

Cyanuric Acid Removal - Melamine

onBalance – Que Hales, Doug Latta and Kim Skinner

The major loss of chlorine in outdoor swimming pools is due to the breakdown by ultraviolet sunlight, with subsequent off-gassing. Cyanuric acid is used in these pools because of its ability to shield chlorine from this photolysis. This benefit may be offset by a slight but measurable decrease in the rate of algacidal and antimicrobial activity, and a downward shift in the calcium carbonate saturation index. Historically excess (>100ppm) cyanuric acid concentrations have been addressed by dilution (draining part or all of the water from the pool and replacing it with fresh water). There is now a need for more conservation-conscious alternatives that do not involve the water loss associated with draining. This series of papers presents our evaluation of some of these methods.

This method is based on the same chemistry as is used in the cyanuric acid test. Melamine complexes on a 1:1 reaction ratio with cyanuric acid to form a filterable suspended solid in increasing proportion to the amount of cyanuric species and melamine present.

1. Determine cyanuric acid concentration.
2. Apply the following dosage formula: $(\text{Volume}_{\text{gal}} / 120,000) \times \text{ppm to remove} = \text{melamine}_{\text{lbs}}$ to add
3. Add the melamine dose to the pool water.
4. Allow for full blending and for the reaction to go to completion. In a circulating pool this typically will be about 15 – 20 minutes.
5. Run the circulation continuously, to allow for filtration and to maintain the solid in a suspended state. Brush settled material as needed.
6. Remove the resultant suspended solid (white powder/turbidity) using a cartridge or a DE filter. In our testing, the pool will typically be clear after 4 – 6 turnovers.
7. Re-test the cyanuric acid in the pool to verify the target concentration has been reached.

Points of interest:

- When onBalance evaluated this method in our lab and in the onBalance demo pools, we were able to achieve over 90% reductions in CyA.
- In most cases the target reduction should be to achieve the “ideal range” of 20-30 ppm CyA concentration in the pool.
- Overdosing the melamine will result in an excess residual of melamine in the pool water. As a result, any further additions of cyanuric acid (either as raw CyA or as a result of tri- or dichlor addition) will result in the production of additional clouding with filterable suspended solid (melamine cyanurate) until all of the melamine has been complexed and removed via filtration.
- The melamine cyanurate complex is readily filterable using a cartridge or a DE filter. The complex is easily removed from the filter element.

Strengths: Speed (ca. ½ hour for complexing and inside 24 hours for filtration depending on turnover rate), simplicity, ease

Weaknesses: Cost and availability of melamine



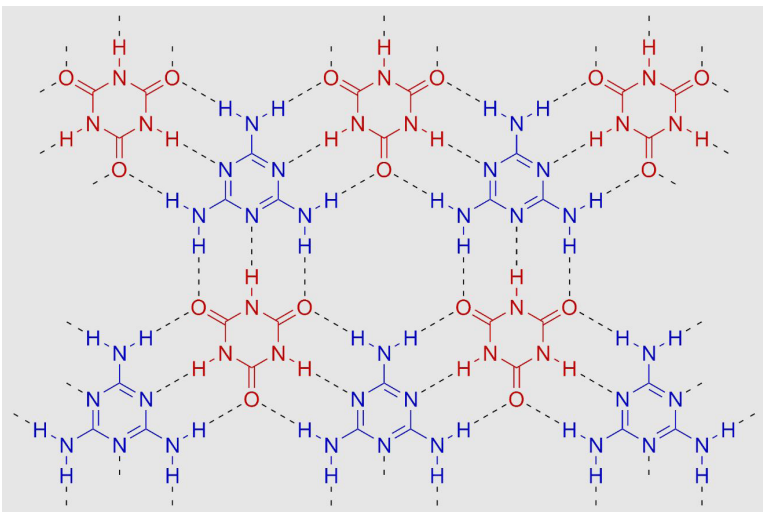
onBalance Demo Pools - Cyanuric Acid Complexed With Melamine



Before and After Filter Elements

Before on left
After on right

DE on left
Cartridge on right



Sample Structure of Cyanuric Acid Complexed With Melamine

(credit: Wikipedia)

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