2^+N_2 + e \rightarrow {}^3CH_2 + N_2$	$5.00\times10^{-06}(300/T)^{0.70}$	est.(clusters)
$R_{er}11a$	4	$CH_3^+ + e \rightarrow {}^3CH_2 + H$	$1.28\times10^{-07}(300/T)^{0.53}$	[8],[9]
$R_{er}11b$	4	$CH_3^+ + e \rightarrow C + H_2 + H$	$9.60\times10^{-08}(300/T)^{0.53}$	[8],[9]
$R_{er}11c$	4	$CH_3^+ + e \rightarrow CH + H + H$	$5.12\times10^{-08}(300/T)^{0.53}$	[8],[9]
$R_{er}11d$	4	$CH_3^+ + e \rightarrow CH + H_2$	$4.48\times10^{-08}(300/T)^{0.53}$	[8],[9]
$R_{er}12$	4	$CH_3^+N_2 + e \rightarrow CH_3 + N_2$	$5.00\times10^{-06}(300/T)^{0.70}$	est.(clusters)
$R_{er}13a$	4	$CH_4^+ + e \rightarrow {}^3CH_2 + H + H$	$8.72\times10^{-07}(300/T)^{0.66}$	[10]
$R_{er}13b$	4	$CH_4^+ + e \rightarrow CH + H_2 + H$	$3.93\times10^{-07}(300/T)^{0.66}$	[10]
$R_{er}13c$	4	$CH_4^+ + e \rightarrow CH_3 + H$	$3.08\times10^{-07}(300/T)^{0.66}$	[10]
$R_{er}13d$	4	$CH_4^+ + e \rightarrow {}^3CH_2 + H_2$	$1.03\times10^{-07}(300/T)^{0.66}$	[10]
$R_{er}13e$	4	$CH_4^+ + e \rightarrow C + H_2 + H_2$	$3.42\times10^{-08}(300/T)^{0.66}$	[10]
$R_{er}14a$	4	$CH_5^+ + e \rightarrow CH_3 + H + H$	$7.61\times10^{-07}(300/T)^{0.72}$	[11],[12]
$R_{er}14b$	4	$CH_5^+ + e \rightarrow {}^3CH_2 + H_2 + H$	$1.87\times10^{-07}(300/T)^{0.72}$	[11],[12]
$R_{er}14c$	4	$CH_5^+ + e \rightarrow CH_4 + H$	$5.34\times10^{-08}(300/T)^{0.72}$	[11],[12]
$R_{er}14d$	4	$CH_5^+ + e \rightarrow CH_3 + H_2$	$5.23\times10^{-08}(300/T)^{0.72}$	[11],[12]
$R_{er}14e$	4	$CH_5^+ + e \rightarrow CH + H_2 + H_2$	$3.60\times10^{-08}(300/T)^{0.72}$	[11],[12]
$R_{er}15$	4	$CH_5^+CH_4 + e \rightarrow CH_4 + CH_4 + H$	$4.00\times10^{-06}(300/T)^{0.70}$	[13]
$R_{er}16$	4	$CH_5^+HNC + e \rightarrow HNC + CH_4 + H$	$4.00\times10^{-06}(300/T)^{0.70}$	est.(clusters)
$R_{er}17a$	4	$C_2H^+ + e \rightarrow C_2 + H$	$1.16\times10^{-07}(300/T)^{0.76}$	[14]
$R_{er}17b$	4	$C_2H^+ + e \rightarrow CH + C$	$1.05\times10^{-07}(300/T)^{0.76}$	[14]
$R_{er}17c$	4	$C_2H^+ + e \rightarrow C + C + H$	$4.86\times10^{-08}(300/T)^{0.76}$	[14]
$R_{er}18a$	4	$C_2H_2^+ + e \rightarrow C_2H + H$	$1.35\times10^{-07}(300/T)^{0.50}$	[4],[15]
$R_{er}18b$	4	$C_2H_2^+ + e \rightarrow C_2 + H + H$	$8.10\times10^{-08}(300/T)^{0.50}$	[4],[15]
$R_{er}18c$	4	$C_2H_2^+ + e \rightarrow CH + CH$	$3.51\times10^{-08}(300/T)^{0.50}$	[4],[15]
$R_{er}18d$	4	$C_2H_2^+ + e \rightarrow {}^3CH_2 + C$	$1.35\times10^{-08}(300/T)^{0.50}$	[4],[15]
$R_{er}18e$	4	$C_2H_2^+ + e \rightarrow C_2 + H_2$	$5.40\times10^{-09}(300/T)^{0.50}$	[4],[15]
$R_{er}19a$	4	$C_2H_3^+ + e \rightarrow C_2H + H + H$	$2.95\times10^{-07}(300/T)^{0.84}$	[16]
$R_{er}19b$	4	$C_2H_3^+ + e \rightarrow C_2H_2 + H$	$1.45\times10^{-07}(300/T)^{0.84}$	[16]
$R_{er}19c$	4	$C_2H_3^+ + e \rightarrow C_2H + H_2$	$3.00\times10^{-08}(300/T)^{0.84}$	[16]
$R_{er}19d$	4	$C_2H_3^+ + e \rightarrow C_2 + H_2 + H$	$1.50\times10^{-08}(300/T)^{0.84}$	[16]
$R_{er}19e$	4	$C_2H_3^+ + e \rightarrow {}^3CH_2 + CH$	$1.50\times10^{-08}(300/T)^{0.84}$	[16]
$R_{er}19f$	4	$C_2H_3^+ + e \rightarrow CH_3 + C$	$3.00\times10^{-09}(300/T)^{0.84}$	[16]
$R_{er}20a$	4	$C_2H_4^+ + e \rightarrow C_2H_2 + H + H$	$3.70\times10^{-07}(300/T)^{0.76}$	[14]
$R_{er}20b$	4	$C_2H_4^+ + e \rightarrow C_2H_3 + H$	$6.16\times10^{-08}(300/T)^{0.76}$	[14]
$R_{er}20c$	4	$C_2H_4^+ + e \rightarrow C_2H + H_2 + H$	$5.60\times10^{-08}(300/T)^{0.76}$	[14]
$R_{er}20d$	4	$C_2H_4^+ + e \rightarrow C_2H_2 + H_2$	$3.36\times10^{-08}(300/T)^{0.76}$	[14]

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	Type	Reaction	k	Ref.
$R_{er}20e$	4	$C_2H_4^+ + e \rightarrow {}^3CH_2 + {}^3CH_2$	$2.24\times10^{-08}(300/T)^{0.76}$	[14]
$R_{er}20f$	4	$C_2H_4^+ + e \rightarrow CH_3 + CH$	$1.12\times10^{-08}(300/T)^{0.76}$	[14]
$R_{er}20g$	4	$C_2H_4^+ + e \rightarrow CH_4 + C$	$5.60\times10^{-09}(300/T)^{0.76}$	[14]
$R_{er}21a$	4	$C_2H_5^+ + e \rightarrow C_2H_2 + H_2 + H$	$3.55\times10^{-07}(300/T)^{1.20}$	[17],[18]
$R_{er}21b$	4	$C_2H_5^+ + e \rightarrow C_2H_3 + H + H$	$3.33\times10^{-07}(300/T)^{1.20}$	[17],[18]
$R_{er}21c$	4	$C_2H_5^+ + e \rightarrow CH_3 + {}^3CH_2$	$2.08\times10^{-07}(300/T)^{1.20}$	[17],[18]
$R_{er}21d$	4	$C_2H_5^+ + e \rightarrow C_2H_2 + H_2 + H$	$1.59\times10^{-07}(300/T)^{1.20}$	[17],[18]
$R_{er}21e$	4	$C_2H_5^+ + e \rightarrow C_2H_4 + H$	$1.47\times10^{-07}(300/T)^{1.20}$	[17],[18]
$R_{er}22$	4	$C_2H_5^+CH_4 + e \rightarrow C_2H_4 + CH_4 + H$	$4.00\times10^{-06}(300/T)^{0.70}$	[13]
$R_{er}23a$	4	$C_2H_6^+ + e \rightarrow C_2H_4 + H + H$	$4.60\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),[19]
$R_{er}23b$	4	$C_2H_6^+ + e \rightarrow C_2H_5 + H$	$3.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),[19]
$R_{er}23c$	4	$C_2H_6^+ + e \rightarrow C_2H_4 + H_2$	$8.00\times10^{-08}(300/T)^{0.70}$	est.(eq.(E14)),[19]
$R_{er}23d$	4	$C_2H_6^+ + e \rightarrow CH_3 + CH_3$	$8.00\times10^{-08}(300/T)^{0.70}$	est.(eq.(E14)),[19]
$R_{er}23e$	4	$C_2H_6^+ + e \rightarrow CH_4 + {}^3CH_2$	$4.00\times10^{-08}(300/T)^{0.70}$	est.(eq.(E14)),[19]
$R_{er}23f$	4	$C_2H_6^+ + e \rightarrow C_2H_3 + H_2 + H$	$3.00\times10^{-08}(300/T)^{0.70}$	est.(eq.(E14)),[19]
$R_{er}24a$	4	$C_2H_7^+ + e \rightarrow C_2H_6 + H$	$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}24b$	4	$C_2H_7^+ + e \rightarrow CH_4 + CH_3$	$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}25$	4	$C_2H_7^+CH_4 + e \rightarrow C_2H_6 + CH_4 + H$	$4.00\times10^{-06}(300/T)^{0.70}$	[13]
$R_{er}26$	4	$C_3^+ + e \rightarrow C_2 + C$	$4.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),[20]
$R_{er}27a$	4	$C_3H^+ + e \rightarrow C_3 + H$	$3.97\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),[21],[22]
$R_{er}27b$	4	$C_3H^+ + e \rightarrow C_2H + C$	$1.87\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),[21],[22]
$R_{er}27c$	4	$C_3H^+ + e \rightarrow C_2 + CH$	$1.56\times10^{-08}(300/T)^{0.70}$	est.(eq.(E14)),[21],[22]
$R_{er}28a$	4	$C_3H_2^+ + e \rightarrow C_3H + H$	$3.66\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),[21],[22]
$R_{er}28b$	4	$C_3H_2^+ + e \rightarrow C_3 + H_2$	$1.94\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),[21],[22]
$R_{er}28c$	4	$C_3H_2^+ + e \rightarrow C_3 + H + H$	$1.40\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),[21],[22]
$R_{er}28d$	4	$C_3H_2^+ + e \rightarrow C_2H_2 + C$	$7.71\times10^{-08}(300/T)^{0.70}$	est.(eq.(E14)),[21],[22]
$R_{er}28e$	4	$C_3H_2^+ + e \rightarrow C_2H + CH$	$1.43\times10^{-08}(300/T)^{0.70}$	est.(eq.(E14)),[21],[22]
$R_{er}28f$	4	$C_3H_2^+ + e \rightarrow C_2 + {}^3CH_2$	$8.56\times10^{-09}(300/T)^{0.70}$	est.(eq.(E14)),[21],[22]
$R_{er}29a$	4	$c{-}C_3H_3^+ + e \rightarrow C_3H + H + H$	$4.00\times10^{-07}(300/T)^{1.00}$	[23],[19]
$R_{er}29b$	4	$c{-}C_3H_3^+ + e \rightarrow C_3H_2 + H$	$2.88\times10^{-07}(300/T)^{1.00}$	[23],[19]
$R_{er}29c$	4	$c{-}C_3H_3^+ + e \rightarrow C_3H + H_2$	$4.80\times10^{-08}(300/T)^{1.00}$	[23],[19]
$R_{er}29d$	4	$c{-}C_3H_3^+ + e \rightarrow C_2H_2 + CH$	$2.40\times10^{-08}(300/T)^{1.00}$	[23],[19]
$R_{er}29e$	4	$c{-}C_3H_3^+ + e \rightarrow C_2H + {}^3CH_2$	$2.40\times10^{-08}(300/T)^{1.00}$	[23],[19]
$R_{er}29f$	4	$c{-}C_3H_3^+ + e \rightarrow C_2 + CH_3$	$1.60\times10^{-08}(300/T)^{1.00}$	[23],[19]
$R_{er}30a$	4	$l{-}C_3H_3^+ + e \rightarrow C_3H + H + H$	$5.75\times10^{-08}(300/T)^{1.00}$	[23],[19]
$R_{er}30b$	4	$l{-}C_3H_3^+ + e \rightarrow C_3H_2 + H$	$4.15\times10^{-08}(300/T)^{1.00}$	[23],[19]
$R_{er}30c$	4	$l{-}C_3H_3^+ + e \rightarrow C_3H + H_2$	$6.90\times10^{-09}(300/T)^{1.00}$	[23],[19]
$R_{er}30d$	4	$l{-}C_3H_3^+ + e \rightarrow C_2H_2 + CH$	$3.45\times10^{-09}(300/T)^{1.00}$	[23],[19]
$R_{er}30e$	4	$l{-}C_3H_3^+ + e \rightarrow C_2H + {}^3CH_2$	$3.45\times10^{-09}(300/T)^{1.00}$	[23],[19]
$R_{er}30f$	4	$l{-}C_3H_3^+ + e \rightarrow C_2 + CH_3$	$2.30\times10^{-09}(300/T)^{1.00}$	[23],[19]
$R_{er}31a$	4	$C_3H_4^+ + e \rightarrow C_3H_3 + H$	$2.57\times10^{-06}(300/T)^{0.67}$	[24]
$R_{er}31b$	4	$C_3H_4^+ + e \rightarrow C_2H_2 + {}^3CH_2$	$1.77\times10^{-07}(300/T)^{0.67}$	[24]
$R_{er}31c$	4	$C_3H_4^+ + e \rightarrow C_2H_3 + CH$	$2.95\times10^{-08}(300/T)^{0.67}$	[24]
$R_{er}31d$	4	$C_3H_4^+ + e \rightarrow C_2H + CH_3$	$2.95\times10^{-08}(300/T)^{0.67}$	[24]
$R_{er}32a$	4	$C_3H_5^+ + e \rightarrow C_3H_3 + H + H$	$5.60\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),[19]
$R_{er}32b$	4	$C_3H_5^+ + e \rightarrow CH_3CCH + H$	$2.70\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),[19]
$R_{er}32c$	4	$C_3H_5^+ + e \rightarrow C_3H_3 + H_2$	$4.00\times10^{-08}(300/T)^{0.70}$	est.(eq.(E14)),[19]
$R_{er}32d$	4	$C_3H_5^+ + e \rightarrow C_3H_2 + H_2 + H$	$3.00\times10^{-08}(300/T)^{0.70}$	est.(eq.(E14)),[19]
$R_{er}32e$	4	$C_3H_5^+ + e \rightarrow C_2H + CH_4$	$3.00\times10^{-08}(300/T)^{0.70}$	est.(eq.(E14)),[19]
$R_{er}32f$	4	$C_3H_5^+ + e \rightarrow C_2H_2 + CH_3$	$3.00\times10^{-08}(300/T)^{0.70}$	est.(eq.(E14)),[19]

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	Type	Reaction	k	Ref.
R_{er}32g	4	$C_3H_5^+ + e \rightarrow C_2H_4 + CH$	$2.00\times10^{-08}(300/T)^{0.70}$	est.(eq.(E14)),[19]
R_{er}32h	4	$C_3H_5^+ + e \rightarrow C_2H_3 + {}^3CH_2$	$2.00\times10^{-08}(300/T)^{0.70}$	est.(eq.(E14)),[19]
R_{er}33a	4	$C_3H_6^+ + e \rightarrow CH_3CCH + H + H$	$4.40\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),[21],[19]
R_{er}33b	4	$C_3H_6^+ + e \rightarrow C_3H_5 + H$	$2.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),[21],[19]
R_{er}33c	4	$C_3H_6^+ + e \rightarrow C_2H_4 + {}^3CH_2$	$1.20\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),[21],[19]
R_{er}33d	4	$C_3H_6^+ + e \rightarrow C_2H_3 + CH_3$	$1.20\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),[21],[19]
R_{er}33e	4	$C_3H_6^+ + e \rightarrow C_2H_5 + CH$	$8.00\times10^{-08}(300/T)^{0.70}$	est.(eq.(E14)),[21],[19]
R_{er}33f	4	$C_3H_6^+ + e \rightarrow C_3H_3 + H_2 + H$	$3.00\times10^{-08}(300/T)^{0.70}$	est.(eq.(E14)),[21],[19]
R_{er}33g	4	$C_3H_6^+ + e \rightarrow CH_3CCH + H_2$	$3.00\times10^{-08}(300/T)^{0.70}$	est.(eq.(E14)),[21],[19]
R_{er}34a	4	$C_3H_7^+ + e \rightarrow C_3H_6 + H$	$8.36\times10^{-07}(300/T)^{0.68}$	[25]
R_{er}34b	4	$C_3H_7^+ + e \rightarrow C_2H_3 + CH_3 + H$	$3.80\times10^{-07}(300/T)^{0.68}$	[25]
R_{er}34c	4	$C_3H_7^+ + e \rightarrow C_3H_5 + H_2$	$1.14\times10^{-07}(300/T)^{0.68}$	[25]
R_{er}34d	4	$C_3H_7^+ + e \rightarrow C_3H_5 + H + H$	$1.14\times10^{-07}(300/T)^{0.68}$	[25]
R_{er}34e	4	$C_3H_7^+ + e \rightarrow C_2H_2 + CH_4 + H$	$1.05\times10^{-07}(300/T)^{0.68}$	[25]
R_{er}34f	4	$C_3H_7^+ + e \rightarrow C_2H_2 + CH_3 + H_2$	$1.05\times10^{-07}(300/T)^{0.68}$	[25]
R_{er}34g	4	$C_3H_7^+ + e \rightarrow CH_3CCH + H_2 + H$	$1.71\times10^{-07}(300/T)^{0.68}$	[25]
R_{er}34h	4	$C_3H_7^+ + e \rightarrow C_2H_4 + CH_3$	$3.80\times10^{-08}(300/T)^{0.68}$	[25]
R_{er}34i	4	$C_3H_7^+ + e \rightarrow C_2H_4 + {}^3CH_2 + H$	$3.80\times10^{-08}(300/T)^{0.68}$	[25]
R_{er}35a	4	$C_3H_8^+ + e \rightarrow C_3H_6 + H + H$	$4.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),[21],[19]
R_{er}35b	4	$C_3H_8^+ + e \rightarrow C_3H_7 + H$	$2.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),[21],[19]
R_{er}35c	4	$C_3H_8^+ + e \rightarrow C_2H_6 + {}^3CH_2$	$1.60\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),[21],[19]
R_{er}35d	4	$C_3H_8^+ + e \rightarrow C_2H_5 + CH_3$	$1.60\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),[21],[19]
R_{er}35e	4	$C_3H_8^+ + e \rightarrow C_3H_6 + H_2$	$4.00\times10^{-08}(300/T)^{0.70}$	est.(eq.(E14)),[21],[19]
R_{er}35f	4	$C_3H_8^+ + e \rightarrow C_3H_5 + H_2 + H$	$3.00\times10^{-08}(300/T)^{0.70}$	est.(eq.(E14)),[21],[19]
R_{er}36a	4	$C_3H_9^+ + e \rightarrow C_3H_8 + H$	$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
R_{er}36b	4	$C_3H_9^+ + e \rightarrow C_2H_6 + CH_3$	$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
R_{er}37a	4	$C_4H^+ + e \rightarrow C_4 + H$	$3.50\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),[26],[22]
R_{er}37b	4	$C_4H^+ + e \rightarrow C_2H + C_2$	$2.23\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),[26],[22]
R_{er}37c	4	$C_4H^+ + e \rightarrow C_3 + C + H$	$1.53\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),[26],[22]
R_{er}37d	4	$C_4H^+ + e \rightarrow C_3H + C$	$7.26\times10^{-08}(300/T)^{0.70}$	est.(eq.(E14)),[26],[22]
R_{er}38a	4	$C_4H_2^+ + e \rightarrow C_4H + H$	$8.62\times10^{-07}(300/T)^{0.79}$	[27],[26]
R_{er}38b	4	$C_4H_2^+ + e \rightarrow C_2H + C_2H$	$1.95\times10^{-07}(300/T)^{0.79}$	[27],[26]
R_{er}38c	4	$C_4H_2^+ + e \rightarrow C_3H + CH$	$4.40\times10^{-08}(300/T)^{0.79}$	[27],[26]
R_{er}39a	4	$C_4H_3^+ + e \rightarrow C_4H_2 + H$	$4.75\times10^{-07}(300/T)^{0.70}$	[28],[26]
R_{er}39b	4	$C_4H_3^+ + e \rightarrow C_2H_2 + C_2H$	$1.10\times10^{-07}(300/T)^{0.70}$	[28],[26]
R_{er}39c	4	$C_4H_3^+ + e \rightarrow C_3H_2 + CH$	$3.91\times10^{-08}(300/T)^{0.70}$	[28],[26]
R_{er}40	4	$C_4H_3^+CO + e \rightarrow C_4H_3 + CO$	$5.00\times10^{-06}(300/T)^{0.70}$	est.(clusters)
R_{er}41a	4	$C_4H_4^+ + e \rightarrow C_4H_3 + H$	$9.96\times10^{-07}(300/T)^{1.10}$	[29],[26]
R_{er}41b	4	$C_4H_4^+ + e \rightarrow C_2H_2 + C_2H_2$	$2.22\times10^{-07}(300/T)^{1.10}$	[29],[26]
R_{er}41c	4	$C_4H_4^+ + e \rightarrow C_3H_3 + CH$	$8.19\times10^{-08}(300/T)^{1.10}$	[29],[26]
R_{er}42a	4	$C_4H_5^+ + e \rightarrow C_4H_2 + H_2 + H$	$3.77\times10^{-07}(300/T)^{0.70}$	[30],[26]
R_{er}42b	4	$C_4H_5^+ + e \rightarrow C_2H_3 + C_2H_2$	$3.67\times10^{-07}(300/T)^{0.70}$	[30],[26]
R_{er}42c	4	$C_4H_5^+ + e \rightarrow CH_3CCH + CH$	$7.64\times10^{-08}(300/T)^{0.70}$	[30],[26]
R_{er}43a	4	$C_4H_6^+ + e \rightarrow C_4H_4 + H_2$	$5.89\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),[26]
R_{er}43b	4	$C_4H_6^+ + e \rightarrow C_2H_4 + C_2H_2$	$3.21\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),[26]
R_{er}43c	4	$C_4H_6^+ + e \rightarrow CH_3CCH + {}^3CH_2$	$9.00\times10^{-08}(300/T)^{0.70}$	est.(eq.(E14)),[26]
R_{er}44a	4	$C_4H_7^+ + e \rightarrow CH_3CCH + CH_3$	$6.56\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),[26]
R_{er}44b	4	$C_4H_7^+ + e \rightarrow C_4H_2 + H_2 + H_3$	$1.98\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),[26]
R_{er}44c	4	$C_4H_7^+ + e \rightarrow C_2H_4 + C_2H_3$	$1.47\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),[26]
R_{er}45a	4	$C_4H_8^+ + e \rightarrow CH_3CCH + CH_4$	$6.36\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),[26]

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	Type	Reaction								k	Ref.
$R_{er}45b$	4	$C_4H_8^+$	+	e	→	C_4H_6	+	H_2		$3.05\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),[26]
$R_{er}45c$	4	$C_4H_8^+$	+	e	→	C_2H_4	+	C_2H_4		$6.10\times10^{-08}(300/T)^{0.70}$	est.(eq.(E14)),[26]
$R_{er}46a$	4	$C_4H_9^+$	+	e	→	C_4H_8	+	H		$3.34\times10^{-07}(300/T)^{0.59}$	[31],[26]
$R_{er}46b$	4	$C_4H_9^+$	+	e	→	C_3H_6	+	CH_3		$2.38\times10^{-07}(300/T)^{0.59}$	[31],[26]
$R_{er}46c$	4	$C_4H_9^+$	+	e	→	C_2H_6	+	C_2H_3		$8.70\times10^{-09}(300/T)^{0.59}$	[31],[26]
$R_{er}47a$	4	C_5H^+	+	e	→	C_5	+	H		$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}47b$	4	C_5H^+	+	e	→	C_4H	+	C		$2.50\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}47c$	4	C_5H^+	+	e	→	C_3	+	C_2H		$2.50\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}48$	4	$C_5H_2^+$	+	e	→	C_5H	+	H		$1.00\times10^{-06}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}49$	4	$C_5H_3^+$	+	e	→	C_5H_2	+	H		$9.00\times10^{-07}(300/T)^{0.70}$	[32],est.(products)
$R_{er}50$	4	$C_5H_4^+$	+	e	→	C_5H_3	+	H		$1.00\times10^{-06}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}51a$	4	$C_5H_5^+$	+	e	→	C_5H_4	+	H		$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),[1]
$R_{er}51b$	4	$C_5H_5^+$	+	e	→	C_3H_3	+	C_2H_2		$2.50\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),[1]
$R_{er}51c$	4	$C_5H_5^+$	+	e	→	C_4H_2	+	CH_3		$2.50\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),[1]
$R_{er}52a$	4	$C_5H_6^+$	+	e	→	C_5H_5	+	H		$4.50\times10^{-07}(300/T)^{0.70}$	[29],est.(products)
$R_{er}52b$	4	$C_5H_6^+$	+	e	→	C_4H_3	+	CH_3		$2.25\times10^{-07}(300/T)^{0.70}$	[29],est.(products)
$R_{er}52c$	4	$C_5H_6^+$	+	e	→	C_3H_5	+	C_2H		$2.25\times10^{-07}(300/T)^{0.70}$	[29],est.(products)
$R_{er}53a$	4	$C_5H_7^+$	+	e	→	C_5H_6	+	H		$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}53b$	4	$C_5H_7^+$	+	e	→	C_4H_5	+	$^3CH_2$		$2.50\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}53c$	4	$C_5H_7^+$	+	e	→	CH_3CCH	+	C_2H_3		$2.50\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}54a$	4	$C_5H_8^+$	+	e	→	C_5H_7	+	H		$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}54b$	4	$C_5H_8^+$	+	e	→	C_4H_5	+	CH_3		$2.50\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}54c$	4	$C_5H_8^+$	+	e	→	C_3H_5	+	C_2H_3		$2.50\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}55a$	4	$C_5H_9^+$	+	e	→	C_5H_8	+	H		$4.75\times10^{-07}(300/T)^{0.70}$	[30],est.(products)
$R_{er}55b$	4	$C_5H_9^+$	+	e	→	C_4H_6	+	CH_3		$1.58\times10^{-07}(300/T)^{0.70}$	[30],est.(products)
$R_{er}55c$	4	$C_5H_9^+$	+	e	→	C_3H_6	+	C_2H_3		$1.58\times10^{-07}(300/T)^{0.70}$	[30],est.(products)
$R_{er}55d$	4	$C_5H_9^+$	+	e	→	CH_3CCH	+	C_2H_5		$1.58\times10^{-07}(300/T)^{0.70}$	[30],est.(products)
$R_{er}56a$	4	$C_5H_{10}^+$	+	e	→	C_5H_9	+	H		$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}56b$	4	$C_5H_{10}^+$	+	e	→	C_4H_7	+	CH_3		$1.67\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}56c$	4	$C_5H_{10}^+$	+	e	→	C_3H_7	+	C_2H_3		$1.67\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}56d$	4	$C_5H_{10}^+$	+	e	→	C_3H_5	+	C_2H_5		$1.67\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}57a$	4	$C_5H_{11}^+$	+	e	→	C_5H_{10}	+	H		$3.60\times10^{-07}(300/T)^{0.70}$	[33],est.(products)
$R_{er}57b$	4	$C_5H_{11}^+$	+	e	→	C_4H_9	+	$^3CH_2$		$9.00\times10^{-08}(300/T)^{0.70}$	[33],est.(products)
$R_{er}57c$	4	$C_5H_{11}^+$	+	e	→	C_4H_8	+	CH_3		$9.00\times10^{-08}(300/T)^{0.70}$	[33],est.(products)
$R_{er}57d$	4	$C_5H_{11}^+$	+	e	→	C_3H_7	+	C_2H_4		$9.00\times10^{-08}(300/T)^{0.70}$	[33],est.(products)
$R_{er}57e$	4	$C_5H_{11}^+$	+	e	→	C_3H_6	+	C_2H_5		$9.00\times10^{-08}(300/T)^{0.70}$	[33],est.(products)
$R_{er}58a$	4	C_6H^+	+	e	→	C_6	+	H		$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}58b$	4	C_6H^+	+	e	→	C_4H	+	C_2		$2.50\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}58c$	4	C_6H^+	+	e	→	C_4	+	C_2H		$2.50\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}59a$	4	$C_6H_2^+$	+	e	→	C_6H	+	H		$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}59b$	4	$C_6H_2^+$	+	e	→	C_4H	+	C_2H		$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}60a$	4	$C_6H_3^+$	+	e	→	C_6H_2	+	H		$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}60b$	4	$C_6H_3^+$	+	e	→	C_4H_2	+	C_2H		$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}61$	4	$C_6H_4^+$	+	e	→	C_6H_3	+	H		$1.10\times10^{-06}(300/T)^{0.70}$	[30],est.(products)
$R_{er}62$	4	$C_6H_5^+$	+	e	→	C_6H_4	+	H		$1.10\times10^{-06}(300/T)^{0.70}$	[30],est.(products)
$R_{er}63$	4	$C_6H_6^+$	+	e	→	C_6H_5	+	H		$1.30\times10^{-06}(300/T)^{0.69}$	[34]
$R_{er}64$	4	$C_6H_7^+$	+	e	→	C_6H_6	+	H		$2.00\times10^{-06}(300/T)^{0.83}$	[34]
$R_{er}65a$	4	$C_6H_9^+$	+	e	→	C_6H_8	+	H		$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}65b$	4	$C_6H_9^+$	+	e	→	C_5H_6	+	CH_3		$1.67\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}65c$	4	$C_6H_9^+$	+	e	→	C_4H_6	+	C_2H_3		$1.67\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)

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	Type	Reaction	k	Ref.
$R_{er}65d$	4	$C_6H_9^+ + e \rightarrow C_4H_5 + C_2H_4$	$1.67\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}66a$	4	$C_6H_{11}^+ + e \rightarrow C_6H_{10} + H$	$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}66b$	4	$C_6H_{11}^+ + e \rightarrow C_5H_8 + CH_3$	$1.25\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}66c$	4	$C_6H_{11}^+ + e \rightarrow C_4H_8 + C_2H_3$	$1.25\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}66d$	4	$C_6H_{11}^+ + e \rightarrow C_4H_6 + C_2H_5$	$1.25\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}66e$	4	$C_6H_{11}^+ + e \rightarrow C_3H_7 + CH_3CCH$	$1.25\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}67a$	4	$C_6H_{13}^+ + e \rightarrow C_6H_{12} + H$	$6.50\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}67b$	4	$C_6H_{13}^+ + e \rightarrow C_5H_{11} + {}^3CH_2$	$1.63\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}67c$	4	$C_6H_{13}^+ + e \rightarrow C_5H_{10} + CH_3$	$1.63\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}67d$	4	$C_6H_{13}^+ + e \rightarrow C_4H_9 + C_2H_4$	$1.63\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}67e$	4	$C_6H_{13}^+ + e \rightarrow C_3H_7 + C_3H_6$	$1.63\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}68a$	4	$C_7^+ + e \rightarrow C_4 + C_3$	$1.60\times10^{-06}(300/T)^{0.30}$	[1]
$R_{er}68b$	4	$C_7^+ + e \rightarrow C_5 + C_2$	$4.00\times10^{-07}(300/T)^{0.30}$	[1]
$R_{er}69a$	4	$C_7H^+ + e \rightarrow C_7 + H$	$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}69b$	4	$C_7H^+ + e \rightarrow C_6H + C$	$1.67\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}69c$	4	$C_7H^+ + e \rightarrow C_4H + C_3$	$1.67\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}69d$	4	$C_7H^+ + e \rightarrow C_5 + C_2H$	$1.67\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}70a$	4	$C_7H_2^+ + e \rightarrow C_7H + H$	$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}70b$	4	$C_7H_2^+ + e \rightarrow C_6 + {}^3CH_2$	$1.67\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}70c$	4	$C_7H_2^+ + e \rightarrow C_5H_2 + C_2$	$1.67\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}70d$	4	$C_7H_2^+ + e \rightarrow C_3H_2 + C_4$	$1.67\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}71a$	4	$C_7H_3^+ + e \rightarrow C_7H_2 + H$	$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}71b$	4	$C_7H_3^+ + e \rightarrow C_6H + {}^3CH_2$	$1.67\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}71c$	4	$C_7H_3^+ + e \rightarrow C_5H_2 + C_2H$	$1.67\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}71d$	4	$C_7H_3^+ + e \rightarrow C_4H + C_3H_2$	$1.67\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}72$	4	$C_7H_4^+ + e \rightarrow C_7H_3 + H$	$1.00\times10^{-06}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}73$	4	$C_7H_5^+ + e \rightarrow C_7H_4 + H$	$7.00\times10^{-07}(300/T)^{0.70}$	[32],est.(products)
$R_{er}74a$	4	$C_7H_6^+ + e \rightarrow C_7H_5 + H$	$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}74b$	4	$C_7H_6^+ + e \rightarrow C_6H_3 + CH_3$	$1.67\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}74c$	4	$C_7H_6^+ + e \rightarrow C_5H_5 + C_2H$	$1.67\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}74d$	4	$C_7H_6^+ + e \rightarrow C_4H_3 + C_3H_3$	$1.67\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}75a$	4	$C_7H_7^+ + e \rightarrow C_7H_6 + H$	$1.60\times10^{-07}(300/T)^{0.70}$	[35],est.(products)
$R_{er}75b$	4	$C_7H_7^+ + e \rightarrow C_6H_5 + {}^3CH_2$	$1.60\times10^{-07}(300/T)^{0.70}$	[35],est.(products)
$R_{er}76a$	4	$C_7H_8^+ + e \rightarrow C_7H_7 + H$	$3.00\times10^{-07}(300/T)^{0.70}$	[35],est.(products)
$R_{er}76b$	4	$C_7H_8^+ + e \rightarrow C_6H_5 + CH_3$	$3.00\times10^{-07}(300/T)^{0.70}$	[35],est.(products)
$R_{er}77a$	4	$C_7H_9^+ + e \rightarrow C_7H_8 + H$	$1.90\times10^{-07}(300/T)^{0.70}$	[36],est.(products)
$R_{er}77b$	4	$C_7H_9^+ + e \rightarrow C_6H_5 + CH_4$	$1.90\times10^{-07}(300/T)^{0.70}$	[36],est.(products)
$R_{er}78a$	4	$C_8H^+ + e \rightarrow C_8 + H$	$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}78b$	4	$C_8H^+ + e \rightarrow C_6H + C_2$	$1.67\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}78c$	4	$C_8H^+ + e \rightarrow C_6 + C_2H$	$1.67\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}78d$	4	$C_8H^+ + e \rightarrow C_4H + C_4$	$1.67\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}79a$	4	$C_8H_2^+ + e \rightarrow C_8H + H$	$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}79b$	4	$C_8H_2^+ + e \rightarrow C_6H + C_2H$	$2.50\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}79c$	4	$C_8H_2^+ + e \rightarrow C_4H + C_4H$	$2.50\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}80a$	4	$C_8H_3^+ + e \rightarrow C_8H_2 + H$	$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}80b$	4	$C_8H_3^+ + e \rightarrow C_6H_2 + C_2H$	$1.67\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}80c$	4	$C_8H_3^+ + e \rightarrow C_6H + C_2H_2$	$1.67\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}80d$	4	$C_8H_3^+ + e \rightarrow C_4H_2 + C_4H$	$1.67\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}81$	4	$NH^+ + e \rightarrow N + H$	$4.30\times10^{-08}(300/T)^{0.50}$	[4]
$R_{er}82a$	4	$NH_2^+ + e \rightarrow N + H + H$	$1.71\times10^{-07}(300/T)^{0.50}$	[4],[37]

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	Type	Reaction	k	Ref.
$R_{er}82b$	4	$NH_2^+ + e \rightarrow NH + H$	$1.29\times10^{-07}(300/T)^{0.50}$	[4],[37]
$R_{er}83$	4	$NH_3^+ + e \rightarrow NH_2 + H$	$3.10\times10^{-07}(300/T)^{0.50}$	[4],est.(products)
$R_{er}84a$	4	$NH_4^+ + e \rightarrow NH_3 + H$	$1.15\times10^{-06}(300/T)^{0.60}$	[38],[39]
$R_{er}84b$	4	$NH_4^+ + e \rightarrow NH_2 + H + H$	$1.76\times10^{-07}(300/T)^{0.60}$	[38],[39]
$R_{er}84c$	4	$NH_4^+ + e \rightarrow NH_2 + H_2$	$2.70\times10^{-08}(300/T)^{0.60}$	[38],[39]
$R_{er}85a$	4	$CN^+ + e \rightarrow N(^2D) + C$	$3.26\times10^{-07}(300/T)^{0.55}$	[40]
$R_{er}85b$	4	$CN^+ + e \rightarrow N + C$	$1.36\times10^{-08}(300/T)^{0.55}$	[40]
$R_{er}86$	4	$HCN^+ + e \rightarrow CN + H$	$3.90\times10^{-07}(300/T)^{0.96}$	[41],est.(products)
$R_{er}87$	4	$HNC^+ + e \rightarrow CN + H$	$1.82\times10^{-07}(300/T)^{0.96}$	[41],est.(products)
$R_{er}88a$	4	$HCNH^+ + e \rightarrow HCN + H$	$9.62\times10^{-08}(300/T)^{0.65}$	[1]
$R_{er}88b$	4	$HCNH^+ + e \rightarrow HNC + H$	$9.62\times10^{-08}(300/T)^{0.65}$	[1]
$R_{er}88c$	4	$HCNH^+ + e \rightarrow CN + H + H$	$9.06\times10^{-08}(300/T)^{0.65}$	[1]
$R_{er}88d$	4	$HCNH^+ + e \rightarrow CN + H_2$	$9.06\times10^{-08}(300/T)^{0.65}$	[1]
$R_{er}89$	4	$HCNH^+CH_4 + e \rightarrow HCN + CH_4 + H$	5.00×10^{-06}	est.(clusters)
$R_{er}90$	4	$HCNH^+N_2 + e \rightarrow HCN + N_2 + H$	5.00×10^{-06}	est.(clusters)
$R_{er}91$	4	$CH_2NH^+ + e \rightarrow H_2CN + H$	$8.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}92a$	4	$CH_2NH_2^+ + e \rightarrow CH_2NH + H$	$7.00\times10^{-07}(300/T)^{0.70}$	[42]
$R_{er}92b$	4	$CH_2NH_2^+ + e \rightarrow NH_2 + {}^3CH_2$	$7.00\times10^{-07}(300/T)^{0.70}$	[42]
$R_{er}92c$	4	$CH_2NH_2^+ + e \rightarrow HCN + H + H_2$	$7.00\times10^{-07}(300/T)^{0.70}$	[42]
$R_{er}93a$	4	$CH_3NH_2^+ + e \rightarrow CH_2NH_2 + H$	$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}93b$	4	$CH_3NH_2^+ + e \rightarrow NH_2 + CH_3$	$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}94a$	4	$CH_3NH_3^+ + e \rightarrow CH_3NH_2 + H$	$7.00\times10^{-07}(300/T)^{0.70}$	[28],est.(products)
$R_{er}94b$	4	$CH_3NH_3^+ + e \rightarrow NH_3 + CH_3$	$7.00\times10^{-07}(300/T)^{0.70}$	[28],est.(products)
$R_{er}95a$	4	$CNC^+ + e \rightarrow CN + C$	$3.80\times10^{-07}(300/T)^{0.60}$	[1]
$R_{er}95b$	4	$CNC^+ + e \rightarrow C_2 + N$	$2.00\times10^{-08}(300/T)^{0.60}$	[1]
$R_{er}96a$	4	$C_2N^+ + e \rightarrow CN + C$	$3.80\times10^{-07}(300/T)^{0.60}$	est.(CNC+)
$R_{er}96b$	4	$C_2N^+ + e \rightarrow C_2 + N$	$2.00\times10^{-08}(300/T)^{0.60}$	est.(CNC+)
$R_{er}97a$	4	$HC_2N^+ + e \rightarrow C_2N + H$	$3.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}97b$	4	$HC_2N^+ + e \rightarrow CH + CN$	$3.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}98$	4	$HC_2NH^+ + e \rightarrow HC_2N + H$	$8.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}99a$	4	$C_2H_3N^+ + e \rightarrow CH_2CN + H$	$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}99b$	4	$C_2H_3N^+ + e \rightarrow CN + CH_3$	$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}100a$	4	$C_2H_3NH^+ + e \rightarrow CH_3CN + H$	$2.67\times10^{-07}(300/T)^{0.69}$	[43],[44]
$R_{er}100b$	4	$C_2H_3NH^+ + e \rightarrow CH_2CN + H + H$	$2.67\times10^{-07}(300/T)^{0.69}$	[43],[44]
$R_{er}100c$	4	$C_2H_3NH^+ + e \rightarrow HNC + CH_3$	$1.38\times10^{-07}(300/T)^{0.69}$	[43],[44]
$R_{er}100d$	4	$C_2H_3NH^+ + e \rightarrow HCN + {}^3CH_2 + H$	$1.38\times10^{-07}(300/T)^{0.69}$	[43],[44]
$R_{er}101a$	4	$C_2H_5N^+ + e \rightarrow C_2H_4N + H$	$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}101b$	4	$C_2H_5N^+ + e \rightarrow NH_2 + C_2H_3$	$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}102$	4	$C_3N^+ + e \rightarrow CN + C_2$	$6.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}103a$	4	$HC_3N^+ + e \rightarrow C_3N + H$	$6.60\times10^{-07}(300/T)^{0.60}$	[45],[46]
$R_{er}103b$	4	$HC_3N^+ + e \rightarrow CN + C_2H$	$3.60\times10^{-07}(300/T)^{0.60}$	[45],[46]
$R_{er}103c$	4	$HC_3N^+ + e \rightarrow CN + C_2 + H$	$3.60\times10^{-07}(300/T)^{0.60}$	[45],[46]
$R_{er}103d$	4	$HC_3N^+ + e \rightarrow C_2N + C + H$	$6.00\times10^{-08}(300/T)^{0.60}$	[45],[46]
$R_{er}103e$	4	$HC_3N^+ + e \rightarrow HC_2N + C$	$3.00\times10^{-08}(300/T)^{0.60}$	[45],[46]
$R_{er}103f$	4	$HC_3N^+ + e \rightarrow C_2N + CH$	$3.00\times10^{-08}(300/T)^{0.60}$	[45],[46]
$R_{er}104a$	4	$HC_3NH^+ + e \rightarrow HC_3N + H$	$7.80\times10^{-07}(300/T)^{0.58}$	[45],[46]
$R_{er}104b$	4	$HC_3NH^+ + e \rightarrow CN + C_2H_2$	$7.20\times10^{-07}(300/T)^{0.58}$	[45],[46]
$R_{er}105a$	4	$C_3H_3N^+ + e \rightarrow C_3H_2N + H$	$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}105b$	4	$C_3H_3N^+ + e \rightarrow CN + C_2H_3$	$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}106a$	4	$C_3H_3NH^+ + e \rightarrow C_3H_3N + H$	$9.00\times10^{-07}(300/T)^{0.80}$	[43],[47]
$R_{er}106b$	4	$C_3H_3NH^+ + e \rightarrow HCN + C_2H_2 + H$	$4.50\times10^{-07}(300/T)^{0.80}$	[43],[47]

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	Type	Reaction										k	Ref.
$R_{er}106c$	4	$C_3H_3NH^+$	+	e	→	HNC	+	C_2H_3				$4.50\times10^{-07}(300/T)^{0.80}$	[43],[47]
$R_{er}107a$	4	$C_3H_5N^+$	+	e	→	C_3H_4N	+	H				$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}107b$	4	$C_3H_5N^+$	+	e	→	C_2H_2N	+	CH_3				$2.50\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}107c$	4	$C_3H_5N^+$	+	e	→	CN	+	C_2H_5				$2.50\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}108a$	4	$C_3H_5NH^+$	+	e	→	C_3H_5N	+	H				$6.45\times10^{-07}(300/T)^{0.76}$	[48]
$R_{er}108b$	4	$C_3H_5NH^+$	+	e	→	CH_2CN	+	CH_3	+	H		$6.45\times10^{-07}(300/T)^{0.76}$	[48]
$R_{er}108c$	4	$C_3H_5NH^+$	+	e	→	HNC	+	C_2H_5				$2.10\times10^{-07}(300/T)^{0.76}$	[48]
$R_{er}109a$	4	$C_3H_7NH^+$	+	e	→	C_3H_7N	+	H				$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}109b$	4	$C_3H_7NH^+$	+	e	→	C_2H_5N	+	CH_3				$2.50\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}109c$	4	$C_3H_7NH^+$	+	e	→	NH_3	+	C_3H_5				$2.50\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}110a$	4	$C_3H_9NH^+$	+	e	→	C_3H_9N	+	H				$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}110b$	4	$C_3H_9NH^+$	+	e	→	C_2H_7N	+	CH_3				$1.67\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}110c$	4	$C_3H_9NH^+$	+	e	→	CH_3NH_2	+	C_2H_5				$1.67\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}110d$	4	$C_3H_9NH^+$	+	e	→	NH_3	+	C_3H_7				$1.67\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}111a$	4	C_4N^+	+	e	→	C_3N	+	C				$4.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}111b$	4	C_4N^+	+	e	→	CN	+	C_3				$4.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}112a$	4	HC_4N^+	+	e	→	C_4N	+	H				$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}112b$	4	HC_4N^+	+	e	→	C_3N	+	CH				$2.50\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}112c$	4	HC_4N^+	+	e	→	CN	+	C_3H				$2.50\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}113a$	4	HC_4NH^+	+	e	→	HC_4N	+	H				$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}113b$	4	HC_4NH^+	+	e	→	C_3N	+	$^3CH_2$				$2.50\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}113c$	4	HC_4NH^+	+	e	→	CN	+	C_3H_2				$2.50\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}114a$	4	$C_4H_3N^+$	+	e	→	C_4H_2N	+	H				$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}114b$	4	$C_4H_3N^+$	+	e	→	C_3N	+	CH_3				$2.50\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}114c$	4	$C_4H_3N^+$	+	e	→	CN	+	C_3H_3				$2.50\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}115a$	4	$C_4H_3NH^+$	+	e	→	CH_3C_3N	+	H				$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}115b$	4	$C_4H_3NH^+$	+	e	→	HC_3N	+	CH_3				$2.50\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}115c$	4	$C_4H_3NH^+$	+	e	→	HNC	+	C_3H_3				$2.50\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}116a$	4	$C_4H_5N^+$	+	e	→	C_4H_4N	+	H				$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}116b$	4	$C_4H_5N^+$	+	e	→	CN	+	C_3H_5				$2.50\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}116c$	4	$C_4H_5N^+$	+	e	→	C_3H_2N	+	CH_3				$2.50\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}117$	4	$C_4H_5NH^+$	+	e	→	C_4H_5N	+	H				$4.00\times10^{-07}(300/T)^{0.70}$	[36],est.(products)
$R_{er}118a$	4	$C_4H_7NH^+$	+	e	→	C_4H_7N	+	H				$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}118b$	4	$C_4H_7NH^+$	+	e	→	HCN	+	C_3H_7				$8.33\times10^{-08}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}118c$	4	$C_4H_7NH^+$	+	e	→	HNC	+	C_3H_7				$8.33\times10^{-08}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}118d$	4	$C_4H_7NH^+$	+	e	→	CH_3CN	+	C_2H_5				$1.67\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}118e$	4	$C_4H_7NH^+$	+	e	→	C_3H_5N	+	CH_3				$1.67\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}119a$	4	$C_4H_9NH^+$	+	e	→	C_4H_9N	+	H				$1.35\times10^{-06}(300/T)^{0.70}$	[36],est.(products)
$R_{er}119b$	4	$C_4H_9NH^+$	+	e	→	C_3H_7N	+	CH_3				$4.51\times10^{-07}(300/T)^{0.70}$	[36],est.(products)
$R_{er}119c$	4	$C_4H_9NH^+$	+	e	→	C_2H_5N	+	C_2H_5				$4.51\times10^{-07}(300/T)^{0.70}$	[36],est.(products)
$R_{er}119d$	4	$C_4H_9NH^+$	+	e	→	NH_3	+	C_4H_7				$4.51\times10^{-07}(300/T)^{0.70}$	[36],est.(products)
$R_{er}120a$	4	C_5N^+	+	e	→	C_3N	+	C_2				$5.00\times10^{-07}(300/T)^{0.70}$	[49],est.(products)
$R_{er}120b$	4	C_5N^+	+	e	→	CN	+	C_4				$5.00\times10^{-07}(300/T)^{0.70}$	[49],est.(products)
$R_{er}121a$	4	HC_5N^+	+	e	→	C_5N	+	H				$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}121b$	4	HC_5N^+	+	e	→	C_3N	+	C_2H				$2.50\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}121c$	4	HC_5N^+	+	e	→	CN	+	C_4H				$2.50\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}122a$	4	HC_5NH^+	+	e	→	HC_5N	+	H				$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}122b$	4	HC_5NH^+	+	e	→	C_3N	+	C_2H_2				$2.50\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}122c$	4	HC_5NH^+	+	e	→	CN	+	C_4H_2				$2.50\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}123a$	4	$C_5H_3N^+$	+	e	→	C_5H_2N	+	H				$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}123b$	4	$C_5H_3N^+$	+	e	→	C_4N	+	CH_3				$1.67\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)

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	Type	Reaction							k	Ref.
$R_{er}123c$	4	$C_5H_3N^+$	+	e	→	C_2N	+	C_3H_3	$1.67\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}123d$	4	$C_5H_3N^+$	+	e	→	N	+	C_5H_3	$1.67\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}124a$	4	$C_5H_3NH^+$	+	e	→	C_5H_3N	+	H	$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}124b$	4	$C_5H_3NH^+$	+	e	→	HC_4N	+	CH_3	$1.25\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}124c$	4	$C_5H_3NH^+$	+	e	→	C_5H_3N	+	H	$1.25\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}124d$	4	$C_5H_3NH^+$	+	e	→	HC_2N	+	C_3H_3	$1.25\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}124e$	4	$C_5H_3NH^+$	+	e	→	CN	+	C_4H_3	$1.25\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}125a$	4	$C_5H_5N^+$	+	e	→	C_5H_4N	+	H	$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}125b$	4	$C_5H_5N^+$	+	e	→	C_3H_2N	+	C_2H_3	$2.50\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}125c$	4	$C_5H_5N^+$	+	e	→	CN	+	C_4H_5	$2.50\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}126$	4	$C_5H_5NH^+$	+	e	→	C_5H_5N	+	H	$8.90\times10^{-07}(300/T)^{0.50}$	[50],[36],est.(products)
$R_{er}127a$	4	$C_5H_7NH^+$	+	e	→	C_5H_7N	+	H	$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}127b$	4	$C_5H_7NH^+$	+	e	→	C_4H_5N	+	CH_3	$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}128a$	4	C_6N^+	+	e	→	C_5N	+	C	$3.33\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}128b$	4	C_6N^+	+	e	→	C_3N	+	C_3	$3.33\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}128c$	4	C_6N^+	+	e	→	CN	+	C_5	$3.33\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}129$	4	HC_6NH^+	+	e	→	HC_6N	+	H	$1.00\times10^{-06}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}130a$	4	$C_6H_3NH^+$	+	e	→	CH_3C_5N	+	H	$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}130b$	4	$C_6H_3NH^+$	+	e	→	C_5N	+	CH_4	$2.50\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}130c$	4	$C_6H_3NH^+$	+	e	→	CN	+	C_5H_4	$2.50\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}131a$	4	$C_6H_5NH^+$	+	e	→	C_5H_3N	+	CH_3	$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}131b$	4	$C_6H_5NH^+$	+	e	→	C_6H_5N	+	H	$1.25\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}131c$	4	$C_6H_5NH^+$	+	e	→	HC_4N	+	C_2H_5	$1.25\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}131d$	4	$C_6H_5NH^+$	+	e	→	HCCN	+	C_4H_5	$1.25\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}131e$	4	$C_6H_5NH^+$	+	e	→	CN	+	C_5H_6	$1.25\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}132a$	4	$C_6H_7N^+$	+	e	→	C_6H_6N	+	H	$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}132b$	4	$C_6H_7N^+$	+	e	→	C_5H_4N	+	CH_3	$1.67\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}132c$	4	$C_6H_7N^+$	+	e	→	C_3H_2N	+	C_3H_5	$1.67\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}132d$	4	$C_6H_7N^+$	+	e	→	CN	+	C_5H_7	$1.67\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}133$	4	$C_6H_7NH^+$	+	e	→	C_5H_5N	+	CH_3	$1.00\times10^{-06}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}134a$	4	$C_6H_9N^+$	+	e	→	C_6H_8N	+	H	$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}134b$	4	$C_6H_9N^+$	+	e	→	C_5H_6N	+	CH_3	$1.25\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}134c$	4	$C_6H_9N^+$	+	e	→	C_4H_4N	+	C_2H_5	$1.25\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}134d$	4	$C_6H_9N^+$	+	e	→	C_3H_2N	+	C_3H_7	$1.25\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}134e$	4	$C_6H_9N^+$	+	e	→	CN	+	C_5H_9	$1.25\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}135a$	4	$C_6H_9NH^+$	+	e	→	C_6H_9N	+	H	$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}135b$	4	$C_6H_9NH^+$	+	e	→	C_5H_7N	+	CH_3	$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}136a$	4	C_7N^+	+	e	→	C_5N	+	C_2	$3.33\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}136b$	4	C_7N^+	+	e	→	C_3N	+	C_4	$3.33\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}136c$	4	C_7N^+	+	e	→	CN	+	C_6	$3.33\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}137a$	4	HC_7N^+	+	e	→	C_7N	+	H	$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}137b$	4	HC_7N^+	+	e	→	C_5N	+	C_2H	$1.67\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}137c$	4	HC_7N^+	+	e	→	C_3N	+	C_4H	$1.67\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}137d$	4	HC_7N^+	+	e	→	CN	+	C_6H	$1.67\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}138$	4	HC_7NH^+	+	e	→	HC_7N	+	H	$1.00\times10^{-06}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}139a$	4	$C_7H_3N^+$	+	e	→	C_7H_2N	+	H	$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}139b$	4	$C_7H_3N^+$	+	e	→	C_6N	+	CH_3	$1.25\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}139c$	4	$C_7H_3N^+$	+	e	→	C_4N	+	C_3H_3	$1.25\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}139d$	4	$C_7H_3N^+$	+	e	→	C_2N	+	C_5H_3	$1.25\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}139e$	4	$C_7H_3N^+$	+	e	→	CN	+	C_6H_3	$1.25\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}140a$	4	$C_7H_3NH^+$	+	e	→	C_7H_2N	+	H	$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)

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	Type	Reaction										k	Ref.
$R_{er}140b$	4	$C_7H_3NH^+$	+	e	→	HC_6N	+	CH_3				$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}141a$	4	$C_7H_7N^+$	+	e	→	C_7H_6N	+	H				$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}141b$	4	$C_7H_7N^+$	+	e	→	C_6H_4N	+	CH_3				$1.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}141c$	4	$C_7H_7N^+$	+	e	→	C_5H_2N	+	C_2H_5				$1.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}141d$	4	$C_7H_7N^+$	+	e	→	C_4N	+	C_2H_7				$1.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}141e$	4	$C_7H_7N^+$	+	e	→	C_2N	+	C_4H_7				$1.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}141f$	4	$C_7H_7N^+$	+	e	→	N	+	C_7H_7				$1.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}142a$	4	$C_7H_7NH^+$	+	e	→	C_7H_7N	+	H				$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}142b$	4	$C_7H_7NH^+$	+	e	→	C_6H_5N	+	CH_3				$1.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}142c$	4	$C_7H_7NH^+$	+	e	→	C_5H_3N	+	C_2H_5				$1.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}142d$	4	$C_7H_7NH^+$	+	e	→	HC_4N	+	C_3H_7				$1.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}142e$	4	$C_7H_7NH^+$	+	e	→	HCCN	+	C_5H_7				$1.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}142f$	4	$C_7H_7NH^+$	+	e	→	CN	+	C_6H_8				$1.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}143a$	4	N_2^+	+	e	→	$N(^2D)$	+	$N(^2D)$				$1.14\times10^{-07}(300/T)^{0.39}$	[51],[52]
$R_{er}143b$	4	N_2^+	+	e	→	N	+	$N(^2D)$				$1.06\times10^{-07}(300/T)^{0.39}$	[51],[52]
$R_{er}144a$	4	N_2H^+	+	e	→	N_2	+	H				$2.47\times10^{-07}(300/T)^{0.84}$	[1]
$R_{er}144b$	4	N_2H^+	+	e	→	NH	+	N				$1.30\times10^{-08}(300/T)^{0.84}$	[1]
$R_{er}145a$	4	$N_2H_5^+$	+	e	→	N_2H_4	+	H				$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}145b$	4	$N_2H_5^+$	+	e	→	NH_3	+	NH_2				$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}146$	4	$C_2N_2^+$	+	e	→	CN	+	CN				$6.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}147a$	4	$C_2N_2H^+$	+	e	→	C_2N_2	+	H				$4.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}147b$	4	$C_2N_2H^+$	+	e	→	HCN	+	CN				$2.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}147c$	4	$C_2N_2H^+$	+	e	→	HNC	+	CN				$2.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}148$	4	$C_4N_2^+$	+	e	→	C_3N	+	CN				$1.00\times10^{-06}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}149a$	4	$C_4N_2H^+$	+	e	→	C_4N_2	+	H				$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}149b$	4	$C_4N_2H^+$	+	e	→	HC_3N	+	CN				$2.50\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}149c$	4	$C_4N_2H^+$	+	e	→	C_3N	+	HCN				$1.25\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}149d$	4	$C_4N_2H^+$	+	e	→	C_3N	+	HNC				$1.25\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}150a$	4	$C_6N_2^+$	+	e	→	C_5N	+	CN				$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}150b$	4	$C_6N_2^+$	+	e	→	C_3N	+	C_3N				$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}151a$	4	$C_6N_2H^+$	+	e	→	C_6N_2	+	H				$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}151b$	4	$C_6N_2H^+$	+	e	→	HC_5N	+	CN				$1.67\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}151c$	4	$C_6N_2H^+$	+	e	→	C_5N	+	HCN				$8.33\times10^{-08}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}151d$	4	$C_6N_2H^+$	+	e	→	C_5N	+	HNC				$8.33\times10^{-08}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}151e$	4	$C_6N_2H^+$	+	e	→	HC_3N	+	C_3N				$1.67\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}152$	4	N_3^+	+	e	→	N_2	+	N				$5.00\times10^{-06}(300/T)^{0.70}$	est.(clusters)
$R_{er}153$	4	N_4^+	+	e	→	N_2	+	N_2				$5.00\times10^{-06}(300/T)^{0.70}$	est.(clusters)
$R_{er}154$	4	O^+	+	e	→	$O(^3P)$						$3.24\times10^{-12}(300/T)^{0.66}$	[53]
$R_{er}155$	4	OH^+	+	e	→	$O(^3P)$	+	H				$3.75\times10^{-08}(300/T)^{0.50}$	[54],[4]
$R_{er}156a$	4	H_2O^+	+	e	→	OH	+	H				$8.60\times10^{-08}(300/T)^{0.50}$	[55]
$R_{er}156b$	4	H_2O^+	+	e	→	$O(^3P)$	+	H_2				$3.87\times10^{-08}(300/T)^{0.50}$	[55]
$R_{er}156c$	4	H_2O^+	+	e	→	$O(^3P)$	+	H	+	H		$3.05\times10^{-07}(300/T)^{0.50}$	[55]
$R_{er}157a$	4	H_3O^+	+	e	→	OH	+	H	+	H		$5.09\times10^{-07}(300/T)^{0.83}$	[56]
$R_{er}157b$	4	H_3O^+	+	e	→	H_2O	+	H				$1.37\times10^{-07}(300/T)^{0.83}$	[56]
$R_{er}157c$	4	H_3O^+	+	e	→	OH	+	H_2				$8.36\times10^{-08}(300/T)^{0.83}$	[56]
$R_{er}157d$	4	H_3O^+	+	e	→	$O(^3P)$	+	H_2	+	H		$3.04\times10^{-08}(300/T)^{0.83}$	[56]
$R_{er}158a$	4	CO^+	+	e	→	$O(^3P)$	+	C				$2.50\times10^{-07}(300/T)^{0.55}$	[57]
$R_{er}158b$	4	CO^+	+	e	→	$O(^1D)$	+	C				$2.48\times10^{-08}(300/T)^{0.55}$	[57]
$R_{er}159$	4	CO^+N_2	+	e	→	CO	+	N_2				$5.00\times10^{-06}(300/T)^{0.70}$	est.(clusters)
$R_{er}160a$	4	HCO^+	+	e	→	CO	+	H				$1.56\times10^{-07}(300/T)^{1.20}$	[58],[59]
$R_{er}160b$	4	HCO^+	+	e	→	OH	+	C				$1.19\times10^{-08}(300/T)^{1.20}$	[58],[59]

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	Type	Reaction	k	Ref.
$R_{er}160c$	4	$HCO^+ + e \rightarrow CH + O(^3P)$	$1.70\times10^{-09}(300/T)^{1.20}$	[58],[59]
$R_{er}161$	4	$HCO^+H_2 + e \rightarrow HCO + H_2$	$5.00\times10^{-06}(300/T)^{0.70}$	est.(clusters)
$R_{er}162$	4	$HCO^+CO + e \rightarrow HCO + CO$	$5.00\times10^{-06}(300/T)^{0.70}$	est.(clusters)
$R_{er}163a$	4	$HOC^+ + e \rightarrow CO + H$	$1.56\times10^{-07}(300/T)^{1.20}$	est.(HCO+)
$R_{er}163b$	4	$HOC^+ + e \rightarrow OH + C$	$1.19\times10^{-08}(300/T)^{1.20}$	est.(HCO+)
$R_{er}163c$	4	$HOC^+ + e \rightarrow CH + O(^3P)$	$1.70\times10^{-09}(300/T)^{1.20}$	est.(HCO+)
$R_{er}164a$	4	$CH_2O^+ + e \rightarrow CO + H + H$	$2.50\times10^{-07}(300/T)^{0.70}$	[1]
$R_{er}164b$	4	$CH_2O^+ + e \rightarrow HCO + H$	$1.50\times10^{-07}(300/T)^{0.70}$	[1]
$R_{er}164c$	4	$CH_2O^+ + e \rightarrow CO + H_2$	$7.50\times10^{-08}(300/T)^{0.70}$	[1]
$R_{er}164d$	4	$CH_2O^+ + e \rightarrow {}^3CH_2 + O(^3P)$	$2.50\times10^{-08}(300/T)^{0.70}$	[1]
$R_{er}165a$	4	$CH_2OH^+ + e \rightarrow HCO + H + H$	$6.44\times10^{-07}(300/T)^{0.78}$	[60]
$R_{er}165b$	4	$CH_2OH^+ + e \rightarrow OH + {}^3CH_2$	$4.20\times10^{-08}(300/T)^{0.78}$	[60]
$R_{er}165c$	4	$CH_2OH^+ + e \rightarrow H_2O + CH$	$1.40\times10^{-08}(300/T)^{0.78}$	[60]
$R_{er}166$	4	$HC_2O^+ + e \rightarrow ONEUT + H$	$6.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}167$	4	$CH_2CO^+ + e \rightarrow ONEUT + H$	$8.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}168a$	4	$CH_3CO^+ + e \rightarrow ONEUT + H$	$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}168b$	4	$CH_3CO^+ + e \rightarrow CH_3 + CO$	$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}169a$	4	$CH_3COH^+ + e \rightarrow H_2O + C_2H_2$	$5.40\times10^{-07}(300/T)^{0.70}$	[61]
$R_{er}169b$	4	$CH_3COH^+ + e \rightarrow H_2CO + {}^3CH_2$	$5.40\times10^{-07}(300/T)^{0.70}$	[61]
$R_{er}169c$	4	$CH_3COH^+ + e \rightarrow CH_2CO + H + H$	$4.20\times10^{-07}(300/T)^{0.70}$	[61]
$R_{er}170a$	4	$CH_3CHOH^+ + e \rightarrow CH_3CHO + H$	$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}170b$	4	$CH_3CHOH^+ + e \rightarrow H_2CO + CH_3$	$2.50\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}170c$	4	$CH_3CHOH^+ + e \rightarrow OH + C_2H_4$	$2.50\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}171$	4	$HC_3O^+ + e \rightarrow ONEUT + H$	$8.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}172a$	4	$C_2H_2CO^+ + e \rightarrow ONEUT + H$	$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}172b$	4	$C_2H_2CO^+ + e \rightarrow C_2H_2 + CO$	$5.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}173a$	4	$C_2H_3CO^+ + e \rightarrow ONEUT + H$	$1.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}173b$	4	$C_2H_3CO^+ + e \rightarrow HCO + C_2H_2$	$9.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}174$	4	$CO_2^+ + e \rightarrow CO + O$	$4.20\times10^{-07}(300/T)^{0.75}$	[62]
$R_{er}175a$	4	$OCOH^+ + e \rightarrow CO + O + H$	$8.16\times10^{-07}(300/T)^{0.64}$	[63]
$R_{er}175b$	4	$OCOH^+ + e \rightarrow CO + OH$	$3.24\times10^{-07}(300/T)^{0.64}$	[63]
$R_{er}175c$	4	$OCOH^+ + e \rightarrow CO_2 + H$	$6.00\times10^{-08}(300/T)^{0.64}$	[63]
$R_{er}176a$	4	$NO^+ + e \rightarrow O(^3P) + N(^2D)$	$3.19\times10^{-07}(300/T)^{0.75}$	[64],[65]
$R_{er}176b$	4	$NO^+ + e \rightarrow O(^3P) + N$	$1.01\times10^{-07}(300/T)^{0.75}$	[64],[65]
$R_{er}177$	4	$HNO^+ + e \rightarrow NO + H$	$4.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}178$	4	$NCO^+ + e \rightarrow CO + N$	$4.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}179$	4	$HNCO^+ + e \rightarrow CO + NH$	$6.00\times10^{-07}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}180$	4	$C_xH_yN_z^+ + e \rightarrow NEUT$	$1.00\times10^{-06}(300/T)^{0.70}$	est.(eq.(E14)),est.(products)
$R_{er}181$	4	$Adduct^+ + e \rightarrow NEUT$	$5.00\times10^{-06}(300/T)^{0.70}$	est.(clusters)
$R_{er}182$	4	$AdductN^+ + e \rightarrow NEUT$	$5.00\times10^{-06}(300/T)^{0.70}$	est.(clusters)

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Table B.18: Negative ion reaction list.

	Type	Reaction								k	Ref.
$R_{an}1$	2	H^-	+	C_2H_2	→	C_2H^-	+	H_2		3.10×10^{-09}	[1]
$R_{an}2$	2	H^-	+	C_4H_2	→	C_4H^-	+	H_2		6.40×10^{-09}	Langevin
$R_{an}3$	2	H^-	+	C_6H_2	→	C_6H^-	+	H_2		6.30×10^{-09}	Langevin
$R_{an}4$	2	H^-	+	HCN	→	CN^-	+	H_2		1.50×10^{-08}	[2]
$R_{an}5$	2	H^-	+	HC_3N	→	C_3N^-	+	H_2		2.40×10^{-08}	Su-Chesnavich
$R_{an}6$	2	H^-	+	HC_5N	→	C_5N^-	+	H_2		3.10×10^{-08}	Su-Chesnavich
$R_{an}7$	2	CH_2^-	+	HCN	→	CN^-	+	CH_3		6.20×10^{-09}	Su-Chesnavich
$R_{an}8$	2	CH_2^-	+	HC_3N	→	C_3N^-	+	CH_3		7.20×10^{-09}	Su-Chesnavich
$R_{an}9$	2	CH_2^-	+	HC_5N	→	C_5N^-	+	CH_3		8.90×10^{-09}	Su-Chesnavich
$R_{an}10$	2	CH_3^-	+	HCN	→	CN^-	+	CH_4		6.10×10^{-09}	Su-Chesnavich
$R_{an}11$	2	CH_3^-	+	HC_3N	→	C_3N^-	+	CH_4		7.00×10^{-09}	Su-Chesnavich
$R_{an}12$	2	CH_3^-	+	HC_5N	→	C_5N^-	+	CH_4		8.60×10^{-09}	Su-Chesnavich
$R_{an}13$	2	C_2H^-	+	C_2H_2	→	C_4H^-	+	H_2		1.00×10^{-12}	[3],[4]
$R_{an}14$	2	C_2H^-	+	C_4H_2	→	C_4H^-	+	C_2H_2		1.50×10^{-09}	Langevin
$R_{an}15$	2	C_2H^-	+	C_6H_2	→	C_6H^-	+	C_2H_2		2.30×10^{-09}	Langevin
$R_{an}16$	2	C_2H^-	+	HCN	→	CN^-	+	C_2H_2		3.90×10^{-09}	[2]
$R_{an}17$	2	C_2H^-	+	HC_3N	→	C_3N^-	+	C_2H_2		5.80×10^{-09}	Su-Chesnavich
$R_{an}18$	2	C_2H^-	+	HC_5N	→	C_5N^-	+	C_2H_2		7.00×10^{-09}	Su-Chesnavich
$R_{an}19$	2	C_4H^-	+	C_2H_2	→	C_6H^-	+	H_2		1.00×10^{-12}	[3],[4]
$R_{an}20$	2	C_4H^-	+	C_6H_2	→	C_6H^-	+	C_4H_2		1.80×10^{-09}	Langevin
$R_{an}21$	2	C_4H^-	+	N	→	CN^-	+	C_3H		6.00×10^{-12}	[5]
$R_{an}22$	2	C_4H^-	+	HCN	→	CN^-	+	C_4H_2		4.50×10^{-09}	Su-Chesnavich
$R_{an}23$	2	C_4H^-	+	HC_3N	→	C_3N^-	+	C_4H_2		4.80×10^{-09}	Su-Chesnavich
$R_{an}24$	2	C_4H^-	+	HC_5N	→	C_5N^-	+	C_4H_2		5.60×10^{-09}	Su-Chesnavich
$R_{an}25$	2	C_6H^-	+	C_2H_2	→	$C_xH_yN_z^-$				1.00×10^{-12}	[3],[4]
$R_{an}26$	2	C_6H^-	+	N	→	CN^-	+	C_5H		1.00×10^{-11}	[5]
$R_{an}27$	2	C_6H^-	+	HCN	→	CN^-	+	C_6H_2		4.30×10^{-09}	Su-Chesnavich
$R_{an}28$	2	C_6H^-	+	HC_3N	→	C_3N^-	+	C_6H_2		4.30×10^{-09}	Su-Chesnavich
$R_{an}29$	2	C_6H^-	+	HC_5N	→	C_5N^-	+	C_6H_2		5.00×10^{-09}	Su-Chesnavich
$R_{an}30$	2	CN^-	+	HCN	→	$C_xH_yN_z^-$				1.00×10^{-12}	est.(C2H- + C2H2)
$R_{an}31$	2	CN^-	+	HC_3N	→	C_3N^-	+	HCN		$4.30\times10^{-09}(300/\mathrm{T})^{0.12}$	[6]
$R_{an}32$	2	CN^-	+	HC_5N	→	C_5N^-	+	HCN		6.90×10^{-09}	Su-Chesnavich
$R_{an}33$	2	C_3N^-	+	HC_5N	→	C_5N^-	+	HC_3N		5.40×10^{-09}	Su-Chesnavich
$R_{an}34$	2	O^-	+	H_2	→	OH^-	+	H		3.00×10^{-11}	[7]
$R_{an}35$	2	O^-	+	CH_4	→	OH^-	+	CH_3		1.00×10^{-10}	[8]
$R_{an}36$	2	O^-	+	C_2H_2	→	C_2H^-	+	OH		$1.76\times10^{-09}\mathrm{e}^{-289.0/T}$	[9]
$R_{an}37$	2	O^-	+	C_4H_2	→	C_4H^-	+	OH		$1.60\times10^{-09}\mathrm{e}^{-289.0/T}$	Langevin
$R_{an}38$	2	O^-	+	C_6H_2	→	C_6H^-	+	OH		$1.60\times10^{-09}\mathrm{e}^{-289.0/T}$	Langevin
$R_{an}39$	2	O^-	+	HCN	→	CN^-	+	OH		3.70×10^{-09}	[10]
$R_{an}40$	2	O^-	+	HC_3N	→	C_3N^-	+	OH		6.80×10^{-09}	Su-Chesnavich
$R_{an}41$	2	O^-	+	HC_5N	→	C_5N^-	+	OH		8.40×10^{-09}	Su-Chesnavich
$R_{an}42$	2	OH^-	+	C_2H_2	→	C_2H^-	+	H_2O		2.20×10^{-09}	[11]
$R_{an}43$	2	OH^-	+	HCN	→	CN^-	+	H_2O		3.50×10^{-09}	[11]
$R_{an}44$	2	OH^-	+	HC_3N	→	C_3N^-	+	H_2O		6.70×10^{-09}	Su-Chesnavich
$R_{an}45$	2	OH^-	+	HC_5N	→	C_5N^-	+	H_2O		8.20×10^{-09}	Su-Chesnavich

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Table B.19: Associative detachment reaction list.

	Type	Reaction								k	Ref.
$R_{ad}1$	2	H^-	+	H	→	H_2	+	e		5.50×10^{-09}	[1]
$R_{ad}2$	2	H^-	+	CH_3	→	CH_4	+	e		5.50×10^{-09}	est.(H- + H)
$R_{ad}3$	2	H^-	+	N	→	NH	+	e		1.00×10^{-09}	[2]
$R_{ad}4$	2	CH_2^-	+	H	→	CH_3	+	e		1.80×10^{-09}	[3]
$R_{ad}5$	2	CH_2^-	+	CH_3	→	C_2H_5	+	e		1.80×10^{-09}	est.(CH2- + H)
$R_{ad}6$	2	CH_2^-	+	N	→	H_2CN	+	e		1.80×10^{-09}	est.(CH2- + H)
$R_{ad}7$	2	CH_3^-	+	H	→	CH_4	+	e		1.80×10^{-09}	[3]
$R_{ad}8$	2	CH_3^-	+	CH_3	→	C_2H_6	+	e		1.80×10^{-09}	est.(CH3- + H)
$R_{ad}9$	2	CH_3^-	+	N	→	CH_2NH	+	e		1.80×10^{-09}	est.(CH3- + H)
$R_{ad}10$	2	C_2H^-	+	H	→	C_2H_2	+	e		1.60×10^{-09}	[4]
$R_{ad}11$	2	C_2H^-	+	CH_3	→	CH_3CCH	+	e		1.60×10^{-09}	est.(C2H- + H)
$R_{ad}12$	2	C_2H^-	+	N	→	HC_2N	+	e		5.00×10^{-11}	[5]
$R_{ad}13$	2	C_4H^-	+	H	→	C_4H_2	+	e		8.30×10^{-10}	[4]
$R_{ad}14$	2	C_4H^-	+	CH_3	→	C_5H_4	+	e		8.30×10^{-10}	est.(C4H- + H)
$R_{ad}15$	2	C_6H^-	+	H	→	C_6H_2	+	e		5.00×10^{-10}	[4]
$R_{ad}16$	2	C_6H^-	+	CH_3	→	C_7H_4	+	e		5.00×10^{-10}	est.(C6H- + H)
$R_{ad}17$	2	CN^-	+	H	→	HCN	+	e		6.30×10^{-10}	[6]
$R_{ad}18$	2	CN^-	+	CH_3	→	CH_3CN	+	e		6.30×10^{-10}	est.(CN- + H)
$R_{ad}19$	2	C_3N^-	+	H	→	HC_3N	+	e		5.40×10^{-10}	[7],[6]
$R_{ad}20$	2	C_3N^-	+	CH_3	→	CH_3C_3N	+	e		5.40×10^{-10}	est.(C3N- + H)
$R_{ad}21$	2	C_5N^-	+	H	→	HC_5N	+	e		5.80×10^{-10}	[6]
$R_{ad}22$	2	C_5N^-	+	CH_3	→	CH_3C_5N	+	e		5.80×10^{-10}	est.(C5N- + H)
$R_{ad}23$	2	$C_xH_yN_z^-$	+	H	→	NEUT	+	e		1.00×10^{-09}	[3]
$R_{ad}24$	2	$C_xH_yN_z^-$	+	CH_3	→	NEUT	+	e		1.00×10^{-09}	est.(CXHYNZ- + H)
$R_{ad}25$	2	$C_xH_yN_z^-$	+	N	→	NEUT	+	e		1.00×10^{-09}	est.(CXHYNZ- + H)
$R_{ad}26$	2	O^-	+	H	→	OH	+	e		5.00×10^{-10}	[2]
$R_{ad}27$	2	O^-	+	CH_3	→	CH_2OH	+	e		5.00×10^{-10}	est.(O- + H)
$R_{ad}28$	2	O^-	+	C_2H_2	→	CH_2CO	+	e		$1.10\times10^{-09}(300/T)^{0.39}$	[8]
$R_{ad}29$	2	O^-	+	N	→	NO	+	e		2.20×10^{-10}	[9]
$R_{ad}30$	2	O^-	+	CO	→	CO_2	+	e		7.30×10^{-10}	[10]
$R_{ad}31$	2	OH^-	+	H	→	H_2O	+	e		1.40×10^{-09}	[11]
$R_{ad}32$	2	OH^-	+	CH_3	→	CH_3OH	+	e		1.40×10^{-09}	est.(OH- + H)
$R_{ad}33$	2	OH^-	+	N	→	HNO	+	e		1.40×10^{-09}	est.(OH- + H)

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Table B.20: Positive + negative ion reaction list.

	Type	Reaction									k	Ref.
$R_{ir}1$	2	H^-	+	CH_5^+	→	H	+	CH_4	+	H	$1.00\times10^{-07}(300/T)^{1.00}$	[1],[2]
$R_{ir}2$	2	H^-	+	$C_2H_5^+$	→	H	+	C_2H_4	+	H	$1.00\times10^{-07}(300/T)^{1.00}$	[1],[2]
$R_{ir}3$	2	H^-	+	$HCNH^+$	→	H	+	HCN	+	H	$1.00\times10^{-07}(300/T)^{1.00}$	[1],[2]
$R_{ir}4$	2	CH_2^-	+	CH_5^+	→	$^3CH_2$	+	CH_4	+	H	$1.10\times10^{-07}(300/T)^{0.90}$	[3]
$R_{ir}5$	2	CH_2^-	+	$C_2H_5^+$	→	$^3CH_2$	+	C_2H_4	+	H	$9.60\times10^{-08}(300/T)^{0.90}$	[3]
$R_{ir}6$	2	CH_2^-	+	$HCNH^+$	→	$^3CH_2$	+	HCN	+	H	$9.70\times10^{-08}(300/T)^{0.90}$	[3]
$R_{ir}7$	2	CH_3^-	+	CH_5^+	→	CH_3	+	CH_4	+	H	$1.40\times10^{-07}(300/T)^{0.90}$	[3]
$R_{ir}8$	2	CH_3^-	+	$C_2H_5^+$	→	CH_3	+	C_2H_4	+	H	$1.20\times10^{-07}(300/T)^{0.90}$	[3]
$R_{ir}9$	2	CH_3^-	+	$HCNH^+$	→	CH_3	+	HCN	+	H	$1.20\times10^{-07}(300/T)^{0.90}$	[3]
$R_{ir}10$	2	C_2H^-	+	CH_5^+	→	C_2H	+	CH_4	+	H	$7.60\times10^{-08}(300/T)^{0.90}$	[3]
$R_{ir}11$	2	C_2H^-	+	$C_2H_5^+$	→	C_2H	+	C_2H_4	+	H	$6.60\times10^{-08}(300/T)^{0.90}$	[3]
$R_{ir}12$	2	C_2H^-	+	$HCNH^+$	→	C_2H	+	HCN	+	H	$6.70\times10^{-08}(300/T)^{0.90}$	[3]
$R_{ir}13$	2	C_4H^-	+	CH_5^+	→	C_4H	+	CH_4	+	H	$6.70\times10^{-08}(300/T)^{0.90}$	[3]
$R_{ir}14$	2	C_4H^-	+	$C_2H_5^+$	→	C_4H	+	C_2H_4	+	H	$5.60\times10^{-08}(300/T)^{0.90}$	[3]
$R_{ir}15$	2	C_4H^-	+	$HCNH^+$	→	C_4H	+	HCN	+	H	$5.60\times10^{-08}(300/T)^{0.90}$	[3]
$R_{ir}16$	2	C_6H^-	+	CH_5^+	→	C_6H	+	CH_4	+	H	$6.30\times10^{-08}(300/T)^{0.90}$	[3]
$R_{ir}17$	2	C_6H^-	+	$C_2H_5^+$	→	C_6H	+	C_2H_4	+	H	$5.20\times10^{-08}(300/T)^{0.90}$	[3]
$R_{ir}18$	2	C_6H^-	+	$HCNH^+$	→	C_6H	+	HCN	+	H	$5.20\times10^{-08}(300/T)^{0.90}$	[3]
$R_{ir}19$	2	CN^-	+	CH_5^+	→	CN	+	CH_4	+	H	$2.60\times10^{-07}(300/T)^{1.10}$	[3]
$R_{ir}20$	2	CN^-	+	$C_2H_5^+$	→	CN	+	C_2H_4	+	H	$2.60\times10^{-07}(300/T)^{1.10}$	[3]
$R_{ir}21$	2	CN^-	+	$HCNH^+$	→	CN	+	HCN	+	H	$2.60\times10^{-07}(300/T)^{1.10}$	[3]
$R_{ir}22$	2	C_3N^-	+	CH_5^+	→	C_3N	+	CH_4	+	H	$6.40\times10^{-08}(300/T)^{0.90}$	[3]
$R_{ir}23$	2	C_3N^-	+	$C_2H_5^+$	→	C_3N	+	C_2H_4	+	H	$5.40\times10^{-08}(300/T)^{0.90}$	[3]
$R_{ir}24$	2	C_3N^-	+	$HCNH^+$	→	C_3N	+	HCN	+	H	$5.40\times10^{-08}(300/T)^{0.90}$	[3]
$R_{ir}25$	2	C_5N^-	+	CH_5^+	→	C_5N	+	CH_4	+	H	$6.20\times10^{-08}(300/T)^{0.90}$	[3]
$R_{ir}26$	2	C_5N^-	+	$C_2H_5^+$	→	C_5N	+	C_2H_4	+	H	$5.00\times10^{-08}(300/T)^{0.90}$	[3]
$R_{ir}27$	2	C_5N^-	+	$HCNH^+$	→	C_5N	+	HCN	+	H	$5.10\times10^{-08}(300/T)^{0.90}$	[3]
$R_{ir}28$	2	$C_xH_yN_z^+$	+	CH_5^+	→	NEUT	+	CH_4	+	H	$1.00\times10^{-07}(300/T)^{0.90}$	[3]
$R_{ir}29$	2	$C_xH_yN_z^+$	+	$C_2H_5^+$	→	NEUT	+	C_2H_4	+	H	$1.00\times10^{-07}(300/T)^{0.90}$	[3]
$R_{ir}30$	2	$C_xH_yN_z^+$	+	$HCNH^+$	→	NEUT	+	HCN	+	H	$1.00\times10^{-07}(300/T)^{0.90}$	[3]
$R_{ir}31$	2	O^-	+	CH_5^+	→	$O(^3P)$	+	CH_4	+	H	$1.00\times10^{-07}(300/T)^{1.00}$	[1],[2]
$R_{ir}32$	2	O^-	+	$C_2H_5^+$	→	$O(^3P)$	+	C_2H_4	+	H	$1.00\times10^{-07}(300/T)^{1.00}$	[1],[2]
$R_{ir}33$	2	O^-	+	$HCNH^+$	→	$O(^3P)$	+	HCN	+	H	$1.00\times10^{-07}(300/T)^{1.00}$	[1],[2]
$R_{ir}34$	2	OH^-	+	CH_5^+	→	OH	+	CH_4	+	H	$2.70\times10^{-07}(300/T)^{1.10}$	[3]
$R_{ir}35$	2	OH^-	+	$C_2H_5^+$	→	OH	+	C_2H_4	+	H	$2.70\times10^{-07}(300/T)^{1.10}$	[3]
$R_{ir}36$	2	OH^-	+	$HCNH^+$	→	OH	+	HCN	+	H	$2.70\times10^{-07}(300/T)^{1.10}$	[3]

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