Total Pool Ltd are the manufacturers of the patented **Poolcure** system currently used in many large leisure facilities in the UK. ***Poolcure enables pool operators to win the battle to control combined chlorine levels in their pools.*** These compounds are produced when the disinfecting free chlorine reacts with the ammonia-based pollutants that bathers bring into the pool. They are driven into the atmosphere and cause breathing and eye discomfort to bathers and staff.

There are significant indications of a link between the chlorinous pool atmospheres and asthma in children. This acidic content also damages building structures, sometimes with catastrophic results. Various processes, including ozone and UV, have been introduced to destroy them but are only partially effective and are costly to install and maintain. Further, they do not attack the problem at source. Chemical engineers, like those at Total Pool, look primarily at the chemistry of a process, and it was from this angle that the Poolcure system was developed and patented. Poolcure does not reduce the level of combined chlorines, it *stops them ever being formed*.

Benefits

When Poolcure is used there are improvements in air quality and water quality, often at reduced cost. The main benefits are:

- The pool atmosphere is neutral. In a chlorine pool acids are released into the pool atmosphere, this cannot happen in a Poolcure pool.
- No “chlorine cough” or “flume flu”. The neutral atmosphere ensures that pool staff and pool users do not develop the breathing problems that are common in chlorine sanitised pools.
- No atmospheric corrosion due to acid atmosphere. Under a neutral atmosphere corrosion of pool materials is significantly reduced, resulting in lower maintenance costs and improved safety.
- More effective sanitising, especially on busy pools. Poolcure uses a bromine based sanitiser that kills bacteria more quickly and is stable across a wider range of pH.
- Recirculated air is not corrosive. A greater proportion of air can be recirculated and energy saved.
- Less corrosion of filters and grout. Poolcure pools can be run at a higher pH, reducing corrosion of filters and grout.
- Little or no acid is required. This reduces costs and removes the need to stock dangerous acids. Less hypochlorite is used.
- Less hypochlorite is required because chloramines are not formed in a Poolcure pool.
- Reduced TDS (Total Dissolved Solids). TDS is lower in a Poolcure pool as less acid and hypochlorite are needed.
- Less grease at the scum line.
- More stable pool chemistry. High water temperature and water agitation do not affect the stability of Poolcure pools.
- The alkalinity buffer can be maintained even in leisure pools.

Chemistry

Poolcure works in the background with the conventional chlorine donors such as sodium or calcium hypochlorite to create a pool chemistry where the disinfecting chlorine is converted to disinfecting bromine. When free bromine reacts with the ammonia based pollutants only small amounts of non-acidic combined bromines are generated. There are no combined chlorines in the pool water or the pool atmosphere.

Corrosion Prevention

When nitrogen trichloride is given off from the water in a pool it reacts with the atmospheric humidity to form hydrochloric acid. This then condenses onto cold surfaces and attacks them. Handrails in pools are often constructed from high quality stainless steel. This choice is based on its corrosion resistance. Stainless steel wires and fastenings are also used to support flumes and other structures within the pool building. Stainless steel in contact with hydrochloric acid is not stainless. It is damaged in two ways. One is superficial. An unsightly film of rust forms and, where accessible, can be removed with abrasive cleaners. The other is unseen and extremely dangerous. The hydrochloric acid penetrates the crystalline structure of the stainless steel and forms microscopic cracks that can only be detected using sophisticated engineering techniques. The cracks migrate through the metal and weaken it to such an extent that it eventually breaks. There have been many examples of this type of failure – it is strongly suspected as the cause of the recent collapse of a leisure pool roof in Moscow that killed 28 people.

Other swimming pool systems are also affected by the acidic atmosphere. In order to reduce heating costs the air is often partially recirculated and passed through dehumidifers or heat exchangers. The high acid content often corrodes these units leading to premature failure.

As part of the development of the Poolcure system Total Pool Chemicals commissioned the University of Manchester Institute of Science and Technology (UMIST) to carry out analyses of the air in two pools. One pool was using Poolcure with sodium hypochlorite and the other hypochlorite alone. The results were dramatic. The acid content of the air in the non-Poolcure pool was 250 times higher than that in the Poolcure pool.

Bromine

Bromine, chlorine and iodine are halogens with disinfecting qualities that have been utilised by mankind for many years. Chlorine is the most common, but bromine has characteristics that, in the swimming pool environment, bring considerable advantages. All disinfecting halogens react chemically with ammonia-based pollutants to produce halo-amines. Mono-chloramine, di-chloramine and nitrogen trichloride are formed by chlorine. These have minimal disinfecting action. The nitrogen trichloride is given off into the atmosphere and is responsible for the irritant ‘chlorine smell’ that bathers dislike so much. Bromine, on the other hand, forms only mono-bromamine. This has a powerful disinfecting action and is not given off into the air. Consequently, the atmosphere in a bromine-disinfected pool has no chlorine smell and no irritant effect on bathers.

Bromine disinfection has a further advantage. The efficiency of chlorine falls rapidly as the pH (a measure of the acid or alkaline content of the water) rises. In swimming pools there is a natural tendency for the pH to increase – especially in areas where the mains water is hard. Consequently, acids have to be added to the pool to keep the pH at a level where the chlorine remains effective.

The generally accepted pH value is 7.5 – at which the disinfecting chlorine efficiency is 50%. At pH 7.5 bromine disinfectants are over 90% efficient and at pH 8.0 are 85% efficient so the need for acid addition to reduce pH is much reduced. This introduces chemical stability (page 6) to the pool water and accurate automatic chemical dosing is much more easily achieved. Poolcure enables pool operators to gain all the benefits of bromine disinfection without capital expenditure and often with a net chemical cost saving.

UMIST also inspected both buildings for evidence of atmospheric metallic corrosion. They found severe damage in the non-Poolcure pool, even though it had only been in operation for 4 months. On the other hand, the Poolcure pool had minimal levels of atmospheric metallic corrosion.

Health and Safety

The imperative objective of pool disinfection is to ensure that infections are not transmitted from one bather to another through the medium of the pool water. Chlorine and bromine are the most common and effective disinfectants. However, they combine with the ammonia based pollutants that bathers bring into the water to form disinfection byproducts (DBPs). Much work has been done to chemically identify DBP and measure their affect on bathers. Nitrogen trichloride is the most well known DBP in chlorine disinfection and is found in high concentrations in pool atmospheres. Bromine disinfection forms fewer DBPs in much lower concentrations.

Two recent studies, one in Birmingham and a much larger one in Belgium, have examined the possible link between nitrogen trichloride and asthma. It was originally thought that only temporary ‘asthmatic type’ symptoms were induced. However, the Belgian study seems to have identified a link between exposure to nitrogen trichloride and the permanent onset of asthma in some children.

Bromine based disinfection using Poolcure removes the risk of exposure to nitrogen trichloride.

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