

Table 2-10 Investigations of SO₂ - Copper - O₂ Aqueous Systems

Investigators	Type of System	Comment
Titoff (1903)	Bulk	2
Reinders and Vles (1925)	Bulk	2
Alyea and Backstrom (1929)	Bulk	2
Johnstone (1931)	Bubbler	1
Albu and Grof von Schweinitz (1932)	Bulk	2
Fuller and Crist (1941)	Bubbler	1
Riccoboni et al (1949)	Bulk	2
Basset and Parker (1951)	Bulk	2
Higgins and Marshall (1957)	Bulk	2
Johnstone and Coughanowr (1958)	Supported droplet	1
Junge and Ryan (1958)	Bubbler	1
Barron and O'Hern (1966)	Flow	
Bracewell and Gall (1967)	Bubbler	1
Cheng et al. (1971)	Supported droplet	1
Veprek-Siska and Lunak (1974)	Flow	2
Barrie and Georgii (1976)	Supported droplet	1
Huss et al. (1978)	Bulk	2
Mishra and Srivastava (1976)	Flow	

1. Incompletely characterized 2-phase system; results cannot be considered to be reliable.
2. Rate expression not reported.

be recommended as reliable for use in calculating sulfate formation rates due to CU catalysis in the troposphere.

Vanadium catalysis has been reported in only one study (Bracewell and Gall, 1967); a bubble reactor was used, and its mass transfer characteristics were inadequately reported. Therefore, no rate expression can be recommended as reliable. However, Bracewell and Gall (1967) did observe qualitatively that V(V) was orders of magnitude less effective than Mn and Fe. Most likely, V(V) catalysis is unimportant for sulfate formation in the troposphere. Likewise, there are no definitive studies for Cr(III), Ni(II), Zn(II), and Pb(II), but it appears