

Table 2-8 Investigations of SO<sub>2</sub> - Iron - O<sub>2</sub> Aqueous Systems

Investigators	Type of System	Comment
Reinders and Vles (1925)	Bulk	2
Basset and Parker (1931)	Bulk	2
Higgins and Marshall (1957)	Bulk	2
Johnstone and Coughanowr (1958)	Supported droplet	1
Junge and Ryan (1958)	Bubbler	1,2
Neytzell-de Wilde and Taverner (1958)	Bulk	2
Johnstone and Moll (1960)	Free droplets	2
Danilczuk and Swinarski (1961)	Bulk	2
Karraker (1963)	Bulk	3
Bracewell and Gall (1967)	Bubbler	1
Brimblecombe and Spedding (1974a)	Bubbler	1
Brimblecombe and Spedding (1974b)	Not reported	4
Freiberg (1974)	Theoretical	
Lunak and Veprek-Siska (1975)	Flow	5
Barrie and Georgii (1976)	Supported droplet	1
Fuzzi (1978)	Bulk	

1. Incompletely characterized 2-phase system; results cannot be considered to be reliable.
2. Rate expression not reported.
3. O<sub>2</sub> -free system; results not applicable to tropospheric SO<sub>2</sub> oxidation.
4. Insufficient details reported to determine if the results should be considered to be reliable.
5. Photochemical initiation.

TABLE 2-9. Rate Expression for the Iron-Catalyzed Oxidation

Expression <sup>a, b</sup>	pH	Investigators
$\frac{d[\text{SO}_4^{2-}]}{dt} = 0.04 [\text{Fe(III)}][\text{S(IV)}][\text{H}^+]_0^{-1}$	~ 2	Adapted from Neytzell-de Wilde and Taverner (1958)
$\frac{d[\text{SO}_4^{2-}]}{dt} = 100 [\text{Fe(III)}][\text{S(IV)}]$	4	Brimblecombe and Spedding (1974a)
$\frac{d[\text{SO}_4^{2-}]}{dt} = 0.1 [\text{Fe(III)}][\text{S(IV)}][\text{H}^+]_0^{-1}$	≤ 4	Adapted from Fuzzi (1978)

<sup>a</sup>The units are: liter, mole, second.

<sup>b</sup>The term  $[\text{H}^+]_0^{-1}$  indicates that the rate is dependent on the inverse of the initial H<sup>+</sup> ion concentration; changes in H<sup>+</sup> concentration after the reaction is in progress do not affect the rate.