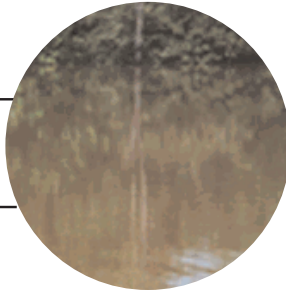


# When pH changes

## What happens?

### RESEARCH ARTICLE



*Water quality is critical to our health and that of any ecosystem. Poor water quality can cause severe health problems to humans and to all life that depends on an aquatic site. But, what is pH and why is it so important to water quality?*

#### What is pH?

pH is a measurement of how acidic or basic a solution is. It is measured on a scale of 0 (highly acidic) to 14 (highly basic). When a solution is not acidic or basic it is neutral and has a pH of 7. pH less than 7 indicates an acid. Lemon juice tastes sour and is acidic. It has a pH of about 2. pH greater than 7 indicates a base. Detergents are slimy and they are basic. They have a pH between 8 and 9.

One pH unit change represents a ten-fold change. For example if the pH of a water sample changes from pH 7 to pH 6, it will become 10 times more acidic.



#### Vocabulary

**Acid** A substance that produces positively charged hydrogen ions ( $H^+$ ) when dissolved in water and reacts with bases to form salts.

**Acidosis** Condition characterized by abnormally high levels of acidity, which may affect aquatic life. Acidosis can also affect humans with abnormally high levels of acidity in their blood.

**Alkalosis** Condition characterized by abnormally low levels of acidity, which may affect aquatic life. Alkalosis can also affect humans with abnormally low levels of acidity in their blood.

**Base** A substance that produces negatively charged hydroxide ions ( $OH^-$ ) when dissolved in water and reacts with acids to form salts.

**Ecosystem** A group of organisms together with its environment, seen as a unit.

**Habitat** The environment where a particular plant or animal is normally found.

**pH** A measure of acidity.

**Salinity** The amount of dissolved salt in water.

**Watershed** An area of land that delivers runoff water, sediment, and dissolved substances to surface water bodies, such as rivers or lakes. All watersheds consist of boundaries, a basin and collection areas.



# When pH changes

## What happens?

### Why is the pH of an aquatic site important?

The level of acidity (pH) influences life in an aquatic site. The pH of the wet area around roots affects how plants take up nutrients. Aquatic organisms have adapted to life in water with a specific pH. If the pH changes, the organisms may die.

If the pH is too low, fish can get really sick. They may get a disease called acidosis (too much acidity in the water). When they have this disease they eat very little. Then they produce excess slime and rest on the bottom. If the condition worsens, their fins bleed. They may even die, but they can get better once the pH is brought up to a normal range. If the pH is too high, fish will gasp at the surface. This is a condition called alkalosis (water is too basic). Alkalosis is difficult to reverse and can kill fish.

Water with pH values between 4 and 10 has a minimal effect on human health. Water with pH values outside of this range may cause eye and skin irritation.

### How does the pH of an aquatic site change?

The pH is influenced by many factors like water temperature, water salinity, amount of light, amount of algae or plants in the water, and more. Human activities can also affect the pH of an aquatic site. Air pollution, mainly from automobile exhaust and fossil fuel burning, increase sulfur and nitrogen oxides in the air. When it rains, these oxides turn into "acid rain" and increase the acidity of water. Runoff that contains industrial, agricultural, and domestic waste sends chemicals in the aquatic site that change pH levels.

| pH Ranges that Support Life |         |
|-----------------------------|---------|
| Aquatic Organisms           | pH      |
| Bacteria                    | 2-13    |
| Plants                      | 6-13    |
| Carp                        | 6-9     |
| Some Insects                | 6-9     |
| Bass                        | 6.5-9   |
| Snails                      | 7-9     |
| Trout                       | 6.5-7.5 |
| Fly Larva                   | 6.5-7.5 |

