

DISINFECTION OF WASH WATER

By pH & ORP

- Chlorine, Ozone, Peroxyacetic Acid etc are Oxidizer
- Oxidation is Transfer of Electrons
- Microbes lose electrons and are Oxidized (killed)
- Transfer of Electrons creates an Electrical Potential
- Electron Potential generated by the Oxidizer is ORP
- **ORP = Oxidation Reduction Potential**
- It is a Potential, and measured in millivolts
- Stronger the ORP, faster the microbe is killed
- **ORP measures disinfection NOT ppm of Chlorine**



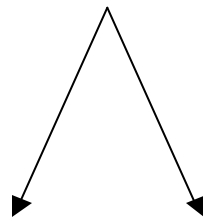
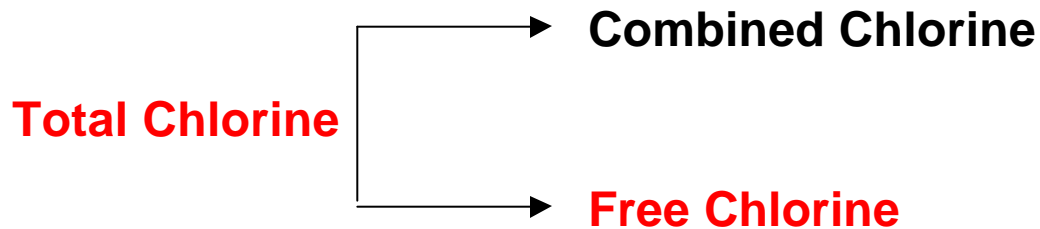
Chlorine + electron → **Killed Microbe**

ORP (mV)	KILL TIME E. COLI
450	Infinite
500	1 hour
550	100 seconds
600	10 seconds
650	0 seconds

Experience shows that tougher organisms require slightly higher ORP Listeria, Salmonella, Yeast, Mold need $\geq 750\text{mV}$

Typical ORP in Produce Wash Water is 650 mV

CHLORINE CHEMISTRY



<u>pH</u>	<u>HOCl</u>	<u>OCl⁻</u>
6.5	95%	5%
7.0	80%	20%
7.5	50%	50%
8.0	20%	80%



HOCl = Fast Oxidizer (Sanitizer)

OCl⁻ = Slow Oxidizer (No Sanitation)

Maximum Efficiency of Chlorine is at pH 6.5

Conclusion: pH 6.5 and ORP 650 mV (not ppm)

Automation of Water Treatment Process

pH & ORP

Operation:

- Sensors monitor pH and ORP
- Control automatically turn chemical pump On/Off as needed
- Always maintain a tight chemical concentration range
- Inject Chemical only on demand or as needed
- Self Maintains and adjusts to organic load
- Datalogger maintains a continuous record
- Operates only when the process is ON
- Smart Logic allows "Hands Free" Operation
- Special sensors require low maintenance

Advantages:

- Continuous Digital Readout
- Continuous Chemical Control
- Continuous Recording
- Efficient Chemical Use and minimize Waste
- Increase Product Shelf Life
- Increase Product Safety
- Built-In Safety Alarms and Chemical Shut-Off
- Save Labor
- Save Time
- Save \$
- Strengthen HACCP
- Provide Efficacy to the Process
- Satisfy Food Safety Guidelines (WGA, IFPA)