



## Langelier Saturation Index

The following table is the numerical values for the Langelier Saturation Index used when converting the results of tests to a factor or value.

Temp. (C°)	TF	Calcium (Hardness)	CF	Total Alkalinity	AF
0	0.0	5	0.3	5	0.7
3	0.1	25	1.0	25	1.4
8	0.2	50	1.3	50	1.7
12	0.3	75	1.5	75	1.9
16	0.4	100	1.6	100	2.0
19	0.5	150	1.8	150	2.2
24	0.6	200	1.9	200	2.3
29	0.7	300	2.1	300	2.5
34	0.8	400	2.2	400	2.6
40	0.9	800	2.5	800	2.9
53	1.0	1000	2.6	1000	3.0

$$\text{Saturation Index} = \text{pH} + \text{TF} + \text{CF} + \text{AF} - 12.1$$

The following is the formula for, and the procedure used to interpret the Langelier Saturation Index (SI) to test the water balance of pool water.

### Langelier Saturation Index (SI)

$$\text{SI} = \text{pH} + \text{TF} + \text{CF} + \text{AF} - 12.1$$

where:

TF = Temperature factor

CF = Calcium Hardness factor

AF = Alkalinity Factor

\* The 12.1 is a constant.



**Interpreting the Langelier Saturation Index**

If the SI index is 0, then the water is *balanced*.

If the SI is negative, the water is *corrosive*.

If the SI is positive, (i.e. greater than 0) the water is *scaling*.

The SI is considered satisfactory if the value is within +0.5 or -0.5 of Zero. Zero being perfect!

Avoid negative (-ve) SI values. It is better to be slightly scaling than slightly corrosive.

Example 1: The following test results were obtained for a school pool.

**Is the pool balanced, scaling or corrosive?**

pH	7.4
Temperature	24 degrees C
Calcium Hardness	150 milligrams per litre
Total Alkalinity	75 milligrams per litre

Step 1: Convert the test results to SI factors as shown above.

pH	7.4
Temperature factor (CF)	0.6
Calcium Hardness factor (CF)	1.8
Alkalinity Factor (AF)	1.9

Step 2: Insert the factors into the Langelier SI formula.

$$SI = pH + TF + CF + AF - 12.1$$

which should read  $SI = 7.4 + 0.6 + 1.8 + 1.9 - 12.1$   
 $SI = - 0.4$



Step 3: Interpret the results.

In the example given the SI is negative therefore the water is corrosive. Over a long period of time this water would tend to cause pitting of metal and concrete surfaces.

Step 4: Correct the pool balance.

The factor most obviously low is the pH 7.4. Either Soda Ash or Sodium Bicarbonate could be used to raise the pH. The addition of either of these chemicals will also raise the Alkalinity (see below). At 100 milligrams per litre the pool would be balanced and more comfortable for the swimmers.

pH	7.7
Temperature (TF)	0.6
Calcium Hardness Factor (CF)	1.8
Alkalinity Factor (AF)	2.0

$$\text{Adjusted SI} = 7.7 + 0.6 + 1.8 + 2.0 - 12.1$$

$$\text{SI} = 0$$

### Recommended Water Chemistry Levels –Pool and Spa’s

- pH 7.2 – 7.8
- Total Alkalinity 90- 110 PPM
- Calcium Hardness 150-400 PPM
- Chlorine (Free) 1.0- 3.0 PPM
- Chlorine (Combined) 0 (0.5 maximum!)
- Cyanuric Acid 30 PPM maximum (outdoor pools only)
- Note- dosing recommendations are estimates only and rates will vary depending on ‘your’ Water Balance at time of dosing.
- Please call for further assistance!

**(Ph) 0400 225 749 (Fax) 02 9626 5142 (E-mail) ian@aliaswater.com**

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