



The overall equilibrium expression for the reactions has not been developed as yet. Consideration must also be given to the H^+ due to $\text{Fe}^{+2} = \text{Fe}^{+3}$ reaction. The extent of reaction to form various hydrates and other species should also be considered.

It is not be chance that most efforts to develop a mine water process involve lime neutralization. Lime is generally available, has a high basicity, and the cost, while high, is less than all other bases except limestone and waste material.

The basicity (28) of lime is measured by determining the total neutralizing power (TNP) by titration with standard acid. Pure CaCO_3 has a TNP of 106, CaO has a TNP of 178, and $\text{Ca}(\text{OH})_2$ has a TNP of 135 (assuming 100 percent purity).

The reactivity of lime is related to method of preparation and surface area. Whitman (29), for example, found "highest reactivity and fastest rate of dissolution with the finest hydrates of largest surface area.

The cost of lime (30) is as follows:

- (1) Lime, chemical, hydrated.....\$19.25/ton f.o.b.
- (2) Lime, chemical, quicklime.....\$15.50/ton f.o.b.

The theoretical requirements of lime and hydrated lime for neutralization of sulfuric acid are:

- (1) Lime--1 pound of lime (CaO) will neutralize 1.75 pounds of acid.
- (2) Hydrated lime--1 pound of $\text{Ca}(\text{OH})_2$ will neutralize 1.32 pounds of acid.