Laying to Rest the Acid Column Myth

by onBalance – Kim Skinner, Que Hales, and Doug Latta

Although it has been nine years since we first debunked the Acid Column Myth in the *Journal of the Swimming Pool and Spa Industry*, we still regularly get asked in our trade show chemistry classes about its validity. As recently as this year's shows we found the need to re-debunk the concept, while another instructor in another class continued to teach it as valid… without any supporting facts. Why has this incorrect and potentially pool-damaging practice so persistently managed to survive? We would like to recount what the myth is, why it is wrong, why following the practice could damage your pools (costing you money), and why the idea still seems to refuse to lay down and die.

First, the myth. As we mentioned in the 1995 research journal article, at that time many pool industry publications promoted this (faulty) method of preferentially lowering pH and/or alkalinity:

– That if acid is added by walking it around a pool and evenly distributing it throughout the water, the pH will be preferentially lowered, with only a minor decrease of alkalinity.

– And that if acid is poured in a concentrated area, variously referred to as a column, slug, well or cloud, the alkalinity will be drastically reduced, but the pH will not drop as much as it otherwise would.

Various attempts have been made to develop a chemical rationale for why this is supposed to work. As can be expected (since the whole idea is a myth...), none of the attempted explanations are valid science, nor are they what actually happens in a swimming pool.

Most of the rationales center around the (mistaken) assumption that lowering pH decreases carbon dioxide (CO_2) solubility – in other words, that lowering the pH enough will make more CO_2 escape into the air. The fact of the matter is that pH is not a solubility factor for CO_2. The actual things that govern CO_2 solubility are temperature, pressure, and agitation (exposure to air).

The easiest way for the non–chemist to remember these factors is to think of a can of carbonated beverage, such as soda pop or beer. The colder the can, the more fizz (CO_2). The higher the pressure, the more fizz... opening the can and leaving it sit loses fizz. And shaking the can decreases fizz, by releasing CO_2 gas from the liquid into the air. If anything, *lowering* the pH of "flat" or "stale" soda by adding dry ice (frozen CO_2) increases the CO_2 content – just ask anyone who has made home-made root beer!

The plain and simple fact of the matter is that a given amount (or "dose") of acid added to a fixed volume of water (the pool) will result in an identical reduction of both pH and alkalinity. Every time. No matter how it is added. That's the rule, that's science, and it can easily be demonstrated at poolside by anyone with a test kit. The only real chemical difference between the two addition methods is the time required for the acid to blend throughout the entire pool.

Now – what really happens when acid is added in a concentrated fashion to a pool? Since acid is noticeably heavier than water, the acid sinks to the bottom, and flows to the lowest part of the pool. If that lowest part happens to include an operating main drain or an operating suction-side cleaner, the concentrated acid dose winds up in the circulation system. Although the movement of the water will eventually dilute and blend the acid into the rest of the pool, the initial contact of concentrated acid can potentially etch the plaster it touches, and attack the circulation system it flows through. Even adding several smaller "slugs" of concentrated acid will result in this puddling of acid on the bottom – try adding dye to your acid and watch it. Its fun – as long as you are not worried about etching the bottom of the pool!

Of course, etching the plaster and eating the components of the circulation system is generally considered a bad thing… yet the proposed treatment process (“slugging” the acid) *recommends* this potentially damaging treatment technique, all for the sake of a theoretical, unfounded attempt at chemistry manipulation. Even if it worked (which it doesn’t), would it be worth the risk?

What is the right way? The best way to manually add acid to a pool is to pre-dilute the acid and to add it by “walking” it around the perimeter of the pool, pouring it evenly, close to the surface, and slowly enough to minimize splashing. When added in this fashion, the acid blends throughout the pool water faster, and the pool is protected from low pH. In fact, in extensive testing of the two methods, pH levels next to the plaster in “slugged” pools were routinely in the 2-2.5 pH range. In pools treated with the acid dilution and distribution method, the lowest pH levels measured next to the plaster were in the 7.1-7.2 range. (Repeat – once the acid addition was blended throughout the water, the end-result pH and total alkalinity reduction was identical, no matter how the acid was added.)

Since we first pointed out the fallacy of the acid column method, all but one of the major sources we cited have revised their publications and removed the myth from their recommendations. The remaining hold-out, unfortunately, is widely read and refuses to change – not based on science, but because they claim that service techs in the field *think* the acid column works!

It is time to get this nonsense laid to rest, and stick to what is scientifically sound and that we all *know* works. There are proven ways to preferentially affect pH and alkalinity, and there are proven treatment strategies for pools that don’t want to follow the pH and alkalinity norms. Let’s stick to them, and quit risking damage to pools in our care.

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Here is a photograph sequence of an acid column in action. The pictures were taken with an underwater camera, and the acid was colored with phenol red powder... the same chemical used to test pH. Unless the circulation system is running, or the unless the resultant puddle of acid on the bottom of the pool is brushed or moved around some way, the puddle will stay visible and intact for hours – with a pH of about 2.5 right on the plaster. Ouch!