

Phosphorus Removal

The most common method to remove phosphorus from a waste stream is chemical precipitation.

The common precipitating cations are Ca, Al and Fe

Calcium

Calcium is usually added as lime ($\text{Ca}(\text{OH})_2$).
The reaction is represented as:

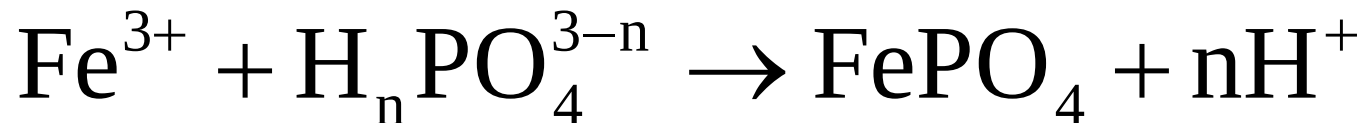
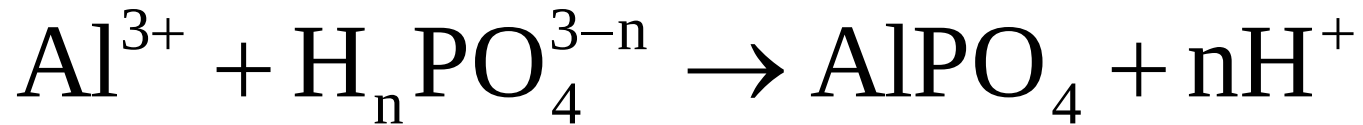


Lime dosage is primarily a function of system alkalinity. The key parameter here is pH. The pH has to be elevated to somewhere between 10.5 and 11 to get effective P removal. As an approximation lime dose to attain this pH is about **1.5** times the alkalinity represented in mg/L as CaCO_3

Lime addition is seldom practiced in the US because it produces large amount of sludge and because the pH usually has to be readjusted typically by recarbonation.

Al and Fe

Precipitation of P by Al and Fe is more direct:



% P reduction

Al dosage
(mol Al:mol P)

75

1.4:1

85

1.7:1

95

2.3:1

In most cases jar tests or pilot plant studies are used to fine tune the dosages.

There are a variety of chemical application points in the treatment scheme. In some cases the chemical precipitation process is incorporated into a biological treatment process. Some alternative treatment schemes are shown below.

