Appendix A

Table A1. Bimolecular reactions and parameters used for the modelling described in Sect. 2.5. Reactions follow the rate expression $k(T) = A(T/298)^n e^{-\mathrm{Ea}/RT}$ (Burkholder et al., 2015).

Reaction	A	n	Ea (kJ mol^{-1})	Reference
$ClNO_2 + M$ ==> $Cl + NO_2$	9.13×10	0	106	Baulch et al. (1981)
$Cl + Cl$ ==> Cl_2	6.15×10^{-34}	0	−7.53	Baulch et al. (1981)
$M + ClONO_2$ ==> $NO_2 + ClO$	2.76×10^{-5}	0	94.78	Anderson and Fahey (1990)
$CH_4 + Cl$ ==> $CH_3 + HCl$	8.24×10^{-13}	2.49	5.06	Bryukov et al. (2002)
$HCl + OH$ ==> $H_2O + Cl$	3.74×10^{-12}	0	4.27	Baulch et al. (1981)
$HCl + M$ ==> $H + Cl$	7.31×10^{-11}	0	342	Baulch et al. (1981)
$CH_3 + HCl$ ==> $CH_4 + Cl$	3.89×10^{-13}	0	9.64	Baulch et al. (1981)
$CH_3 + NO_2$ ==> $CH_3O + NO$	3.44×10^{-11}	0	0	Srinivasan et al. (2005)
$O_3 + M$ ==> $O + O_2$	7.6×10^{-10}	0	93.12	Heimerl and Coffee (1979)
$CH_3 + O$ ==> $CH_2O + H$	2.26×10^{-11}	0	0	Baulch et al. (1992)
$HCl + O$ ==> $OH + Cl$	7.07×10^{-14}	2.87	14.72	Mahmud et al. (1990)
$OH + CH_4$ ==> $CH_3 + H_2O$	4.16×10^{-13}	2.18	10.24	Srinivasan et al. (2005)
$Cl_2 + M$ ==> $Cl + Cl$	3.85×10^{-11}	0	196	Baulch et al. (1981)
$Cl + Cl$ ==> Cl_2	6.15×10^{-34}	0	−7.53	Baulch et al. (1981)
$Cl_2 + O$ ==> $ClO + Cl$	4.17×10^{-12}	0	11.39	Baulch et al. (1981)
$Cl_2 + H$ ==> $HCl + Cl$	1.43×10^{-10}	0	4.91	Baulch et al. (1981)
$Cl_2 + OH$ ==> $HOCl + Cl$	3.60×10^{-12}	0	9.98	Atkinson et al. (2007)
$CH_3 + O_2$ ==> $CH_3O + O$	2.19×10^{-10}	0	131	Baulch et al. (1992)
$ClO + O$ ==> $O_2 + Cl$	2.50×10^{-11}	0	−0.91	Atkinson et al. (2007)
$OH + ClO$ ==> $HO_2 + Cl$	6.86×10^{-12}	0	−2.49	Atkinson et al. (2007)
$OH + ClO$ ==> $HCl + O_2$	4.38×10^{-13}	0	−2.49	Atkinson et al. (2007)
$CH_3O + NO$ ==> $CH_2O + HNO$	4.00×10^{-12}	−0.7	0	Atkinson et al. (1992)
$CH_3O + O_2$ ==> $CH_2O + HO_2$	7.20×10^{-14}	0	8.98	Atkinson et al. (1992)
$HOCl + O$ ==> $OH + ClO$	1.70×10^{-13}	0	0	Atkinson et al. 2007)
$ClCO + M$ ==> $CO + Cl$	4.10×10^{-10}	0	24.6	Atkinson et al., 2007)
$O_3 + NO$ ==> $O_2 + NO_2$	1.40×10^{-12}	0	10.9	Atkinson et al. (2004)
$CH_3O_2 + NO$ ==> $CH_3O + NO_2$	2.30×10^{-12}	0	−2.99	Atkinson et al. (2006b)
$HO_2 + NO$ ==> $NO_2 + OH$	3.6×10^{-12}	0	−2.24	Atkinson et al. (2004)
$CH_2O + Cl$ ==> $HCl + HCO$	8.20×10^{-11}	0	0.28	Atkinson et al. (1992)
$CH_2O + OH$ ==> $HCO + H_2O$	4.73×10^{-12}	1.18	−1.87	Baulch et al. (1992)
$CH_3O_2 + HO_2$ ==> $CH_3OOH + O_2$	3.80×10^{-13}	0	−6.49	Atkinson et al. (1992)
CH_3OOH ==> $CH_3O + OH$	6.00×10^{14}	0	177	Baulch et al. (1994)
$HCO + O_2$ ==> $CO + HO_2$	5.20×10^{-12}	0	0	Atkinson et al. (2006b)
$CO + OH$ ==> $CO_2 + H$	5.40×10^{-14}	1.5	−2.08	Baulch et al. (1992)
$Cl + HO_2$ ==> $HCl + O_2$	1.80×10^{-11}	0	−1.41	Atkinson et al. (1992)
$Cl + HO_2$ ==> $ClO + OH$	6.30×10^{-11}	0	4.74	Atkinson et al. (2007)
$Cl + O_3$ ==> $ClO + O_2$	2.80×10^{-11}	0	2.08	Atkinson et al. (2007)
$CO + Cl$ ==> $ClCO$	1.33×10^{-33}	−3.8	0.00	Atkinson et al. (2007)
$OH + HOCl$ ==> $H_2O + ClO$	5.00×10^{-13}	0	0	Atkinson et al. (2007)
$ClO + HO_2$ ==> $HOCl + O_2$	2.20×10^{-12}	0	−2.8	Atkinson et al. (2007)
$ClO + ClO$ ==> $Cl_2 + O_2$	1.00×10^{-12}	0	13.22	Atkinson et al. (2007)
$ClO + ClO$ ==> $OClO + Cl$	3.50×10^{-13}	0	11.39	Atkinson et al. (2007)
$ClO + ClO$ ==> $ClOO + Cl$	3.00×10^{-11}	0	20.37	Atkinson et al. (2007)
$ClO + NO$ ==> $Cl + NO_2$	6.20×10^{-12}	0	−2.45	Atkinson et al. (2007)
$CH_2O + O$ ==> $HCO + OH$	1.78×10^{-11}	0.57	11.56	Baulch et al. (1992)
$OH + NO_2$ ==> HNO_3	2.70×10^{-11}	0	0	Troe (2012)
$CH_3Cl + OH$ ==> $CH_2Cl + H_2O$	1.40×10^{-12}	1.6	8.65	Cohen and Westberg (1991)
$CH_3Cl + H$ ==> $CH_3 + HCl$	6.14×10^{-11}	0	38.9	Westenberg and deHaas (1975)
$CH_3Cl + CH_3$ ==> $CH_4 + CH_2Cl$	2.09×10^{-12}	0	48.6	Macken and Sidebottom (1979)
$CH_3Cl + Cl$ ==> $CH_2Cl + HCl$	3.30×10^{-11}	0	10.39	Atkinson et al. (2008)
$CHCl_3 + Cl$ ==> $CCl_3 + HCl$	4.90×10^{-12}	0	10.31	Atkinson et al. (2008)
$Cl + C_3H_6$ ==> Products	2.70×10^{-10}	0	0	Atkinson et al. (2006b)
$Cl + C_5H_8$ ==> Products	4.30×10^{-10}	0	0	Orlando et al. (2003)
$ClNO + M$ ==> $Cl + NO$	2.16×10^{-9}	0	134	Baulch et al. (1981)

Proof only