



# LIME & WATER

## THE HISTORY BEHIND LIME

Lime is a material that is derived from limestone; it consists mainly of calcium carbonate, and it has been used since prehistoric times, where it served as building mortar because it was sticky.

People have been mining limestone from quarries and underground mines for (literally) thousands of years. Archeological discoveries in Turkey indicate lime was used as a mortar as far back as 7,000 years ago and ancient Egyptian civilization used lime to make plaster and mortar, as well.

To make lime, the raw materials are cut, crushed, or pulverized; they are then

burned. The results are used to create quicklime (calcium oxide) or hydrated lime (calcium hydroxide).

## MODERN USES

Current use of lime couldn't be more modern. Lime is used heavily today by a number of different businesses, in part because it works and in part because it is cost-effective. You can find practical applications for lime by all of the following:

- Municipalities
- Industries
- Utilities
- Mines

However, one of the most important uses of lime is in regards to water – something we all use day in and day out and is by far the most important substance on Earth.

Because water covers over 70 percent of the planet, it is sometimes hard to make the connection that water is not as abundant as it initially appears.

All water is local—it's a scarce resource and can't be shipped in by truck or train. It has been said that water is the number one challenge to modern global growth. The use of lime in water treatment and purification and wastewater treatment is for the most part unknown by the general public.

## TREATING THE WATER

### YOU DRINK

The truth is, for many of us, when we are thirsty; we go to the tap in our kitchen, never thinking about where the water we drink came from and what happened to it along the way.

Lime softens drinking water by removing carbonate hardness. Calcium and magnesium salts also contribute to water hardness, but they can be

removed by using a lime-soda process that causes the lime to precipitate the magnesium.

## TREATING THE WATER

### YOU USE

Equally important to treating the water we drink is treating the water we use, or wastewater, which has contaminants such as human waste, food scraps, oils and chemicals. Wastewater comes from sinks, showers, toilets, washing machines and yes, even rain.

Most people are under the impression that water that falls from the sky is fairly clean, but storm runoff contains harmful substances that are washed off of our roads and roofs, much of which makes its way to our rivers and lakes. That's where lime comes in. Lime is used to remove solids and other contaminants from water. The primary objective of wastewater management is to produce environmentally-friendly fluid waste that is suitable for disposal—it won't cause harm to the environment and prevents pollution.

Wastewater management is important to all of us because it affects not only our environment, but our health as well—because we live, work and play so close to it. If water is not properly cleaned, it can carry disease or other contaminants that are harmful to our health. Wastewater management also affects what we eat and how we spend our recreational time. Most people don't equate the fish they eat for dinner or their refreshing summer boating trips with wastewater management—but clean water is critical for animals and plants that live in water, as well as for people who enjoy water sports. Lime is also used to treat the animal waste and sewage sludge that are produced when animals are fed.

If you are a gardener, you know all about adding phosphorus and nitrogen to the plants in your yard. It makes them grow lush and green. When there is too much phosphorus and nitrogen in the water as a result of human activity,

however, there is a fancy name for it, cultural eutrophication, and very real ecological damage to go along with it. Excess nitrogen and phosphorus cause surface waters to grow too much algae. This is a problem that has only developed during the last 50 to 100 years, but it is affecting every continent. According to a study entitled "A Survey of the State of the World's Lakes," the percentage of affected lakes is significant:

- North America, 48%
- South America, 41%
- Europe, 53%
- Asia, 54%
- Africa, 28%

Lime takes out the phosphorus and nitrogen, and makes it easier to clean the wastewater.

A particularly useful application of lime is its use to prevent the growth of bacteria and harmful viruses in water by controlling the pH of water for one to three days. Lime is also often used to treat the phenolic water that is created from the use of chlorine. The treatment, which is called excess alkalinity treatment, makes the water less acidic. It also removes most of the heavy metals from the water.

Lime and alum or iron salts combine to coagulate suspended solids in what is called turbid water; basically, turbid water has so many contaminants that it has thickened and become opaque. Cleaning turbid water works best when the pH level is correct for coagulation, and lime helps with that as well. Sometimes lime is used to help alum sludge thicken on pressure filters so it can be removed.

## LIME AND WATER

Sometimes the old tools are the best tools. When it comes to protecting something as important as what we drink and the water in the environment around us, by removing toxic substances, few tools are more useful than lime. ✨

# WATER IS LIFE

From the environment to our health, there are many reasons why treating our wastewater with lime remains high priority.

## FISHING INDUSTRY

Fisheries and sport fishing enthusiasts rely heavily on clean water, which is absolutely critical to plants and animals that live in water.

## WILDLIFE HABITATS

Migratory water birds that rest and feed in water areas and other aquatic creatures depend on wastewater management to keep our rivers, oceans, shorelines, beaches and marshes clean.

## RECREATION

Boating, fishing and swimming all require clean water. One of the reasons people choose to live where they do can rely heavily on available water sports and scenic views.

## HEALTH CONCERNS

Because people live and work so close to water, if it is not properly cleaned, it can carry disease or other contaminants that are harmful to our health.

# LIME & WATER

## COMPREHENSION QUESTIONS

1. What was lime used for during prehistoric times?
2. How much of the earth is covered by water?
3. Why can water be considered a scarce resource even though there is so much of it? [All water is local.]
4. How is lime used during water purification?
5. How is lime used to purify wastewater?
6. What does too much phosphorus and nitrogen in water cause?
7. Why is too much phosphorus and nitrogen a problem?
8. How does lime clean turbid water?