



Chlorine Chemistry

Water Recreation Program

Primary Disinfectants (CHLORINE)

Product	% Available Chlorine	pH in 1% solution	pH Effect	Appearance
Gas Chlorine	100%	0	Lowers pH	Gas
Sodium Hypochlorite	10-12.5% Household bleach 3-5%	9-14	Raises pH	Liquid
Calcium Hypochlorite	47-78%	8.5-11	Raises pH	Granular, tabs, briquet
Lithium Hypochlorite	35%	10.8	Raises pH	Granular
Trichlor*	90%	2.8-3.5	Lowers pH	Granular & Tabs
Dichlor*	56-63%	6.5-6.8	Neutral	Granular
Bromine (BCDMH)	27%	4.8	Lowers pH	Granular, Tabs

*These chlorine products are sun stabilized – they contain cyanuric acid

Section 1

THE CHEMISTRY OF DISINFECTION HYPOCHLOROUS ACID/HYPOBROMOUS ACID

Free Chlorine

97%

50%

91%



Hypochlorous Acid is
a powerful germ killer

Hypochlorite ion is
a weak germ killer



6.0

7.5

8.5

Bromine

100%

94%

17%



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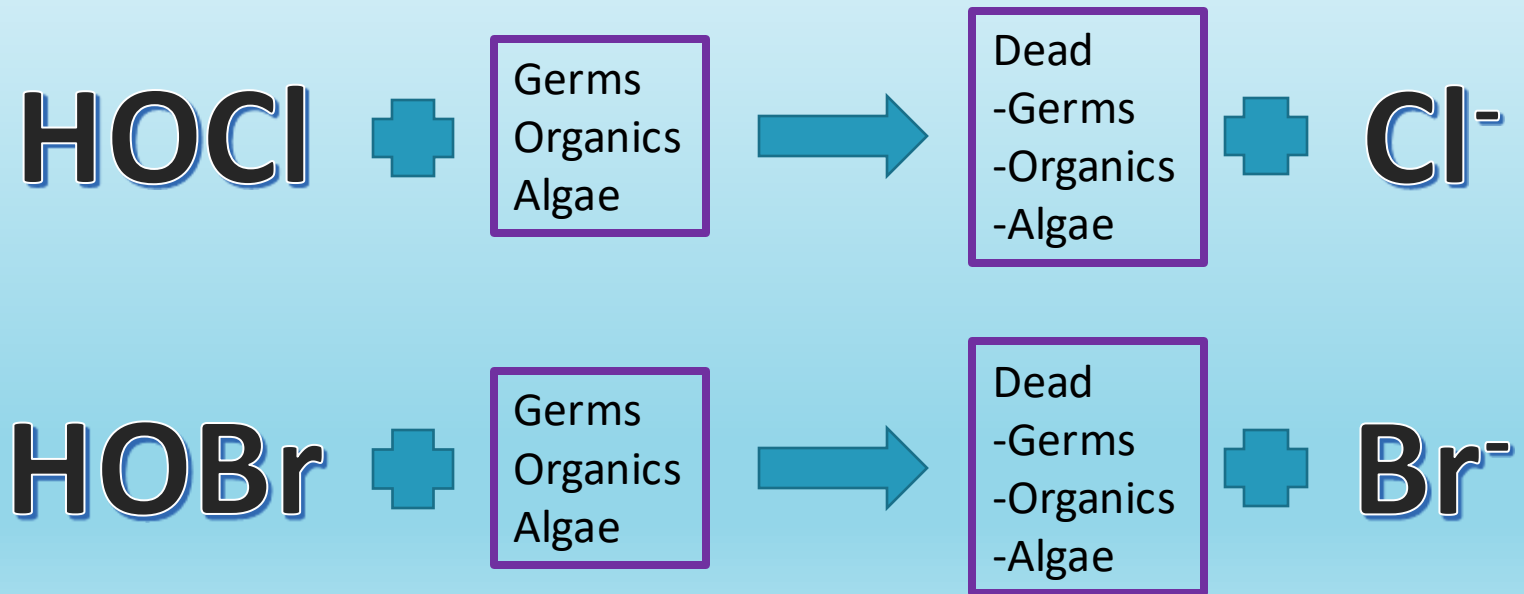
6.0

7.5

8.0

Killing Germs

- Chlorine attacks the cell membrane and dissolves it
- But chlorine also attacks all organic materials



Chloramines

- There are lots of things that end up in pool water that are not pathogens
 - Sweat, urine, dead skin cells, leaves, hair, etc.
 - Your sanitizer works to break this down

Breaking down Ammonia



Section 2

SANITIZER LEVELS

How much Chlorine should you use?

- Are you using sun stabilizer (Cyanuric Acid)?
- What kind of pool (spa, swimming pool)
- What are your patterns of use?

Sanitizer Chart

Swimming Pool	Minimum
Chlorine	1.5 ppm FAC
Chlorine w/ Cyanuric Acid	2.0 ppm FAC
Bromine	2.5 ppm TB

Spas & Wading & Spray Pools	Minimum
Chlorine	3.0 ppm FAC
Chlorine w/ Cyanuric Acid	3.5 ppm FAC
Bromine	4.0 ppm TB

Maximum levels should conform to manufacturers' recommendations and shall not exceed 10 ppm. Check your product's label for manufactures' maximum level.

Cyanuric Acid

- Cyanuric Acid protects Chlorine from being destroyed by the sun. You can lose half of your chlorine every hour on a bright sunny day.
- The CPO manual recommends 30 to 50 ppm to provide sun protection.
- Too much reduces the activity of chlorine.
- Legal Maximum in Washington State is 90 ppm.



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Questions?

Presenter



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