

Typical spa and pool chemicals used for bleaching and sanitizing were tested in spa conditions. It was found that TriChlor can cause bleaching and blistering in acrylic and is not recommended for spa usage.

Chemicals Tested:

- Bromine tablets
- Bromine granules
- TriChlor tablets
 - Low concentrations
 - Medium-high concentration
 - High concentrations
 - Floating dispenser
- DiChlor granules - Normal to high concentrations
- Calcium Hypochlorite (pool shock) - high concentration
- Sanitizer/Oxidizing shock (Chlorine free)

Results:

TriChlor tablets dissolves very fast in comparison to Bromine tablets and decreases the ph. TriChlor is often used in pools in floating dispensers. They should not be used in spas. TriChlor is very corrosive and can also affect the pumps and spa jets. TriChlor can affect the acrylic surface above and below the water surface. Please note: Use of TriChlor in spas is not recommended by many in the industry. In many instances, use of TriChlor by spa customers will void the warranty.

DiChlor at high concentrations can cause bleaching if allowed to settle to the bottom and remain with no stirring. DiChlor dissolves quickly even at high concentrations. Stir it in and DiChlor won't cause bleaching of the acrylic. However, more is not better. Putting in more than the recommended DiChlor will cause the vapor above the water surface to have a heavy chlorine smell. It does not lead to a good spa experience. Although there was no evidence from this study, using more than what the manufacturer recommends could lead to acrylic bleaching above the water surface.

Bromine Tablets or granules did not cause any bleaching or blistering.

Potassium peroxymonosulfate (Sanitizer/Oxidizing Shock) does not cause bleaching even at high concentrations.

Calcium Hypochlorite (pool shock) - high concentration – causes cloudy water and a calcium ring. No bleaching was evident.

Spa chemicals should be added according to the manufacturer's recommendation.

Detail of Testing

Over 50 mini spas with different Lucite acrylic sheets were tested with various spa/pool chemicals and concentrations. The chemical details are given below and the photos show results.

Chemical Detail:

Bromine tablets

1-Bromo-3-Chloro-5,5-Dimethylhydantoin
and related Hydantoin

Bromine granules

1-Bromo-3-chloro-5, 5-Dimethylhydantoin 54.2%,
1,3-DiChloro-5,5-Dimethylhydantoin 28.9%,
1,3-DiChloro-5-ethyl-5-methylhydantoin 15.9%

TriChlor tablets

TriChloro-s-triazinetrione - 99%
Other ingredients - 1%

DiChlor

Sodium DiChloro-s-triazinetrione dihydrate 99%
Other ingredients - 1%

Sanitizer/Oxidizing shock

Potassium peroxymonosulfate 38%
Other ingredients 62%

Dissolve rate:

Granules

Very Fast: Sanitizer/Oxidizing shock, DiChlor

Fast: Bromine granules

Tablets

Fast: TriChlor -- 6 tablets, 80% dissolved after 1 week in half gallon of water at 103°F

Medium Fast: TriChlor in floating dispenser set at 2 ½ -- 6 tablets, 54% dissolved after 1 week in half gallon of water at 103°F

Slow: Bromine tablets (6 tablets, 13% dissolved after 1 week in half gallon of water at 103°F)

pH of TriChlor, 1 tablet after 1 week in ½ gallon of water, 1.3. 3 tablets after 1 week in ½ gallon of water pH 1.0



Early testing took place in a water bath at elevated temperatures. This was later changed to testing in a spa. A clear acrylic lid was placed on the mini spa. We used rusty water to heat the exterior of the mini spa.



Rim of mini spa which was tested in a rust rich water bath. Red blister was on the rim only which was covered with a clear acrylic sheet. Blisters below the water line were rust free. Similar red blisters were tested using SEM with EDX and found to contain iron oxide. This iron oxide (rust) came from the rust rich water bath.



Mini spa testing utilizing a large spa as a water bath to maintain typical spa water temperatures
Spa temperature was set at 103F



Initial testing with TriChlor with tablets loose on the bottom



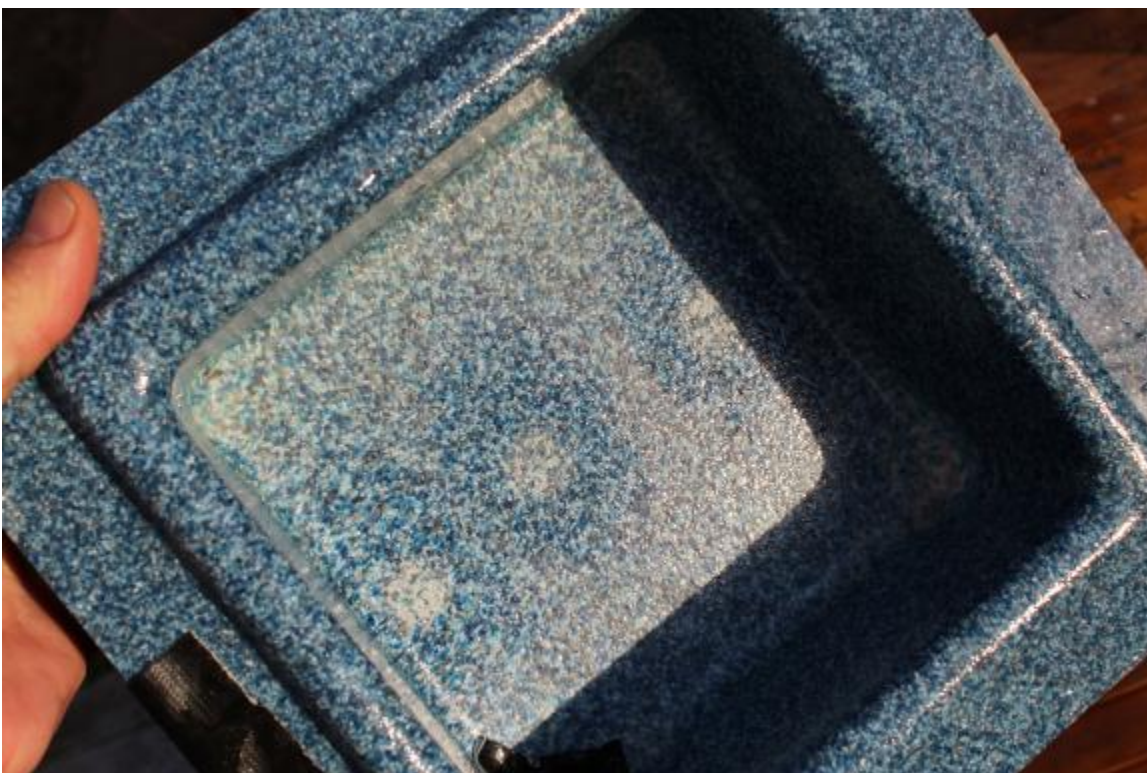
Initial testing TriChlor was placed directly on the mini spa surface. Later tests the TriChlor tablet was elevated and kept in place using epoxy. Bleaching and blistering still occurred. Blisters were scrapped and top part came off. These defects were at the surface only.



TriChlor bleaching and blistering took place in this mini spa.



Granites only exhibited bleaching and no blistering



Bleaching in a blue granite



After many years of never seeing any signs of rust, I got a lot of rust on these two jets that were just outside the surface of the water. I attribute this to the TriChlor testing performed inside the spa.



Typical 3" and 1" floating dispensers – do not use with Trichlor in a spa.