

# N85-32731

## K.H. Nealson: POSSIBLE ROLES OF MANGANESE REDOX CHEMISTRY IN THE SULFUR CYCLE

Manganese commonly exists in two valence states, which are easily interchangeable by chemical redox reactions. These are the soluble Mn(II) ion, and the Mn(IV) ion, which is usually found as one of several possible insoluble oxides or manganates (designated as MnO<sub>2</sub>). Oxidation is favored in alkaline (high pH) and oxidizing (high Eh) environments, whereas reduction is favored by acidic and reducing conditions. Bacteria can catalyze both oxidation and reduction.

Sulfate-reducing bacteria (SRB) are very potent MnO<sub>2</sub> reducers by virtue of their sulfide production: H<sub>2</sub>S reacts rapidly with MnO<sub>2</sub> to yield Mn(II), elemental sulfur, and water. In manganese-rich zones, Mn cycles rapidly if sulfate is present to drive the reduction and the MnO<sub>2</sub> precipitates and sinks into anaerobic zones. The production of sulfide (by organisms requiring organic carbon compounds) to reduce manganese oxides might act to couple the carbon and sulfur cycles in water bodies in which the two cycles are physically separated. Iron has been proposed for this provision of reducing power by (Jørgensen, 1983), but since MnS is soluble and FeS is very insoluble in water, it is equally likely that manganese rather than iron provides the electrons to the more oxidized surface layers.

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