

# how the presence of phosphates affect chlorine demand



Chlorine demand is the consistent inability to establish or maintain a free chlorine residual in a swimming pool or spa due to elements that deplete chlorine.

In a properly maintained pool or spa (one that has a free chlorine residual ranging from 1 to 3 ppm), the presence of phosphates do nothing to add to or eliminate this problem.

Some experts have suggested that removing phosphate will decrease chlorine demand. However, for this to be true, it would also suggest that the addition of phosphate will increase chlorine demand. Scientific evaluation demonstrates that phosphates and chlorine do not react to each other or that any depletion of chlorine occurs.

## Why Phosphates Do Not Affect Chlorine Demand

The key to the relation between chlorine (hypochlorous acid) and phosphates is that larger phosphorous-containing materials have been broken down into orthophosphates in the water. Orthophosphate is the final stage of phosphorous breakdown, meaning it cannot oxidize any further. If it cannot oxidize, it cannot react with an oxidizing compound such as chlorine and cause a demand situation.

Compounds other than phosphates that also don't react with chlorine include nitrates, balancing chemicals or any other material that is essentially inert (unreactive).

## What Does Cause Chlorine Demand?

Inorganic material, such as ammonia, are fast-reacting with chlorine while organic material, such as the proteins found in urine, sweat, other waste and beauty products, are slow-reacting but all contribute to a demand situation. Algae and bacteria are also known contributors. These contaminants are introduced from rain and source water, fertilizers, swimmers, animals or plants and leaves.

## where do phosphates come from?



Phosphates are derived from phosphorous, the 11th most abundant mineral in the earth's crust. It makes its way into pool and spa water from a variety of sources, including fertilizers, industrial discharge, swimmer waste (sweat and urine), detergents and even tap water (which contains compounds used to treat corrosion).

Phosphates attach themselves to larger molecules such as proteins or eventually break down into orthophosphates. Orthophosphates are the only form that will show up on water test kits and the only form that will be affected by current phosphate remover products.

# how the presence of phosphates affect algae growth

Algae growth is a common problem and some experts have suggested an effective solution is to remove phosphates from the water. The belief is that this action takes away a food source, reducing algae problems or even killing it (by starvation). It is important to note that phosphate-removing products are NOT EPA approved or registered as algae killers (algaecides) or algae inhibitors (algaestats).

## Phosphates and Algae

Phosphorous is the base element phosphates derive from and is a significant nutrient source for all living things, including algae (it also requires carbon, oxygen, hydrogen and nitrogen). There are more than 7,000 species of green algae alone and the phosphorous requirement varies widely between each of them.

Algae even have the capability to store phosphorous within their cells and can still thrive in phosphorous deficient environments. This is called "*luxury phosphorus uptake*" and demonstrates that removing phosphates from the water will not remove the algae's ability to continue feeding itself.

Algae feed on phosphorous from sources other than orthophosphates (the only form removed with current products) and those products have little to no residual, making it is difficult to provide a lasting effect due to the constant influx of phosphates from various sources

## Regular Maintenance and Algae Growth

There are typically four treatments used to inhibit or kill algae; chlorine (hypochlorous acid), quaternary ammonium compounds, polyquats and copper. Chlorine will disrupt the metabolic activity within algae cells and growth will not continue, even in nutrient rich surroundings. Often, algaecides are only used as a corrective treatment, but an initial dose added at the start of each season or whenever significant amounts of water are added will prevent algae growth during the course of a season. The addition of an algaecide can also contribute to improved water quality.

A properly maintained pool or spa utilizing a regular 3-step process of treating with chlorine (measuring a free chlorine residual ranging from 1 to 3 ppm), balancing chemicals and algaecides will remain relatively algae-free and reduce the need for additional products.

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