1 Bimolecular Reactions

A total of 81 bimolecular reactions were selected and they are given in Table 1.

#	Reactants		Products	Rate coefficient
1	$O(^3P) + O_3$	$\longrightarrow$	$2\ O_2$	$k_1^{bi} = 8.000x10^{-12}\ e^{-\frac{2060.}{T}}$
2	$OH + O_3$	$\longrightarrow$	$HO_2 + O_2$	$k_2^{bi} = 1.700x10^{-12}\ e^{-\frac{940.0}{T}}$
3	$HO_2 + O_3$	$\longrightarrow$	$OH + 2\ O_2$	$k_3^{bi} = 1.000x10^{-14}\ e^{-\frac{490.0}{T}}$
4	$ClO + HO_2$	$\longrightarrow$	$HOCl + O_2$	$k_4^{bi} = 2.700x10^{-12}\ e^{\frac{220.0}{T}}$
5	$Cl + H_2O_2$	$\longrightarrow$	$HCl + HO_2$	$k_5^{bi} = 1.100x10^{-11}\ e^{-\frac{980.0}{T}}$
6	$O(^1D) + N_2$	$\longrightarrow$	$O(^3P) + N_2$	$k_6^{bi} = 1.800x10^{-11}\ e^{\frac{110.0}{T}}$
7	$O(^1D) + O_2$	$\longrightarrow$	$O(^3P) + O_2$	$k_7^{bi} = 3.200x10^{-11}\ e^{\frac{70.00}{T}}$
8	$NO + O_3$	$\longrightarrow$	$NO_2 + O_2$	$k_8^{bi} = 3.000x10^{-12}\ e^{-\frac{1500.}{T}}$
9	$NO_2 + O_3$	$\longrightarrow$	$NO_3 + O_2$	$k_9^{bi} = 1.200x10^{-13}\ e^{-\frac{2450.}{T}}$
10	$H + O_3$	$\longrightarrow$	$OH + O_2$	$k_{10}^{bi} = 1.400x10^{-10}\ e^{-\frac{470.0}{T}}$
11	$OH + ClONO_2$	$\longrightarrow$	$HOCl + NO_3$	$k_{11}^{bi} = 1.200x10^{-12}\ e^{-\frac{330.0}{T}}$
12	$CH_4 + OH$	$\longrightarrow$	$CH_3 + H_2O$	$k_{12}^{bi} = 2.450x10^{-12}\ e^{-\frac{1775.}{T}}$
13	$CH_3O_2 + NO$	$\longrightarrow$	$CH_3O + NO_2$	$k_{13}^{bi} = 2.800x10^{-12}\ e^{\frac{300.0}{T}}$
14	$CH_3O + O_2$	$\longrightarrow$	$HCHO + HO_2$	$k_{14}^{bi} = 3.900x10^{-14}\ e^{-\frac{900.0}{T}}$
15	$HO_2 + HO_2$	$\longrightarrow$	$H_2O_2 + O_2$	$k_{15}^{bi} = 2.300x10^{-13}\ e^{\frac{600.0}{T}}$
16	$N + O_2$	$\longrightarrow$	$NO + O(^3P)$	$k_{16}^{bi} = 1.500x10^{-11}\ e^{-\frac{3600.}{T}}$
17	$HCHO + O(^3P)$	$\longrightarrow$	$HCO + OH$	$k_{17}^{bi} = 3.400x10^{-11}\ e^{-\frac{1600.}{T}}$
18	$CH_3O_2 + HO_2$	$\longrightarrow$	$CH_3OOH + O_2$	$k_{18}^{bi} = 4.100x10^{-13}\ e^{\frac{750.0}{T}}$
19	$Cl + H_2$	$\longrightarrow$	$HCl + H$	$k_{19}^{bi} = 3.700x10^{-11}\ e^{-\frac{2300.}{T}}$
20	$Cl + O_3$	$\longrightarrow$	$ClO + O_2$	$k_{20}^{bi} = 2.300x10^{-11}\ e^{-\frac{200.0}{T}}$
21	$ClO + O(^3P)$	$\longrightarrow$	$Cl + O_2$	$k_{21}^{bi} = 3.000x10^{-11}\ e^{\frac{70.00}{T}}$
22	$Cl + CH_4$	$\longrightarrow$	$HCl + CH_3$	$k_{22}^{bi} = 9.600x10^{-12}\ e^{-\frac{1360.}{T}}$
23	$HCl + OH$	$\longrightarrow$	$Cl + H_2O$	$k_{23}^{bi} = 2.600x10^{-12}\ e^{-\frac{350.0}{T}}$
24	$ClO + NO$	$\longrightarrow$	$Cl + NO_2$	$k_{24}^{bi} = 6.400x10^{-12}\ e^{\frac{290.0}{T}}$
25	$OH + H_2O_2$	$\longrightarrow$	$H_2O + HO_2$	$k_{25}^{bi} = 2.900x10^{-12}\ e^{-\frac{160.0}{T}}$
26	$H_2 + OH$	$\longrightarrow$	$H_2O + H$	$k_{26}^{bi} = 5.500x10^{-12}\ e^{-\frac{2000.}{T}}$
27	$O(^3P) + H_2O_2$	$\longrightarrow$	$OH + HO_2$	$k_{27}^{bi} = 1.400x10^{-12}\ e^{-\frac{2000.}{T}}$
28	$O(^3P) + ClONO_2$	$\longrightarrow$	$ClO + NO_3$	$k_{28}^{bi} = 2.900x10^{-12}\ e^{-\frac{800.0}{T}}$
29	$CO + OH$	$\longrightarrow$	$CO_2 + H$	$k_{29}^{bi} = 1.500x10^{-13}$
30	$HNO_3 + OH$	$\longrightarrow$	$NO_3 + H_2O$	$k_{30}^{bi} = 2.410x10^{-14}\ e^{-\frac{460.0}{T}}$
31	$NO + HO_2$	$\longrightarrow$	$OH + NO_2$	$k_{31}^{bi} = 3.500x10^{-12}\ e^{\frac{250.0}{T}}$
32	$H_2O + O(^1D)$	$\longrightarrow$	$OH + OH$	$k_{32}^{bi} = 2.200x10^{-10}$
33	$OH + HO_2$	$\longrightarrow$	$H_2O + O_2$	$k_{33}^{bi} = 4.800x10^{-11}\ e^{\frac{250.0}{T}}$
34	$OH + O(^3P)$	$\longrightarrow$	$H + O_2$	$k_{34}^{bi} = 2.200x10^{-11}\ e^{\frac{120.0}{T}}$
35	$HO_2 + O(^3P)$	$\longrightarrow$	$OH + O_2$	$k_{35}^{bi} = 3.000x10^{-11}\ e^{\frac{200.0}{T}}$
36	$NO_2 + O(^3P)$	$\longrightarrow$	$NO + O_2$	$k_{36}^{bi} = 5.600x10^{-12}\ e^{\frac{180.0}{T}}$
37	$N_2O + O(^1D)$	$\longrightarrow$	$2\ NO$	$k_{37}^{bi} = 6.700x10^{-11}$
38	$N + NO$	$\longrightarrow$	$N_2 + O(^3P)$	$k_{38}^{bi} = 2.100x10^{-11}\ e^{\frac{100.0}{T}}$
39	$H_2 + O(^1D)$	$\longrightarrow$	$OH + H$	$k_{39}^{bi} = 1.100x10^{-10}$

Table 1: Bimolecular reactions.

#	Reactants		Products	Rate coefficient
40	$CH_4 + O(^1D)$	$\longrightarrow$	$CH_3 + OH$	$k_{40}^{bi} = 1.250x10^{-11}$
41	$HCHO + OH$	$\longrightarrow$	$H_2O + HCO$	$k_{41}^{bi} = 9.000x10^{-12}$
42	$HCO + O_2$	$\longrightarrow$	$CO + HO_2$	$k_{42}^{bi} = 5.200x10^{-12}$
43	$Cl + HO_2$	$\longrightarrow$	$HCl + O_2$	$k_{43}^{bi} = 1.800x10^{-11}\ e^{\frac{170.0}{T}}$
44	$OH + HO_2NO_2$	$\longrightarrow$	$H_2O + O_2 + NO_2$	$k_{44}^{bi} = 1.300x10^{-12}\ e^{\frac{380.0}{T}}$
45	$CH_4 + O(^1D)$	$\longrightarrow$	$H_2 + HCHO$	$k_{45}^{bi} = 7.500x10^{-12}$
46	$OH + CH_3OOH$	$\longrightarrow$	$H_2O + CH_3O_2$	$k_{46}^{bi} = 3.800x10^{-12}\ e^{\frac{200.0}{T}}$
47	$OH + OH$	$\longrightarrow$	$H_2O + O(^3P)$	$k_{47}^{bi} = 4.200x10^{-12}\ e^{-\frac{240.0}{T}}$
48	$ClO + OH$	$\longrightarrow$	$Cl + HO_2$	$k_{48}^{bi} = 7.400x10^{-12}\ e^{\frac{270.0}{T}}$
49	$ClO + OH$	$\longrightarrow$	$HCl + O_2$	$k_{49}^{bi} = 6.000x10^{-13}\ e^{\frac{230.0}{T}}$
50	$HOCl + OH$	$\longrightarrow$	$H_2O + ClO$	$k_{50}^{bi} = 3.000x10^{-12}\ e^{-\frac{500.0}{T}}$
51	$Cl + HCHO$	$\longrightarrow$	$HCl + HCO$	$k_{51}^{bi} = 8.100x10^{-11}\ e^{-\frac{30.00}{T}}$
52	$HO_2 + HO_2$	$\longrightarrow$	$H_2O_2 + O_2$	$k_{52}^{bi} = 1.700x10^{-33}\ e^{\frac{1000.}{T}}$
53	$BrO + NO$	$\longrightarrow$	$Br + NO_2$	$k_{53}^{bi} = 8.800x10^{-12}\ e^{\frac{260.0}{T}}$
54	$Cl + HO_2$	$\longrightarrow$	$OH + ClO$	$k_{54}^{bi} = 4.100x10^{-11}\ e^{-\frac{450.0}{T}}$
55	$N + OH$	$\longrightarrow$	$NO + H$	$k_{55}^{bi} = 5.000x10^{-11}$
56	$Br + HCHO$	$\longrightarrow$	$HBr + HCO$	$k_{56}^{bi} = 1.700x10^{-11}\ e^{-\frac{800.0}{T}}$
57	$H + HO_2$	$\longrightarrow$	$H_2 + O_2$	$k_{57}^{bi} = 6.500x10^{-12}$
58	$H + HO_2$	$\longrightarrow$	$H_2O + O(^3P)$	$k_{58}^{bi} = 1.600x10^{-12}$
59	$H + HO_2$	$\longrightarrow$	$OH + OH$	$k_{59}^{bi} = 7.300x10^{-11}$
60	$NO + NO_3$	$\longrightarrow$	$NO_2 + NO_2$	$k_{60}^{bi} = 1.500x10^{-11}\ e^{\frac{170.0}{T}}$
61	$N_2O + O(^1D)$	$\longrightarrow$	$N_2 + O_2$	$k_{61}^{bi} = 4.900x10^{-11}$
62	$N_2O_5 + H_2O$	$\longrightarrow$	$2\ HNO_3$	$k_{62}^{bi} = 2.000x10^{-21}$
63	$O(^1D) + CF_2Cl_2$	$\longrightarrow$	$ClO + Cl$	$k_{63}^{bi} = 1.400x10^{-10}$
64	$N + NO_2$	$\longrightarrow$	$N_2O + O(^3P)$	$k_{64}^{bi} = 5.800x10^{-12}\ e^{\frac{220.0}{T}}$
65	$Br + O_3$	$\longrightarrow$	$BrO + O_2$	$k_{65}^{bi} = 1.700x10^{-11}\ e^{-\frac{800.0}{T}}$
66	$Br + HO_2$	$\longrightarrow$	$HBr + O_2$	$k_{66}^{bi} = 1.500x10^{-11}\ e^{-\frac{600.0}{T}}$
67	$BrO + BrO$	$\longrightarrow$	$2\ Br + O_2$	$k_{67}^{bi} = 1.500x10^{-12}\ e^{\frac{230.0}{T}}$
68	$OH + HBr$	$\longrightarrow$	$H_2O + Br$	$k_{68}^{bi} = 1.100x10^{-11}$
69	$CH_3Br + OH$	$\longrightarrow$	Br	$k_{69}^{bi} = 2.350x10^{-12}\ e^{-\frac{1300.}{T}}$
70	$BrO + ClO$	$\longrightarrow$	$Br + OClO$	$k_{70}^{bi} = 9.500x10^{-13}\ e^{\frac{550.0}{T}}$
71	$BrO + ClO$	$\longrightarrow$	$Br + ClOO$	$k_{71}^{bi} = 2.300x10^{-12}\ e^{\frac{260.0}{T}}$
72	$BrO + ClO$	$\longrightarrow$	$BrCl + O_2$	$k_{72}^{bi} = 4.100x10^{-13}\ e^{\frac{290.0}{T}}$
73	$BrO + HO_2$	$\longrightarrow$	$HOBr + O_2$	$k_{73}^{bi} = 3.400x10^{-12}\ e^{\frac{540.0}{T}}$
74	$BrO + O(^3P)$	$\longrightarrow$	$Br + O_2$	$k_{74}^{bi} = 1.900x10^{-11}\ e^{\frac{230.0}{T}}$
75	$CH_4 + O(^1D)$	$\longrightarrow$	$H + CH_3O$	$k_{75}^{bi} = 3.000x10^{-11}$
76	$O(^1D) + CH_3Br$	$\longrightarrow$	$Br + CH_3O$	$k_{76}^{bi} = 1.800x10^{-10}$
77	$O(^1D) + O_3$	$\longrightarrow$	$O_2 + O_2$	$k_{77}^{bi} = 1.200x10^{-10}$
78	$O(^1D) + O_3$	$\longrightarrow$	$O_2 + O(^3P) + O(^3P)$	$k_{78}^{bi} = 1.200x10^{-10}$

Table 1: (continued) Bimolecular reactions.

#	Reactants		Products	Rate coefficient
79	$H + NO_2$	$\longrightarrow$	$OH + NO$	$k_{79}^{bi} = 4.000x10^{-10}$
80	$BrO + CH_3O_2$	$\longrightarrow$	$O_2 + Br + CH_3O$	$k_{80}^{bi} = 3.230x10^{-11}\ e^{-\frac{965.0}{T}}$
81	$ClO + CH_3O_2$	$\longrightarrow$	$O_2 + Cl + CH_3O$	$k_{81}^{bi} = 3.300x10^{-12}\ e^{-\frac{965.0}{T}}$

Table 1: (continued) Bimolecular reactions.