POOL WATER TREATMENT
ADVISORY GROUP

TECHNICAL NOTE

52 – Lowering pH: No Problem

20 April 2021

It has long been a basic factor in disinfection: the lower the pH, the more effective is chlorinous disinfection. PWTAG has always emphasised this in its book Swimming Pool Water and in its online code of practice. A recent technical note (TN60) included some of the science behind this. The Covid-19 pandemic has of course emphasised the importance of disinfection – an issue included in other recent PWTAG technical notes. But some pool operators have been concerned that lowering the pH may adversely affect water balance, or even the pool; and what about the bathers? This technical note offers reassurance on these issues.

Balancing the risk

In order to maximise the efficacy of chlorine against SARS-CoV2 during the current pandemic, PWTAG has recommended that pH is reduced to between 7.0 and 7.4. (ideally 7.0-7.2) And a chlorine residual of 1.5-3mg/l (for all chlorine based disinfectants excluding cyanurates) should be maintained throughout the pool.

For many pools, lowering the pH like this means that the water balance, as measured on the most commonly used Langelier index, extends below the normal acceptable figure of -0.5. It would require corresponding adjustments to the calcium hardness or alkalinity to give balanced water in the range of +/–0.5. This has proved difficult for some pools where the incoming mains water has a low hardness and alkalinity content – and a strong acid is being used for pH correction. But such adjustments should not be necessary, as small variations in water balance are not a problem. The Water Research Centre Saturation index table here defines the implications of balanced water ranges.

Saturation index	Description	General recommendation
- 5	Severe corrosion	Treatment recommended
- 4	Severe corrosion	Treatment recommended
- 3	Moderate corrosion	Treatment recommended
- 2	Moderate corrosion	Treatment may be needed
-1	Mild corrosion	Treatment may be needed
-0.5	None to mild corrosion	Probably no treatment
0	Near balanced	No treatment
0.5	Some faint coating	Probably no treatment
1	Mild scale coating	Treatment may be needed
2	Mild to moderate coating	Treatment may be needed
3	Moderate scale forming	Treatment advisable
4	Severe scale forming	Treatment advisable

TECHNICAL NOTE

Even at pH 7.0, with all other values in line with our recommendations (290C, calcium hardness 200mg/l, total alkalinity 150 mg/l – both as CaCO3) this gives a Saturation index of –0.3. According to the table this is between near balanced and none to mildly corrosive to cementitious and metallic components. So no further treatment is required.

What about the pool?
Even a pH of 7.0 will certainly not affect ceramic pool tiling and uPVC pipework. Steel filters and pumps/valves are routinely treated with protective linings and provided these are not disrupted then they will be unaffected. If tiles are epoxy grouted this also should be unaffected as too will be cementitious grout provided it has been adequately dried and cured during installation.

Many countries throughout the world and particularly in Europe use the DIN standards. They set a pH range of 6.5-7.3 and for over 10 years have provided excellent pools.

And bathers?
The skin has an average pH value of 5.5, so there is no problem swimming in waters with a pH of 7.0. The eye's lachrymal secretions have a normal pH range of 6.5-7.6, so a pH of 7.0 would have no deleterious effect on bathers' eyes.

It is much more likely that stinging eyes are caused by combined chlorine levels over 1mg/l, or free chlorine concentrations above 5 mg/l. PWTAG recommends that combined chlorine ideally should be zero and in any event not exceed 1mg/l. There is more on this in Swimming Pool Water and in Technical note 61.