THE 7.5% RULE

CYA to Free Chlorine Table | Card 1 of 3

SIDE A

FORMULA:

FC minimum = CYA level x 0.075

At 0 ppm CYA: maintain FC at 0.5–2.0 ppm

POOLS SCIENTIFIC CYA STANDARD:

Target: 0 ppm | Preferred: 0–20 ppm | Acceptable: 0–30 ppm

Absolute ceiling: 50 ppm — never exceeded under any circumstance

CYA added only for undersized or aging salt cells — case by case

CYA TO FC MINIMUM REFERENCE TABLE

CYA (ppm)	Min FC (ppm)	PS Status
0 ppm	0.5–2.0 ppm	IDEAL — Pools Scientific target
10 ppm	0.75 ppm	Excellent — preferred range
20 ppm	1.5 ppm	Good — preferred upper end
30 ppm	2.25 ppm	Acceptable — monitor closely
40 ppm	3.0 ppm	Above acceptable — plan correction
50 ppm	3.75 ppm	Ceiling — monitor closely, correct if rising
80 ppm	6.0 ppm	Critical — well above ceiling
100 ppm	7.5 ppm	Emergency — drain immediately

THE 7.5% RULE

Why Low CYA Is Better | Card 1 of 3

SIDE B

WHY POOLS SCIENTIFIC TARGETS 0 PPM CYA

At 0 ppm CYA, none of your chlorine is bound, so all of it is available to sanitize (about half as HOCl at pH 7.5).
As CYA rises, a larger fraction of FC is bound and inactive.
Lower CYA = more effective chlorine per ppm tested.
90%+ of the Pools Scientific route runs 0–20 ppm CYA with FC maintained at 0.5–2.0 ppm. Pools stay perfect.

CHLORINE SOURCES — CYA IMPACT

Chlorine Type	CYA Impact
Trichlor tablets (3" pucks)	~55% CYA — accumulates with every dose
Dichlor granules	~57% CYA — avoid for regular dosing
Calcium hypochlorite	Zero CYA — preferred for all dosing
Liquid chlorine (sodium hypo)	Zero CYA — preferred for all dosing
Salt chlorine generator	Zero CYA added by cell itself

POOLS SCIENTIFIC PHILOSOPHY:

CYA is added only when operationally necessary — specifically for undersized or aging salt cells that need UV protection.
Fewer chemicals in the water is always the goal.

ACTION STEPS — CYA MANAGEMENT

1. Test CYA — use liquid drop test, not strips
2. Target 0 ppm; acceptable up to 30 ppm
3. Calculate FC minimum: CYA x 0.075
4. If above 30 ppm — plan correction
5. If above 50 ppm — partial drain immediately
6. Switch to cal-hypo or liquid chlorine for dosing

LANGELIER SATURATION INDEX

LSI Quick Reference | Card 2 of 3

SIDE A

WHAT IS THE LSI?

LSI measures water balance. Negative = corrosive.

Positive = scale-forming. Zero = perfect equilibrium.

TARGET: -0.3 to +0.3 (aim for lower half in salt pools)

THE SIX VARIABLES

Variable	Target	LSI Effect	Adjustment
pH	7.4–7.6	High raises	Acid (down) / Soda ash (up)
Total Alk.	80–100 ppm	High raises	Bicarb (up) / Acid (down)
Calcium	200–400 ppm	High raises	Cal-chloride (up) / Dilute (down)
CYA	0–20 ppm*	High lowers slightly	Dilution only to reduce
TDS	Under 1,500 ppm	High lowers slightly	Dilution only
Temp.	Seasonal	High raises	Recalculate seasonally

*CYA: 0 ppm target | 0–20 preferred | 0–30 acceptable | 50 absolute ceiling

ADJUSTMENT ORDER — ALWAYS FOLLOW THIS SEQUENCE

1

ALKALINITY FIRST

Foundation.
Sets pH stability.

2

pH SECOND

Primary lever.
Most powerful.

3

CALCIUM LAST

Slowest to change.
Plan ahead.

LANGELIER SATURATION INDEX

Damage Patterns + Diagnosis | Card 2 of 3

SIDE B

WHAT OUT-OF-BALANCE WATER DOES

CORROSIVE WATER

LSI below -0.3

- **Etches plaster surfaces**
- **Roughens pool finish**
- **Deteriorates tile grout**
- **Corrodes heat exchangers**
- Attacks copper piping
- Blue-green water staining
- Destroys pump seals
- Pits metal fittings

SCALE-FORMING WATER

LSI above +0.3

- **White calcium on tile**
- **Scaling on cell plates**
- **Reduced filter efficiency**
- **Blocks heat exchanger tubes**
- Rough plaster deposits
- Clogs return fittings
- Reduces pump efficiency
- Scale on all wetted surfaces

CRITICAL:

Clear water does NOT mean balanced water. A pool can look perfect while silently corroding plaster and destroying equipment.

ACTION STEPS — BALANCING LSI

1. Test all 6 variables: pH, TA, CH, CYA, TDS, note temperature
2. Calculate LSI (Pool Math app recommended)
3. Adjust TA first if out of range
4. Adjust pH second — fastest and most powerful lever
5. Adjust CH last — slowest, requires dilution to lower
6. Recalculate seasonally as temperature changes

pH & CHLORINE EFFECTIVENESS

How pH Determines Sanitizer Power | Card 3 of 3

SIDE A

THE PRINCIPLE:

Active chlorine (HOCl) decreases sharply as pH rises.

At 0 ppm CYA, maintain FC 0.5–2.0 ppm at pH 7.4–7.6.

FC minimum always = CYA x 0.075. TARGET pH: 7.4 to 7.6

PH VS. ACTIVE CHLORINE (HOCL) PERCENTAGE

pH Level	% Active HOCl	Practical Meaning
6.8	85%	Too acidic — corrosive water
7.0	78%	Below target — trending corrosive
7.2	69%	Acceptable — slightly low
7.4	58%	TARGET ZONE — ideal balance
7.5	52%	TARGET ZONE — sweet spot
7.6	47%	TARGET ZONE — upper ideal
7.8	35%	Reduced — adjust down
8.0	26%	Poor — lost >half effectiveness
8.2	18%	Very poor — adjust immediately
8.5	10%	Critical — nearly ineffective

Values shown for 77°F (25°C) water.

At pH 8.5 your chlorine is 90% inactive. pH management is non-negotiable.

pH & CHLORINE EFFECTIVENESS

pH Management Guide | Card 3 of 3

SIDE B

PH ADJUSTMENT REFERENCE

Adjustment	Chemical	Notes
RAISE pH	Soda Ash	Fast-acting. Add to deep end.
RAISE pH	Sodium Bicarb	Slower — also raises TA.
LOWER pH	Muriatic Acid	Fast. Dilute before adding.
LOWER pH	Dry Acid (NaHSO4)	Safer to handle. Slower.

WHY PH DRIFTS — COMMON CAUSES

Cause	pH Direction
Salt chlorine generator running	Rises (electrolysis generates OH-)
CO2 off-gassing (aeration)	Rises
Heavy bather load	Drops (organic acids)
Trichlor tablets dissolving	Drops (very acidic, pH ~3)
Cal-hypo shocking	Rises
Liquid chlorine added	Rises slightly
Rainwater dilution	Variable — test after rain

ACTION STEPS — pH MANAGEMENT

1. Test pH at least twice per week (daily for salt pools)
2. Adjust to 7.4–7.6 before adjusting anything else
3. Always adjust TA before pH if both are off
4. Add acid with pump running — never to skimmer
5. Retest 4–6 hours after any pH adjustment