WATER CHEMISTRY

Ozone carries an oxidation potential that supercedes that of three (3) of the four (4) halogens currently being used in oxidation and disinfection of water. Of the four (4) halogens, two (2) are predominantly used in swimming pool and spa applications. The two (2) being chlorine and bromine.

If you were to use a scale with chlorine as the base, of one (I1) in oxidation potential, the following is a list of the ranking for commonly used oxidants.

Oxidation Potential of Standard Oxidants

Oxidant	Oxidation Potential Volts	Oxidation Power
Fluorine	3.06	2.25
Hydroxyl Radical	2.80	2.05
Atomic Oxygen	2.42	1.78
Ozone	2.07	1.52
Hydrogen Peroxide	1.77	1.30
Permanganate	1.67	1.22
Hypochlorous Acid	1.49	1.10
Chlorine	1.36	1.00
Bromine	.78	.57

Basically, if this were to be summarized one could assume ozone has more than twice the oxidation potential of either chlorine or bromine. Because of this, ozone will disinfect water 3200 times faster than chlorine and 5,600 at times faster than bromine. In addition to this, oxidation efficiency of organics to biodegradable compounds (that are filterable) is increased by 80%.

To add further to this would be the ability to oxidize minerals such as iron, Fe, to $Fe_2\ 0_3$. The new molecule Fe_20_3 precipitates from the water and settles to the bottom of the pool. A good indication of this has taken place in a red color in the backwash of the filter or the pool itself.

As well as iron, Fe, alkalinity can be affected to. The following is a list of the three (3) types of alkalinity found in water.

1. *Bicarbonate Alkalinity*

   This would be the most common and most desirable type of alkalinity.

2. *Carbonate Alkalinity*

   This would be the second most abundant type of alkalinity and should never construe more than 10% of total alkalinity due to its harshness.

3. *Hydroxide Alkalinity*

   This is the least abundant type of alkalinity and is exceedingly caustic in action. In even weak hydroxide solutions, organics are quickly destroyed by this type of alkalinity. Due to this, even small levels are undesirable in swimming pool applications.

   Contrary to popular belief, PH is not a measurement of alkalinity. The following is a description of both PH and alkalinity.

   pH - Water in nature tends to be quite complex. Basically, the formula for a molecule of water is H_2O. However, a small part of water dissociates to form H^+ (hydrogen ions) and OH-(hydroxyl ions). The hydrogen ions form what we call pH. The definition for this is "The logarithm of the reciprocal of the hydrogen iion concentration in moles per liter".