Table 2-11. Estimates of SO_2 Oxidation Rates in a Well-Mixed Troposphere

Reaction	Rate, % h^{-1}			Discussion Section	Comments
I. Gas Phase					
HO radical	0.3 - 1.3			2.3.3.2	1
HO_2 radical	0.4 - 2.0			2.3.3.2	1,2
CH_3O_2 radical	0.3 - 1.5			2.3.3.2	1,2
II. Aqueous Phase pH=	1	2	3		
Mn(II) catalysis	1E-1	1E+1	1E+3	2.3.4.2	2,3,4
Fe(III) catalysis	5E-5	5E-1	5E+3	2.3.4.2	3,5
C (soot) catalysis	3E+1	3E+1	3E+1	2.3.4.3	6
O_3 (40 ppb)	2E-8	2E-6	2E-4	2.3.4.4	3,7
O_3 (120 ppb)	6E-8	6E-6	6E-4	2.3.4.4	3,7
H_2O_2 (1 ppb)	2E-2	3E-2	3E-2	2.3.4.4	3,8
H_2O_2 (10 ppb)	2E-1	2E-1	3E-1	2.3.4.4	3,8

NOTE: "E" denotes "exponential to 10th power;" e.g., 3E-1 = 3×10^{-1}

1. Typical range for daytime at northern midlatitudes during the summer.
2. This reaction rate is not well established; see discussion section.
3. Assumed that liquid water volume of aerosol = $50 \times 10^{-12} m^3/m^3$, $[SO_2]_g$ = 10 ppb (or 27 ug/m^3).
4. Assumed that Mn(II) mass concentration = 20 ng/m^3; also , the Mn(II) is assumed to be uniformly dissolved in the liquid water of the aerosol [Mn(II)] = $8.9 \times 10^3 M$). Rate calculation used the expression of Neytzell-de Wilde and Taverner (1958); see Table 2-7.