

This Technical Information Bulletin was prepared following a consumer complaint that undissolved calcium hypochlorite caused pitting on the surface of a commercial concrete pool shell.

As is well known, calcium hypochlorite (and, for that matter, all chlorine- and bromine-based pool sanitisers) can cause bleaching of vinyl liners and some painted surfaces if left lying undissolved on the floor of a pool. This is why pre-dissolution advice is mandatory on all labels for calcium hypochlorite. Notwithstanding this, undissolved calcium hypochlorite cannot cause pitting in a concrete pool. At worst, it may discolour the painted surface and/or cause calcium carbonate "scale" to form on the surface. Whereas the former may require the surface to be repainted, the latter can usually be removed simply by using a product like BioGuard Scale Inhibitor.

So what causes pitting and etching in concrete or plaster installations? Apart from general "wear and tear" over a long period of operation, the culprits are (i) low pH, (ii) low total alkalinity (TA), (iii) low calcium hardness and (iv) some species of algae.(1) To understand why this is, remember that concrete is essentially a collection of calcium salts, including calcium oxide (CaO) and calcium carbonate (CaCO₃). In the case of low pH and low TA, the water in contact with the concrete becomes extremely acidic, dissolving the calcium salts and etching the surface. In the case of low calcium hardness, the body of water seeks a source of calcium to establish equilibrium. In the absence of added calcium, it dissolves calcium from the concrete, again etching the surface. In the case of algae, some species actually feed on calcium carbonate, roughening concrete surfaces and causing pitting.

Undissolved calcium hypochlorite would, in fact, have acted against pitting on all four counts. Firstly, it has a very high pH (11.8). Secondly, it contributes to raising the total alkalinity, not lowering it. Thirdly, it is obviously a source of calcium, so the water should not need to obtain any additional calcium from the concrete surface. Finally, the high concentration of hypochlorite at the site of the undissolved material would kill any algae it came into contact with. Indeed, it is interesting to note that the National Spa and Pool Institute (NSPI) in the US actually recommends treating black spot algae stains by rubbing the affected area with a slurry of calcium hypochlorite.(2) Clearly, such advice would never have been given if pitting were a problem.

Now whereas calcium hypochlorite and other alkaline sanitisers will not cause pitting in a concrete pool, undissolved acidic sanitisers are another matter entirely. This is particularly the

case with trichloroisocyanuric acid-based products, although BCDMH tablets are also a candidate. These products not only have a low pH, they are also lacking in calcium. It is therefore essential that trichlor or bromine tablets never be dropped directly into the pool. Always use a floater, feeder or, if applicable, the skimmer. Never pour a granular trichlor product like BioGuard Power Chlor into the pool - add it through the skimmer as directed. Finally, always maintain proper water balance, ensuring that pH, TA and calcium hardness do not fall below recommended levels.

References

1. National Spa and Pool Institute, "Basic Pool and Spa Technology", 2nd edition, NSPI, Alexandria VA, 1992, p. 60.
2. National Spa and Pool Institute, Reference 1, p. 48.

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TIB No. BG-077

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Last update: 30 April 2003